DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[FWS–R8–ES–2008–0002; 1111 FY07 MO;ABC Code: B2]

Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To List the Siskiyou Mountains Salamander (Plethodon stormi) and Scott Bar Salamander (Plethodon asupak) as Threatened or Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding on a petition to list the Siskiyou Mountains salamander (*Plethodon stormi*) and Scott Bar salamander (*Plethodon asupak*) as threatened or endangered, under the Endangered Species Act of 1973, as amended (Act). After a thorough review of all available scientific and commercial information, we find that listing the Siskiyou Mountains salamander and Scott Bar salamander is not warranted. We ask the public to continue to submit to us any new information concerning the status of, and threats to, these species. This information will help us to monitor and encourage the ongoing management of these species.

DATES: We made the finding announced in this document on January 24, 2008.

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov* and *http://www.fws.gov/yreka/*. Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Yreka Fish and Wildlife Office, 1829 S. Oregon Street, Yreka, CA 96097; telephone 530–842–5763; facsimile 530–842–4517. Please submit any new information, materials, comments, or questions concerning this finding to the above address or via electronic mail (e-mail) at *Siskiyou_salamander@fws.gov*.

FOR FURTHER INFORMATION CONTACT: Phil Detrich, Field Supervisor, U.S. Fish and Wildlife Service, Yreka Fish and Wildlife Office (see **ADDRESSES** section). If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Act (16 U.S.C. 1531 et seq.) requires that, for any petition to revise the Lists of Endangered and Threatened Wildlife and Plants that contains substantial scientific and commercial information that listing may be warranted, we make a finding within 12 months of the date of our receipt of the petition on whether the petitioned action is: (a) Not warranted, (b) warranted, or (c) warranted, but the immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether any species is threatened or endangered. Such 12-month findings are to be published promptly in the **Federal Register**. Section 4(b)(3)(C) of the Act requires that we treat a petition for which the requested action is found to be warranted but precluded as though resubmitted on the date of such finding, and we must make a subsequent finding within 12 months.

Previous Federal Actions

On June 18, 2004, we received a petition dated June 16, 2004, from the Center for Biological Diversity, Klamath-Siskiyou Wildlands Center, and Noah Greenwald, to list the Siskiyou Mountains salamander (*Plethodon stormi*) as a threatened or endangered species on behalf of themselves and five other organizations. The petition clearly identified itself as such and included the requisite identification information for the petitioners, as required in 50 CFR 424.14(a). In their petition, the petitioners assert that there are three separate distinct population segments (DPSs) of the Siskiyou Mountains salamander, one of which consists of the Scott Bar salamander. Alternatively, the petitioners assert that the Scott Bar salamander is a separate species and request that it be considered independently for listing. Since the time the petition was submitted, the Scott Bar salamander (*Plethodon asupak*) has been recognized as a species separate from the Siskiyou Mountains salamander (Mead et al. 2005, pp. 169–171), and we have reviewed it separately in making this finding. The petitioners also requested the Service to consider whether the Siskiyou Mountains salamander (and therefore the Scott Bar salamander, as well) warrants listing throughout a significant portion of its range, and requested designation of critical habitat for both species concurrent with their listing. In a July 19, 2004, letter to the petitioners, we responded that we reviewed the petition for both species and determined that an emergency listing was not warranted, and that because of inadequate funds for listing and critical habitat designation, we would not be able to otherwise address the petition to list the Siskiyou Mountains salamander and Scott Bar salamander at that time.

On June 23, 2005, we received a 60-day notice of intent to sue and on August 23, 2005, the Center for Biological Diversity and four other groups filed a Complaint for Declaratory and Injunctive Relief in Federal District Court for the District of Oregon (*Center for Biological Diversity et al.* v. *Norton et al.*, No. 3:05–CV–1311–BR), challenging our failure to issue a 90-day finding on the petition to list the Siskiyou Mountains salamander and Scott Bar salamander. On December 28, 2005, we reached an agreement with the plaintiffs to complete the 90-day finding by April 15, 2006, and if we determined that the petition presented substantial information that listing may be warranted, to complete the 12-month finding by January 15, 2007.

On April 17, 2006, the Service made its 90-day finding (71 FR 23886, April 25, 2006), concluding that the petition did not present substantial scientific or commercial information to indicate that listing the Siskiyou Mountains salamander and Scott Bar salamander may be warranted.

On July 6, 2006, the Center for Biological Diversity and others filed suit in the United States District Court for the Northern District of California (*Center for Biological Diversity et al.* v. *Dirk Kempthorne et al.*, No. C–06–4186–WHA), challenging the merits of that finding. On January 19, 2007, the District Court determined the 90-day finding was arbitrary and capricious, vacated and remanded the finding, and ordered the Service to make a new finding by March 23, 2007.

A new 90-day finding was signed on March 22, 2007, and we published it in the **Federal Register** on March 29, 2007 (72 FR 14750). In that 90-day finding, we concluded that the petition presented substantial scientific or commercial information to indicate that listing the Siskiyou Mountains salamander and Scott Bar salamander may be warranted, announced the initiation of a status review of these taxa, and solicited comments and information to be provided in connection with the status review by May 29, 2007. This notice constitutes our 12-month finding regarding the petition to list these two species.

To ensure that this finding is based on the latest information and incorporates the opinions of the scientific community, the Service entered into a

Cooperative Agreement with the U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, in Corvallis, Oregon, to provide a technical report addressing taxonomy, biology, habitat associations, detectability, and effects of habitat alteration on the salamanders. The technical report was authored by Douglas DeGross and R. Bruce Bury, and reviewed by species experts in the U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center; U.S. Forest Service (USFS) Pacific Northwest Research Station and Pacific Southwest Research Station; and Rogue River-Siskiyou National Forest. The technical report (DeGross and Bury 2007), information provided by the public, and additional information and data in our files provided the basis for this status review for the Siskiyou Mountains salamander and Scott Bar salamander. In addition, Service staff involved in the development of this finding have several years of combined experience surveying for and researching the distribution and habitat associations of Siskiyou Mountains salamander.

Foreseeable Future

The principal difference between an ''endangered'' and a ''threatened'' species under the Act is whether the species is currently in danger of extinction, or if it is likely to become so ''within the foreseeable future.'' The Act does not define the term foreseeable future; however, we consider the foreseeable future to be affected by the biological and demographic characteristics of the species, as well as our ability to predict or extrapolate the effects of threats facing the species in the future. Quantification of the time period corresponding to the forseeable future is challenging because it necessitates making predictions about inherently dynamic political, legal, and social mechanisms that influence the degree and immediacy of potential threats to the species.

Population dynamics of the Siskiyou Mountains salamander and Scott Bar salamander are poorly known, and we are unaware of data sufficient to support estimates of longevity, generation times, or recruitment rates for these species. For example, *Nussbaum et al.* (1983, p. 103) state that both sexes ''are thought to'' mature at 5 to 6 years of age, but provide no basis for this estimate. Likewise, estimates of population and genetically effective population (N_e) size are unavailable for these species (DeGross and Bury 2007, p. 9). Because the demographic and biological characteristics of these species are so poorly understood, we must base our estimate of foreseeable future on our ability to predict or extrapolate the effects of the future threats facing these species.

Our ability to predict the effects of future threats is limited to our knowledge of the time frame of the threats potentially facing the species (e.g., timber harvest, wildfire, roads and road construction, mining and rock quarrying, disease, stochastic events, and climate change) and of any conservation activities taking place to address these threats. For example, the rate of timber harvest has declined on Federal lands (which constitute over 85 percent of the combined ranges of both species) during the last 30 years (USDA and USDI 1994, 2005) and we have no information that would lead us to predict a dramatic increase in the rate and intensity of timber harvest such that large areas of habitat will be affected to such a great degree that these species will suffer adverse impacts. In the event that the rate and intensity of timber harvesting were to increase dramatically, it would take some period of time (depending on the actual increase of the rate and intensity, and the impact of the harvesting at issue on the salamanders) for the cumulative impact of the timber harvesting to have a significant effect on the species. Because the available evidence suggests that the salamanders recover for even intensive disturbances such as clearcutting (from 11 years (Bull et al. 2006, p. 21) to 30 years (Welsh et al. 2007b) for Siskiyou Mountains salamanders), the species would only become in danger of extinction if that increased level and intensity of harvest lasted long enough to effect sufficient habitat at nearly the same time such that it overcame the apparent resiliency of the species to such disturbances. Further, while scientists predict that the rate of temperature change will continue to increase throughout the present century (EPRI 2003, p. 3; Hayhoe et al. 2004, p. 12423; Cayan et al. 2006, pp. 11–14, 31; Maurer 2007, p. 317), the effects of climate change on these species are uncertain and estimation of the timing of potential effects would be speculative.

We do not have sufficient demographic information on Siskiyou Mountains salamanders or Scott Bar salamanders, nor on the trajectory of potential threats when combined with existing regulatory mechanisms, on which to base a precise definition of foreseeable future. Given the stability of Federal Land and Resource Management Plans and the Northwest Forest Plan (NWFP) since its establishment in 1994, we assume that significant changes to current land management practices on Federal lands are not likely to occur within 20 years. We note that the changes in Federal land management that we can anticipate may happen in the short term, including termination of the Survey and Manage Program and Western Oregon Plan Revision, discussed below, are unlikely to result in the sort of significant changes that might have an important effect on the conservation status of the species. If a significant change were to occur, we estimate that, because of logistical and regulatory limitations imposed on the rate of planning and implementing significant land management actions, actual management activities could take an additional 20 years to reach a magnitude of effect that would measurably affect salamander populations. Therefore, we conclude that the foreseeable future for the salamanders does not extend beyond 40 years. In other words, we have sufficient confidence in our estimates of the threats and reaction of the two species to those threats to draw a conclusion as to the likelihood of endangerment over only at most 40 years. Beyond that period, our level of confidence is such that any conclusions we drew would be too speculative on which to base current action. We find that this estimate of the foreseeable future is both reasonable and appropriate because it focuses this status review on the time frame in which current social and political change may affect species management, which we consider to have the most likely potential for meaningful near-term influence on the status of these species.

Species Descriptions

Like others in the Family Plethodontidae (the lungless salamanders), the Siskiyou Mountains salamander and Scott Bar salamander are completely terrestrial, medium-sized, slender-bodied salamanders with short limbs and a dorsal stripe. Both species are found in or near talus (loose surface rock) and fissured rock outcrops where moisture and humidity are high enough to allow respiration through their skin (Feder 1983, p. 296; Nussbaum et al. 1983, pp. 73, 90, and 102; Stebbins 2003, p. 168). Both species are endemic to the Klamath-Siskiyou Mountains of southern Oregon and northern California, where they are considered as part of a species complex that includes and is named for the similar Del Norte salamander (*Plethodon elongatus*).

Members of the *Plethodon elongatus* Complex differ physically from other regional members of the genus

Plethodon. Species in the *Plethodon elongatus* Complex have webbed toes, while Dunn's salamander (*P. dunni*) and western red-backed salamander (*P. vehiculum*) do not (Highton 1962, pp. 255–256). The larger number of trunk vertebrae and costal grooves (vertical creases along the side of the body), as well as the smaller number of vomerine teeth (teeth on the vomer bone in the roof of the mouth) further distinguish the *Plethodon elongatus* Complex from the rest of the western *Plethodon* species (Highton and Brame 1965, p. 1; Brodie 1970, pp. 503–505; Nussbaum et al. 1983, p. 102; Mead et al. 2005, pp. 163–166).

The Siskiyou Mountains salamander was described in 1965, two years after it was first identified (Highton and Brame 1965, p. 1). It is characterized by a modal number of 17 costal grooves and 4 to 5.5 intercostal folds (folds of skin between the costal grooves) between the toes of adpressed limbs (limbs firmly pressed against the sides of the body) (Nussbaum et al. 1983, p. 102; Leonard et al. 1993, p. 78). Adults have a light- to purplish-brown dorsum, and the body is sprinkled with a moderate to dense array of white to yellow flecks, concentrated on the sides and limbs and away from the light-brown dorsal stripe (Highton and Brame 1965, p. 1; Nussbaum et al. 1983, p. 102). Juveniles are black and have an olive-tan dorsal stripe that extends onto the tail.

The Scott Bar salamander is more robust and has a wider head and longer limbs than the Del Norte salamander and Siskiyou Mountains salamander. It has fewer intercostal folds between adpressed limbs (2.5 to 3.5) than either the Del Norte salamander (5 to 6) or Siskiyou Mountains salamander (4 to 5.5), and the modal number of costal grooves (17) is one less than in the Del Norte salamander (18). The Scott Bar salamander has a longer body relative to its tail length and longer forelimbs and hindlimbs than the Siskiyou Mountains salamander or Del Norte salamander. The coloration of the Scott Bar salamander is similar to that of the Siskiyou Mountains salamander and is described in Mead et al. (2005, p. 170). Despite the morphological differences described in Mead et al. (2005, pp. 169–171), the two species are difficult to distinguish in the field.

Taxonomy

The Siskiyou Mountains salamander was first identified in 1963, adding the second form to what is now referred to as the *Plethodon elongatus* Complex (Highton and Brame 1965, p. 1). Early distinctions between Siskiyou Mountains salamanders and Del Norte salamanders were based on morphological traits and coloration (Highton and Brame 1965, p. 1; Brodie 1970, pp. 503–505; Bury 1973, p. 57). However, it is now clear that field identification of these species based on coloration is unreliable because both species exhibit geographic variation in coloration (Brodie 1970, p. 503; Bury 1999, pp. 9–10).

Researchers have cited morphological differences as evidence of a taxonomic distinction between Siskiyou Mountains salamanders and Del Norte salamanders. Perhaps the most convincing support for distinguishing between these forms was provided by Mead et al. (2005, pp. 165–166), who found that all three species in the *Plethodon elongatus* Complex differed in average measurements of male snout-vent length, forelimb length, and head width; and female snout-vent length, forelimb length, and internarial distance. Additionally, both Siskiyou Mountains salamanders and Scott Bar salamanders have a smaller modal number of costal folds and proportionally larger forelimbs than Del Norte salamanders, contributing to their more robust appearance (Highton and Brame 1965, p. 1; Mead et al. 2005, p. 170).

Phylogenetic studies of the *Plethodon elongatus* Complex have provided further support for classifying Siskiyou Mountains salamanders and Del Norte salamanders as closely related species (Mahoney 2001, p. 183; Mahoney 2004, pp. 155–161; Bury and Welsh 2005, p. 842; Mead et al. 2005, p. 166). Phylogenetic studies of these species have also shown that early studies of the morphology of Del Norte salamanders along the Klamath River between Happy Camp and Seiad Valley, California, were in fact describing Siskiyou Mountains salamanders (Pfrender and Titus 2001, p. 15; DeGross 2004, pp. 17–18; Mahoney 2004, p. 5; Mead et al. 2005, p. 173; Mead 2006, pp. 15–16). In fact, Bury (1973, p. 57) proposed possible intergradation between these two species, and Stebbins (1985, p. 47; 2003, pp. 173–174) demoted the Siskiyou Mountains salamander to a subspecies of Del Norte salamander. However, recent research suggests that little gene flow occurs between these species across their zone of contact in the Indian Creek drainage in western Siskiyou County, California (DeGross 2004, p. 40; DeGross et al. unpublished).

Phylogenetic studies of the Siskiyou Mountains salamander have indicated that this species consists of two distinct genetic lineages: North Clade (populations within the Applegate River drainage and on the crest of the Siskiyou Mountain Range) and South Clade (populations south of the Siskiyou Mountain Range crest and adjacent to the Klamath River) (Pfrender and Titus 2001, pp. 5–6; DeGross 2004, pp. 24–44; Mahoney 2004, p. 8; Mead et al. 2005, pp. 163–166). A third, more divergent, group was also identified and is now recognized as a separate species, the Scott Bar salamander.

Based on levels of genetic divergence between species in the *Plethodon elongatus* Complex, researchers estimated that the Del Norte salamander and Siskiyou Mountains salamander lineages diverged approximately 4 million years ago and that their shared ancestral lineage diverged from that of the Scott Bar salamander between 20 and 26 million years ago (Mahoney 2004, p. 15; Mead et al. 2005, p. 165). Therefore, the Scott Bar salamander lineage appears to be the basal (most primitive, from which others are derived) lineage of the *Plethodon elongatus* Complex. Given the time periods during which these species diverged, speciation within this complex was probably influenced by Pleistocene glaciation (Soltis et al. 1997, pp. 369–370; Bury 1999, p. 22; DeGross and Bury unpublished).

Differences between Scott Bar salamanders and the other members of the *Plethodon elongatus* Complex are not limited to their genetic divergence. As noted above, Mead et al. (2005, pp. 165–166) found differences in morphological measurements of all three species. Nonetheless, questions about the validity of the current classification of these species persist (sensu Wake and Jockusch 2000, p. 117). Further, the ranges of the Scott Bar salamander and Siskiyou Mountains salamander abut each other north of the Klamath River and south of Horse Creek, so it is possible that these species interbreed in this area. Measurements of gene flow between these species would be helpful to further clarify the taxonomy of southern populations of Siskiyou Mountains salamanders and Scott Bar salamanders and define the interspecific boundaries for each species range (DeGross and Bury 2007, p. 4; Wake and Jockusch 2000, p. 117).

The Service recognizes that questions about the taxonomy of the *Plethodon elongatus* Complex remain and that research on this topic is ongoing. However, for the purpose of this finding, we evaluated the threats to the Siskiyou Mountains salamander and Scott Bar salamander separately because the preponderance of available evidence currently supports recognition of these forms as separate species. Even so, the ecological research on these species was

conducted prior to recognition of the Scott Bar salamander as a separate species, and since both species are members of the Family Plethodontidae, their life histories and habitat associations appear to be similar. Therefore, for the purpose of this finding, we use the current literature describing the biological characteristics and ecology of the Siskiyou Mountains salamander for both species.

For the purposes of this finding, we use the following hierarchy of taxonomic names:

(1) *Plethodon elongatus* Complex: Plethodon salamanders within the geographic region occupied by Del Norte salamander, Siskiyou Mountains salamander, and Scott Bar salamander.

(2) Siskiyou Mountains salamander Complex: The three known genetic entities previously classified as Siskiyou Mountains salamander, consisting of the Scott Bar salamander, Siskiyou Mountains salamander North Clade, and Siskiyou Mountains salamander South Clade.

(3) Siskiyou Mountains salamander (North and South Clades combined), not including the Scott Bar salamander.

(4) Individual genetic subunits of Siskiyou Mountains salamander: North Clade (hereafter referred to as the Applegate salamander) and South Clade (hereafter referred to as the Grider salamander).

Biology

Like other members of the Family Plethodontidae, Siskiyou Mountains and Scott Bar salamanders require contact with moisture for respiration through their permeable skin (Feder 1983, pp. 292–293). Desiccation is lethal to *Plethodon* species and therefore, surface activity by Siskiyou Mountains and Scott Bar salamanders primarily occurs at night, when the air is cool and moist (Nussbaum 1974, p. 3; Nussbaum et al. 1983, p. 103; Clayton and Nauman 2005, p. 139; Mead et al. 2005, p. 118). Peak periods of surface activity occur during the rainy season (usually late fall and spring) (Clayton and Nauman 2005, p. 139; Mead et al. 2005, p. 118). These salamanders retreat to underground refugia during the extreme climatic conditions common during summer and winter in the eastern Klamath Mountains (Nussbaum 1974, p. 3). They may forage at the surface during the summer (Nussbaum et al. 1983, p. 103) but probably only in sites with relatively cool, moist microclimates. Little is known about these species' behavior, but many researchers assume that they are inactive underground and that foraging and reproduction only occur during brief periods of surface activity (Feder 1983, p. 305). However, it is possible that these activities also occur below the surface (Welsh and Lind 1992, p. 433). The limited surface activity by these species is reflected in survey protocols for Siskiyou Mountains salamanders, which require that surveys be restricted to periods of relative humidity above 65 percent, air temperatures between 39.2 and 68 °F (4 to 20 °C), soil temperatures between 38.3 and 64.4 °F (3.5 to 18 °C), and moist soil conditions (Clayton et al. 1999, p. 133).

Plethodon salamanders are fully terrestrial amphibians and do not need standing or flowing water for any stage of their life cycle (Zug et al. 2001, p. 383). Eggs are thought to be laid in small clusters deep in moist, rocky substrates, but this has not been observed by researchers. Females have clutches of 2 to 18 eggs, with an average of 9 eggs per clutch (Nussbaum et al. 1983, pp. 21–23). Juveniles emerge in late fall and early spring. Welsh and Lind (1992, p. 432) reported that juveniles captured in mid-spring were significantly larger than would be expected if newly hatched. These salamanders appear to become reproductively mature at 5 to 6 years and are relatively long-lived (up to 15 years) (Nussbaum et al. 1983, p. 103; Clayton and Nauman 2005, p. 139). Females appear to breed every other year (Nussbaum 1974, p. 22).

Siskiyou Mountains and Scott Bar salamanders are 'lie-and-wait' predators that prey on a variety of small terrestrial invertebrates, including spiders, pseudoscorpions, mites, ants, collembolans, and beetles (Nussbaum et al. 1983, p. 103). Seasonal changes in diet have been reported for these species (Nussbaum 1974, p. 24). Predators of these species have not been identified but may include snakes, shrews, or animals that opportunistically forage in spring leaf litter and debris (e.g., ground-foraging birds). Several researchers have hypothesized that interspecific and intraspecific competition are important factors in the population ecology of Siskiyou Mountains and Scott Bar salamanders (Nishikawa 1985, p. 1290; Mathis 1989, p. 790; Griffis and Jaeger 1998, p. 2500). These species' ranges overlap with those of ensatina (*E. eschscholtzii oregonensis*) and black salamanders (*Aneides flavipunctatus*), and a recent study described one site where they are sympatric with Del Norte salamanders (Mead 2006, p. 8). We are not aware of any information about parasites or diseases affecting these species or information about symbiotic or mutualistic interactions with other organisms.

Habitat Associations

Siskiyou Mountains salamanders and Scott Bar salamanders occur on slopes with rocky soils or talus (loose surface rock) outcrops. These substrates provide interstitial spaces into which these animals can retreat from the climatic extremes of the eastern Klamath Mountains. These salamanders are occasionally found under other types of cover, such as bark, limbs, or logs, but only during wet weather when moisture is high and only in close proximity to suitable rocky substrates (Nussbaum 1974, p. 13; Nussbaum et al. 1983, p. 102). Like other plethodontids, Siskiyou Mountains salamanders and Scott Bar salamanders require contact with moisture for respiration through their skin. Therefore, habitat characteristics that influence forest microclimates, especially relative humidity and soil surface moisture, are likely important to these species. Based on these species' similar natural histories and physiologies (see ''Biology'' section), occurrence in the same region, and previous designation as one species, we assume that Siskiyou Mountains salamanders and Scott Bar salamanders have similar habitat requirements. As noted above, nearly all of the available information on these species comes from studies conducted on both species, prior to recognition of Scott Bar salamander as a separate species.

Early observational studies of Siskiyou Mountains salamanders found that these animals are highly associated with talus and other rocky substrates (Highton and Brame 1965, p. 1; Storm 1966, p. 1; Nussbaum 1974, p. 13; Clayton and Nauman 2005, p. 139; Mead et al. 2005, p. 118). Nussbaum (1974, p. 13) found that the densest populations were on heavily wooded, north-facing slopes that also had talus deposits or fissured rock outcrops. Many of the earliest known populations of Siskiyou Mountains salamanders occurred in talus road cuts, where the underlying rock substrate was exposed and detection of salamanders was facilitated (Nussbaum 1974, p. 13).

The degree to which Siskiyou Mountains salamanders and Scott Bar salamanders are associated with late-seral forest conditions has been the subject of considerable uncertainty and debate among scientists and land managers. Understanding this debate is essential to understanding the Service's finding for these species. The debate is exemplified by the salamander population at Muck-a-Muck Creek, the type locality from which the Scott Bar salamander was described (Mead et al. 2005, p. 169). Biologists and researchers

use Muck-a-Muck as a ''reference site,'' a location with reliable salamander detections that can be checked prior to conducting surveys in other nearby areas to confirm that current weather conditions are within proper limits to conduct these surveys. However, even when survey conditions are adequate, salamanders may not be detected at this known reference site on any given single visit. Located adjacent to a road, the site experienced hydraulic mining in the late 1800s and currently supports a sparse overstory of young and early mature trees. These habitat conditions are representative of habitat at many locations occupied by apparently viable populations of Siskiyou Mountains salamanders (Bull et al. 2006, pp. 19–22; CDFG 2005, p. 24; Farber 2007a, pp. 3–4). The regularly reported existence of salamander populations at sites like the Muck-a-Muck Creek site undercuts the conclusion of some researchers (based on the results of a single study) that the species is dependent on old-growth forest (Ollivier et al. 2001, pp. 26–29; Welsh et al. 2007a, p. 31).

The results of studies of habitat relationships conducted to date are equivocal or provide limited inferences. Limited inferences result from either (1) lack of a random or systematic sampling design that allows inference to a larger population, or (2) single-visit sampling that fails to incorporate the low and variable detection rates associated with these species. Two analyses of a single, relatively large-scale, single-visit, random, sampling-based study suggested an association with closed-canopy, older forest (Ollivier et al. 2001; Welsh et al. 2007a), whereas field studies evaluating habitat attributes at known (not randomly or systematically selected) locations demonstrated that the species are found in a wide range of forest structural conditions (Farber et al. 2001; Bull et al. 2006; Farber 2007a). We are not aware of any rigorous studies evaluating the species' demographic responses to forest conditions.

The most rigorous research of these species' habitat associations was conducted by Ollivier et al. (2001) and Welsh et al. (2007a). These studies used the same data set and somewhat different analytical techniques. The data used in both analyses were collected at 61 sites occupied by Siskiyou Mountains salamanders and possibly Scott Bar salamanders (a few sites were located within the range of what were later recognized as Scott Bar salamanders). These sites were compared with sites classified as unoccupied by salamanders (see below). These studies found that salamander populations on either side of the Siskiyou Crest appeared to occupy habitat based on different environmental factors (Welsh et al. 2007a, p. 28). The authors primarily attributed this result to geographic differences in precipitation, illumination (topographic variation in sunlight or shading), and vegetation (Welsh et al. 2007a, pp. 19, and 28). Based on these differences, they suggested that suitable habitat is less abundant and more patchily distributed on the south side of the crest than on the north side (Welsh et al. 2007a, p. 28). Although these results differed somewhat for salamanders on either side of the Siskiyou Crest, they generally indicated that sites occupied by salamanders contained attributes that likely moderate surface microclimates for these animals (e.g., greater canopy closure, more leaf litter cover, more decaying logs) or that are associated with moist, cool microclimates (e.g., less grass cover, more sword fern cover) (Ollivier et al. 2001, pp. 17–21, 26–29; Welsh et al. 2007a, pp. 24, 27). Both analyses concluded that Siskiyou Mountains (and possibly Scott Bar) salamanders are ''a mature to old-growth-forest-associated species that exists at its biological optimum under conditions found primarily in later seral stages of mixed conifer-hardwood forests in northwestern California and southwestern Oregon'' (Ollivier et al. 2001, p. 42; Welsh et al. 2007a, p. 31). However, the authors also state that ''[t]oday, information on the habitat requirements of this species is incomplete and conflicting'' (Welsh et al. 2007a, p. 16) and ''[m]any of the biotic and abiotic requirements necessary for long-term viability for the Siskiyou Mountains salamander remain undetermined'' (Welsh et al. 2007a, p. 31). It is important to note that the results of these studies only indicate correlations between forest attributes and the presence of salamanders; they do not actually demonstrate that these species select habitat based on older-forest characteristics (Welsh et al. 2007a, p. 31). For example, these salamanders may select habitat based on other factors (e.g., suitable microclimates) that often occur within older forests but that can also occur in other areas such as deep drainages and north-facing slopes.

Our understanding of the habitat associations of Siskiyou Mountains salamander and their degree of ecological dependence on specific habitat conditions is hampered by the difficulty in detecting this species during surveys. Their brief, intermittent periods of surface activity, nocturnal habits, and secretive behavior make detection of Siskiyou Mountains salamanders and Scott Bar salamanders difficult (Nussbaum 1974, p. 3; Olson et al. 2007, pp. 7–8). Welsh et al. (2007a, p. 25) estimated that their detection rates for these species were 20 and 28 percent on the south and north slopes of the Siskiyou Crest, respectively. Detection rates for other *Plethodon* species are similarly low: 15 percent (Bailey et al. 2004, p. 21) and 2 to 32 percent (Taub 1961, p. 695). Because detection rates are low for these species, repeated surveys and estimation of the probability of false negatives during surveys are required to minimize or account for the probability of classifying occupied sites as unoccupied. The survey protocol developed for the NWFP Survey and Manage Guidelines (Clayton et al. 1999, p. 141) requires three survey visits to determine presence or absence of Siskiyou Mountains salamanders. Classifying occupied sites as unoccupied, or failing to account for the probability of doing so, can bias conclusions about relationships between salamanders and habitat characteristics. The presence or absence data analyzed by Ollivier et al. (2001) and Welsh et al. (2007a) were collected with a single-visit protocol, so these studies cannot reliably infer absence at sites where detections were not obtained. In fact, the California Department of Fish and Game (CDFG) used a more intensive survey protocol to resurvey 13 clear-cut or precanopy (0 to 30 years-old) sites classified as unoccupied by Ollivier et al. (2001) and Welsh et al. (2007a) and found Siskiyou Mountains salamanders at 5 sites, Scott Bar salamanders at 2 sites, and Del Norte salamanders at 1 site (Bull et al. 2006, p. 25). While this finding does not appear to change the general conclusion described by Ollivier et al. (2001) and Welsh et al. (2007a) that salamanders were more likely to be detected in closed-canopied older forest than in more open sites, it acts to substantially weaken the inference of Ollivier et al. (2001, p. 42) and Welsh et al. (2007a, p. 31), that these species are ecologically dependent on conditions primarily found in mature or late-seral stage forests.

Two other studies have examined potential relationships between habitat attributes and abundances of Siskiyou Mountains salamanders and Scott Bar salamanders. Farber (2007a) described sites occupied by Scott Bar salamanders on private timber company property and adjacent National Forest land. This study compared salamander abundances and habitat characteristics at 26 sites

within a relatively small area (29 acres (ac) (11.7 hectares (ha))) and found that salamander abundance was only significantly related to percent rock cover. A large proportion of the occupied sites (94 percent) had evidence of at least one previous manmade or natural disturbance (Farber 2007a, p. 3). Bull et al. (2006) described CDFG surveys at 68 sites occupied by Siskiyou Mountains or Scott Bar salamanders. Eighty-seven percent of these sites were on private timberlands, and the remaining sites were on Federal lands (Bull et al. 2006, p. 24). Like Farber (2007a), CDFG found evidence of previous disturbance at most (82 percent) occupied sites (Bull et al. 2006, p. 24). Roughly 83 percent of the sites occurred in forest stands with relatively open canopies (less than 60 percent canopy closure). They also found that salamander sites occurred within a wide range of environmental conditions, including all slope aspects and nearly all (16 of 18) California Wildlife Habitat Relationships tree size and canopy classes (Bull et al. 2006, p. 24). These studies' sampling designs preclude inferences about the habitat preferences of other Siskiyou Mountains salamander populations because they were focused on known salamander sites and did not take into account the broad range of habitat that is potentially available to these salamander species. However, both studies showed that Siskiyou Mountains salamanders and Scott Bar salamanders occur within a relatively wide range of forest conditions, and were not extirpated by the disturbances (timber harvest) that created those conditions.

To support their argument that the Siskiyou Mountains salamander is critically imperiled by habitat loss, the petitioners rely heavily on statements made by Welsh et al. (2007a) as providing new scientific information that the salamanders are highly associated with, and ecologically dependent on, old-growth forest conditions, and the petitioners highlight an ongoing debate between Dr. Welsh and the CDFG (Greenwald and Curry 2007, pp. 4–7). As discussed above, we conclude that the survey methodology employed by Ollivier et al. (2001) and Welsh et al. (2007a, p. 18) was inadequate to rigorously determine salamander absence as required for the presence-absence statistical modeling method used to analyze the data. The single-visit sampling methodology these authors employed is more appropriate for comparisons of relative abundance among habitat types, which is how we interpreted their results. The fact that salamanders were subsequently detected by CDFG at over half of the 'absent' sites analyzed by Welsh et al. (2007a) does not negate the importance of this study or the habitat associations it describes; it does, however, limit the strength of inference regarding the degree to which Siskiyou Mountains salamanders may require old-growth forest conditions. We do not consider the field studies conducted by CDFG (Bull et al. 2006) as providing competing scientific research requiring reconciliation with the statistical design of the Welsh et al. (2007a) study. The CDFG field studies do, however, provide habitat results from a large sample of occupied salamander locations, which, in combination with similar data sets from Farber et al. (2001), constitute a significant source of information on these species.

A model was recently developed for predicting the occurrence of Siskiyou Mountains salamanders north of the Siskiyou Crest (Reilly et al. 2007). This model incorporated three variables reported by Ollivier et al. (2001) and Welsh et al. (2007a) to be positively related to occupancy by Siskiyou Mountains salamanders: rocky soil types, forest canopy closures above 70 percent, and conifer forest with average tree sizes greater than 17 inches (43 centimeters) in diameter at breast height (DBH) (Reilly et al. 2007, p. 1). An additional variable modeling topographical variation in sunlight or shading was also incorporated (Reilly et al. 2007, p. 2). Strategic surveys of sites that were predicted by the model to be occupied had 65 percent detection rates (34 of 52 sites were occupied), the highest ever reported for this species (Nauman and Olson 2004, p. 3). In addition to indicating the usefulness of presence or absence modeling as a scientific and management tool, this relatively high detection rate seems to support the associations described by Ollivier et al. (2001) and Welsh et al. (2007a).

Summary of Habitat Associations

Few studies of the habitat associations of Siskiyou Mountains salamanders and Scott Bar salamanders have been conducted. These include only a single large, systematic sample effort, from which two analyses were conducted (Ollivier et al. 2001 and Welsh et al. 2007a). These analyses found positive relationships between detection of Siskiyou Mountains salamanders (and possibly Scott Bar salamanders) and habitat characteristics that likely moderate surface microclimates for them (e.g., high canopy closure, more leaf litter cover, more decaying logs). Studies by Farber et al. (2001), Farber (2007a), and CDFG (Bull et al. 2006) were smaller and less rigorous than the analyses by Ollivier et al. (2001) and Welsh et al. (2007a). However, they clearly showed that Siskiyou Mountains salamanders and Scott Bar salamanders occur within a wide range of habitat conditions, including clear-cuts and young forest. The limited available evidence suggests that these species are highly associated with talus and fissured rock outcrops and are generally associated with moist, cool surface microclimates. These salamanders are likely more common in mature and old-growth forest than in other forest classes, but many salamander sites occur in other habitat types. Potential differences in the size and viability of populations in open or disturbed habitat and mature or old-growth habitat are discussed below under Factor A.

Range and Extant Distribution

Range

Currently known populations within the Siskiyou Mountains salamander Complex occur within Jackson County and the extreme southeast portion of Josephine County in southwestern Oregon, and in northern Siskiyou County in northwestern California. In Oregon, known populations occur in the Applegate Valley watershed north of the Siskiyou Crest. In California, the species complex occurs in the Klamath River drainage, south of the Siskiyou Crest, in the area bounded to the west by Indian Creek and the headwaters of Grider Creek, Kelsey Creek, and Canyon Creek; to the south by Scott Bar Mountain; and to the east by the headwaters of Mill Creek and the Horse Creek drainage. This range is subdivided into three areas based on genetically distinct populations. Siskiyou Mountains salamander North Clade (or Applegate Population) occupies the area north of the Siskiyou Crest; Siskiyou Mountains salamander South Clade (or Grider Population) occurs south of the Siskiyou Crest; and the Scott Bar salamander is found in the southeastern portion of the former range of Siskiyou Mountain salamander South Clade.

Boundary lines for the ranges of the members of the Siskiyou Mountains salamander Complex have been variously estimated by several authors (DeGross 2004, p. 15; Nauman and Olson 2004, p. 2; 2007, p. 4) and have changed through time as additional populations were discovered and results of genetic analyses were obtained. For the purposes of this finding, we delineated species' ranges and calculated landscape statistics based on

range boundaries proposed by Nauman and Olson (2007, p. 4) but we slightly modified these boundaries based on new species locations, watershed boundaries, and distribution of suitable habitat. Based on the locations of genetic samples of Scott Bar salamanders, we estimated its range to incorporate the southeastern portion of the former Siskiyou Mountains salamander's range. However, the uneven distribution of surveys and small number of locations with genetic confirmation creates uncertainty as to the actual extent of the Scott Bar salamander. The resulting estimated range (136,740 ac (55,335 ha)) is considerably larger than previous estimates that were based on a small number of genetically confirmed locations; some of this expansion is the result of confirmation of one Scott Bar salamander location in the Walker Creek drainage (DeGross 2007). Several watersheds in the southern portion of the estimated range delineated by Nauman and Olson (2007, p. 4) do not have records of Siskiyou Mountains or Scott Bar salamander locations. Review of these areas by species experts (Cuenca 2007; Clayton 2007) indicated that surveys have not been conducted there, but suitable habitat is widespread. Additional surveys and genetic analyses are necessary to adequately delineate the southern boundary of the Scott Bar salamander and Siskiyou Mountains salamander. Our estimates of species' ranges are intended for use in evaluating species' distribution across various land ownership and Federal land allocations; they are not intended to represent precise estimates of occupied habitat.

Our understanding of the range and distribution of the Siskiyou Mountains salamander Complex is dynamic; the known range has roughly tripled between 1980 and 2007, doubling between 1993 and 1998 (Olson et al. 2007, p. 20). Biologists familiar with the species believe that the currently known range is well-defined to the east by xeric conditions and unsuitable soil types, and to the west by the range of the Del Norte salamander (Olson et al. 2007, p. 19). However, it is likely that the known range will continue to be refined and expanded through discovery of additional populations to the south in the Scott River, Canyon Creek, Kelsey Creek, and Upper Grider Creek drainages, and to the north in the Applegate River drainage. For example, two detections of salamanders described as Siskiyou Mountains salamanders were reported by a Survey and Manage Guidelines survey crew near the town of Rogue River in 2006 (DeGross 2007). If confirmed, these detections would represent a range expansion of roughly 5 miles (mi) (8.45 kilometers (km)).

We were unable to find any information suggesting that the occupied range of any member of the Siskiyou Mountains salamander Complex is different from its historical range. Many occupied locations exist within watersheds that have sustained considerable physical modification by historical mining, roadbuilding, and logging. As described above, the species' ranges appear to be defined by climatic conditions, soil and parent material type, and the adjacent Del Norte salamander (Olson et al. 2007, p. 19).

Distribution

The distribution of Siskiyou Mountains and Scott Bar salamander populations within their respective species' ranges is poorly known. With the exception of systematic surveys conducted by Ollivier et al. (2001) and Nauman and Olson (2004a and 2004b), the majority of surveys have been opportunistic or conducted in support of timber management planning activities. Large areas within the species' known ranges remain unsurveyed due to poor access or lack of planned projects requiring surveys. The lack of systematic surveys may result in biased estimates of population distribution. For example, because CDFG requires surveys for Siskiyou Mountains salamanders and Scott Bar salamanders during the Timber Harvest Plan (THP) review process, a high proportion (40 percent) of known Scott Bar salamander locations have been reported on private timberlands, which accounts for only 22 percent of the known range of the species (see Table 1 below).

TABLE 1.—PROPORTION OF LAND OWNERSHIP WITHIN THE ESTIMATED RANGES OF SISKIYOU MOUNTAINS SALAMANDERS (SMS) AND SCOTT BAR SALAMANDERS (SBS)

	Applegate SMS (%)	Grider SMS (%)	Scott Bar salamander (%)	SMS–SBS complex (%)
Private Lands	15	9	22	15
Federal Lands:				
USFS	66	91	78	76
BLM	19	0	0	9
Total Area (ac)	248,870	174,285	136,740	559,895
Total Area (ha)	100,712	70,529	55,335	226,578

Population distribution is strongly influenced by the abundance and distribution of suitable talus habitat. Using a Geographic Information System (GIS)-based predictive model, the Survey and Manage Guidelines Species Review Panel for Siskiyou Mountains salamanders estimated that roughly 30 percent of the known range north of the Siskiyou Crest consisted of high-quality talus habitat (USDA and USDI Species Review Panel 2002), but pre-disturbance surveys conducted in the same area found that 3 to 14 percent of a given planning area (10,000 to 15,000 ac (4,047 to 6,070 ha)) consisted of suitable rock substrate (USDA and USDI Species Review Panel 2001). Based on surveys and mapping of rock habitat, Timber Products Company estimated that approximately 18 percent of their surveyed lands within the range of the Scott Bar salamander was composed of suitable talus habitat (Farber 2006). Using a similar methodology, Fruit Growers Supply Company (2007) estimated that 19 percent of 2,615 ac (1,058 ha) surveyed within the range of the Applegate Population of the Siskiyou Mountains salamander was composed of suitable talus habitat.

The Siskiyou Mountains salamander Complex occurs within a roughly 500,000 ac (202,346 ha) area dominated by Federal lands (see Table 1). The range of the Applegate Population (North Clade) of the Siskiyou Mountains salamander occurs within 248,870 ac (100,712 ha), consisting primarily (85 percent) of Federal lands, and more than 90 percent of the 174,285 ac (70,529 ha) range of the Grider Population (South Clade) of the Siskiyou Mountains salamander occurs on Federal lands (see

Table 1). The Scott Bar salamander has the smallest range, covering approximately 136,740 ac (55,335 ha), and occurs on the smallest proportion of Federal lands (78 percent) within the complex (see Table 1).

Known populations appear to be well-distributed across their respective species' ranges. To evaluate spatial distribution of salamander locations within each species' range at a coarse scale, we compared known locations to watershed boundaries within each species' range. Site locations of the Applegate Population of the Siskiyou Mountains salamander occur within 19 of the 21 watersheds that constitute the range of this group. The range of the Grider Population of the Siskiyou Mountains salamander is composed of 36 watersheds of which 23 (64 percent) contain known populations. The 13 watersheds without known salamander locations are primarily situated in Wilderness and Roadless areas where access is difficult and few surveys have been conducted. Known locations of Scott Bar salamanders occupy 17 of the 25 watersheds within their range. Of the eight watersheds without known locations, six are within Wilderness and Roadless areas where suitable habitat exists but surveys have not been conducted.

Nauman and Olson (2007) conducted surveys at a stratified random sample of points located on Federal lands within the range of the Grider Population of the Siskiyou Mountains salamander and the Scott Bar salamander. They found occupancy rates (presence or absence) to be similar at high-elevation (greater than 4,000 feet (ft) (1,219 meters (m)) sites and low-elevation (less than 4,000 ft (1,219 m)) sites, but relative abundance (captures per person, per hour) at low-elevation sites was roughly twice that at high elevation. The authors conducted a single survey visit per site during one season, and did not evaluate the potential effect of variable detection probabilities at different elevations on their results, which, as noted above, may underestimate the number of animals actually present; however, their findings suggest that these salamanders may be less abundant or less detectable at higher elevations.

Population Size and Trend

Evaluation of potential population sizes for the Siskiyou Mountains salamander and Scott Bar salamander is strongly influenced by the species' low detectability and the amount and distribution of potentially suitable habitat. Because of their secretive habits, detection rates for these salamanders are very low, even though the species may be locally quite abundant (Nussbaum 1974, p. 3; Clayton et al. 1999, p. 133). Results of surveys within habitat known to be occupied are frequently negative (Clayton et al. 2004, p. 10; CDFG 2005, p. 10). Individual populations likely range in size from a few individuals to thousands of individuals (Nussbaum 1974, p. 16; Welsh and Lind 1992, p. 96). Based on extrapolation of salamander densities obtained during intensive field surveys, Nussbaum (1974, p. 16) provided a species-wide ''conservative estimate'' of over 3 million Siskiyou Mountains salamanders, and opined that the actual abundance could be 10 times as high. While the author acknowledged that a number of methodological problems may affect this estimate, it nonetheless suggests that the perceived rarity of this species may be more related to low detectability than to actual population size.

Our current understanding of population sizes for Siskiyou Mountains salamander and Scott Bar salamander is based primarily on the cumulative number of occupied sites or locations that have been reported over time. However, these numbers may be misleading for several reasons. At many locations, particularly sites detected during project surveys under Survey and Manage Guidelines, no attempt was made to determine population size; detection of a single individual was adequate to define an occupied site. Because of this, large habitat patches potentially supporting many individual salamanders are counted as equivalent to small habitat patches or detections of dispersing individuals. In addition, large areas of suitable habitat remain unsurveyed, particularly in Wilderness, Roadless Areas, and Late-successional Reserves where access is poor or project surveys are typically not conducted (Late-successional Reserves are a NWFP land allocation designed to serve as habitat for late-successional- and old-growth-related species). For example, approximately 10 percent and 26 percent of the range of the Scott Bar salamander and Grider salamander, respectively, is classified as ''Roadless Area.'' Finally, known locations are frequently spatially clumped, and no uniform effort to distinguish between individual populations has been undertaken. Agencies and researchers involved with these species employ several criteria (e.g., 164 to 492 ft (50 to 150 m) spacing, presence of perennial stream or area of unsuitable habitat) to imply separation between occupied locations or ''populations.'' For these reasons, the currently known numbers of Siskiyou Mountains salamanders and Scott Bar salamanders are more representative of the distribution and intensity of survey efforts than of actual salamander populations.

The numbers of known locations of Siskiyou Mountains salamanders and Scott Bar salamanders have increased steadily since the discovery of these species. For example, the number of known locations of Scott Bar salamanders on lands managed by Timber Products Company increased from 8 in 1997 to 36 in 2007 (Farber 2007c). To describe the number and distribution of known salamander locations, we obtained location data from Federal and State agencies and private timber companies and combined them into a single GIS layer. Because of variability in methods used by various agencies to delineate individual locations (many locations were clumped less than 328 ft (100 m) apart), we evaluated the proximity of adjacent locations and retained only locations greater than 328 ft (100 m) apart, to minimize the inclusion of multiple records at discrete locations. The resulting numbers are intended to represent individual populations, but likely still contain multiple records from large habitat patches and likely differ from previous estimates based on dissimilar mapping methods.

Within each of the genetic subunits in the Siskiyou Mountains salamander Complex, the number of locations with individuals that have been genetically confirmed to the species level is much smaller than the overall number of known locations. For example, the estimated range of the Scott Bar salamander is defined on the basis of 23 genetically confirmed locations from the samples of Mahoney, Mead, and DeGross; however, the defined range of the species contains 98 additional salamander locations previously attributed to the Grider salamander. Because populations of the two species tend not to overlap (Mead 2006, p. 10), it is reasonable to conclude that all salamander detections within what is now known to be the range of the Scott Bar salamander are Scott Bar salamanders. For the purposes of this finding, we used the total number of individual locations within each species' range, recognizing that ongoing genetic studies may modify the boundaries of these subunits, and therefore the number of known individual sites within each genetic subgroup.

TABLE 2.—NUMBER OF KNOWN LOCATIONS AND PERCENT OF TOTAL KNOWN SISKIYOU MOUNTAINS SALAMANDERS (SMS) AND SCOTT BAR SALAMANDERS (SBS) ON FEDERAL AND PRIVATE LANDS

	Applegate SMS	Grider SMS	Scott Bar salamander [1]	SMS–SBS complex
Federal lands	376 (85%)	74 (97%)	69 (60%)	519 (82%)
Private Lands	64 (14%)	2 (3%)	46 (40%)	112 (18%)
Total	440	76	115	631

[1] Number of known *Plethodon* sp. locations within the presumed range of the Scott Bar salamander.

Density

Population densities for the Siskiyou Mountains salamander Complex are poorly known. Estimation of population density for these salamanders is hindered by low detectability and highly variable environmental or habitat conditions during surveys (Nussbaum 1974, p. 15). Densities recorded during the habitat associations study conducted by Ollivier et al. (2001, p. 16) ranged from 1 to 13 animals per 527-ft^2 (49-m^2) search plot (i.e., 0.02 to 0.33 animals per m^2); whereas Nussbaum (1974, p. 16) recorded 0.53 animals per m^2 during an intensive field study. Nauman and Olson (2007, p. 19) reported an average of 0.01 salamanders per m^2 and 2.39 salamanders per person, per hour in California, with capture rates ranging from 2.83 salamanders per person, per hour at lower elevations to 1.25 salamanders per person, per hour at higher elevation sites. An inventory of all known Siskiyou Mountains salamander sites on the Applegate Ranger District in 1992 reported abundances of salamanders ranging from 0.3 to 11 salamanders per person, per hour (Olson et al. 2007, p. 13). None of these studies was designed to estimate salamander density, and mark-recapture studies that would permit estimation of density have not been conducted.

Population Trend

We were unable to locate any information describing population trends for the Scott Bar salamander or Siskiyou Mountains salamander (or either of its constituent populations). Several authors have inferred population declines based on observations of habitat modification within occupied areas (Ollivier et al. 2001, p. 5; Welsh 2005, pp. 5–7), but their study design did not support this type of inference.

Land Management

Populations of Siskiyou Mountains salamanders and Scott Bar salamanders receive an added layer of security from several conservation efforts on Federal lands. The majority of the Siskiyou Mountains salamander Complex occurs within lands administered under the provisions of the NWFP (USDA and USDI 1994) (see Table 1 above), which was established to provide an ecosystem-based management strategy for late-successional forests and the wildlife species that inhabit them (USDA and USDI 1994). The NWFP consists of two primary parts that concern salamander conservation: (1) A system of land-use allocations with associated Standards and Guidelines to guide land management; and, (2) until recently, the Survey and Manage Mitigation Measure Standards and Guidelines, which provided species-specific management guidance for certain groups of species. The NWFP Record of Decision (ROD) was implemented as amendments to all existing land and resource management plans for the Bureau of Land Management (BLM) and USFS within the range of the northern spotted owl.

Lands administered by the USFS and BLM are divided into five primary categories of land management under the NWFP: Late-successional Reserves, Congressionally Reserved Areas, Riparian Reserves, Adaptive Management Areas, and Matrix. Late-successional Reserves are established with an objective to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional, forest-related species. Forest management activities are highly restricted within Late-successional Reserves. Congressionally Reserved Areas, such as Wilderness Areas, Wild and Scenic Rivers, and National Monuments, are incorporated into the design of the Late-successional Reserve System. Riparian Reserves provide an area along all streams, wetlands, lakes, ponds, and unstable areas where riparian-dependant resources receive primary management emphasis. Maintenance of forested conditions in Riparian Reserves for shading and water quality is also expected to contribute to dispersal and breeding habitat for late-successional species. Adaptive Management Areas (AMAs) are established to develop and test new management approaches and timber harvest methods to integrate and achieve ecological and economic health, and other social objectives. Matrix lands consist of those Federal lands outside of the four other categories described above. Production of timber and other commodities is an important objective for Matrix lands. However, forests in the Matrix also provide connectivity between Late-successional Reserves and function as habitat for a variety of forest-dwelling species. The NWFP Matrix Standards and Guidelines are designed to provide for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as logs, snags, and large trees. The Matrix also provides ecological diversity by providing early-successional habitat. Within Matrix, other land use allocations such as Visual Emphasis Areas, Managed Wildlife Areas, and Retention Areas carry additional restrictions on timber harvest and to some degree function as reserves.

TABLE 3.—FEDERAL LAND ALLOCATIONS WITHIN THE ESTIMATED RANGES OF THE SISKIYOU MOUNTAINS SALAMANDER (SMS) AND SCOTT BAR SALAMANDER (SBS)

	Applegate SMS	Grider SMS	Scott Bar salamander	SMS–SBS complex
Total area in ac (ha)	248,870 (100,712)	174,285 (70,529)	136,740 (55,335)	559,895 (226,578)

TABLE 3.—FEDERAL LAND ALLOCATIONS WITHIN THE ESTIMATED RANGES OF THE SISKIYOU MOUNTAINS SALAMANDER (SMS) AND SCOTT BAR SALAMANDER (SBS)—Continued

	Applegate SMS	Grider SMS	Scott Bar salamander	SMS–SBS complex
Private Lands (%)	15	9	22	15
Federal Lands (%):				
Reserves	33	73	51	50
Adaptive Management Area [1]	42	0	0	19
Matrix-retention [2]	1	13	19	9
Matrix-general forest [3]	9	5	8	7

[1] Experimental management to meet ecological, economic, and social goals.
[2] Timber harvest restricted to accommodate various other management goals.
[3] Timber production is a high priority.

Roughly 33 percent of the range of the Applegate salamander occurs within reserves (Late-successional Reserves, Wilderness, Riparian Reserves, and other land allocations withdrawn from scheduled timber harvest), 42 percent of the range within the Applegate Adaptive Management Area, 9 percent in Matrix, and 15 percent on private lands (see Table 3 above). Nearly three-quarters of the range of the Grider salamander is in reserves, and 18 percent is in Matrix; however, almost three-fourths of the Matrix is in land-use allocations (retention areas) where timber harvest is restricted (USDA 1994, pp. 4–73 to 4–176). Fifty-one percent of the Scott Bar salamander's range is in reserves, and an additional 19 percent occurs within retention areas (Wild and Scenic Rivers, Retention Visual Quality Objective). Overall, only approximately 14 percent of the range of the Applegate salamander, 24 percent of the range of the Grider salamander, and 30 percent of the range of the Scott Bar salamander are composed of Matrix-General Forest and private timberlands, where intensive timber management would be expected to occur. However, because varying levels of timber management occur within the Applegate Adaptive Management Area in the range of the Applegate salamander, up to about 66 percent of this species' range is available for various levels of timber harvest and cannot be considered to be reserve lands.

Little is known about the actual distribution of salamander populations among the land-use allocations described above. Nauman and Olson (2007) attempted to evaluate the occurrence of Grider salamanders and Scott Bar salamanders by conducting surveys at a stratified random sample of points in reserved and matrix land allocations at high (greater than 4,000 ft (1,219 m)) versus low (less than 4,000 ft (1,219 m)) elevation. They found that capture rates for these species were higher on matrix lands, likely because a higher proportion of reserved lands occur at higher elevations, which are less suitable for the species. The authors concluded that reserved land allocations may not provide adequately for conservation of the species but described a number of sampling issues (single-visit protocol, unequal sampling of strata) that may weaken this conclusion.

Survey and Manage Mitigation Measure Standards and Guidelines

In addition to the NWFP's system of land-use allocations and management standards and guidelines, specific mitigation measures were included for about 400 rare or poorly known species. We refer to this broadly as the Survey and Manage Program. The Survey and Manage Program contains an adaptive management provision, establishing the Species Review Process wherein species experts (''taxa teams'') evaluate and synthesize the latest information about each species. Reports from the taxa teams are then used by the agencies to propose changes to management of these taxa, as appropriate. The Siskiyou Mountains salamander was included in the original list of Survey and Manage species under Survey Strategies 1 and 2 (USDA and USDI 1994, pp. C–59, C–45). Survey and Manage guidelines for these salamanders required that known salamander sites be managed via protection buffers (Strategy 1), and that surveys be conducted prior to ground-disturbing activities such as timber harvest (Strategy 2). Protection buffer standards and guidelines for Siskiyou Mountains salamanders required the retention of all overstory trees within a buffer of at least the height of one site-potential tree or 100 feet horizontal distance, whichever is greater, surrounding the location. As a result of the 1999 Species Review Process, the Siskiyou Mountains salamander was reclassified as a Category C species in the Final Supplemental Environmental Impact Statement (FSEIS) for the NWFP (USDA and USDI 2000, Appendix F; p. 101). Criteria for including a taxon in Category C are: (1) There is not a high concern for persistence; (2) it is likely that not all known sites are necessary for reasonable assurance of persistence of the taxon; (3) the taxon is uncommon (as opposed to rare); and (4) pre-disturbance surveys are required until a population network is established. The management objective for the Siskiyou Mountains salamander under Category C is to identify and manage high-priority sites to provide for reasonable assurance of persistence. The current status of the Siskiyou Mountains salamander was assigned in the March 14, 2003, Implementation of the 2002 Annual Species Review Memorandum (USDA and USDI 2003). Because of their smaller number of known sites and patchy distribution, salamander populations south of the Siskiyou Crest were assigned to Category A, requiring pre-disturbance surveys and management of protection buffers for all known sites. Northern populations were assigned to Category D. Management objectives for Category D species are to identify and manage high-priority sites to provide for a reasonable assurance of species persistence; pre-disturbance surveys are not required.

The USFS and BLM have determined to remove the Survey and Manage Program, and in July 2007 published their Record of Decision (2007 ROD) to implement this decision (see ''Summary of Factors Affecting the Species: Factor D''). Therefore, at this time, the Survey and Manage Program has been eliminated for project planning and new decisions. However, because of the lag time in implementation of the 2007 ROD, most new Federal land management decisions issued in 2008 will be compliant with the Survey and Management guidance for the Siskiyou Mountains salamander (West 2007); implementation of new projects compliant with the 2007 ROD is unlikely until 2009. We therefore view

the Survey and Manage guidelines as existing habitat management until after 2008. Unless the 2007 ROD is successfully challenged in court, project decisions after 2008 will no longer contain protections currently provided by the Survey and Manage provisions.

The Survey and Manage guidelines have provided additional security for salamander populations across the vast majority of the range of the Siskiyou Mountains salamander. With the removal of the Survey and Manage Guidelines under the 2007 ROD, management of these species will be based on the USFS's Special Status Species Program and the BLM's Sensitive Species Program (Hughes 2007). The Special Status Species and Sensitive Species programs are anticipated to provide less stringent protections than those in the Survey and Manage Program; however, they include provisions for development of Conservation Strategies and Conservation Agreements.

Based on ecological and management information in the Annual Species Reviews and strategic surveys, the taxa team joined with additional species experts to formalize the Survey and Manage Program objectives for Siskiyou Mountains salamander. In anticipation of the eventual removal of the Survey and Manage Program, they developed their management recommendations into a Conservation Strategy for Siskiyou Mountains Salamanders in the Northern Portion of the Range (Olson et al. 2007). The USFS and BLM committed to implement this Conservation Strategy in the August 16, 2007, Conservation Agreement for the Siskiyou Mountains Salamander (*Plethodon stormi*) in Jackson and Josephine Counties of southwest Oregon and in Siskiyou County of northern California (USDA and USDI 2007; USDI 2007b).

In accordance with management objectives for Category D species, the Conservation Strategy relies on long-term management of a subset of known salamander sites. A panel of scientists and resource managers selected high-priority sites and considered a number of criteria including existing Federal Standards and Guidelines for the planning area, distribution and quality of habitat, known locations of salamanders, and potential risk factors such as fire hazard, road density, and land ownership. To ensure the existence of well-distributed, interacting subpopulations, these criteria were evaluated at three spatial scales: The entire Applegate River watershed, 19 smaller watersheds within the Applegate River watershed, and individual sites. Of 316 known salamander locations on Federal lands, 151 (48 percent) were included in the 110 high-priority salamander management areas selected (some management areas encompassed multiple salamander sites). Of the 110 selected sites, 44 are on BLM lands and 66 are on the Rogue River-Siskiyou National Forest. Each high-priority salamander-management site is intended to maintain a subpopulation of Siskiyou Mountains salamanders over the long term (100 years). Because habitat-disturbing activities are regulated to varying degrees across the entire NWFP area occupied by the salamanders, the scientists who developed the strategy anticipate that many additional populations will continue to persist in reserved lands and in Matrix where habitat is retained for other reasons (Olson et al. 2007, p. 21).

Each high-priority salamander-management site was evaluated for application of one of two management strategies. The first strategy focuses on maintaining habitat conditions for salamanders at the site by limiting activities that may have adverse effects on substrate, ground cover, forest condition, or microhabitat and microclimate. The second strategy allows for greater latitude in activities at the high-priority site by applying the existing National Fire Plan Fire Management Recommendations to the high-priority site. This two-tiered approach attempts to integrate the fire ecology of the area, current forest conditions, fuel loads, and proximity to populated areas while providing for the persistence of Applegate salamander populations over the long term.

The Conservation Strategy contains a rigorous risk assessment (Olson et al. 2007, p. 22 and Appendix 2), which concludes that implementation of the Strategy presents an extremely low risk to the species' persistence at the range-wide scale. This conclusion is based on evaluation of the comparative risk of losses of individuals or subpopulations due to fuels management activities versus higher risk of losses if high-intensity wildfires occur at untreated sites. Other risks posed by other forest management activities are ameliorated by the protection-buffer approach adopted from current Survey and Manage guidance. Redundancy of protected sites and a mix of protective and restoration approaches across the entire range of the Applegate salamander also act to increase the likelihood of persistence over the long term.

The Conservation Strategy was authored by four of the most published scientific experts on this species (D. Olson, D. Clayton, H. Welsh, and R. Nauman, among others), and incorporates habitat modeling and risk assessment in the evaluation of species persistence and distribution within the strategy area. The Conservation Strategy also contains provisions to support monitoring and strategic surveys to address gaps in our knowledge of the species and its conservation. Funding for these efforts is anticipated to come from the USFS and BLM's Special Status Species programs. Implementation and effectiveness of this Conservation Strategy will be reviewed every five years by BLM, USFS, and the Service. Based on these regular reviews, or significant information that may become available between the five-year reviews, the Conservation Strategy may be revised to refine the plan or address emerging issues.

In anticipation of the discontinuation of the Survey and Manage Program, biologists from the Klamath National Forest (KNF) and the Service's Yreka Fish and Wildlife Office (YFWO) are developing a Conservation Strategy to guide management of both Grider and Scott Bar salamander populations on lands administered by the KNF. This Strategy would apply to over 90 percent of the range of the Grider salamander DPS, and 78 percent of the Scott Bar salamander's range. The draft KNF Strategy does not require surveys to be conducted prior to ground-disturbing activities; instead, all suitable salamander habitat (talus substrate) is assumed to be occupied and managed for long-term persistence of salamander populations. Similar to the Conservation Strategy for Applegate salamanders (Olson et al. 2007), the draft KNF Strategy balances protection of existing suitable habitat with active management of risks such as hazardous fuels. Small habitat patches (less than 5 ac (2 ha)) and locations with high likelihood of occupancy by salamanders (lower slopes, northerly exposures) receive strict protective guidelines; whereas habitat patches on upper slopes with southerly exposures may receive fuels reduction treatments that reduce canopy closure to a limited degree.

As discussed below in Factor D, we are not relying on implementation of the Conservation Strategies in making our determination that listing the Siskiyou Mountains salamander and Scott Bar salamander is not warranted. We have included this discussion solely as background for the public and to acknowledge USFS and BLM efforts to

further reduce possible threats to the species.

Summary of Factors Affecting the Species

Section 4 of the Act (16 U.S.C. 1533) and implementing regulations at 50 CFR part 424 set forth procedures for adding species to the Federal List of Endangered and Threatened Wildlife. In making this finding, we summarize below, information regarding the status and threats to this species in relation to the five factors in section 4(a)(1) of the Act. In making our 12-month finding, we considered and evaluated all scientific and commercial information in our files, including information received during the public-comment period that ended May 29, 2007.

Siskiyou Mountains Salamander

Factor A: The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Like other plethodontids, Siskiyou Mountains salamanders require moisture for respiration (Nussbaum et al. 1983, pp. 73, and 90). This physiological requirement limits the time during which they are active at the soil's surface to relatively brief, rainy periods in the spring and fall (Nussbaum et al. 1983, pp. 102–103; Clayton et al. 1999, p. 133). These salamanders engage in important behaviors, including foraging and breeding, during periods of surface activity (Feder 1983, p. 296). During the remainder of the year, they retreat into rocky substrates, which provide refuge from the climatic extremes of the eastern Klamath Mountains (Nussbaum et al. 1983, p. 102). Given their physiology and life histories, disturbances that reduce surface and soil moisture, relative humidity, or suitable rocky substrates may negatively affect these species. Disturbances that possibly impact Siskiyou Mountains salamanders include timber harvesting, fires, road construction, mining, and quarrying.

Effects of Timber Harvesting on Siskiyou Mountains Salamanders

Timber harvesting may impact Siskiyou Mountains salamander by killing individuals or by reducing habitat quality. Ollivier et al. (2001, pp. 41–42) and Welsh et al. (2007a, p. 28) found that Siskiyou Mountains salamanders were associated with characteristics found in mature forests, such as dense canopy cover, large-diameter trees, and mossy ground cover. Other studies have shown that Siskiyou Mountains salamanders occur within a wide range of forest conditions, including in recently clear-cut sites and in open-canopy forest (e.g., Bull et al. 2006, p. 24; Farber et al. 2001, p. 13; Farber 2007, p. 3). The conclusions of these studies do not necessarily conflict since it is possible that these salamanders occur within a wide range of habitat conditions while selectively using or receiving greater fitness from a subset of them, or are more easily detected in a subset of them. Alternatively, these species may select habitat based on attributes that are not dependent on forest age or structural class. For example, they may select habitat with cool, moist microclimates, which are common in mature forests but also occur under other conditions (e.g., in deep drainages or on north-facing slopes). The paucity of rigorous scientific information about Siskiyou Mountains salamanders makes an accurate evaluation of their habitat associations (see Habitat Associations section above) and sensitivities to timber harvesting difficult. Information about the effects of timber harvesting on this species is currently limited to inferences based on the physiology of this species, two studies of the effects of timber harvesting on Siskiyou Mountains salamanders, and extrapolation of inferences from studies of the effects of timber harvesting on other species of plethodontid salamanders.

Timber harvesting may negatively affect Siskiyou Mountains salamander by reducing soil moisture and increasing soil temperature. Studies by Chen et al. (1993, pp. 233–234; 1995, pp. 77–82; 1999, pp. 292–294) in Pacific Northwest Douglas fir forests found that both soil and air were drier and warmer in clear cuts and clear-cut forest edges than in adjacent old-growth forest. These results indirectly suggest that clear-cutting may negatively affect these animals. We are not aware of any studies on the effects of other silvicultural techniques on forest microclimates. However, alternative even-age harvesting techniques (shelterwood and seed-tree cuts), uneven-age harvesting (single tree and group selection harvesting), and thinning retain more canopy cover than does clear-cutting and, therefore, probably have lower impacts on forest microclimates. The effects of timber harvesting also strongly depend on the silvicultural prescription (e.g., the volume of wood removed and the size, volume, and distribution of retained trees, snags, and logs) and on site-specific factors (e.g., climate and slope aspect). We expect that the effects of silviculture on Siskiyou Mountains salamander depend primarily on the intensity and scale of the disturbance.

We are aware of two studies analyzing the effects of timber harvesting on Siskiyou Mountain salamanders. The first was conducted in Siskiyou County, California by the USFS (D. Clayton, cited in Bull et al. 2006, p. 21; Olson et al. 2007, p. 16). This study compared abundances of Siskiyou Mountains salamanders through time at a clear-cut site and an adjacent selectively cut site. In the clear-cut site, the researchers found 40 salamanders (10 salamanders per person, per hour) the spring after the harvest, one juvenile the following year, no animals in the subsequent 7 years, and one juvenile during an opportunistic survey in the tenth year. In comparison, they consistently found 3 to 6 salamanders per person, per hour in the selectively cut site during the same years sampled (Bull et al. 2006, p. 21). The CDFG resurveyed the same clear-cut site in the spring and fall of the eleventh year post-harvest (Bull et al. 2006, p. 21). Single surveyors found 10.6 salamanders per person, per hour in the spring and 4.25 salamanders per person, per hour in the fall. This result suggests that, while Siskiyou Mountains salamanders may be negatively impacted by intensive timber management practices such as clear-cutting, they are able to recover in, or recolonize, some clear-cuts as vegetation recovers. As importantly, less intensive harvest methods may have less impact on salamander abundance. However, inferences from both sets of surveys are highly limited because the surveys did not include pre-harvest data and were conducted in only one pair of plots.

In a nearby area, Fruit Growers Supply Company monitored Siskiyou Mountains salamanders on the Elliot Fly Timber Harvesting Plan. They monitored salamanders on 39 plots (35 harvested and 4 controls). The harvesting method was a selective cut, and logs were removed by helicopter, a method which significantly reduces the amount of ground disturbance. Plots were surveyed prior to harvest, 1 year post-harvest, and 10 years post-harvest (Taylor 2007, p. 1). Estimates of relative abundance (count data) in the harvested plots ranged from 1.8 to 2.0 captures per survey compared to 2.0 to 3.2 captures per survey in unharvested controls, and did not significantly change during the study. These results suggest that the harvest did not significantly adversely affect the salamanders (Taylor 2007, p. 3). The determination of no significant difference between treatments and control plots was likely influenced by the high variability observed within and

between plots. All Siskiyou Mountains salamander life stages were found in the harvested plots, likely indicating that these populations continued to reproduce following harvesting. Although this study used a more rigorous design and was larger than the nearby USFS paired-plot study, its inferences are also limited because pre-harvest data were only collected one year prior to harvest and the study plots were not randomly selected.

All life-history stages of Siskiyou Mountains salamander, including gravid females (carrying eggs), have been found in open-canopy forest and recent clear-cuts (Farber et al. 2001, p. 13; Bull et al. 2006, p. 24; Farber 2007, p. 3). However, little is known about relationships between forest conditions and the population dynamics of the Siskiyou Mountains salamander. Welsh et al. (2007b) analyzed relationships between forest age class and the age structure and body condition of both Siskiyou Mountains salamanders and Scott Bar salamanders. All salamander age classes were found in pre-canopy (0 to 33 years) sites, but 8 of 11 individuals detected in those sites were juveniles or subadults. If representative of population age structure, this observation could indicate that pre-canopy sites function as 'sink' or dispersal habitat for non-reproductive individuals. Alternatively, high proportions of juveniles could indicate high reproductive rates and population recovery following logging. Sample sizes were too small to test these hypotheses. Welsh et al. (2007b) also found that Siskiyou Mountains salamanders in mature (100 to 199 years) sites had significantly higher median body condition (ratio of body mass to length) than those in young sites (31 to 99 years). This could indicate that young forest stands provide lower quality habitat than mature stands.

Timber harvesting could also affect Siskiyou Mountains salamanders at spatial scales larger than individual salamander sites. The petition to list the Siskiyou Mountains salamander (Center for Biological Diversity et al. 2004, p. 8) asserts that timber harvesting creates gaps in the distribution of this species because it is rarely able to recolonize habitat after local populations are extirpated. Indirectly supporting this hypothesis, studies of the closely related Del Norte salamander showed that it is highly sedentary and, therefore, likely to have limited dispersal abilities. Welsh and Lind (1992, p. 427) reported that the longest movement by an individual Del Norte salamander was 119 ft (36.2 m) over 6 months, and Lowe (2001, p. 27) found that the longest movement was 129.9 ft (39.6 m) over 2 years. Average movements were substantially smaller than these: 22 ft (6.7 m) over 2 years (Lowe 2001, p. 27) and 16.7 ft (5.1 m) over 6 months (Karraker and Welsh 2006, p. 136). Siskiyou Mountains salamanders, and in particular Scott Bar salamanders, have relatively longer limbs than Del Norte salamanders and may be capable of longer movements, but their dispersal abilities are still likely limited. Some researchers have suggested that dispersing juvenile Siskiyou Mountains salamanders readily colonize logged sites (Welsh 2005, pp. 1–2) and road cutbanks (Nussbaum 1974, p. 13). Alternatively, it is possible that salamanders in regenerating logged sites and road cutbanks are indicative of population persistence and recovery following disturbance, rather than extirpation and subsequent recolonization.

Welsh and Ollivier (1995, pp. 8–9) suggested that tractor yarding of logs during timber harvesting may impact Siskiyou Mountains salamanders by compacting, breaking, or realigning talus. If tractor yarding has these effects, it could reduce the interstitial spaces in talus and thereby reduce habitat quality for these species. Although it is reasonable to conclude that tractor yarding may disturb talus substrates, research has not demonstrated how this affects salamander populations.

In summary, rigorous research of the effects of timber harvesting on Siskiyou Mountains salamanders is needed, but intensive timber harvesting practices, such as clear-cutting and tractor yarding, appear to have negative short-term (30 years or less) effects on abundance, population structure, and body condition of these species (Welsh et al. 2007b). Intensive timber harvesting likely affects these salamanders by changing forest characteristics that influence microclimates for them, for example, by opening the forest overstory and understory canopies and reducing coverage of down wood and leaf litter. Despite these effects, it is also clear that the salamanders frequently persist in intensively harvested habitats, and there is no information suggesting that populations are permanently extirpated by timber harvest. It is unknown whether these salamanders may be temporarily extirpated from severely disturbed sites or simply retreat underground during the initial period of post-disturbance recovery. Alternative silvicultural techniques, such as thinning, selective harvesting, and helicopter yarding, appear to be less harmful to these salamanders than more intensive harvesting methods.

Timber Harvesting Effects on Other Plethodontids

To support their assertion that the Siskiyou Mountains salamander is threatened by timber harvesting, the petitioners cite studies of other closely related species. Most studies of the closely related Del Norte salamander indicate that this salamander is more abundant in mature forest than in other forest age classes (Raphael 1988, p. 27; Welsh and Lind 1991, p. 400; Welsh and Lind 1995, p. 208). In contrast, Diller and Wallace (1994, p. 316) did not detect a relationship between forest age and the presence of Del Norte salamanders near the northern California coast. It is possible that forest structural characteristics (e.g., canopy cover) more strongly influence microclimates for salamanders in the interior of the Klamath Mountains than near the coast, where temperatures are more moderate and moisture is less limiting.

Karraker and Welsh (2006, p. 137) found lower abundances of Del Norte salamanders in clear-cuts than in mature stands. All salamander life stages were observed in clear-cuts, indicating that reproduction was occurring in them. Abundances were similar in commercially thinned and mature stands. Welsh et al. (2007b) found significant positive relationships between forest age class and presence and abundance of Del Norte salamanders. Adult salamanders accounted for a larger proportion of individuals observed in old-growth (older than 200 years) and mature (100 to 199 years) stands than they did in young (31 to 99 years) stands. The authors suggested that higher proportions of adult salamanders are indicative of greater population stability for this species. In contrast, salamanders at pre-canopy (0 to 33 years), young, and old-growth sites had higher median body condition than those in mature stands or the reference site (thought to be a high-quality site). The authors speculated that the apparent inconsistencies in their results were related to greater competition and poorer body condition in sites with higher salamander abundances, but more research is needed to test this hypothesis. Biek et al. (2002, p. 137) found similar abundances of Del Norte salamanders in clear-cuts and mature forests in Oregon, apparently contradicting the results of the studies discussed above.

Evaluation of studies of the effects of timber harvesting on plethodontids outside the *Plethodon elongatus* Complex may improve our

understanding of the effects of harvesting on Siskiyou Mountains salamanders. However, these studies should be cautiously considered due to differences in the natural histories of these species. Most plethodontids occupy soil, surface litter, and woody debris in mesic environments (e.g., where it frequently rains during summer), whereas Siskiyou Mountains salamanders occupy talus substrates, which provide refuge from the temperature extremes and dry conditions that characterize the eastern Klamath Mountains.

Grialou et al. (2000, pp. 108–110) found that western red-backed salamanders in mesic forests in southwestern Washington occupied recent clear-cuts (2 to 4 years post-harvest) but at significantly lower abundances than in adjacent older stands. Body sizes of salamanders (subadults and juveniles) were smaller the year after harvesting but were normal by the second year. Gravid females were captured on clear-cut plots before and after harvest. Grialou et al. (2000, p. 111) suggested that reduced abundances of western red-backed salamanders in clear-cuts were related to soil compaction, loss of woody debris, and decreased leaf litter cover associated with harvesting. Bury and Corn (1988, p. 171) reported plethodontid salamanders to be absent in four clear-cut study sites, but their results were equivocal because detection rates were very low in all of the habitats studied. In contrast to the above studies, Corn and Bury (1991, p. 311) found that abundances of western red-backed salamanders were not significantly different in recent clear-cuts (less than 10 years old) and old-growth forest.

Studies of plethodontids in the mid-western and eastern United States (Ash 1997, p. 985; deMaynadier and Hunter 1998, pp. 344–345; Herbeck and Larsen 1999, p. 626) and western Canada (Dupuis et al. 1995, p. 648) indicated that clear-cutting can have significant short-term impacts on plethodontid salamander abundance. Dupuis et al. (1995, p. 648), Ash (1997, p. 987), and Herbeck and Larsen (1999, p. 626) reported that plethodontid salamanders were frequently absent from 2- to 5-year-old clear-cut stands. However, the impact of clear-cutting on these salamanders may be temporary, as one study (Ash 1997, pp. 985–986) showed that salamanders returned to clear-cut areas 4 to 6 years after cutting, and their return was followed by rapid increases in their numbers. Statistical modeling of salamander abundances on clear-cut plots indicated that salamanders would equal or exceed numbers on forested plots by 20 to 24 years after cutting (Ash 1997, pp. 985–986). Knapp et al. (2003, pp. 754–758) used a randomized, replicated design to quantify plethodontid salamander populations on harvested timberlands of the Appalachian Mountains in Virginia and West Virginia. While salamander abundances were lower in clear-cuts than in control plots, there were no differences in the proportion of gravid females or in the average number of eggs in gravid females. Moreover, there were no differences in the proportion of juvenile animals, except in one plethodontid species, which had a higher proportion of juveniles in uncut treatments.

Extent of Timber Harvesting Within the Range of the Siskiyou Mountains Salamander

Evaluation of the threat potentially posed by modification or loss of habitat via timber harvest must be based on an assessment of the biological mechanisms involved, as well as quantification of the likelihood of those mechanisms occurring to an extent and magnitude reasonably expected to result in the threat of extinction. The extent and magnitude of potential effects caused by timber harvest are strongly influenced by existing land management regulations on the majority of the species' ranges. Approximately 85 percent of the range of the Siskiyou Mountains salamander occurs on Federal lands managed under the NWFP (USDA and USDI 1994) (see Table 3 above). In general the system of reserves and management guidelines provided by the NWFP provide a substantial reduction in the likelihood of widespread habitat alteration due to timber harvesting.

The rate and extent of timber harvest has declined dramatically on Federal lands within the NWFP area during the past 30 years (USDA and USDI 2005), particularly on the Klamath National Forest, which comprises roughly 91 percent of the range of the Grider salamander. These reductions have been primarily due to the implementation of the NWFP and other Federal land management regulations. During the 6-year period from 2000 to 2005, the Klamath National Forest sold and removed an average of 15.9 million board feet of timber annually, compared with 187.8 million board feet per year during 1985 to 1990 (inclusive), and 238.2 million board feet per year from 1979 to 1984; this marks a reduction of roughly 93 percent from the 1979 to 1984 period (USDA 2006a). Perhaps more importantly, the amount of intensive timber management (regeneration harvests, overstory removal) has declined sharply, from an average of 3,733 ac per year from 1988 to 1991, to 38 ac per year from 2000 to 2006. Intensive harvest prescriptions such as clear-cutting were not used in 2001 or 2002, nor in 2004 to 2006 (USDA 2007b). Likewise, timber harvest on the Rogue River National Forest (which comprises roughly 66 percent of the range of the Applegate Population of the Siskiyou Mountains salamander (Clayton 2007b) declined by 96 percent during the last 30 years. Annual timber harvest during the 1980s averaged 182 million board feet, compared with 8 million board feet per year from 2000 to 2006 (USDA 2007c). Since 1996, only one timber sale has been sold and harvested on the Rogue River National Forest's Applegate Ranger District. Timber harvest, particularly intensive harvest methods, has also declined dramatically on lands administered by the BLM within the range of Applegate salamander. Mean annual harvest on the BLM's Ashland Resource Area have declined from 2,240 ac (907 ha) per year between 1995 and 2000, to 664 ac (269 ha) per year between 2001 and 2007 (USDI 2007a). Less than 270 ac (109 ha) per year have been harvested since 2003 (USDI 2007a). Intensive harvest methods, such as clear-cuts and shelterwood harvests, have declined from 54 percent of acres harvested in the mid-1990s, to less than 1 percent of the annual harvest since 2001. The implementation of the NWFP and subsequent declines in timber harvest levels on Federal lands, particularly intensive harvests thought to potentially affect salamanders, greatly reduces the likelihood that a substantial proportion of the salamanders' populations will be affected by logging. We anticipate that reduced levels of timber harvest will continue into the foreseeable future because this has been the trend for the last 30 years and we have no substantial information that indicates that this trend will be reversed in the foreseeable future. In addition, the essential goals of the NWFP remain in effect and we have no information that would lead us to anticipate changes to the overall goals of this ecosystem management strategy. The removal of the Survey and Manage guidelines is relevant only to occupied salamander sites that overlap with Federal forest management projects; this comprises a very small fraction of the NWFP area and will have an insignificant effect on the overall levels of timber harvest within the range of the Siskiyou Mountains salamander.

Intensive timber harvest methods such as clear-cutting are extremely limited in extent on Federal lands within the ranges of these salamanders, but where they occur they may reasonably be expected to have negative impacts on salamander populations. The available evidence does not demonstrate that the less-intensive harvest methods commonly employed on Federal lands have had substantial impacts to salamander populations, and we do not anticipate such impacts in the future. However, we acknowledge that the relationship between degree of management intensity and effects to salamanders requires further investigation.

Intensive timber harvesting practices on private timberlands affect only 10 percent of the Siskiyou Mountains salamander's range. The majority of private lands within the salamander's range occur as small parcels (typically one square mile or less) in a checkerboard pattern surrounded by Federal lands. Salamander populations on private lands may be negatively affected by timber harvesting but are dispersed among populations on Federal lands where management is more favorable. This acts to maintain redundancy, distribution, and connectivity among Siskiyou Mountains salamander populations within the mix of Federal and private lands. In addition, surveys and monitoring of Siskiyou Mountains salamanders on private timberlands demonstrate that numerous populations of Siskiyou Mountains salamanders continue to exist post-harvest and some exhibit evidence of normal population structure (Farber et al. 2001, p. 13; Bull et al. 2006, p. 24; Farber 2007, p. 3), indicating that extirpation of salamander populations on harvested private timberlands is not a substantial threat to the species.

Wildfire

Wildfire is thought to be a potential threat to Siskiyou Mountains salamander habitat (Olson et al. 2007, pp. 15, 25–26). Fire suppression and logging have altered forest structure and increased fuel loading in much of the Klamath-Siskiyou region (Skinner et al. 2006, pp. 178–179). Fire regimes within the ranges of the species have largely shifted from frequent, low-to-moderate or mixed-severity fires to less frequent, more severe fires (Agee 1993, pp. 388–389; Taylor and Skinner 1998, p. 298; USDA 1999, pp. 2–76 and 2–82; Skinner et al. 2006, p. 191). However, debate exists concerning the extent to which this effect is operating in the Klamath and Siskiyou Mountains (Odion et al. 2004, pp. 933–934). Climate changes associated with global warming are expected to increase the frequency of large, severe fires in this region (see Factor E discussion below). However, fire modeling suggests that the level of tree mortality would be highly variable within the geographic ranges of these species (USDA 1999, pp. 2–76 and 2–82; Suzuki and Olson 2007, p. 8), resulting in a mosaic pattern of habitat effects. Similar mosaics of effects have been documented for large fires in other regions (e.g., Eberhart and Woodard 1987, pp. 1207–1212). In addition, the talus outcrops inhabited by these salamanders may modify the behavior of fire (e.g., Major 2005, p. 95) by acting as minor fuel breaks and influencing the mosaic of burned and unburned areas.

The direct effects of fire on these species are unknown but interstitial spaces in deeper talus habitat likely provide underground refugia for these salamanders during fires (DeGross and Bury 2007, p. 7). In addition, wildfires typically burn during the dry summer and fall months when the salamanders are not on the surface; the period of surface activity coincides with wet climatic conditions prohibitive to wildfire.

The indirect effects of fire on these species are also unknown. Severe wildfires, by definition, remove or significantly reduce canopy cover; consume moss, duff, and forest litter; and may sterilize surface soil layers. Siskiyou Mountains salamanders occasionally use woody debris as cover during surface activity, and canopy and leaf litter cover may influence habitat quality for them (see Habitat Associations section), so these habitat changes likely affect salamanders during some period of post-fire recovery.

We are unaware of any studies of the effects of prescribed burning on Siskiyou Mountains salamanders. Prescribed fires are usually applied in the spring or fall, when moisture levels minimize the risk of damage to mature trees and unacceptable spreading of fire. Moisture levels during periods of surface activity by these species are higher than those that are appropriate for prescribed burning, so the risk of direct mortality during prescribed fires is likely low. Prescribed fires could temporarily reduce the quality of habitat for these species by consuming understory vegetation, down wood, litter, and duff. Conversely, the benefits of prescribed fires may outweigh their costs to salamanders in some areas by reducing the risk of severe wildfires.

Roads and Road Construction

Research suggests that forest roads may significantly restrict movements and local abundances of plethodontid salamanders (deMaynadier and Hunter 2000, pp. 63–64; Marsh et al. 2005, p. 2006; Semlitsch et al. 2007, p. 159). Forest roads may reduce dispersal by salamanders, leading to lower gene flow and reduced long-term persistence of populations (Marsh et al. 2005, p. 2007). Conversely, Nussbaum (1974, p. 13) found numerous salamander locations within road cuts, and suggested that the road construction provided habitat in the form of newly exposed fissured rock, or at least did not render the adjacent habitat unsuitable. Within the ranges of the Siskiyou Mountains salamander, roads are typically constructed for access to timber harvest operations. While road densities are high in some areas within the ranges of the salamanders (USDA 1999, pp. 2–31), the amount of road construction activity has declined sharply as timber harvest levels have dropped. Road decommissioning projects may have short-term localized effects to rock substrates, but are designed to re-create a natural substrate. The small area affected by road construction and the linear nature of habitat impacts, combined with the ability of salamander populations to occupy road cuts, suggest that forest roads do not pose a significant threat to populations of Siskiyou Mountains salamanders (Olson et al. 2007, p. 17). We are not aware of any other information that suggests that the presence of roads or road construction presents a substantial threat to the Siskiyou Mountains salamander.

Mining and Rock Quarrying

Some sites occupied by the Siskiyou Mountains salamander have evidence of previous mining activity. It is unclear whether or how salamanders in those sites may have been affected by these activities. Rock quarrying could pose a greater threat to individual populations because of the potentially greater intensity of the disturbance. However, this activity occurs within an extremely small proportion of this species' range, and is unlikely to have more than localized effects (Olson et al. 2007, p. 17). We are not aware of any information that suggests that mining or rock quarrying presents a substantial threat to the Siskiyou Mountains salamander.

Summary of Factor A

While intensive timber management practices such as clear-cutting appear to

have negative impacts on the abundance of Siskiyou Mountains salamanders, this practice is severely restricted on Federal lands that constitute the vast majority of the species' range. Less intensive harvest practices appear to have relatively minor or short-term impacts to salamander abundance, and the available evidence suggests that salamander populations persist in a broad range of forest habitat conditions and under different management practices.

Current management on Federal lands under the provisions of the NWFP protects salamanders via a system of reserves and land management guidelines (see Background Information: Land Management) that dramatically reduce the likelihood of large-scale reduction of suitable or occupied habitat. Until recently, the Survey and Manage guidelines also served to protect occupied salamander sites from disturbance from management activities. In the northern portion of the range, a Conservation Strategy has been implemented that will essentially continue the Survey and Manage Protections for Applegate salamander. However, even without Survey and Manage or Conservation Strategy protections, the available evidence does not show that timber harvest practices on Federal lands, either alone or in combination with other habitat disturbing activities such as mining, road building or wildfire, have substantially reduced the habitat or range of this species or are likely to do so in the foreseeable future.

Intensive timber harvesting practices, such as clear-cutting and shelterwood removal, are more likely to occur on private timberlands. While it is reasonable to assume that abundance and population structure of Siskiyou Mountains salamander populations on private timberlands may be negatively affected by timber harvesting and other habitat disturbances, these lands constitute less than 10 percent of the species' range. Other factors combine to greatly reduce the likelihood that Siskiyou Mountains salamander populations will be threatened by management activities on private lands: (1) The majority of private lands within the species' range occur as small parcels (typically one square mile or less) in a checkerboard pattern surrounded by Federal lands; and (2) many salamander populations have persisted on private timberlands in spite of a history of timber harvest. We, therefore, conclude that timber harvesting and other management practices on private lands do not constitute a substantial threat to the Siskiyou Mountains salamander.

Wildfires are expected to occur and may reduce habitat quality for some salamander populations; however, the effects of wildfires on salamander habitat are temporary and populations appear to recover as vegetation recovers. Wildfires typically burn in a mosaic pattern of intensities, leaving a variety of habitat conditions for salamanders within burned areas.

In summary:

(1) There is no evidence that the range of the Siskiyou Mountains salamander has changed from its historical size.

(2) Despite over a century of mining, road building, and intensive timber harvest, salamander populations remain well-distributed in a wide variety of habitat conditions.

(3) Results of field studies and surveys indicate that salamander populations recover following intensive habitat disturbances.

(4) On Federal lands, which constitute the majority of this species' range, NWFP land allocations and Standards and Guidelines (excepting the Survey and Manage program) and other regulations contained in Land and Resource Management Plans provide a broad range of protections for salamander habitat.

(5) The rate and intensity of timber harvest has declined dramatically on Federal lands and there is no reliable information suggesting that harvest rates or intensity will increase substantially in the foreseeable future.

(6) While more intense harvesting may occur on private lands, these lands are patchily distributed among Federal land holdings and taken together constitute less than 10 percent of the species' range.

(7) Available evidence does not indicate that other potential habitat threats to salamanders, individually or in combination with timber harvest (i.e., wildfire, mining and rock quarrying, and road building) have resulted in, or are likely in the foreseeable future to result in, significant habitat loss that would pose a threat to salamanders.

Therefore, we conclude that the Siskiyou Mountains salamander is not now or in the foreseeable future, threatened by destruction, modification, or curtailment of its habitat or range.

Factor B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

We are not aware of any information that indicates overutilization for commercial, recreational, scientific, or educational purposes threatens now, or in the foreseeable future, the Siskiyou Mountains salamander across its range.

Factor C: Disease or Predation

Chytridiomycosis is a relatively recently described epidermal infection of amphibians caused by the chytrid fungus *Batrachochytrium dendrobatidis.* Chytridiomycosis has been implicated in mass mortalities, population declines, and extinctions of some amphibian species, but species appear to vary in their susceptibility to the disease (Daszak et al. 1999; Blaustein et al. 2005; Ouellet et al. 2005; Pearl et al. 2007). This disease is most likely transmitted to amphibians by contact with infected water or other amphibians (Johnson and Speare 2003, p. 922). *Batrachochytrium dendrobatidis* requires moisture for survival (Johnson and Speare 2003, p. 922) and is therefore more likely to pose a threat to aquatic amphibians than to terrestrial ones. However, a chytrid infection was recently found in a terrestrial salamander, the Jemez Mountains salamander (*Plethodon neomexicanus*), living in a wet meadow (Cummer et al. 2005, p. 248). Infected aquatic amphibians appeared to be the most likely source of transmission of the disease to this individual. Bullfrogs (*Rana catesbeiana*) infected with *B. dendrobatidis* were recently found in a pond in Trinity County, California (Bettaso and Rachwicz 2006, p. 162), so it is possible that the disease occurs, or will soon occur, within the range of the Siskiyou Mountains salamander. Nonetheless, we do not anticipate that the Siskiyou Mountains salamander will be exposed to this disease or that exposure would lead to transmission through a significant portion of its range. This species is not associated with bodies of water, occurs in a characteristically dry environment, is only active above ground for brief and intermittent periods during the year, and appears to have limited dispersal abilities. Given these restrictions, we believe that the Siskiyou Mountains salamander is unlikely to be exposed to diseased water or infected aquatic amphibians and, if infected, is unlikely to transmit the disease between populations.

The Service is not aware of any predators that potentially pose a threat to the species.

Therefore, we find disease or predation does not threaten now, or in the foreseeable future, the Siskiyou Mountains salamander across its range.

Factor D: Inadequacy of Existing Regulatory Mechanisms

To the extent that we identify possibly significant threats in the other factors, we consider under this factor

whether those threats are adequately addressed by existing regulatory mechanisms. Thus, if a threat is minor, listing may not be warranted even if existing regulatory mechanisms provide little or no protection to counter the threat.

As described above in the ''Background: Land Management'' section, habitats occupied by Siskiyou Mountains salamanders receive protection from a number of sources such as the NWFP and other Federal land management regulations. Until recently, protections for the Siskiyou Mountains salamander on Federal lands included the Survey and Manage Mitigation Measure Standards and Guidelines portion of the NWFP. On private lands in California, the species complex receives protection pursuant to the California Endangered Species Act (CESA). The future of some of these regulations (Survey and Manage Program and State Protections) is in flux.

Federal Lands

Survey and Manage Mitigation Measure Standards and Guidelines

Siskiyou Mountains salamanders and their habitat have received an additional layer of security from the Survey and Manage Mitigation Measure Standards and Guidelines (Survey and Manage Program) under the NWFP (USDA and USDI 1994). The Survey and Manage Program provided specific guidance for management of both genetic subunits of the Siskiyou Mountains salamander. Management guidance for Applegate salamander populations included identification of high-priority sites that will be managed to provide a reasonable assurance of long-term species persistence. In the southern portion of the range (Grider and Scott Bar salamanders), protections included the requirement of surveys prior to land management activities, and restrictions of habitat-altering activities such as timber harvesting at occupied sites (see ''Background: Land Management''). The USFS and BLM decided to remove the Survey and Manage Program from the NWFP, and published their ROD entitled ''To Remove or Modify the Survey and Manage Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl'' in March 2004 (March 2004 ROD). The FSEIS for the March 2004 ROD identified potential mitigation measures, including sensitive species programs, for species affected by the removal of the Survey and Manage Program.

In January 2006, the court in *Northwest Ecosystem Alliance* v. *Rey,* 2006 U.S. Dist. Lexis 1846 (N.D. Wash.) ordered the March 2004 ROD set aside for failure to comply with the National Environmental Policy Act. With this order, the court reinstated the 2001 Survey and Manage ROD, which had modified the original Survey and Manage Program but maintained protections for the salamanders. At the end of July 2007, the USFS and BLM issued a new ROD (2007 ROD) to remove the Survey and Manage Mitigation Measure Standards and Guidelines portion of the Northwest Forest Plan. Following issuance of the 2007 ROD, the USFS and BLM petitioned the court to lift or modify the injunction against projects that relied on the 2004 ROD. In its November 21, 2007, order, the court denied the agencies' request (*Conservation Northwest* v. *Mark E. Rey* 2007 U. S. Dist. Lexis 88541 (N. D. Wash.)), but did not rule on the sufficiency of the 2007 ROD.

With issuance of the 2007 ROD, the Survey and Manage Program has been eliminated for new project planning and decisions. However, because of the lag time in implementation of the 2007 ROD, most new Federal land management decisions issued in 2008 will be compliant with the former Survey and Management guidance for the Siskiyou Mountains salamander (West 2007); implementation of new projects compliant with the 2007 ROD is unlikely until 2009. Although judicial challenge to the removal of the Survey and Manage Program in the 2007 ROD is very likely, we assume for purposes of this finding that the Survey and Manage Program will not remain in effect in the future.

Assuming the removal of the Survey and Manage Program, management of this species will be based on the USFS's Special Status Species Program and the BLM's Sensitive Species Program (Hughes 2007). The Special Status Species and Sensitive Species programs are anticipated to provide less stringent protections than those in the Survey and Manage Program; however, they include provisions for development of conservation strategies and Conservation Agreements, which, as discussed previously under ''Land Management,'' has already occurred with regard to the Applegate salamander, and is under development for the Grider salamander and Scott Bar salamander.

It is important to note that, while the Service recognizes the added layer of security provided by Survey and Manage Protections for the Siskiyou Mountains salamander, our evaluation of the potential threats to this species does not indicate that the Survey and Manage Protections are key to the species' persistence. The petitioners cite statements in the 2004 FSEIS (USDA and USDI 2004) indicating that loss of the Survey and Manage Protections could result in gaps in the distribution of Siskiyou Mountains salamander. In addition, the Species Review Panel (USDA and USDI 2001, p. 16) concluded that ''[i]t is likely that non-protected land allocations will be required in order to ensure persistence for the species, both in the northern and southern portions of the range'' indicating that current reserves may be inadequate. We have carefully evaluated this information, and we find that these conclusions are no longer consistent with the current scientific knowledge about the Siskiyou Mountains salamander and Scott Bar salamander, because: (1) The conclusions were made based on a much smaller number of known populations (161) than what is known today (631); (2) they are based on a single unpublished habitat-associations study by Ollivier et al. (2001); and (3) they assumed extirpation of populations that experience any degree of timber harvesting. As described previously under ''Summary of Factors Affecting the Species: Factor A,'' the best available evidence indicates that Siskiyou salamanders persist in areas affected by timber harvest, and in particular, in areas subject to the less intensive harvesting methods employed on the vast majority of Federal lands that make up the species range and there is little evidence to support the speculation that the rate and intensity of timber harvest on Federal lands will increase in the foreseeable future, with or without the Survey and Manage protections.

Conservation Strategies

Conservation Strategy for the Siskiyou Mountains Salamander—Northern Portion of the Range

As discussed in detail above under the Species Information: Land Management section, in anticipation of the eventual removal of the Survey and Manage Program, a team of researchers and biologists from USFS Pacific Northwest Research Station and the Service formalized the existing Survey and Manage Category D objectives for the Siskiyou Mountains salamander in the northern portion of its range (Applegate salamander) in a Conservation Strategy (Olson et al.

2007). The USFS and BLM committed to implement this Conservation Strategy in the August 16, 2007, Conservation Agreement for the Siskiyou Mountains Salamander (*Plethodon stormi*) in Jackson and Josephine Counties of southwest Oregon and in Siskiyou County of northern California (USDA and USDI 2007; Olson et al. 2007). However, because of the limited nature of the threats addressed by the conservation Strategy, we did not rely on it in determining whether listing the Siskiyou Mountains salamander is warranted.

The petitioners (Greenwald and Curry 2007, p. 9) questioned whether the BLM will adhere to the Conservation Agreement because it is not incorporated into the proposed Western Oregon Plan Revision (WOPR) Draft Environmental Impact Statement (DEIS), a proposal to modify the NWFP land allocations and standards and guidelines on BLM lands in Oregon, which could potentially increase timber harvest levels on BLM lands within the range of the salamanders. Because we did not rely on the Conservation Strategy in reaching our determination, the petitioners' concern is not relevant. In any case, the timing of development and release of the WOPR DEIS precluded inclusion of the then-unsigned Conservation Agreement; the BLM has subsequently provided a letter to the Service clarifying the BLM's commitment to implement the Conservation Strategy regardless of the eventual outcome of the WOPR proposal (USDI 2007b).

The petitioners also question the ability of the Conservation Agreement to conserve the Siskiyou Mountains salamander because it protects only roughly half of the currently known salamander locations and allows management of fire risk at 48 locations (Greenwald and Curry 2007, pp. 10–11). Petitioners apparently assume that only the selected high-priority sites will receive any degree of protection, management guidelines designed to reduce fire risk at 48 sites will harm populations, and significant losses of Applegate salamander populations not specifically protected by the strategy are likely. Although we did not rely on the Conservation Strategy in reaching our conclusion, we note that the available information does not support these assumptions. It is unlikely that a high proportion of the non-network sites are at risk because of other protections in place. For example, many of the 289 Siskiyou Mountain salamander locations not selected for the population network fall within NWFP reserves and other areas not likely to experience intensive disturbance, and, as described above under Factor A, there is little evidence to suggest that substantial losses of populations will occur as a result of foreseeable forest management activities. The Conservation Strategy was authored by four of the most-published scientific experts on this species (D. Olson, D. Clayton, H. Welsh, and R. Nauman, among others), and incorporates habitat modeling and risk assessment in the evaluation of species persistence and distribution within the strategy area. The petitioners present no information or analysis to support their contention that the expert team somehow erred in the development of the Conservation Strategy.

The petitioners assert that the Conservation Strategy is unlikely to be effective because it contains management recommendations that appear to lack regulatory force (Greenwald and Curry 2007, p. 10) and further claim that the Conservation Strategy does not meet the standards of the Service's Policy for Evaluating Conservation Efforts (PECE) (68 FR 15100; March 28, 2003) (Greenwald and Curry 2007, p. 11). In response to the petitioners' first concern, we have no basis to conclude that the Federal parties to the Conservation Agreement will fail to comply with their own management guidance, and note that the Service will be a participant in the 5-year reviews described in the Strategy under Adaptive Management (Olson et al. 2007, p. 39–40). As described under ''Background: Land Management,'' the Conservation Strategy for the Siskiyou Mountains Salamander, Northern Portion of the Range is simply the formalization of existing Survey and Manage guidance for northern populations of Siskiyou Mountains salamanders; guidance deemed adequate by the petitioners (Center for Biological Diversity et al. 2003, p. 17) and the Survey and Manage taxa team experts.

In response to petitioners' reliance on PECE, we emphasize that application of the PECE is inappropriate here. The Service may rely on conservation efforts that meet the standards of PECE in making listing determinations. In other words, a conservation effort relied on consistent with PECE can be dispositive as to the Service's ultimate finding on the status of a species. The policy therefore requires a high level of certainty that conservation efforts will be implemented and will be effective to ameliorate threats that would otherwise warrant listing of a species. Even in the absence of the Conservation Strategy, we do not consider the threats to the Siskiyou Mountains salamander under factors A through E of Section 4(a)(1) of the Act, now or in the foreseeable future, substantial enough to warrant its listing under the Act. Therefore, although implementation of the Conservation Strategy may be beneficial for the Siskiyou salamander, we did not rely on it in making our determination that the species does not warrant listing.

Western Oregon Plan Revisions

The WOPR are a proposal by the BLM to revise six resource management plans (RMPs) that cover all BLM-administered lands in western Oregon. In August 2003, the American Forest Resource Council, the Association of Oregon and California Counties, and the Secretaries of Interior and Agriculture entered into a settlement agreement requiring the BLM to revise its RMPs to meet the mandated requirements of the Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act of 1937. In accordance with this agreement, the BLM is proposing to revise existing RMPs to replace the NWFP land-use allocations and management direction. In its August 16, 2007, DEIS for the Revision of the Western Oregon RMPs, the BLM describes three action alternatives designed to meet the purpose and need of the plan revisions, and a no-action alternative. Each of the action alternatives includes a range of management strategies; however, none of the action alternatives propose to retain NWFP late-successional reserves, and all action alternatives would result in a reduction in riparian reserve areas.

While these proposed revisions have the potential to increase timber harvesting within the range of the Siskiyou Mountains salamander, we cannot at this time predict which alternative, including the no action alternative, will be selected or evaluate the potential effects to the 11 percent of the range of the Siskiyou Mountains salamander that occurs on lands administered by BLM in Oregon.

While the potential effects of possible RMP changes on the small percentage of Siskiyou Mountains salamander's range that occurs on BLM lands are unknown, NWFP land-use allocations and management direction provides substantial protection for the Siskiyou Mountains salamander and its habitat. If existing Federal management for the Siskiyou Mountains salamander is modified in the future, the Service can consider any such changes in the context of the degree and immediacy of potential threats to the Siskiyou Mountains salamander at that time.

State Regulations

In California, the Siskiyou Mountains salamander is listed as a threatened species and receives substantial protection pursuant to CESA. On private timberlands, this protection includes a requirement for pre-project surveys and prohibitions on timber harvest in established buffers around occupied suitable habitat. In May 2005, CDFG submitted a petition to the California Fish and Game Commission to delist the Siskiyou Mountains salamander throughout its entire range in California. In August 2005, CDFG amended the petition by removing that portion of the Siskiyou Mountains salamander's range that is now known to be occupied by the recently described Scott Bar salamander. The private lands affected by the amended petition consititute only 9 percent of the known range of the Siskiyou Mountains salamander in California. The final determination on whether to delist the Siskiyou Mountains salamander was scheduled to be made at the Fish and Game Commission's January 31, 2007, meeting; however, that decision has been postponed pending completion of environmental documents. Because of controversy surrounding the proposed delisting, it is uncertain whether the existing regulatory protections will be removed in the foreseeable future. If existing State regulations are modified in the future, the Service can consider such changes in the context of the degree and immediacy of potential threats to the Siskiyou Mountains salamander at that time. However, because of the small proportion of the species' range that occurs on private lands in California, combined with evidence that Siskiyou Mountains salamander populations persist in disturbed habitats, we find that removal of CESA protections would not pose a substantial threat to the species.

No specific regulatory mechanisms to protect the Siskiyou Mountains salamander exist on the approximately seven percent of the species' range that occurs on private lands in Oregon. However, most of these lands occur as small (one square mile or less) parcels distributed in a checkerboard pattern or as isolated parcels within Federal lands where management is more favorable for salamanders and serves to maintain redundancy, distribution, and connectivity among Siskiyou Mountains salamander populations. In addition, research indicates that populations of Siskiyou Mountains salamander persist following timber harvesting and recover as vegetation is re-established (see Factor A). Therefore, the Service believes that the lack of regulatory protections on a small proportion of the species' range in Oregon does not pose a threat to the species in the foreseeable future.

Summary of Factor D

The adequacy of existing regulatory mechanisms to protect Siskiyou Mountains salamander populations must be evaluated in light of the degree of threat potentially posed by the actions being regulated. As described above under Factor A, Siskiyou Mountains salamander populations may find optimum habitat conditions in mature forest, but also occupy a wide range of forest conditions and have been shown to persist and recover following disturbances such as timber harvesting and fire. Although not specifically aimed at conservation of Siskiyou Mountains salamanders, land management guidance such as the NWFP and other regulations provide protection of salamander habitat on Federal lands which constitute the vast majority of the species' range. Although we have determined that the species does not warrant listing even in the absence of any reduction in threat resulting from implementation of the Conservation Strategy for the Siskiyou Mountains salamander (Plethodon stormi) in the Northern Portion of the Range (Olson et al. 2007), that Conservation Strategy may provide an added layer of security to the Northern Clade of Siskiyou Mountains salamander populations.

Current California regulations provide substantial protection for the Siskiyou Mountains salamander on the small percentage of the species' range in California that occurs on private lands. The California Fish and Game Commission is currently evaluating a petition to delist the Siskiyou Mountains salamander, but has not reached a decision regarding this action. However, we find that the removal of CESA protections would not pose a substantial threat to the species, because of the small proportion of the species' range that occurs on private lands in California, combined with evidence that Siskiyou Mountains salamander populations persist in disturbed habitats. Oregon does not provide regulatory protections for the Siskiyou Mountains salamander on private lands. However, private lands in Oregon comprise only seven percent of the Siskiyou Mountains salamander's entire range (both clades) and are scattered among Federal lands that compose the vast majority of the species' range.

Under Section 4(a)(1)(D) the Service must evaluate the adequacy of existing regulatory mechanisms rather than speculate about future changes to those mechanisms. With the exception of the Survey and Manage guidelines, which have been eliminated for future projects on Federal lands, we assume that the NWFP and other land management regulations will continue as existing regulatory mechanisms that provide adequate conservation of Siskiyou Mountains salamanders. If Federal or State regulatory mechanisms are modified or eliminated in the future, the Service can consider that information when evaluating the adequacy of then existing regulatory mechanisms to protect the Siskiyou Mountains salamander in the context of the degree and immediacy of potential threats to the Siskiyou Mountains salamander at that time.

In light of the ability for Siskiyou Mountains salamander populations to persist in managed landscapes, we find that existing Federal regulatory mechanisms such as the NWFP and other provisions of Federal Land and Resource Management Plans, in combination with the Federal Special Status Species programs, offer adequate protection for the Siskiyou Mountains salamander and its habitat over the vast majority of its range, and conclude that this species is not now, or in the foreseeable future, threatened by inadequate regulatory mechanisms.

Factor E: Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Other natural or manmade factors that may affect the persistence of the Siskiyou Mountains salamander within all or a significant portion of its range are climate changes associated with global warming and stochastic events, which are rare, chance events, such as epidemics and large, severe wildfires.

Climate Change

There is considerable uncertainty associated with projecting future climate changes. This uncertainty is partly due to uncertainties about future emissions of greenhouse gases and to differences among climate models and simulations (Stainforth et al. 2005, pp. 403–406; Duffy et al. 2006, p. 874). We are not aware of any climate change simulations for the Klamath-Siskiyou region, but the results of numerous climate change simulations for California and the Pacific Northwest have been published (see below). Together, these simulations describe a range of plausible outcomes from increased emissions of greenhouse gases.

All studies we reviewed predicted continued increases in average surface temperatures in California and the Pacific Northwest in response to increased emissions of greenhouse gases (Leung and Ghan 1999, p. 2031; Snyder et al. 2002, p. 1; EPRI 2003, p. 95; Hayhoe et al. 2004, p. 12422; Cayan et al. 2006, p. 11; Duffy et al. 2006, p. 873; Maurer 2007, p. 317; Salathé et al. submitted, pp. 8–9). The magnitude of projected increases in annual average temperature varied widely among studies, depending on the models and emissions scenarios used, from 3 to 10.4 degrees Farenheit (°F) (1.5 to 5.8 degrees Celsius (°C)), by the year 2100 (EPRI 2003, p. 3; Hayhoe et al. 2004, p. 12423; Cayan et al. 2006, pp. 11–14; Maurer 2007, p. 317). Simulations consistently project more pronounced temperature increases in California during the summer months than during other times of the year, 3.9 to 14.9 °F (2.2 to 8.3 °C) by 2100 (Hayhoe et al. 2004, p. 12422; Cayan et al. 2006, p. 14; Maurer 2007, p. 317). Some simulations projected more rapid temperature increases at higher elevations than at lower ones (Leung and Ghan 1999, p. 2047; Salathé et al. submitted, pp. 10–12). Most researchers attributed this difference to a snow-albedo feedback effect; this occurs when increased surface temperatures cause earlier and faster snow melt, which, in turn, allows more absorption of heat by the ground and further increases in surface temperatures.

Increased average surface temperatures could cause soils used by Siskiyou Mountains salamanders to become warmer, and possibly drier, during the dry season. If this occurs, it could negatively affect these species because they are associated with cool, moist soil conditions (see Habitat Associations above). However, we expect that the Siskiyou Mountains salamanders will be somewhat buffered from changes to soil surface conditions because they are primarily active below ground during the dry season. Salamanders at shallow sites may be more negatively affected by drying and heating of the soil surface than those at deeper sites since they will be less able to respond to changing soil microclimates with vertical movements. Increased surface temperatures could have unpredictable indirect effects on these species: For example, through effects on vegetation, disturbance regimes, competitors, predators, or prey.

Reviews of a large number and variety of climate change simulations found that projected changes to precipitation in California were highly variable but clustered around no change or a slight increase in annual precipitation (Cayan et al. 2006, p. 17; Maurer 2007, p. 317). Warming temperatures are consistently projected to increase the proportion of precipitation that falls as rain rather than as snow in California and the Pacific Northwest (Leung and Ghan 1999, p. 2041; Snyder et al. 2002, p. 3; Hayhoe et al. 2004, p. 12425; Cayan et al. 2006, p. 31; Maurer 2007, p. 319). Earlier and more rapid snowmelt and decreases in the proportion of precipitation that falls as snow are expected to cause declines in spring snowpacks (Hayhoe et al. 2004, p. 12422; Cayan et al. 2006, p. 31; Maurer 2007, p. 309). Declines in spring snowpacks have already occurred in some areas and are correlated with global warming trends (Mote 2003, pp. 1–4). Some areas will experience increased cloud cover as surface temperatures continue to increase (Croke et al. 1999, pp. 2128–2134). One model projected a greater increase in low cloud cover during spring in the Pacific Northwest, especially near the coast (Salathé et al. submitted, pp. 14–16).

Lower proportions of snow versus rain and earlier and faster snowmelt could enable the Siskiyou Mountains salamanders to become surface active earlier in the spring. We currently do not know whether or how a shift in the timing of surface activity might affect the viability of these species. Little is known about the physiological sensitivities of the Siskiyou Mountains salamanders to temperature, but an increase in spring cloud cover could directly benefit them by moderating daily temperature ranges during their periods of surface activity. Superficially, increased precipitation might also directly benefit the species, while decreased precipitation might negatively affect it. For example, changes to the timing and amount of precipitation could alter the length or frequency of the species' periods of surface activity or the size or location of its geographic range. Changes to cloud cover or the amounts, timing, and form of precipitation could also have complex indirect effects on the species; for example, through influences on vegetation, disturbance regimes, competitors, predators, or prey. Evaluation of the potential effects of changes to precipitation on the Siskiyou Mountains salamander should become more meaningful as emissions scenarios, climate change models, and our knowledge of these species continue to improve.

Vegetation modeling by Lenihan et al. (2003a, pp. 1–41; 2003b, pp. 1667–1681) projected that increased emissions of greenhouse gases will cause large-scale replacement of evergreen conifer forest (e.g., Douglas fir-white fir) with mixed evergreen forest (e.g., Douglas-fir-tanoak) in the Klamath-Siskiyou region. This redistribution of vegetation types is predicted to occur under conditions created by two contrasting climate change models (Lenihan et al. 2003a, pp. 23–25). Because Siskiyou Mountains salamanders already occur within mixed evergreen forest, we do not anticipate a direct negative effect to the species from this potential change. However, the species may shift its range to higher elevations, following elevational changes in climate and vegetation. Numerous indirect effects of community composition shifts on the Siskiyou Mountains salamander could occur, but the net effect of these shifts is currently impossible to predict owing to the lack of information about this species' ecology.

Despite variability in climate change simulations, consistent projections for warmer summers, reduced spring snowpacks, and earlier and more rapid snowmelt suggest that forests in California and the Pacific Northwest will experience longer fire seasons and more frequent, extensive, and severe fires in the future (Flannigan et al. 2000, pp. 221–229; Lenihan et al. 2003a, p. 18; Whitlock et al. 2003, pp. 13–14; McKenzie et al. 2004, pp. 897–898). However, inconsistent predictions for precipitation, including increased cloud cover and rainfall, make this outcome uncertain.

The Siskiyou Mountains salamander has experienced other large changes to global and regional climates during its history. For example, global temperatures during the Pliocene warm period (5 to 3 million years ago) were approximately 5.4 °F (3 °C) higher than today (Ravelo et al. 2004, p. 263). More recently, several large changes to climate, fire regimes, and vegetation occurred in the Klamath-Siskiyou region during the Holocene (approximately 12,000 years to present day) (e.g., Mohr et al. 2000). Little is known about how the Siskiyou Mountains salamander responded to prehistoric climate changes or how those responses might inform us about the impacts of future changes.

Stochastic Events

Siskiyou Mountains salamanders have relatively small geographic ranges and limited dispersal abilities. Analyses of the fossil record and of currently threatened species suggest that species with these characteristics are at a higher risk of extinction than are mobile, widely distributed species (Jablonksi

1986; Manne et al. 1999; Dynesius and Jansson 2000; Jones et al. 2003; Payne and Finnegan 2007). Stochastic (rare, chance) events such as epidemics or large, severe fires can threaten the persistence of species with restricted ranges because a single event can occur within all or a large portion of their ranges. Species that are relatively sedentary are probably less able than mobile animals to escape stochastic events and their effects, or to recolonize parts of their range where they have been extirpated. Some researchers have suggested that the Siskiyou Mountains salamander is rare and patchily distributed, which could further increase the species' risks of extinction. However, the evidence cited above suggests that this salamander is in fact well distributed within its range, that it likely occurs at high densities in some areas, and that it persists in areas that have experienced disturbances (see Range and Distribution, and Factor A).

Epidemics and large, severe fires are two kinds of stochastic events that could negatively affect populations of the Siskiyou Mountains salamander. However, these events are unlikely to threaten the persistence of the species across its range. The only lethal disease we are aware of that could behave as an epidemic in populations of this salamander is chytridiomycosis (*Batrachochytrium dendrobatidis*), but this species does not appear likely to contract this disease and the Siskiyou Mountains salamander's life history makes it unlikely that this disease would spread as an epidemic (see Factor C above). The Siskiyou Mountains salamander is probably more likely to experience large, severe wildfires than epidemics in the foreseeable future. Wildfires can occur over large areas relative to the range of the Siskiyou Mountains salamander. For example, 499,965 ac (202,329 ha) burned during the 2002 Biscuit Fire in southwestern Oregon and northwestern California, largely outside of the range of the salamanders. Approximately 44 percent of the area (219,985 ac (89,025 ha)) was severely burned (USDA and USDI 2004). In comparison, the species range of the Siskiyou Mountains salamander is 423,155 ac (171,241 ha). However, Siskiyou Mountains salamanders appear to be relatively resilient to disturbances (see Factor A above), having evolved in a region where large wildfires are characteristic. Further, past fire behavior and modeling of future fire behavior suggest that large, severe fires in this region will have a mosaic of effects, leaving unburned and lightly burned patches of suitable habitat for the species in some areas (see Factor A above).

Summary of Factor E

Uncertainty is associated with predicting future climate changes, but simulations have consistently projected continued increases in average surface temperatures, reduced spring snowpacks, and a lower proportion of precipitation falling as snow during this century. Given its physiology, this species may be strongly affected, positively or negatively, by changes to precipitation patterns. However, projections of future patterns of precipitation are highly variable for northern California and southern Oregon, precluding any reliable prediction of future effects on salamander populations.

The Siskiyou Mountains salamander has a relatively small geographic range, restricted habitat associations, and limited dispersal abilities, which could make it more vulnerable to stochastic events such as large, severe fires than species without these characteristics. Large, severe fires are also expected to increase in frequency in the Klamath-Siskiyou region due to global warming and other anthropogenic factors. However, the high variability of wildfire effects at landscape scales, coupled with the apparent ability of the species to persist and eventually recover following habitat disturbance (see Factor A above), indicates that the Siskiyou Mountains salamander has a high likelihood of persistence in the foreseeable future. In addition, land management agencies within the ranges of the salamanders are actively conducting fuels management treatments to reduce the likelihood of wide-scale catastrophic fire. The future effectiveness of these treatments is unknown, but evidence suggests that at least local reductions in fire severity will be achieved. Therefore, we conclude that the Siskiyou Mountains salamander is not now, or in the foreseeable future, threatened by the individual or cumulative effects of climate change, or stochastic events such as epidemics or large, severe wildfires across its range.

Finding

We have carefully assessed the best scientific and commercial information available regarding threats faced by the Siskiyou Mountains salamander. We have reviewed the petition, information available in our files, and all information submitted to us following our 90-day petition finding (72 FR 14750; March 29, 2007). We also consulted with recognized salamander experts and Federal land managers, and arranged for researchers to initiate field studies to assess the distribution of genetic entities within the salamander complex, and demographic response of these species to forest structure.

The petitioners' primary argument for listing the Siskiyou Mountains salamander is founded on a chain of inferences, which may be simplified into the following: (1) The salamanders are highly dependent on old growth forest conditions; (2) disturbances such as timber harvesting that modify forest structure will extirpate populations; (3) the extent and magnitude of such disturbances are sufficient to threaten the species with extinction in the immediate future; (4) therefore, highly restrictive regulatory mechanisms are critical to prevent extirpation of populations by timber harvesting or wildfire; and, finally, (5) existing regulatory mechanisms are inadequate to ameliorate the perceived threats to the species. We find that there is little evidence to support any of the five above-mentioned assertions.

The available information indicates that, while habitat conditions associated with dense mature forests may be optimal for the Siskiyou Mountains salamander, populations occupy a wide range of habitats that provide the requisite elements of shading, moisture, and cover. Salamander populations are found in a wide variety of forest conditions, including areas with evidence of past disturbances. Local abundance and fitness of populations may be negatively affected by more intensive timber harvesting and wildfires, but salamander populations appear to persist and recover as vegetation is re-established following such intense disturbances, and these intensive timber harvest practices such as clear-cutting are severely restricted on the Federal lands that constitute the majority of the species' range. Less-intensive harvest practices appear to have relatively minor or short-term impacts on salamander abundance, and there are many known populations on managed timberlands. There is no reliable evidence that indicates loss of populations or curtailment of the species' ranges has occurred.

Federal lands managed under the provisions of the NWFP comprise the majority of the Siskiyou Mountains salamander's range. The NWFP acts to protect salamanders and their habitat via a system of reserves and land management guidelines that dramatically reduce the likelihood of large-scale reduction of suitable habitat. Additional land allocations and management guidance in Federal land management planning documents

(retention areas, Roadless Areas) and the Federal agencies' Special Status Species programs provide additional layers of security against any long-term threats posed by timber harvesting or other land management activities.

Private lands comprise only about 10 percent of the species' range, and receive a relatively greater amount of timber harvesting. Currently, the Siskiyou Mountains salamander is listed under CESA and receives substantial protection on private lands in California; however, the future of these protections is uncertain. Regardless of the eventual CESA status of the species in California, habitat impacts on private land are not expected to pose a substantial threat to the Siskiyou Mountains salamander, because: (1) Private lands constitute a small minority of the species' range; (2) private lands exist in a checkerboard pattern of small (less than one square mile) parcels interspersed among Federal lands where management is more favorable and therefore, acts to maintain redundancy, distribution, and connectivity among populations within the mix of Federal and private lands; (3) salamander populations appear to persist and recover following timber harvesting; and (4) many salamander populations are known to occur on private timberlands despite a long history of timber harvesting.

Wildfires are expected to occur and may reduce habitat quality for some salamander populations; however, the effects of wildfire on salamander habitat are temporary and populations appear to recover as vegetation recovers. Wildfires in the Klamath-Siskiyou region typically burn in a mosaic pattern of intensities, leaving a variety of habitat conditions for salamanders within burned areas. We also note that Federal Federal land management agencies are actively planning and conducting fuels reduction treatments to reduce the threat of large, stand-replacing wildfires within the range of the Siskiyou Mountains salamander.

Within its relatively small range, populations of Siskiyou Mountains salamanders are well distributed, and abundance within populations can be high. There are 516 known locations for this species, and large areas supporting suitable habitat have not been surveyed. These population characteristics, combined with the species' apparent ability to persist and recover following habitat disturbance, indicate that the Siskiyou Mountains salamander is resilient to stochastic events such as large wildfires. Our evaluation of climate change modeling for the geographic area inhabited by the salamanders does not support the contention that climate change poses a substantial threat to Siskiyou Mountains salamanders. Although most of the available models predict increases in average temperatures, models were inconsistent with regard to future precipitation; increases in annual precipitation and cloud cover are a plausible outcome and could act to ameliorate any negative impacts caused by increased temperatures. It is not currently possible to forecast the specific effects of future climate on salamander populations.

Our evaluation of the threats to the Siskiyou Mountains salamander leads us to the conclusion that several factors act cumulatively to assure the continued existence of well-distributed, viable populations of this species into the foreseeable future. These are: (1) Populations are demonstrated to persist in a wide variety of habitat conditions; (2) populations appear to be somewhat resilient to habitat disturbances such as timber harvesting and fire; (3) to the extent that habitat disturbances have negative effects to salamander populations, 90 percent of the species' range is protected from substantial negative impacts by existing Federal land management regulations such as the NWFP and other regulations that provide protection for their habitat; (4) private timberlands constitute only 10 percent of the species' range, and currently support numerous salamander populations; and (5) the 516 currently known locations of this species are well-distributed spatially and large areas of suitable habitat have yet to be surveyed. Therefore, we do not find that the Siskiyou Mountains salamander is in danger of extinction (endangered) now, nor is it likely to become endangered within the foreseeable future (threatened) across its range. Therefore, listing the species range-wide as threatened or endangered under the Act is not warranted at this time.

Distinct Population Segment

As stated above, the Siskiyou Mountains salamander can be separated into two clades, the Applegate salamander and the Grider salamander and, therefore, may be considered as two distinct population segments (DPSs), if indeed, they meet the criteria to be defined as such. Section 2(16) of the Act defines ''species'' to include ''any species or subspecies of fish and wildlife or plants, and any distinct vertebrate population segment of fish or wildlife that interbreeds when mature'' (16 U.S.C. 1532 (16)). To interpret and implement the DPS provisions of the Act and Congressional guidance, the Service and the National Marine Fisheries Service (now the National Oceanic and Atmospheric Administration—Fisheries), published a Policy Regarding the Recognition of Distinct Vertebrate Population Segments in the **Federal Register** (DPS Policy) on February 7, 1996, (61 FR 4722). Under the DPS policy, three factors are considered in the decision concerning the establishment and classification of a possible DPS. These are applied similarly for additions to the list of endangered and threatened species. These factors are (1) the discreteness of a population in relation to the remainder of the species to which it belongs, (2) the significance of the population segment to the species to which it belongs, and (3) the population segment's conservation status in relation to the Act's standards for listing, delisting, or reclassification (i.e., is the population segment endangered or threatened?).

Discreteness

Citing the Services' DPS policy (61 FR 4722) and the best available information, the June 2006 petition suggests that the Siskiyou Mountains salamander can be separated into two discrete populations based on reproductive isolation. Under the DPS policy, a population segment of a vertebrate taxon may be considered discrete if it satisfies either one of the following conditions:

(1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

(2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status,or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

Phylogenetic studies of the Siskiyou Mountains salamander demonstrate that this species consists of two distinct genetic lineages: the Applegate salamander (populations within the Applegate River drainage and north of the Siskiyou Crest) and the Grider salamander (populations south of the Siskiyou Crest and adjacent to the Klamath River) (Pfrender and Titus 2001, pp. 5–6; DeGross 2004, pp. 24–44; Mahoney 2004, p. 8; Mead et al. 2005, pp. 163–166). Mead et al. (2005, p. 168) describe these lineages as ''a major phylogenetic subdivision within *P. stormi*.'' Mead et al. (2005, p. 168) estimated an average of 2.22 percent

mitochondrial DNA sequence divergence between the Applegate and Grider salamanders, compared with 11.5 percent and 11.68 percent sequence divergence between Scott Bar salamander and the Applegate and Grider salamanders, respectively. An additional genetic distinction between the two lineages is the almost complete lack of genetic variation within and among Applegate populations, likely the result of range expansion and genetic bottleneck as individuals dispersed into the southern reaches of the Applegate watershed (Pfrender and Titus 2001, pp. 5–6).

The geographic ranges occupied by the Applegate and Grider salamanders are separated by the Siskiyou Crest, a high-elevation ridge system unlikely to permit population connectivity between the groups. Analyses of mitochondrial DNA indicate that, while the ancestral lineage of the Applegate salamander originated south of the Siskiyou Crest, the two groups diverged over four million years ago (DeGross and Bury 2007, p. 3), further supporting the conclusion that the Siskiyou Crest constitutes an effective barrier between the groups.

The Applegate and Grider salamanders are markedly separated as a consequence of physical (geographic) features, and as a consequence exhibit genetic divergence as well. We, therefore, conclude that the two groups are discrete under our DPS policy.

Significance

If a population segment is considered discrete under one or more of the conditions described in our DPS policy, its biological and ecological significance will be considered in light of Congressional guidance that the authority to list DPSs be used ''sparingly'' while encouraging the conservation of genetic diversity. In making this determination, we consider available scientific evidence of the discrete population segment's importance to the taxon to which it belongs. Since precise circumstances are likely to vary considerably from case to case, the DPS policy does not describe all the classes of information that might be used in determining the biological and ecological importance of a discrete population. However, the DPS policy does provide four possible reasons why a discrete population may be significant. As specified in the DPS policy (61 FR 4722), this consideration of the population segment's significance may include, but is not limited to, the following:

(1) Persistence of the discrete population segment in an ecological setting unusual or unique to the taxon;

(2) Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon;

(3) Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or

(4) Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

A population segment needs to satisfy only one of these criteria to be considered significant. Furthermore, the list of criteria is not exhaustive; other criteria may be used as appropriate.

The ranges and population distribution of the Applegate and Grider salamanders suggest that the loss of either group would result in a significant gap in the range of the Siskiyou Mountains salamander. The estimated ranges of the Applegate and Grider salamanders constitute about 59 percent and 41 percent, respectively, of the overall range of the Siskiyou Mountains salamander. Loss of such a substantial portion of the species' range, coupled with the dispersal barrier posed by the Siskiyou Crest, would be significant to the distribution of the species. An additional consideration is the metapopulation-level redundancy that the two groups provide each other. Climatic conditions and fire regimes differ on either side of the Siskiyou Crest, and the elevation of the Crest itself serves as a barrier to wildfires. Large-scale disturbances such as catastrophic wildfire may therefore act independently on either clade; allowing the continued persistence of the species in the event of substantial losses of one group.

The uneven distribution of genetic variation across the range of the Siskiyou Mountains salamander places a disproportionate significance on each group for the maintenance of genetic diversity in the species. The Applegate salamander exhibits a strikingly low level of genetic variation, and is divergent from the more variable Grider salamander (Pfrender and Titus 2001, pp. 5–6; Mead et al. 2005, pp. 166–169). Loss of either genetically distinct group would pose a substantial reduction in genetic diversity of Siskiyou Mountains salamander. Therefore, we consider the Applegate and Grider salamanders significant to the taxon as a whole under our DPS policy.

Conclusion of Distinct Population Segment Review

Based on the best scientific and commercial information available, as described above, we find that under our DPS policy, the Applegate and Grider salamander groups of the Siskiyou Mountains salamander are discrete and each are significant to the overall species. Because the Applegate and Grider salamanders are both discrete and significant, they warrant recognition as separate DPSs under the Act.

Since we have identified the Applegate and Grider salamanders as two separate, valid DPSs, we will evaluate each DPS with regard to its potential for listing as threatened or endangered using the five listing factors enumerated in Section 4(a) of the Act. Our evaluation of the Applegate salamander DPS follows.

Applegate Salamander Distinct Population Segment

As described above, Section 4 of the Act (16 U.S.C. 1533) and implementing regulations (50 CFR part 424) describe procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a), we may list a species on the basis of any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence.

An endangered species is defined by the Act, with exception, as ''any species which is in danger of extinction throughout all or a significant portion of its range.'' A threatened species is defined as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' A species is defined by the Act to include ''any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.''

Factor A: The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Our understanding of the habitat associations of the Applegate salamander DPS, and the potential effects of habitat perturbations such as timber harvest and fire on this

salamander, is based primarily on research conducted across the range of the entire Siskiyou Mountains salamander Complex. The available information indicates that the members of the Complex have similar physiological and behavioral characteristics, and consequently similar habitat associations. This conclusion is supported by Welsh et al. (2007a, p. 31), who state that the genetic subunits of Siskiyou Mountains salamander ''do little if anything to alter their basic eco-physiological limits (e.g., Spotila 1972; Feder 1983) and consequent similar environmental requirements imposed by the plethodontid life form.'' We recognize that the range of the Applegate salamander DPS is roughly 60 percent of the area occupied by the entire Siskiyou Mountains salamander, and that the relative magnitude of effects caused by habitat perturbations may be different at this smaller spatial scale. We have incorporated these differences of scale into our analysis. Given this caveat, we believe that the potential effects of timber harvesting, fire, and other habitat perturbations on the Applegate salamander DPS are the same as those described previously for the Siskiyou Mountains salamander. To avoid redundancy, these effects are summarized below; further detail and citations may be found in the Factor A analysis for the Siskiyou Mountains salamander.

Effects of Timber Harvesting on the Applegate Salamander DPS

Rigorous research of the effects of timber harvesting on these salamanders is lacking, but the available evidence suggests that intensive timber harvest practices such as clear-cutting have a short-term (30 years) negative impact on abundance, age structure, and body condition of this DPS. However, it is also clear that the salamanders frequently persist in intensively harvested areas, and that populations recover as vegetation is re-established (Welsh et al. 2007b). There is no information indicating that populations are extirpated in intensively harvested sites. Alternative timber harvesting methods such as thinning and helicopter yarding have not been shown to have negative effects on populations of this DPS.

Extent and Magnitude of Timber Harvesting Effects on the Applegate Salamander DPS

The extent and magnitude of potential effects caused by timber harvesting are strongly limited by existing land management regulations on the majority of the range of this DPS. Approximately 85 percent of the range of the Applegate salamander DPS consists of Federal lands managed under the provisions of the NWFP; 66 percent is administered by the USFS and 19 percent by the BLM. Roughly 33 percent of the range occurs within reserves (Late-successional Reserves, Wilderness, Riparian Reserves) withdrawn from scheduled timber harvesting; 42 percent of the range is in the Applegate Adaptive Management Area; and 9 percent is in Matrix. Of the three members within the Siskiyou Mountains salamander Complex, the Applegate salamander DPS has the lowest proportion of its range protected in reserves.

The rate and intensity of timber harvesting has declined substantially on Federal lands within the range of the Applegate salamander DPS during the past 20 years. Annual timber harvesting on the Rogue River National Forest, which comprises 66 percent of the DPS range, declined from an average of 182 million board feet during the 1980s to 8 million board feet per year from 2000 to 2006, a decrease of 96 percent (USDA 2007c). The Applegate Ranger District, which comprises roughly 66 percent of the DPS range, has completed only one timber sale since 1996 (Clayton 2007b). Similarly, the rate of timber harvest has declined substantially on BLM lands within the range of the Applegate salamander DPS. Mean annual harvest on the BLM Ashland Resource Area declined from 2,240 ac (907 ha) per year between 1995 and 2000, to 664 ac (269 ha) per year between 2001 and 2007; less than 270 ac (109 ha) per year have been harvested since 2003 (USDI 2007a). The intensity of timber harvest practices on Federal lands has declined dramatically as well. For example, on the BLM's Ashland Resource Area, intensive harvest methods such as clear-cutting have declined from 54 percent of acres harvested in the mid-1990s, to less than one percent of annual harvest since 2001 (USDI 2007a). The likelihood that a substantial proportion of the Applegate salamander DPS will be affected by intensive timber harvesting is greatly reduced by the long-term declining trend in the rate and intensity of timber harvesting. The BLM's proposal to increase timber harvest levels by revising their RMPs has an uncertain outcome, and we see no reason to forecast a significant increase in timber harvest levels in the foreseeable future.

Intensive timber harvesting practices such as clear-cutting and shelterwood removal are more prevalent on private timberlands, which comprise only 15 percent of the range of the Applegate salamander DPS. Approximately 12 percent of the DPS range occurs on private timberlands in Oregon; 3 percent lies in California. The majority of private lands within the range of the Applegate salamander DPS occur as small parcels (typically one square mile or less) in a checkerboard pattern surrounded by Federal lands, or as small isolated parcels. Populations of the Applegate salamander DPS on private lands may be affected by timber harvesting but are dispersed among populations on Federal lands where management is more favorable. Since the distribution of private lands occurs within a larger matrix of Federal lands, this acts to disperse any negative impacts of timber harvesting on Applegate salamander DPS populations and maintains redundancy, distribution, and connectivity among salamander populations. Therefore, no one area within the range of the Applegate salamander DPS has significantly greater threats from timber harvesting on private lands.

Wildfire

Based on the best scientific and commercial information available, we believe the potential effects of wildfire on the Applegate salamander DPS are similar to those described previously for the Siskiyou Mountains salamander. When they occur, wildfires typically burn in a range of intensities, resulting in a mosaic of habitat effects. Intense, stand-replacing fire likely reduces habitat quality for this DPS by reducing overstory cover and consuming moss, duff and forest floor litter, thereby modifying suitable microclimate habitat. However, as shown for the effects of intensive timber harvesting, Siskiyou Mountains salamander populations appear to persist and recover as vegetation is re-established after severe habitat disturbances. The degree to which wildfires affect the viability of salamander populations is unknown, but it is likely that large-scale intense wildfires may negatively affect some populations.

The potential threat posed by wildfire to the Applegate salamander DPS was evaluated by Olson et al. (2007, p. 25, Appendix 2 p. 5). The authors combined a habitat suitability model (Reilly et al. 2007) with spatial data on various risk factors such as wildfire hazard and NWFP land use allocations into a GIS and developed a range-wide map depicting risk to persistence of salamander populations. Extensive areas of highly suitable habitat and lower fire hazard were predicted on north-facing slopes, such as the north slope of the

Siskiyou Crest (Olson et al. 2007, Appendix 2 p. 8).

While there is uncertainty concerning the potential population-level effects of wildfire on the Applegate salamander DPS, we expect that wildfires will occur and may reduce habitat quality for some salamander populations. However, the effects of wildfire are unlikely to result in widespread loss of population viability because: (1) Fires typically burn in a mosaic of effects, leaving a variety of habitat conditions for salamanders occupying burned areas; and (2) these salamanders persist in disturbed areas and recover as vegetation recovers, allowing for persistence and recovery of local salamander populations. In addition, land management agencies within the range of this DPS are actively conducting fuels management treatments to reduce the likelihood of wide-scale catastrophic fire. The future effectiveness of these treatments is unknown, but evidence suggests that at least local reductions in fire severity will be achieved.

Direct Disturbance: Roads and Road Construction, Mining, and Rock Quarrying

As described under Factor A for the Siskiyou Mountains salamander, activities that physically alter the talus substrates occupied by the Applegate salamander DPS have the potential to reduce habitat quality or remove habitat. In addition, some research suggests that forest roads may pose a barrier to these salamanders, reducing dispersal and connectivity among populations. We find that, while it may reasonably be expected that crushing or removal of talus habitat during road construction, mining, or rock quarrying could negatively affect Applegate salamander populations, these activities affect only a very small area of the DPS's range. Further, numerous records exist of the salamanders occupying road cuts and sites with historical mining activity, and the rate of road construction, which is typically associated with access for timber harvesting, has declined significantly as timber harvest levels have decreased. There is little potential for a substantial portion of Applegate salamander DPS populations to be affected by direct disturbance from road construction, mining, or rock quarrying. For these reasons, we conclude that road construction, mining and rock quarrying do not pose a substantial threat to this DPS; a conclusion echoed by species experts (Olson et al. 2007, p. 17).

Summary of Factor A

While intensive timber management practices such as clear-cutting appear to have short-term negative effects on abundance of Applegate salamanders, this practice is severely restricted on Federal lands, which constitute the majority of the DPS's range. Less-intensive harvest practices appear to have relatively minor or short-term impacts to salamander abundance, and the available evidence suggests that salamander populations persist in a broad range of forest habitat conditions and under different management practices.

Current management on Federal lands under the provisions of the NWFP protects salamander habitat via a system of reserves and management guidelines that dramatically reduce the likelihood of large-scale reduction of suitable or occupied habitat; additional Federal land management direction and the Special Status Species programs provide additional security to salamander populations on non-reserved Federal lands. Management practices on private timberlands may negatively affect some populations of the Applegate salamander DPS; however, due to the patchy distribution of private lands within the larger matrix of Federal lands, and the ability of these salamanders to persist in managed habitats, we conclude that habitat modifications on this small portion of the Applegate salamander DPS's range do not constitute a substantial threat to the DPS.

Wildfires are expected to occur and may reduce habitat quality for some salamander populations; however, the effects of wildfires on salamander habitat are temporary and populations appear to recover as vegetation recovers. Wildfires typically burn in a mosaic pattern of intensities, leaving a variety of habitat conditions for salamanders within burned areas. In addition, Federal land management agencies are planning and conducting fuels reduction treatments to reduce the threat of stand-replacing wildfires within the range of the Applegate salamander.

Although relatively undisturbed mature forests may provide optimum habitat for Applegate salamanders; these salamanders have been shown to exist in a range of habitat conditions that have experienced timber harvesting, wildfire, and other disturbances such as mining and quarrying, and evidence suggest that populations persist and recover following habitat disturbance. Intense disturbances such as clear-cutting are highly limited by current land-use regulations, and along with rock quarrying and road construction constitute a tiny fraction of the DPS's habitat. Therefore, we conclude that the Applegate salamander DPS is not now, or in the foreseeable future, threatened by destruction, modification, or curtailment of its habitat across its range.

Factor B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

We are not aware of any information that indicates overutilization for commercial, recreational, scientific, or educational purposes threatens the Applegate salamander DPS, now or in the foreseeable future, across its range.

Factor C: Disease or Predation

Chytridiomycosis is a relatively recently described epidermal infection of amphibians caused by the chytrid fungus *Batrachochytrium dendrobatidis*. This fungus requires moisture for survival (Johnson and Speare 2003, p. 922) and is therefore more likely to pose a threat to aquatic amphibians than to terrestrial ones. As described for the Siskiyou Mountains salamander, we do not anticipate that the Applegate salamander DPS will be exposed to this disease or that exposure would lead to transmission through significant portions of its range. Salamanders composing this DPS are not associated with bodies of water, occur in a characteristically dry environment, are only active above ground for brief and intermittent periods during the year, and appear to have limited dispersal abilities. Given these circumstances, we believe that the Applegate salamander DPS is unlikely to be exposed to diseased water or infected aquatic amphibians and, if infected, salamanders are unlikely to transmit the disease between populations.

The Service is not aware of any predators that potentially pose a threat to the species. We, therefore, conclude that the Applegate salamander DPS is not now, or in the foreseeable future, threatened by disease or predation across its range.

Factor D: Inadequacy of Existing Regulatory Mechanisms

Federal Lands

Federal lands managed under the provisions of the NWFP comprise the majority of the Applegate salamander's range. The NWFP acts to protect salamanders and their habitat via a system of reserves and land management guidelines that

dramatically reduce the likelihood of large-scale reduction of suitable habitat.

Northwest Forest Plan Survey and Manage Mitigation Measure Standards and Guidelines

The provisions and current status of the Survey and Manage Program are described under Factor D for the Siskiyou Mountains salamander. The Survey and Manage Program contains specific guidance for the Applegate salamander DPS, requiring the identification of high-priority sites that will be managed to provide a reasonable assurance of species persistence. While the Survey and Manage Program currently provides protection for the Applegate salamander DPS on Federal lands, we assume for purposes of this finding that the Survey and Management Program is eliminated for future projects on Federal lands and management of the Applegate salamander DPS will be conducted under the USFS's Special Status Species Program and the BLM's Sensitive Species Program. While these programs do not specify protections for the Applegate salamander DPS, they contain provisions for development of Conservation Strategies that provide a reasonable assurance of species persistence.

Conservation Agreements

The final Conservation Strategy for the Siskiyou Mountains Salamander, Northern Portion of the Range (Olson et al. 2007), is currently being implemented by the USFS and BLM on Federal lands occupied by the Applegate salamander DPS. The Conservation Strategy was authored by four of the most-published scientific experts on this species (D. Olson, D. Clayton, H. Welsh, and R. Nauman, among others), and incorporates habitat modeling and risk assessment in the evaluation of species persistence and distribution within the strategy area. The Conservation Strategy is described in detail in the Background section and under Factor D for the Siskiyou Mountains salamander, which is incorporated by reference here. However, because of the limited nature of the threats addressed by the Conservation Strategy, we did not rely on it in determining whether listing the Applegate salamander is warranted.

Western Oregon Plan Revisions

The BLM's proposed changes to its existing Resource Management Plans through the WOPR contain provisions that have the potential to increase timber harvesting within the range of the Applegate salamander DPS (see Factor D for Siskiyou Mountains salamander). The WOPR proposal affects only Federal lands administered by the BLM, which constitute approximately 19 percent of the range of the Applegate salamander DPS. The WOPR DEIS is currently in the public review period, and we cannot at this time predict which alternative, including the no-action alternative, will be selected or evaluate the potential effects to Applegate salamander populations on BLM lands.

While the potential effects of possible RMP changes on the 19 percent of Applegate salamander DPS' range that occurs on BLM lands are unknown, NWFP land-use allocations and management direction provides substantial protection for the DPS and its habitat. If existing Federal management for the Applegate salamander DPS is modified in the future, the Service can consider any such changes in the context of the degree and immediacy of potential threats to the DPS at that time.

Private Lands and State Regulations

Approximately 12 percent of the range of the Applegate salamander DPS occurs on private lands located in Oregon, and 3 percent occurs on private lands located in California. In Oregon, no regulatory mechanisms exist to protect this DPS on private lands. In California, the Siskiyou Mountains salamander (both Applegate and Grider populations) is listed as a threatened species and receives substantial protections pursuant to CESA. These protections include the requirement of surveys prior to project implementation and prohibitions on timber harvest in established buffers around occupied suitable habitat. There is some uncertainty concerning the future of CESA protections for Applegate salamander DPS populations on the small fraction of the DPS's range that occurs in California (see Factor D for Siskiyou Mountains salamander). Regardless of the future status of protections for the Siskiyou Mountains salamander under CESA, those protections only apply to 3 percent of the Applegate salamander DPS's range, and the potential removal of these protections will not pose a significant threat to this DPS.

As described under Factor A, we find that there is little evidence to suggest that members of the Applegate salamander DPS are extirpated by timber harvesting and other habitat disturbances. Research indicates that populations of these salamanders persist following intensive timber harvest and recover as vegetation is re-established. Less intensive harvest practices appear to have little effect on populations. Therefore, we find that the lack of regulatory protections on state lands, a limited proportion of the range of the Applegate salamander DPS, does not pose a threat to this genetic subunit in the foreseeable future.

Summary of Factor D

Existing Federal regulations currently provide substantial protection on Federal lands for the Applegate salamander DPS through the NWFP land use categories and management provisions. For the purposes of this finding, we assume that the NWFP's Survey and Manage Program, which provides additional protection for the Applegate salamander DPS, is eliminated for future projects on Federal lands within the range of the DPS. Regulatory protection for this DPS will consist of the Standards and Guidelines of the NWFP, other Federal land management regulations, and the Special status Species programs, which will continue to provide adequate protection for the DPS across the 85 percent of its range that occurs on Federal lands. While the petitioners have cited the proposed WOPR as posing a significant reduction to these protections (Greenwald and Curry 2007, p. 7), we cannot at this time speculate about what impact, if any, the proposal, if finalized in the future by BLM, may have on salamander populations or their habitat.

We find that the current Federal regulations and land management planning guidelines and the Special status Species programs provide substantial protection for the DPS across the vast majority of its range. The lack of regulatory mechanisms to protect the Applegate salamander DPS on private lands in Oregon does not pose a substantial threat because: (1) Private lands comprise a small portion of the DPS's range and are distributed in small parcels interspersed among Federal lands where management is more favorable and therefore, acts to maintain redundancy, distribution, and connectivity among populations within the mix of Federal and private lands; and (2) salamander populations have been shown to persist in managed landscapes. While there is some uncertainty concerning the future of CESA protections for Applegate salamander DPS populations in California, the potential removal of CESA protections will not pose a significant threat to the DPS due to the very small percentage of the DPS's range that occurs in the state and the interspersed pattern of private and state

lands. We, therefore, conclude that the Applegate salamander DPS is not now, or in the foreseeable future, threatened by inadequate existing regulatory mechanisms across its range.

Factor E: Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Other natural or manmade factors that could potentially affect the persistence of the Applegate salamander DPS within all or significant portion of its range are climate changes associated with global warming and stochastic events, which are rare, chance events, such as epidemics and large, severe wildfires.

Climate Change

The similarities in physiology, ecology, and habitat associations between the Applegate salamander DPS and other members of the Siskiyou Mountains salamander Complex, combined with the large scales at which climate change studies are conducted, lead us to conclude that our analysis of the potential effects of climate change under Factor E for the Siskiyou Mountains salamander applies to the Applegate DPS as well. Given its physiology, this species may be strongly affected by changes to precipitation patterns. Although most of the available climate models predict increases in average temperatures, models were inconsistent with regard to future precipitation; increases in annual precipitation and cloud cover are a plausible outcome and could act to ameliorate negative impacts caused by increased temperatures. We are unable to predict the potential effects of future climate change on the Applegate salamander DPS at this time.

Stochastic Events

Like other members of the Siskiyou Mountains salamander Complex, the Applegate salamander DPS occupies a relatively small geographic range (248,870 ac (100,712 ha)) and exhibits limited dispersal abilities. These traits act to increase a species' vulnerability to stochastic (rare, chance) events such as epidemics or large, severe fires because a single event can occur within all or a large portion of the range, and individuals may be unable to escape the disturbance or recolonize habitat following extirpation. However, as described in the ''Range and Distribution'' section and Factor A for the Siskiyou Mountains salamander, current research suggests that Applegate salamanders are in fact well-distributed within their range, that they occur at high densities in some areas, and that they persist in areas that have experienced disturbances. These traits act to decrease the potential vulnerability conferred on this DPS by its small range. While it may be reasonably expected that negative effects to abundance or population structure may follow severe disturbances (as described under Factor A for the Siskiyou Mountains salamander), there is no evidence that they result in significant losses of populations.

A large wildfire that affects the majority of the range of the Applegate salamander DPS is a plausible description of a significant stochastic event. For example, 499,965 ac (202,329 ha) burned during the 2002 Biscuit Fire in southwestern Oregon and northwestern California. Approximately 44 percent of the area (219,985 ac (89,025 ha)) was severely burned (USDA and USDI 2004). In comparison, the species range of the Applegate salamander DPS is 248,870 ac (100,712 ha). Although there is evidence that fire size and intensity may have increased in the Klamath-Siskiyou region, large fires with mixed severity are characteristic of the natural disturbance regime (Odion et al. 2004, p. 933; Agee 1993, pp. 388–389) within which these salamanders have evolved. The mosaic pattern of fire effects, combined with the salamanders' ability to remain protected underground and persist during postfire vegetation recovery, indicates that the threat posed by this stochastic event is unlikely to result in large-scale extirpation of populations.

Summary of Factor E

Because of the uncertain nature of climate change predictions, particularly predictions of future precipitation patterns, we are unable to evaluate the potential for climate change to impact Applegate salamander DPS populations in the future. We find that, although stochastic events such as large wildfires may occur within a large portion of this salamanders' restricted range, Applegate salamanders appear to persist following wildfires and other disturbances, to recover as vegetation is re-established following disturbance, and have adequate numbers of well-distributed populations throughout their range to allow for persistence and viability of this DPS. We, therefore, conclude that the Applegate salamander DPS is not now, or in the foreseeable future, threatened by the individual or cumulative effects of climate change or stochastic events such as epidemics or large, severe wildfires.

Finding

We assessed the best available scientific and commercial information regarding threats faced by the Applegate salamander DPS. We have reviewed the petition, information available in our files, and information submitted to us following our 90-day petition finding (72 FR 14750; March 29, 2007). We also consulted with recognized salamander experts and Federal land managers, and arranged for researchers to initiate field studies to assess the distribution of genetic entities within the salamander complex, and demographic response of these species to forest structure.

We find little support for the petitioners' claim that the Applegate salamander DPS is threatened by habitat destruction caused by timber harvesting and wildfire, and that existing regulatory mechanisms are inadequate to protect the DPS. While the available information suggests that Applegate salamanders may be positively associated with older forest conditions, the majority of studies and available field data show the species occupying a wide range of forest conditions, including previously harvested areas. Recent research indicates that even in severely disturbed habitats, the salamanders persist and populations recover as vegetation is re-established over time. Less intensive disturbances such as forest thinning and mixed-effects wildfire appear to have minor or short-term impacts on salamander abundance. There is no reliable evidence that indicates loss of populations or curtailment of this DPS's range has occurred.

We acknowledge that intensive timber harvesting practices such as clear-cutting may have short-term negative impacts on abundance and population structure of Applegate salamanders. The extent and magnitude of such practices, however, are severely limited by a number of regulatory mechanisms and other factors operating within the salamanders' range, as evidenced by the steep decline in timber harvest levels on Federal lands that constitute 85 percent of the DPS's range. Over the past 20 years, timber harvest levels, particularly of intensive harvest methods, on Federal lands within the range of the Applegate salamander have declined by over 90 percent. Levels of timber harvesting are higher on private lands, which constitute only 15 percent of the DPS's range and occur as small parcels interspersed among Federal lands. Due to the small proportion of the range consisting of private lands, coupled with the ability of Applegate salamanders to persist in managed

landscapes, we conclude that management activities on private lands do not pose a substantial threat to this DPS.

There are a number of existing regulatory mechanisms that provide protection for Applegate salamanders and their habitats. The system of land use allocations and Standards and Guidelines of the NWFP act to limit the amount and intensity of land management activities on Federal lands, as evidenced by the dramatic decline in timber harvest levels observed since the NWFP was implemented. The Survey and Manage Mitigation Measure Standards and Guidelines are one aspect of the NWFP that has provided protection specifically to occupied salamander locations. However, we anticipate the elimination of the Survey and Manage Guidelines within the range of the Applegate salamander DPS. Federal land management agencies have implemented a Conservation Strategy founded on the Survey and Management guidelines for this DPS, to help provide for well-distributed, viable populations of Applegate salamanders over the long term. The Conservation Strategy uses an approach similar to that required by the Survey and Manage Program for this DPS (i.e., identification of a network of high-priority salamander populations for protection and management). However, because of the limited nature of the threats addressed by the Conservation Strategy, we did not rely on it in determining whether listing the Applegate salamander DPS is warranted.

The BLM's proposal to revise WOPR on 19 percent of the Applegate salamander DPS's range is in draft form and undergoing public review. We cannot reliably predict the outcome of this process or what effect, if any, any future changes to the WOPR might eventually have on salamanders or their habitat. The NWFP land-use allocations, other federal land management, and the special Status Species programs constitute existing regulatory mechanisms that currently provide substantial protection for the Applegate DPS and it habitat on Federal lands and are anticipated to continue to provide such protection in the foreseeable future. Should regulatory protections change in the future, the Service can consider such changes in the context of the degree and immediacy of potential threats to the Siskiyou Mountains salamander at that time.

Populations of Applegate salamanders are well distributed, and abundance within populations can be high. There are 440 known locations for this DPS, and many areas supporting suitable habitat have not been surveyed. These population characteristics, combined with the species' apparent ability to persist and recover following habitat disturbance, indicates that Applegate salamanders are resilient to stochastic events such as wildfire. Our evaluation of climate change modeling for the geographic area inhabited by the salamanders does not support the contention that climate change poses a threat to Applegate salamanders. While increases in average daily temperatures are reliably predicted for the Klamath-Siskiyou region, predictions regarding timing and amount of precipitation are inconsistent, precluding any meaningful evaluation of future effects to these salamanders. It is not currently possible to forecast the specific effects of future climate on salamander populations.

Our evaluation of the five listing factors does not support the contention that there are threats of sufficient imminence, intensity, or magnitude as to cause substantial threats to the DPS, losses of population distribution, or viability of the Applegate salamander DPS. Therefore, we do not find that the Applegate salamander DPS is in danger of extinction (endangered), nor is it likely to become endangered within the foreseeable future (threatened) throughout its range. Therefore listing the Applegate salamander DPS as threatened or endangered under the Act is not warranted at this time.

Grider Salamander Distinct Population Segment

Factor A: The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

Our current knowledge of the habitat associations of the Grider salamander DPS, and the potential effects of habitat perturbations such as timber harvest and fire on this salamander, are based primarily on research conducted across the range of the entire Siskiyou Mountains salamander Complex. The members of the complex have similar physiological and behavioral characteristics, and consequently similar habitat associations. This conclusion is supported by Welsh et al. (2007a, p. 31), who state that the genetic subunits of Siskiyou Mountains salamander ''do little if anything to alter their basic eco-physiological limits (e.g., Spotila 1972; Feder 1983) and consequent similar environmental requirements imposed by the plethodontid life form.'' We recognize that the range of the Grider salamander DPS is roughly 40 percent of the area occupied by the entire Siskiyou Mountains salamander, and that the relative magnitude of effects caused by habitat perturbations may be greater at this smaller spatial scale. We have incorporated these differences of scale into our analysis. Given this caveat, we believe that the potential effects of timber harvesting, fire, and other habitat perturbations on the Grider salamander DPS are similar to those described previously for the Siskiyou Mountains salamander. To avoid redundancy, these effects are summarized below; details and citations may be found in the Factor A analysis for Siskiyou Mountains salamander.

Effects of Timber Harvesting on the Grider Salamander DPS

Although rigorous research of the effects of timber harvesting on Grider salamanders is lacking, the available evidence suggests that intensive timber harvest practices such as clear-cutting have a short-term (30 years) negative impact on abundance, age structure, and body condition of these salamanders. However, it is also clear that the salamanders frequently persist in intensively harvested areas, and that populations recover as vegetation is re-established. Alternative timber harvesting methods such as thinning and helicopter yarding have not been shown to have negative effects on populations of this DPS.

Extent and Magnitude of Timber Harvesting Effects on the Grider Salamander DPS

The extent and magnitude of potential effects caused by timber harvesting are strongly limited by existing land management regulations on the majority of the range of this DPS. Approximately 91 percent of the range of the Grider salamander DPS consists of Federal lands managed by the Klamath National Forest (KNF) under the provisions of the NWFP. Approximately 73 percent of the range occurs within reserves (Late-successional Reserves, Wilderness, Riparian Reserves) withdrawn from scheduled timber harvesting; an additional 13 percent of the range is within Matrix-retention areas where timber harvest is restricted. Less than 5 percent of the Grider salamanders' range lies within the Matrix-General Forest land allocation where intensive timber harvesting is anticipated to occur.

Primarily as a result of implementation of the NWFP, the rate and intensity of timber harvesting has declined substantially on Federal lands within the range of the Grider salamander DPS. During the period from 1979 to 1984, the KNF sold and removed an average of 238.2 million

board feet of timber per year; harvest levels declined to 187.8 million board feet per year during 1985 to 1990, and fell to 15.9 million board feet annually between 2000 and 2005; a decrease of roughly 93 percent (USDA 2006a). The proportion of intensive timber management practices such as clear-cutting and overstory removal has declined even more abruptly; from an annual average of 3,733 ac (1,511 ha) per year from 1988 to 1991 to roughly 38 ac (15.4 ha) per year during 2000 to 2006 (USDA 2007b). We conclude that the land management regulations responsible for this long-term declining trend in the rate and intensity of timber harvesting greatly reduces the likelihood that a substantial proportion of the Grider salamander DPS will be negatively affected by intensive timber harvesting.

Less than 10 percent of the Grider salamander's range consists of private timberlands where intensive timber harvesting practices such as clear-cutting and shelterwood removal are likely to occur. Virtually all of these lands are in California; only about 1 percent occurs in Oregon. The majority of private lands within the range of the Grider salamander DPS occur as small parcels (typically one square mile or less) in a checkerboard pattern surrounded by Federal lands. Salamander populations on private lands may be affected by timber harvesting but are dispersed among populations on Federal lands where management is more favorable and serves to effectively reduce the impacts of intensive private land timber harvest practices and maintain redundancy, distribution, and connectivity among Grider DPS populations.

Wildfire

We assume that the potential effects of wildfire on the Grider salamander DPS are similar to those described under Factor A for the Siskiyou Mountains salamander. It is likely that intense, stand-replacing fires reduce habitat quality for this salamander by reducing overstory cover and consuming moss, duff and forest floor litter; affecting the microclimate conditions. However, Siskiyou Mountains salamanders appear to be behaviorally adapted to dry-season fires because they are underground during summer and fall when most wildfires occur. While it is likely that large-scale intense wildfires may negatively impact some populations, at least in the short term, populations appear to persist and recover as vegetation is re-established after severe habitat disturbances. Fire regimes within the Klamath-Siskiyou region are characterized by mixed-severity fires that burn in a range of intensities, resulting in a mosaic of habitat effects. Fire effects are frequently moderated on lower slopes with northerly exposures and topographic conditions frequently associated with salamander locations.

Direct Disturbance: Roads and Road Construction, Mining, and Rock Quarrying

We assume that the effects of activities that physically alter the talus substrates occupied by Grider salamanders are similar to those described under Factor A for the Siskiyou Mountains salamander. Although research to evaluate salamander response to physical disturbance is lacking, it is reasonable to assume that these activities likely reduce habitat quality or remove habitat. In addition, some research suggests that forest roads may pose a barrier to these salamanders, reducing dispersal and connectivity among populations. We find that, while it may reasonably be expected that crushing or removal of talus habitat during road construction, mining, or rock quarrying could negatively affect Grider salamander populations, these activities affect a very small area of the DPS range. For this reason, Olson et al. (2007, p. 17) conclude that these disturbances do not pose a primary threat to the species. Numerous records exist of the salamanders occupying road cuts and sites with historical mining activity, suggesting that these disturbances do not eliminate populations. The rate of road construction, which is typically associated with access for timber harvesting, has declined significantly as timber harvest levels have dropped. Surface mining rarely occurs within the range of the DPS, and rock quarrying consists of a small number of sites encompassing an insignificant proportion of the range (less than 100 ac (40.5 ha)).

Summary of Factor A

We find that, while the abundance and population structure of Grider salamanders appear to suffer short-term negative effects from intensive timber management practices such as clear-cutting, these practices are severely restricted on Federal lands, which constitute over 90 percent of the DPS's range. Less than five percent of the Grider salamander's range lies within the Matrix-General Forest land allocation where intensive timber harvesting is anticipated to occur. Less intensive harvest practices appear to have relatively minor or short-term impacts to salamander abundance, and the available evidence suggests that salamander populations persist in a broad range of forest habitat conditions and under different management practices.

The system of NWFP reserves and management guidelines in effect on Federal lands, in combination with other Federal land management direction and the Special Status Species programs, provide substantial protection for Grider salamander habitat, dramatically reducing the likelihood of large-scale reduction of suitable or occupied habitat due to timber harvesting. Even without Survey and Manage protections, the available evidence does not show that timber harvest practices on Federal lands, either alone or in combination with other habitat disturbing activities such as mining, road building or wildfire, have reduced the habitat or range of this species or are likely to do so in the foreseeable future.

Management practices on private timberlands may negatively affect some populations of the Grider salamander DPS; however, due to the patchy distribution of private lands within the larger matrix of Federal lands, and the ability of these salamanders to persist in managed habitats, we conclude that habitat modifications on this small portion of the Grider salamander DPS's range do not constitute a substantial threat to the DPS.

Wildfires are a naturally occurring disturbance factor in the Klamath-Siskiyou region, and are expected to influence the abundance and distribution of salamander habitats. However, the effects of most wildfires on salamander habitat are temporary and populations appear to recover as vegetation recovers. Wildfires typically burn in a mosaic pattern of intensities, leaving a variety of habitat conditions for salamanders within burned areas.

Grider salamander populations have been shown to exist in a range of habitat conditions that have experienced timber harvesting, wildfire, and other disturbances, and there is little evidence to suggest that populations are extirpated followed the land management activities such as thinning and salvage harvesting typically employed on KNF lands. Intense disturbances such as clear-cutting are highly limited by current land-use regulations, and along with rock quarrying and road construction constitute a tiny fraction of the DPS's habitat. Therefore, we conclude that the Grider salamander DPS is not now, or in the foreseeable future, threatened by

destruction, modification, or curtailment across its range.

Factor B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

We are not aware of any information that indicates overutilization for commercial, recreational, scientific, or educational purposes threatens, now or in the foreseeable future, the Grider salamander DPS across its range.

Factor C: Disease or Predation

Chytridiomycosis is a relatively recently described epidermal infection of amphibians caused by the chytrid fungus *Batrachochytrium dendrobatidis.* This fungus requires moisture for survival (Johnson and Speare 2003, p. 922) and is therefore more likely to pose a threat to aquatic amphibians than to terrestrial ones. As described for the Siskiyou Mountains salamander, we do not anticipate that the Grider salamander DPS will be exposed to this disease or that exposure would lead to transmission through significant portions of its range. This DPS is not associated with bodies of water, occurs in a characteristically dry environment, is only active above ground for brief and intermittent periods during the year, and appears to have limited dispersal abilities. Given these restrictions, we believe that the Grider salamander DPS is unlikely to be exposed to diseased water or infected aquatic amphibians and, if infected, these salamanders are unlikely to transmit the disease between populations.

The Service is not aware of any predators that potentially pose a threat to the species. We therefore conclude that the Grider salamander DPS is not now, or in the foreseeable future, threatened by disease or predation across its range.

Factor D: Inadequacy of Existing Regulatory Mechanisms

Federal Lands

Existing Federal regulations currently provide substantial protection on Federal lands for the Grider salamander DPS through the NWFP land use allocations and their management provisions. The NWFP management provisions and current status of the Survey and Manage Program are described under Factor D for the Siskiyou Mountains salamander. The Survey and Manage Program contains specific guidance for the Grider salamander DPS, requiring surveys of potentially suitable talus habitat and restricting management activities at occupied salamander locations. For purposes of this finding, we assume that NWFP's Survey and Manage Program is eliminated for future projects on Federal lands within the range of the DPS.

Given the high proportion of KNF lands in reserved land allocations (86 percent), the low rate of timber harvest, and the low intensity of harvest practices typically employed by the KNF, we conclude that the removal of Survey and Manage guidelines does not pose a substantial threat to the species. Management of the Grider salamander DPS will be conducted under the USFS's Sensitive Species Program, which does not specify protections, but contains provisions for development of conservation strategies that are anticipated to provide an additional layer of security for the DPS.

Private Lands and State Regulations

The Siskiyou Mountains salamander is listed as a threatened species in California and receives substantial protections pursuant to CESA. These protections include the requirement of surveys prior to project implementation and prohibitions on timber harvest in established buffers around occupied suitable habitat (see Factor D for Siskiyou Mountains salamander). The future of CESA protections for Grider salamander populations on private timberlands is uncertain. However, any future changes in the status of CESA protections for the Grider salamander DPS would affect only nine percent of the range of the Grider salamander DPS, and this area consists of small parcels interspersed among Federal lands. This, combined with evidence that Grider salamander populations persist in disturbed habitats, suggests that the removal of CESA protections will not pose a substantial threat to the species.

Summary of Factor D

The Grider salamander DPS receives substantial protection based on the land allocations and Standards and Guidelines of the NWFP and KNF Land and Resource Management Plan. Future protection of the Grider salamander DPS will also occur through the USFS Sensitive Species Program. The high proportion the DPS's range within reserved land allocations, combined with the overall low rate and intensity of timber harvest on Federal lands leads us to conclude that elimination of the Survey and Manage guidelines does not pose a substantial threat to this DPS. We find that the combination of Federal regulations and land management planning guidelines provide adequate existing regulatory mechanisms across the vast majority of the DPS's range.

The Grider salamander DPS also receives protection on private lands in California under CESA. The uncertainty of future CESA protections for Grider salamander populations on private lands does not pose a substantial threat to the DPS because: (1) Private lands comprise a small portion of the DPS's range and generally consist of small parcels interspersed among Federal lands; and (2) salamander populations have been shown to persist in managed landscapes. We therefore conclude that the Grider salamander DPS is not now, or in the foreseeable future, threatened by inadequate existing regulatory mechanisms.

Factor E: Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Other natural or manmade factors that may affect the persistence of the Grider salamander DPS within all or significant portion of its range are climate changes associated with global warming and stochastic events, which are rare, chance events, such as epidemics and large, severe wildfires.

Climate Change

Because the physiology, ecology, and habitat associations of the Grider salamander DPS are similar to other members of the Siskiyou Mountains salamander Complex, we conclude that our analysis of the potential effects of climate change and stochastic events under Factor E for the Siskiyou Mountains salamander applies to the Grider salamander DPS as well. Most of the climate change models available for the Pacific Northwest predicted increases in average temperatures; however, models were inconsistent with regard to future precipitation. Some models predicted significant increases in annual precipitation and cloud cover, which could act to ameliorate any negative impacts caused by increased temperatures. Given the inconsistency of climate change predictions available to us, we are unable to predict the potential effects of future climate change on the Grider salamander DPS at this time.

Stochastic Events

The relatively small geographic range (174,285 ac (70,529 ha)) and limited dispersal abilities of the Grider salamander DPS may increase its vulnerability to stochastic (rare, chance) events such as epidemics or large, severe fires because a single event can occur within all or a large portion of the range, and individuals may be unable to escape the disturbance or recolonize habitat following extirpation. The

petitioners claim that these salamanders are rare, patchily distributed, and easily extirpated by disturbances, making them highly vulnerable to extinction (Greenwald and Curry 2007, p. 1). However, as described under ''Range and Distribution'' and Factor A for the Siskiyou Mountains salamander, current research suggests that Grider salamanders are in fact well-distributed within their range, that they occur at high densities in some areas, and that they persist in areas that have experienced disturbances. These traits act to decrease the potential vulnerability conferred on this DPS by its small range. While it may be reasonably expected that negative effects to abundance or population structure may follow severe disturbances (as described under Factor A for the Siskiyou Mountains salamander), there is no evidence that they result in significant losses of populations.

A large wildfire that affects the majority of the range of the Grider salamander DPS is a plausible description of a significant stochastic event. For example, 499,965 ac (202,329 ha) burned during the 2002 Biscuit Fire in southwestern Oregon and northwestern California. Approximately 44 percent of the area (219,985 ac (89,025 ha)) was severely burned (USDA and USDI 2004). In comparison, the species range of the Grider salamander is 174,285 ac (70,529 ha). Although there is evidence that fire size and intensity may have increased in the Klamath-Siskiyou region, large fires with mixed severity are characteristic of the natural disturbance regime (Odion et al. 2004, p. 933; Agee 1993, pp. 388–389) within which these salamanders have evolved. The mosaic pattern of fire effects, combined with the salamanders' ability to remain protected underground and persist during postfire vegetation recovery, indicates that the threat posed by this stochastic event is unlikely to result in large-scale extirpation of populations.

Summary of Factor E

Because of the uncertain nature of climate change predictions, particularly predictions of future precipitation patterns, we are unable to evaluate the potential for climate change to impact Grider salamander populations in the foreseeable future. We find that, although stochastic events such as large wildfires may occur within a large portion of this salamanders' restricted range, Grider salamanders appear to persist following wildfires and other disturbances, to recover as vegetation is re-established following disturbance, and have adequate numbers of well-distributed populations throughout their range to allow for persistence and viability of this DPS. We therefore conclude that the Grider salamander DPS is not now, or in the foreseeable future, threatened by the individual or cumulative effects of climate change or stochastic events such as epidemics or large, severe wildfires.

Finding

We assessed the best available scientific and commercial information regarding threats faced by the Grider salamander DPS. We have reviewed the petition, information available in our files, and information submitted to us following our 90-day petition finding (72 FR 14750; March 29, 2007). We also consulted with recognized salamander experts and Federal land managers, and arranged for researchers to initiate field studies to assess the distribution of genetic entities within the salamander complex, and demographic response of these species to forest structure.

We find little support for the petitioners' claim that the Grider salamander DPS is threatened by habitat destruction caused by timber harvesting and wildfire, and that existing regulatory mechanisms are inadequate to protect the DPS from this habitat loss. While the available information suggests that Grider salamanders may be positively associated with older forest conditions, the majority of studies and available field data show the species occupying a wide range of forest conditions, including previously harvested areas. Recent research indicates that even in severely disturbed habitats, the salamanders persist and populations recover as vegetation is re-established over time. Less intensive disturbances such as forest thinning and mixed-effects wildfire appear to have minor or short-term impacts on salamander abundance. There is no reliable evidence that indicates that loss of populations or curtailment of this DPS's range has occurred.

We acknowledge that intensive timber harvesting practices such as clear-cutting may have short-term negative impacts on abundance and population structure of Grider salamanders. The extent and magnitude of such practices, however, are severely limited by a number of regulatory mechanisms and other factors operating within the salamanders' range, as evidenced by the steep decline in timber harvest levels on Federal lands that constitute 91 percent of the DPS' range. Over the past 20 years, timber harvest levels, particularly of intensive harvest methods, on Federal lands within the range of the Grider salamander have declined by over 93 percent. Levels of timber harvesting are higher on private lands, which constitute only nine percent of the DPS's range and occur as small parcels interspersed among Federal lands. Due to the small proportion of the DPS's range that consists of private lands, the scattered small size of private land parcels, and the ability of Grider salamanders to persist in managed landscapes, we conclude that management activities on private lands do not pose a substantial threat to this DPS.

There are a number of existing regulatory mechanisms that provide protection for the Grider salamanders and its habitat. The system of land use allocations under the NWFP act to limit the amount and intensity of land management activities on Federal lands, as evidenced by the dramatic decline in timber harvest levels observed since the NWFP was implemented. The Survey and Manage Mitigation Measure Standards and Guidelines are one aspect of the NWFP that, in the past, has provided protection specifically to occupied salamander locations. While the Survey and Manage Program has been eliminated for future projects on Federal lands, we find that existing land management regulations are adequate given the low degree of threat posed by land management activities.

Populations of Grider salamanders are well distributed, and abundance within populations can be high. There are 76 known locations for this DPS, and many areas supporting suitable habitat have not been surveyed. These population characteristics, combined with the species' apparent ability to persist and recover following habitat disturbance, indicates that Grider salamanders are resilient to stochastic events such as wildfire. Our evaluation of climate change modeling for the geographic area inhabited by the salamanders does not support the contention that climate change poses a threat to Grider salamanders. While increases in average daily temperatures are reliably predicted for the Klamath-Siskiyou region, predictions regarding timing and amount of precipitation are inconsistent, precluding any meaningful evaluation of future effects to these salamanders. It is not currently possible to forecast the specific effects of future climate on salamander populations.

Our evaluation of the five listing factors does not support the contention that there are threats of sufficient imminence, intensity, or magnitude as to cause substantial losses of population distribution or viability of the Grider salamander DPS. Therefore, we do not

find that the Grider salamander DPS is in danger of extinction (endangered), nor is it likely to become endangered within the foreseeable future (threatened) throughout its range. Therefore listing the Grider salamander DPS as threatened or endangered under the Act is not warranted at this time.

Scott Bar Salamander

Summary of Factors Affecting the Species

Factor A: The Present or Threatened Destruction, Modification, or Curtailment of the Species' Habitat or Range

The Service believes that the potential effects of habitat perturbations such as timber harvest and fire on the Scott Bar salamander are the same as those previously described for the entire Siskiyou Mountains salamander Complex. This conclusion is based on: (1) Our understanding of the behavior, physiology, and habitat associations of the Scott Bar salamander based primarily on research conducted across the range of the entire Siskiyou Mountains salamander Complex; and (2) available information which indicates that members of the complex have similar physiological and behavioral characteristics, and consequently similar habitat associations (Welsh et al. 2007a, p. 31). Because the range of the Scott Bar salamander is roughly 32 percent of the area occupied by the Siskiyou Mountains salamander, the relative magnitude of effects caused by habitat perturbations may be greater at this smaller spatial scale. Despite differences in scale, we believe that the potential effects of timber harvesting, fire, and other habitat perturbations on the Scott Bar salamander are the same as those described previously for the Siskiyou Mountains salamander. To avoid redundancy, these effects are summarized below; further detail and citations may be found in the Factor A analysis for Siskiyou Mountains salamander.

Effects of Timber Harvesting on the Scott Bar Salamander

Our evaluation of recent research results and survey information indicates that, while abundance of Scott Bar salamanders may be greater at sites with dense, mature forest cover, this species also occupies a wide range of forest age and density conditions. Intensive timber harvesting practices such as clear-cutting likely have negative effects on habitat quality and subsequent abundance and population structure of salamanders. However, recent research suggests that Scott Bar salamanders persist in disturbed sites and their populations recover as vegetation is re-established and habitat conditions improve (Welsh et al. 2007b).

Roughly 40 percent of known Scott Bar salamander locations occur on private timberlands where intensive timber management has been conducted for decades. Farber (2007a, p. 3) evaluated population structure and habitat characteristics at all Scott Bar salamander sites known to be occupied on and adjacent to Timber Products Company (TPC) lands. Ninety-four percent of the sites exhibited evidence of at least one habitat disturbance such as roads, logging activity, wildfire, and mining; 53 percent had evidence of recent or historic timber harvest. None of the salamander sites were in old-growth or late-seral habitat; all were in relatively young forests and over 50 percent occurred in stands with open canopies. At 26 sites on TPC lands where a minimum of two surveys were conducted, 96 percent supported adult salamanders, and 65 percent exhibited all life stages (adults, subadults, and juveniles); gravid females were detected at 54 percent of sites. While these results cannot be inferred to the entire species' range, they clearly suggest that Scott Bar salamander populations persist and appear to be viable within the range of habitat conditions found on managed timberlands.

Extent and Magnitude of Timber Harvesting Effects on the Scott Bar Salamander

Existing land management regulations place substantial limits on the extent and magnitude of potential effects caused by timber harvesting on populations of Scott Bar salamanders. Approximately 78 percent of the Scott Bar salamanders' range consists of Federal lands managed by the KNF under the provisions of the NWFP. Approximately 51 percent of the range occurs within reserves (Late-successional Reserves, Wilderness, and Riparian Reserves) withdrawn from scheduled timber harvesting; an additional 19 percent of the range is within Matrix-Retention areas where timber harvest is restricted. Only about eight percent of the Scott Bar salamanders' range lies within the Matrix-General Forest land allocation where intensive timber harvesting is anticipated to occur.

The rate and intensity of timber harvesting has declined substantially on Federal lands within the range of the Scott Bar salamander, primarily due to NWFP provisions. The amount of timber sold and removed on the Klamath National Forest declined by roughly 93 percent between 1984 and 2005, from an average of 238.2 million board feet of timber per year in 1979 to 1984, to 15.9 million board feet annually between 2000 and 2005 (USDA 2006a). The proportion of intensive timber management practices such as clear-cutting and overstory removal has also declined sharply, from an annual average of 3,733 ac (1,511 ha) per year from 1988 to 1991, to roughly 38 ac (15.4 ha) per year during 2000 to 2006 (USDA 2007b). We conclude that the land management regulations responsible for this long-term declining trend in the rate and intensity of timber harvesting greatly reduces the likelihood that a substantial proportion of the Scott Bar salamander will be affected by intensive timber harvesting.

Private timberlands comprise 22 percent of the range of the Scott Bar salamander. State of California regulations under the California Endangered Species Act currently protect Scott Bar salamanders on private lands by requiring surveys and prohibiting habitat modification at occupied sites, timber harvesting, and other habitat disturbances.

Private timberlands within the range of the Scott Bar salamander occur as small (one square mile) parcels distributed in a checkerboard pattern surrounded by KNF lands. This pattern acts to maintain the distribution of, and connectivity among, salamander populations at larger spatial scales, subsequently reducing the overall impact of habitat losses on private lands. Salamander populations occupying the private portions of this landscape pattern may experience fluctuations in the amount or quality of habitat through time but likely receive demographic support from adjacent populations on Federal lands where management is more favorable.

Although the rate and intensity of timber harvest is greater on privately owned timberlands within the range of the Scott Bar salamander, not all private lands are expected to receive intensive treatments. Timber Products Company, the primary industrial landowner within the species' range, estimates that roughly 31 percent of the company's land base within the range of the Scott Bar salamander in Siskiyou County consists of land unsuitable for harvest (e.g., montane hardwoods, watercourse protection zones, rock outcrops). On the remaining 69 percent, 31 percent of projected timber harvest prescriptions consist of less-intensive harvest prescriptions such as thinning and selection, and 69 percent are more intensive treatments such as clear-cut, shelterwood removal, and seed tree

harvest (Farber 2007c); suggesting that about 50 percent of TPC lands are anticipated to receive intensive harvesting. Of the 25 Scott Bar salamander locations currently known on TPC lands, 4 (16 percent) occur in riparian areas where timber harvest is restricted by State regulations, and 7 (28 percent) are located in previously harvested areas where additional timber harvesting is not anticipated over the next 20 to 30 years (Farber 2007b, pp. 1–2). This information, combined with data indicating that salamander populations persist within managed timberlands, further suggests that even in the absence of State protections for this species, intensive timber harvest would not be expected to impact a majority of populations within the 22 percent of the species' range that occurs on private lands or pose a substantial threat to the species.

Wildfire

Based on the best scientific information available, we believe the potential effects of wildfire on the Scott Bar salamander are similar to those described previously for the Siskiyou Mountains salamander. Fire regimes within the Klamath-Siskiyou region are characterized by mixed-severity fires that burn in a range of intensities, resulting in a mosaic of habitat effects at both fine and landscape-level spatial scales. Fire effects are frequently moderated on lower slopes with northerly exposures, topographic conditions frequently associated with salamander locations. Intense, stand-replacing fires likely reduce habitat quality for these salamanders by reducing overstory cover and consuming moss, duff, and forest floor litter, thereby modifying the microclimate conditions. It is likely that large-scale intense wildfires may negatively affect some populations, at least in the short term, but the degree to which more typical mixed-severity wildfires affect the viability of salamander populations is unknown. However, Scott Bar salamanders appear to be behaviorally adapted to dry-season fires because they are underground during summer and fall when most wildfires occur. Populations appear to persist and recover as vegetation is re-established after severe habitat disturbances (Bull et al. 2006, p. 24; Welsh et al. 2007b).

Direct Disturbance: Roads and Road Construction, Mining, and Rock Quarrying

As described under Factor A for the Siskiyou Mountains salamander, activities that physically alter the talus substrates occupied by the Scott Bar salamander have the potential to reduce habitat quality or remove habitat. While some of these activities such as rock quarrying may completely remove habitat, evidence suggests that salamander populations continue to occupy areas that show evidence of previous mining and road construction. In particular, numerous Scott Bar salamander locations occur in road cuts where rock substrate has been exposed. Although the ease of accessing and surveying such sites may influence the probability of detecting salamanders, the frequent presence of salamanders in road cuts suggests that this species can persist in or recolonize disturbed substrates. Despite these potential effects, road construction and rock quarrying are extremely limited in spatial extent, affecting a very small fraction of the salamander's range, and are not considered a substantial threat to these salamanders (Olson et al. 2007, p. 17).

Summary of Factor A

The abundance and population structure of Scott Bar salamanders appear to exhibit short-term negative effects from intensive timber management practices such as clear-cutting, but these practices are severely restricted on Federal lands, which constitute 78 percent of the species' range. Less intensive harvest practices appear to have relatively minor or short-term impacts to salamander abundance, and the available evidence suggests that salamander populations persist in a broad range of forest habitat conditions and under different management practices.

Scott Bar salamander populations receive substantial protection from the system of NWFP reserves and management guidelines in effect on Federal lands, in combination with other land management direction (e.g. Roadless Areas, retention areas) and the Special Status Species programs, dramatically reducing the likelihood of substantial negative impacts to suitable or occupied habitat due to timber harvesting. Even without Survey and Manage protections, the available evidence does not show that timber harvest practices on Federal lands, either alone or in combination with other habitat disturbing activities such as mining, road building or wildfire, have reduced the habitat or range of this species or are likely to do so in the foreseeable future.

Although timber harvest levels on private timberlands are greater than on Federal lands, current State regulations restrict management activities at occupied Scott Bar salamander locations. Known salamander locations on private timberlands occur in a variety of habitat conditions, including previously harvested areas and naturally open sites, demonstrating that populations persist in these managed landscapes. The dispersed pattern of private land parcels among Federal lands acts to maintain well-distributed populations, and may allow demographic support between adjacent populations.

Wildfires are a naturally-occurring disturbance factor in the Klamath-Siskiyou region, and are expected to influence the quality, abundance and distribution of Scott Bar salamander habitat. However, the effects of most wildfires on salamander habitat appear to be temporary and populations recover as vegetation is re-established on burned areas. Wildfires typically burn in a mosaic pattern of intensities, leaving a variety of habitat conditions for salamanders within burned areas.

In summary, Scott Bar salamander populations have been shown to exist in a range of habitat conditions that have experienced timber harvesting, wildfire, and other disturbances, and there is evidence suggesting that populations persist and recover following habitat disturbances. Current land-use regulations, including State regulations protecting the Scott Bar salamander on private timberlands, strongly limit intense disturbances such as clear-cutting, rock quarrying, and road construction. Therefore, we conclude that the Scott Bar salamander is not now, or in the foreseeable future, threatened by destruction, modification, or curtailment across its range.

Factor B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

We are not aware of any information that indicates overutilization for commercial, recreational, scientific, or educational purposes threatens the Scott Bar salamander, now or in the foreseeable future, across its range.

Factor C: Disease or Predation

Chytridiomycosis is a relatively recently described epidermal infection of amphibians caused by the chytrid fungus *Batrachochytrium dendrobatidis.* This fungus requires moisture for survival (Johnson and Speare 2003, p. 922) and is therefore more likely to pose a threat to aquatic amphibians than to terrestrial ones. As described for the Siskiyou Mountains salamander, we do not anticipate that the Scott Bar salamander will be exposed to this disease or that exposure would lead to

transmission through significant portions of its range. This species is not associated with bodies of water, occurs in a characteristically dry environment, is only active above ground for brief and intermittent periods during the year, and appears to have limited dispersal abilities. Given these restrictions, we believe that the Scott Bar salamander is unlikely to be exposed to diseased water or infected aquatic amphibians and, if infected, is unlikely to transmit the disease between populations.

The Service is not aware of any predators that potentially pose a threat to the species. We therefore conclude that the Scott Bar salamander is not now, or in the foreseeable future, threatened by disease or predation across its range.

Factor D: Inadequacy of Existing Regulatory Mechanisms

Federal Lands

Existing Federal regulations currently provide substantial protection on Federal lands for the Scott Bar salamander through the NWFP land use allocations and their management requirements. The provisions and current status of the Survey and Manage Program are described under Factor D for the Siskiyou Mountains salamander. The KNF extended Survey and Manage Program guidance to the Scott Bar salamander, since this species cannot be easily distinguished from the Siskiyou Mountains salamander in the field (USDA 2006b, p. 2).

The Survey and Manage Program requires surveys of potentially suitable talus habitat and restricting management activities at occupied Scott Bar salamander sites. For purposes of this finding, we assume that NWFP's Survey and Manage Program is eliminated for future projects on Federal lands within the range of the Scott Bar salamander.

Given the high proportion of the species range in reserved land allocations (70 percent), the low rate of timber harvest, and the low intensity of harvest practices typically employed by the KNF, we conclude that the removal of Survey and Manage guidelines will not constitute a substantial threat to the species. Management of the Scott Bar salamander will be conducted under the USFS's Sensitive Species Program, which does not specify protections for the Scott Bar salamander but contains provisions for development of conservation strategies that are anticipated to provide an additional layer of security for the species.

The low proportion of KNF lands in land allocations where intensive timber harvest is anticipated to occur (8 percent), combined with the low degree and immediacy of potential threats to the Scott Bar salamander, lead us to conclude that existing regulatory mechanisms are adequate to maintain the viability of the Scott Bar salamander on Federal lands throughout the species' range.

Private Lands and State Regulations

In July 2005, CDFG described the Scott Bar salamander as a ''newly discovered species from what was part of the range of *Plethodon stormi*'' (CDFG 2005, p. 31). Based on this change of taxonomic status, CDFG took the position that the Siskiyou Mountains salamander populations now recognized as Scott Bar salamanders were no longer protected under CESA. That position was successfully challenged by three environmental organizations in state court (*Environmental Protection Information Center* v. *California Department of Fish and Game,* (No. CPF–06–506585)). The court concluded that, ''[b]y virtue of its having been accorded protection as a subgroup of a listed, protected species, the Scott Bar salamander's protection under the California Endangered Species Act cannot be withdrawn by the California Department of Fish and Game without action first being taken by the California Fish and Game Commission.'' On October 3, 2006, the California Fish and Game Commission received a petition to list the Scott Bar salamander under CESA. The Commission rejected the petition due to the protections already provided the species under CESA.

The Scott Bar salamander is recognized by the Commission as protected under CESA as a sub-group or sub-population of the listed Siskiyou Mountains salamander (Cal. Code Regs. tit. 14, § 670.5, subd. (b)(3)(A).). However, the California Office of Administrative Law recently rejected for procedural reasons a formal effort by the Commission to recognize the protected status of the Scott Bar salamander under CESA in State regulations (Cal. Reg. Notice Register 2007, No. 28–Z, p. 1191). The Scott Bar salamander, therefore, is not specifically listed under CESA, but retains the same protections afforded the Siskiyou Mountains salamander. The Service is not aware of any other formal action by the Commission to recognize the protected status of Scott Bar salamander under CESA.

The CDFG petition to delist the Siskiyou Mountains salamander does not include the historic portion of this species' range known to be occupied by the Scott Bar salamander. Therefore, the Service believes that regardless of the California Fish and Game Commission's decision on whether to delist the Siskiyou Mountains salamander, current State protections for the Scott Bar salamander will remain in effect until a formal rule-making process to remove these protections is undertaken. To our knowledge, there is no formal process currently underway to remove protections for the Scott Bar salamander.

We recognize the uncertainty surrounding the future of State protections for Scott Bar salamanders on private lands and have evaluated the threat potentially posed by timber harvesting on private lands if protections were absent. As described under Factor A, we find that there is little evidence to suggest that timber harvesting on private lands threatens Scott Bar salamander populations because: (1) Numerous populations are currently known to occur in a variety of managed habitat conditions on private timberlands; (2) research indicates that populations of these salamanders persist following intensive timber harvest and recover as vegetation is re-established, and less intensive harvest practices appear to have minor or short-term effects on salamander abundance; and (3) private lands constitute only 22 percent of the species' range, and are distributed in a dispersed pattern among Federal lands where conditions are more favorable and thus acts to maintain the distribution of, and connectivity among, salamander populations at larger spatial scales and reduce the impacts of intensive timber harvest on adjacent private lands. Therefore, we find that in the event that State protections for the Scott Bar salamander are removed, the lack of regulatory protections on private lands would not pose a substantial threat to this species in the foreseeable future.

Summary of Factor D

The Scott Bar salamander receives substantial protection based on the land allocations and Standards and Guidelines of the NWFP and KNF Land and Resource Management Plan. Future protection of the Scott Bar salamander will likely also occur through the USFS Sensitive Species Program. The high proportion the species' range within reserved land allocations, combined with the overall low rate and intensity of timber harvest on Federal lands leads us to conclude that elimination of the Survey and Manage guidelines does not pose a substantial threat to this species. We find that the combination of Federal regulations and land management planning guidelines provide adequate

existing regulatory mechanisms across the vast majority of the species' range.

The Scott Bar salamander also receives protection on private lands in California under CESA. While there presently is no effort underway to remove State protections for the Scott Bar salamander, the continued protection of the species under CESA for the foreseeable future is not certain. However, we find that the uncertain future of CESA protections for Scott Bar salamander populations on private lands does not pose a substantial threat because: (1) Private lands comprise a small portion of the species' range and are distributed in small parcels interspersed among Federal lands; and (2) salamander populations have been shown to persist in managed landscapes. We therefore conclude that the Scott Bar salamander is not now, or in the foreseeable future, threatened by inadequate regulatory mechanisms.

Factor E: Other Natural or Manmade Factors Affecting the Continued Existence of the Species

Other natural or manmade factors that may affect the persistence of the Scott Bar salamander across its range are climate changes associated with global warming and stochastic events, which are rare, chance events such as epidemics and large, severe wildfires.

Climate Change

The similarities in physiology, ecology, and habitat associations between the Scott Bar salamander and other members of the Siskiyou Mountains salamander Complex, combined with the large scales at which climate change studies are conducted, lead us to conclude that our analysis of the potential effects of climate change under Factor E for the Siskiyou Mountains salamander applies to the Scott Bar salamander as well. Given its physiology, this species may be strongly affected by changes to precipitation patterns. Although most of the available climate models predict increases in average temperatures, models were inconsistent with regard to future precipitation; increases in annual precipitation and cloud cover are a plausible outcome and could act to ameliorate any negative impacts caused by increased temperatures. We are unable to predict the potential effects of future climate change on the Scott Bar salamander at this time.

Stochastic Events

The Scott Bar salamander is an endemic species with a relatively small geographic range (136,740 ac (55,335 ha)) and limited dispersal abilities. These traits may increase its vulnerability to stochastic (rare, chance) events such as epidemics or large, severe fires because a single event can occur within all or a large portion of the range, and individuals may be unable to escape the disturbance or recolonize habitat following extirpation. The petitioners claim that these salamanders are rare, patchily distributed, and easily extirpated by disturbances, making them highly vulnerable to extinction (Greenwald and Curry 2007, p. 1). However, current research suggests that Scott Bar salamanders are in fact well-distributed within their range, that they occur at high densities in some areas, and that populations persist in managed landscapes (see ''Range and Distribution'' and Factor A for the Siskiyou Mountains salamander). These traits act to decrease the potential vulnerability conferred on this species by its small range. Severe disturbances such as clear-cutting or intense wildfires may result in negative effects to abundance or population structure of this species (as described under Factor A for the Siskiyou Mountains salamander), but there is no evidence that they result in significant losses of populations, and populations appear to recover over time.

Although there is evidence that fire size and intensity may have increased in the Klamath-Siskiyou region, large fires with mixed severity are characteristic of the natural disturbance regime (Odion et al. 2004, p. 933; Agee 1993, pp. 388–389) within which these salamanders have evolved. However, a large wildfire that affects the majority of the range of the Scott Bar salamander is a plausible description of a significant stochastic event. Large fires such as the 2002 Biscuit Fire in southern Oregon may encompass an area similar to or larger than the range of this species. This does not, however, demonstrate that a fire of this magnitude is likely to threaten the Scott Bar salamander in the foreseeable future. The diverse topography and patchy distribution of habitats within the salamanders' range suggests that a large fire would be unlikely to have homogeneous effects at a large scale. The resulting mosaic pattern of fire effects, combined with the salamanders' ability to remain protected underground and persist during postfire vegetation recovery, indicates that the threat posed by such a stochastic event would be unlikely to result in large-scale extirpation of populations.

Summary of Factor E

The uncertain nature of climate change predictions, particularly predictions of future precipitation patterns, precludes a meaningful evaluation of potential impacts to Scott Bar salamander populations resulting from future climate conditions. We find that, although stochastic events such as large wildfires may occur within a large portion of this salamanders' restricted range, Scott Bar salamanders appear to persist following wildfires and other disturbances, to recover as vegetation is re-established following disturbance, and have adequate numbers of well-distributed populations throughout their range to allow for persistence and viability of this species. We therefore conclude that the Scott Bar salamander is not now, or in the foreseeable future, threatened by the individual or cumulative effects of climate change or stochastic events such as epidemics or large, severe wildfires.

Finding

We assessed the best available scientific and commercial information regarding threats faced by the Scott Bar salamander. We have reviewed the petition, information available in our files, and information submitted to us following our 90-day petition finding (72 FR 14750; March 29, 2007). We also consulted with recognized salamander experts, and Federal and private land managers, and arranged for researchers to initiate field studies to assess the distribution of genetic entities within the salamander complex and demographic response of these species to forest structure and management practices.

We find little support for the petitioners' claim that the Scott Bar salamander is threatened by habitat destruction caused by timber harvesting and wildfire, and that existing regulatory mechanisms are inadequate to protect the species. While the available information suggests that Scott Bar salamanders may be positively associated with older forest conditions, the majority of studies and available field data show the species occupying a wide range of forest conditions, including previously harvested areas. Recent research indicates that these salamanders persist and populations recover as vegetation is re-established in intensively disturbed habitats. Less-intensive disturbances such as forest thinning and mixed-effects wildfire appear to have minor or short-term impacts on salamander abundance. There is no reliable evidence that indicates loss of populations or curtailment of this species' range has occurred.

We acknowledge that the abundance and population structure of Scott Bar salamander populations may be

negatively affected by intensive timber harvesting practices such as clear-cutting. The extent and magnitude of such practices, however, are severely limited by a number of regulatory mechanisms and other factors operating within the salamanders' range, as evidenced by the steep decline in timber harvest levels on Federal lands that constitute 78 percent of the species' range. Although levels of timber harvesting are higher on private timberlands, such lands constitute only 22 percent of the species' range and occur as small parcels interspersed among Federal lands. The small proportion of the range consisting of private lands, coupled with the ability of Scott Bar salamanders to persist in managed landscapes, leads us to conclude that forest management activities on Federal or private lands do not pose a substantial threat to this species.

Several complementary regulatory mechanisms provide protection for Scott Bar salamanders and their habitats. On Federal lands constituting 78 percent of the species' range, the NWFP's system of land use allocations and management guidelines impose substantial limitations on the amount and intensity of land management activities, as evidenced by the dramatic decline in timber harvest levels observed since the NWFP was implemented. For this reason, the elimination of the Survey and Manage Program, which has provided protection specifically to occupied salamander locations, does not pose a substantial threat to the species.

As a species, the Scott Bar salamander exhibits several characteristics that, when combined, suggest that Scott Bar salamanders are resilient to stochastic events such as large wildfires. Populations of Scott Bar salamanders are distributed among several watersheds, and abundance within populations can be high. There are 115 known locations within the estimated range of this species, and the majority of suitable habitat has not been surveyed. These population characteristics, combined with the species' apparent ability to persist and recover following habitat disturbance, acts to reduce any potential threat posed by stochastic events. Our evaluation of climate change modeling for the geographic area inhabited by the salamanders does not support the contention that future climate poses a threat to Scott Bar salamanders, because it is not currently possible to forecast future precipitation regimes.

Our evaluation of the five listing factors does not support the contention that there are threats of sufficient imminence, intensity, or magnitude as to cause substantial losses of population distribution or viability of the Scott Bar salamander. Therefore, we do not find that the Scott Bar salamander is in danger of extinction (endangered), nor is it likely to become endangered within the foreseeable future (threatened) across its range. Therefore, listing the species as threatened or endangered under the Act is not warranted at this time.

Under the Services' DPS policy, (61 FR 4722, February 7, 1996) three elements are considered in the decision concerning the establishment and classification of a possible DPS. These are applied similarly for additions to the Lists of Endangered and Threatened Wildlife and Plants. These elements include: (1) The discreteness of a population in relation to the remainder of the species to which it belongs; (2) the significance of the population segment to the species to which it belongs; and (3) the population segment's conservation status in relation to the Act's standards for listing, delisting, or reclassification (i.e., is the population segment endangered or threatened). We are not aware of any information that would lead us to conclude that the Scott Bar salamander is comprised of population segments that are either discrete or significant. Therefore, we have not analyzed the Scott Bar salamander under the Services' DPS policy.

Significant Portion of the Range Analysis

Having determined that the Siskiyou Mountains salamander, the Applegate salamander DPS of Siskiyou Mountains salamander, the Grider DPS of Siskiyou Mountains salamander, and the Scott Bar salamander do not meet the definition of a threatened or endangered species, we must next consider whether there are any significant portions of their ranges where the species or DPS is in danger of extinction or is likely to become endangered in the foreseeable future.

On March 16, 2007, a formal opinion was issued by the Solicitor of the Department of the Interior, ''The Meaning of 'In Danger of Extinction Throughout All or a Significant Portion of Its Range' '' (USDI 2007c). We have summarized our interpretation of that opinion and the underlying statutory language below. A portion of a species' range (in this case, ''species'' refers to the Siskiyou Mountains salamander, the Scott Bar salamander, and both Siskiyou Mountains salamander DPSs) is significant if it is part of the current range of the species and it contributes substantially to the representation, resiliency, or redundancy of the species. The contribution must be at a level such that its loss would result in a decrease in the ability to conserve the species.

We acknowledge that the Ninth Circuit Court of Appeals decision in *Defenders of Wildlife* v. *Norton*, 258 F.3d 1136 (2001) can be interpreted to require that in determining whether a species is threatened or endangered throughout a significant portion of its range, the Service should consider whether lost historical range (as opposed to current range) constitutes a significant portion of the range of the species at issue. While this is not our interpretation of the case or the statute, we conclude that there are no such areas for the Siskiyou Mountains salamander, the Applegate DPS of the Siskiyou salamander, the Grider DPS of the Siskiyou salamander, or the Scott Bar salamander. As we discussed in detail in our assessment of threats to each species, there is no evidence of range contraction for any of the species. We have no evidence to suggest that the occupied range of any member of the Siskiyou Mountains salamander Complex is different from its historical range.

In determining whether a species is threatened or endangered in a significant portion of its range, we first identify any portions of the range of the species that warrant further consideration. The range of a species can theoretically be divided into portions in an infinite number of ways. However, there is no purpose to analyzing portions of the range that are not reasonably likely to be significant and threatened or endangered. To identify only those portions that warrant further consideration, we determine whether there is substantial information indicating that (i) The portions may be significant and (ii) the species may be in danger of extinction there or likely to become so within the foreseeable future. In practice, a key part of this analysis is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats applies only to portions of the range that are unimportant to the conservation of the species, such portions will not warrant further consideration.

If we identify any portions that warrant further consideration, we then determine whether in fact the species is threatened or endangered in any significant portion of its range.

Depending on the biology of the species, its range, and the threats it faces, it may be more efficient for the Service to address the significance question first, or the status question first. Thus, if the Service determines that a portion of the range is not significant, the Service need not determine whether the species is threatened or endangered there. If the Service determines that the species is not threatened or endangered in a portion of its range, the Service need not determine if that portion is significant. If the Service determines that both a portion of the range of a species is significant and the species is threatened or endangered there, the Service will specify that portion of the range as threatened or endangered pursuant to section 4(c)(1) of the Act.

The terms ''resiliency,'' ''redundancy,'' and ''representation'' are intended to be indicators of the conservation value of portions of the range. Resiliency of a species allows the species to recover from periodic disturbance. A species will likely be more resilient if large populations exist in high-quality habitat that is distributed throughout the range of the species in such a way as to capture the environmental variability found within the range of the species. In addition, the portion may contribute to resiliency for other reasons—for instance, it may contain an important concentration of certain types of habitat that are necessary for the species to carry out its life-history functions, such as breeding, feeding, migration, dispersal, or wintering. Redundancy of populations may be needed to provide a margin of safety for the species to withstand catastrophic events. This does not mean that any portion that provides redundancy is a significant portion of the range of a species. The idea is to conserve enough areas of the range such that random perturbations in the system act on only a few populations. Therefore, each area must be examined based on whether that area provides an increment of redundancy is important to the conservation of the species. Adequate representation ensures that the species' adaptive capabilities are conserved. Specifically, the portion should be evaluated to see how it contributes to the genetic diversity of the species. The loss of genetically based diversity may substantially reduce the ability of the species to respond and adapt to future environmental changes. A peripheral population may contribute meaningfully to representation if there is evidence that it provides genetic diversity due to its location on the margin of the species' habitat requirements.

Siskiyou Mountains Salamander

The Applegate and Grider DPSs together constitute the entirety of the range of the Siskiyou Mountains salamander. We have previously determined, however, that neither DPS is threatened or endangered across its range. Therefore, according to the formal opinion on significant portion of the range (USDOI 2007), we should then evaluate whether any significant portion of the range of a DPS may warrant listing.

Applegate Salamander DPS of Siskiyou Mountains Salamander

To determine whether the Applegate salamander DPS is threatened in a significant portion of its range, we first addressed whether any portions of the range of the Applegate salamander DPS warrant further consideration. Our analysis indicates that the conservation status of the species is essentially the same throughout its range; there is no area within the range of the Applegate salamander DPS where potential threats to this species are significantly concentrated or are substantially greater than in other portions of the range. And, as we explained in detail in our analysis of the status of the species, none of the threats faced by the species, alone or in combination, are sufficient to place it in danger of extinction now (endangered) or in the foreseeable future (threatened).

We found no evidence that populations of Applegate salamander DPS are concentrated in any geographic portion of the range that would increase the vulnerability of this DPS to a particular threat. The 440 known Applegate salamander locations and suitable habitat are widely distributed across the DPS's range, and large areas of suitable habitat remain unsurveyed.

We have analyzed the threats to the Applegate salamander DPS and have determined that they are not concentrated within any geographic portion of the range, and no significant areas within the DPS's range have been determined to face any greater threats. Potential threats to the DPS on Federal lands are addressed by existing land use regulations such as the NWFP, in combination with the Special Status Species program, such that no areas face significant threats which are not being managed. We find that private timberlands do not constitute a significant proportion of the Applegate salamander DPS's range because (1) Private lands constitute a minor proportion (15 percent) of the range of the Applegate salamander, and (2) private lands within the range of the species occur as small parcels in a ''checkerboard'' pattern with Federal lands or as isolated parcels, reducing the potential for threats to be concentrated in a geographic portion of the larger range. For these reasons, we find that there are no portions of the Applegate salamander DPS's range that warrant further consideration as significant portions of the range.

We do not find that the Applegate salamander DPS is in danger of extinction (endangered) now, nor is it likely to become endangered within the foreseeable future (threatened) throughout all or a significant portion of its range. Therefore, listing the Applegate salamander DPS as threatened or endangered under the Act is not warranted at this time.

Grider Salamander DPS of Siskiyou Mountains Salamander

Applying the process described above for determining whether a species is threatened in a significant portion of its range, we also addressed whether any portions of the range of the Grider salamander DPS warrant further consideration. Our evaluation of the distribution of Grider salamander DPS populations and potential threats indicates that the conservation status of the species is essentially the same throughout its range; there is no area within the range of the Grider salamander DPS where potential threats to this species are significantly concentrated or are substantially greater than in other portions of the range. And, as we explained in detail in our analysis of the status of the species, none of the threats faced by the species, alone or in combination, are sufficient to place it in danger of extinction now (endangered) or in the foreseeable future (threatened).

We found no evidence that populations of this DPS are concentrated in any geographic portion of the range that would increase the vulnerability of this DPS to a particular threat. The 76 known Grider salamander locations and suitable habitat are widely distributed across the DPS's range, and large areas of suitable habitat remain unsurveyed.

We have analyzed the threats to the Grider salamander DPS and have determined that they are not concentrated within any geographic portion of the range, and no significant areas within the DPS's range have been determined to face any greater threats. Potential threats to the DPS on Federal lands are addressed by existing land use regulations such as the NWFP, such that no areas face significant threats which are not being managed. We find that

private timberlands do not constitute a significant proportion of the Grider salamander DPS's range because (1) Private lands constitute a minor proportion (9 percent) of the range of the Grider salamander DPS, and (2) private lands within the range of the DPS occur as small parcels in a ''checkerboard'' pattern with Federal lands or as isolated parcels, reducing the potential for threats to be concentrated in a geographic portion of the larger range. Based on the reasons described above, we find that there are no portions of the Grider salamander DPS's range that warrant further consideration as significant portions of the range.

We do not find that the Grider salamander DPS is in danger of extinction (endangered) now, nor is it likely to become endangered within the foreseeable future (threatened) throughout all or a significant portion of its range. Therefore, listing the Grider salamander DPS as threatened or endangered under the Act is not warranted at this time.

Scott Bar Salamander

To determine whether the Scott Bar salamander is threatened in a significant portion of its range, we first addressed whether any portions of the range of the Scott Bar salamander warrant further consideration. Our evaluation of the distribution of Scott Bar salamander populations and potential threats indicates that the conservation status of the species is essentially the same throughout its range; there is no area within the range of the Scott Bar salamander where potential threats to this species are significantly concentrated or are substantially greater than in other portions of the range. And, as we explained in detail in our analysis of the status of the species, none of the threats faced by the species, alone or in combination, are sufficient to place it in danger of extinction now (endangered) or in the foreseeable future (threatened).

We found no evidence that populations of Scott Bar salamanders are concentrated in any geographic portion of the range that would increase the vulnerability of this species to a particular threat. The 115 known Scott Bar salamander locations and suitable habitat are widely distributed across the species' range, and large areas of suitable habitat remain unsurveyed. The higher numbers of salamander locations on private lands is the result of mandatory surveys, and does not suggest the presence of larger or more concentrated populations on private lands.

Existing land use regulations, such as the NWFP, provide protection for the Scott Bar salamander on Federal lands while CESA provides substantial protection for the salamander on private lands in California. Further, even if the CESA protections on private lands were eliminated, the threats facing the Scott Bar salamander would not significantly increase because the private lands are not concentrated in a particular geographical area, but rather occur in a ''checkerboard'' pattern interspersed with Federal lands. This pattern of landownership serves to reduce the potential impacts on the salamander of timber harvest and other habitat disturbing activities on the relatively small portion (22 percent) of the species range that occurs on private lands, and to maintain redundancy, distribution, and connectivity among Scott Bar salamander populations. For these reasons, we conclude that there are no portions of the Scott Bar salamander's range that warrant further consideration as significant portions of the range.

We do not find that the Scott Bar salamander is in danger of extinction (endangered) now, nor is it likely to become endangered within the foreseeable future (threatened) throughout all or a significant portion of its range. Therefore, listing the species as threatened or endangered under the Act is not warranted at this time.

We make this finding at a time when Federal conservation efforts focused specifically on Applegate, Grider, and Scott Bar salamanders are in flux. Given the very recent discontinuation of the Survey and Manage Program and the fact that Survey and Manage guidelines are still applicable to ongoing Federal projects for at least another year, Federal agencies have had little time to develop and implement conservation strategies under their Special Status Species Programs. The Conservation Strategy for the Siskiyou Mountains Salamander, Northern Portion of the Range (Olson et al. 2007) covers the entire range of the Applegate salamander; the KNF is currently finalizing a Conservation Strategy for the Grider salamander and Scott Bar salamander. Both of these conservation strategies are modeled closely after the existing Survey and Manage guidance for the salamanders, but neither was evaluated as an existing conservation effort under PECE, or considered in our evaluation of threats to the species. Despite the fact that we did not rely on these existing and potential conservation efforts in our determination that the Siskiyou Mountains salamander group does not warrant protection under the Act, we note that these efforts by Federal agencies may in the future play an important role in the conservation of the species by acting as a hedge against uncertainty associated with future land management policies and our understanding of the ecology of these species. This finding represents our evaluation of the best currently available scientific information on the poorly known species, the environment they inhabit, and land management practices that may affect them, but we recognize the dynamic nature of our knowledge and land management policy. Through our participation in the development, implementation, and monitoring of these Conservation Strategies, as well as in ongoing field research of the species' habitat relationships, the Service will play a direct role in the future management and status of these salamanders.

We will continue to assess the status of both clades of the Siskiyou Mountains salamander and Scott Bar salamander by working with the USFS, BLM, and other parties to the existing Conservation Strategy; research scientists; and other individuals or groups interested in contributing to the conservation of these species. Through our participation in regular reviews of the Conservation Strategy for the Siskiyou Mountains salamander, Northern Portion of the Range, we will monitor its effectiveness in eliminating and reducing threats to the Applegate salamander over the foreseeable future.

We are continuing our involvement in the evaluation of habitat associations and effects of forest management on the Grider and Scott Bar salamanders. In 2005, the Service's Yreka Fish and Wildlife Office (YFWO), in cooperation with the USFS Redwood Sciences Laboratory and Humboldt State University, initiated research into the comparative abundance, population structure, and body condition of 60 Grider and Scott Bar salamander populations across a gradient of habitat conditions.

We request that you submit any new information concerning the status of, or threats to, these species to our Yreka Fish and Wildlife Office (see **ADDRESSES** section) whenever it becomes available. New information will help us monitor these species and encourage their conservation. If an emergency situation develops for these or any other species, we will act to provide immediate protection.

References Cited

A complete list of all references cited herein is available, upon request, from the Yreka Fish and Wildlife Office (see **ADDRESSES** section).

Author

The primary authors of this notice are the staff of the Yreka Fish and Wildlife Office (see **ADDRESSES**).

Authority

The authority for this action is section 4 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.).

Dated: January 14, 2008.

Kenneth Stansell,

Acting Director, U.S. Fish and Wildlife Service.

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