

**DEPARTMENT OF THE INTERIOR****Fish and Wildlife Service****50 CFR Part 17**

[Docket No. FWS-R8-ES-2011-0076; MO-92210-0-0008]

**Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition To List 29 Mollusk Species as Threatened or Endangered With Critical Habitat**

**AGENCY:** Fish and Wildlife Service, Interior.

**ACTION:** Notice of petition finding and initiation of status review.

**SUMMARY:** We, the U.S. Fish and Wildlife Service announce a 90-day finding on a petition to list 29 mollusk species and subspecies as threatened or endangered, under the Endangered Species Act of 1973, as amended (Act). Based on our review, we find that the petition presents substantial scientific or commercial information indicating that listing 26 of the 29 species and subspecies may be warranted. Therefore, with the publication of this notice, we are initiating a review of the status of the 26 species and subspecies to determine if listing any of them is warranted. To ensure that the status review is comprehensive, we are requesting scientific and commercial data and other information regarding these 26 species and subspecies. Based on the status review, we will issue a 12-month finding on the petition, which will address whether the petitioned action is warranted, as provided in the Act.

**DATES:** To allow us adequate time to conduct this review, we request that we receive information on or before December 5, 2011. After this date, you must submit information directly to the Field Office (see **FOR FURTHER INFORMATION CONTACT** section below). Please note that we may not be able to address or incorporate information that we receive after the above requested date.

**ADDRESSES:** You may submit comments by one of the following methods:

- *Federal eRulemaking Portal:* <http://www.regulations.gov>. Search for docket [Docket No. FWS-R8-ES-2011-0076] and then follow the instructions for submitting comments.

- *U.S. mail or hand-delivery:* Public Comments Processing, Attn: [Docket No. FWS-R8-ES-2011-0076]; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, MS 2042-PDM; Arlington, VA 22203.

We will post all information received on <http://www.regulations.gov>. This generally means that we will post any personal information you provide us (see the Information Solicited section below for more details).

**FOR FURTHER INFORMATION CONTACT:**

Listing Coordinator, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, 2800 Cottage Way, Room W-2605, Sacramento, CA 95825; telephone 916-414-6600; or facsimile 916-414-6712. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800-877-8339.

**SUPPLEMENTARY INFORMATION:****Information Solicited**

When we make a finding that a petition presents substantial information indicating that listing a species or subspecies may be warranted, we are required to promptly review the status of the species or subspecies (status review). For the status review to be complete and based on the best available scientific and commercial information, we request information on the 26 petitioned species and subspecies of mollusk for which we find substantial information herein to indicate that listing as threatened or endangered may be warranted. We request such information from governmental agencies, Native American Tribes, the scientific community, industry, and any other interested parties. We seek information on:

(1) The species' or subspecies' biology, range, and population trends, including:

(a) Habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy (especially reasons why they should or should not be considered listable entities under section 4(a) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*) (see Listable Entity Evaluation, below);

(c) Historical and current range including distribution patterns;

(d) Historical and current population levels, and current and projected trends; and

(e) Past and ongoing conservation measures for the species, its habitat, or both.

(2) The factors that are the basis for making a listing determination a species or subspecies under section 4(a) of the Act, which are:

(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.

Please include sufficient information with your submission (such as full references) to allow us to verify any scientific or commercial information you include.

If, after the status review, we determine that listing any of the 26 species and subspecies of mollusk is warranted, we will propose critical habitat (see definition in section 3(5)(A) of the Act), as per section 4 of the Act, to the maximum extent prudent and determinable at the time we propose to list the species or subspecies. Therefore, within each of the geographical ranges currently occupied by the 26 species and subspecies of mollusk, we also request data and information on:

(1) What may constitute "physical or biological features essential to the conservation of the species;"

(2) Where these features are currently found; and

(3) Whether any of these features may require special management considerations or protection.

In addition, we request data and information on "specific areas outside the geographical area occupied by the species" that are "essential to the conservation of the species." Please provide specific comments and information as to what, if any, critical habitat you think we should propose for designation if the species is proposed for listing, and why such habitat meets the requirements of section 4 of the Act.

Submissions merely stating support for or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination. Section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or a threatened species must be made "solely on the basis of the best scientific and commercial data available."

You may submit your information concerning this status review by one of the methods listed in the **ADDRESSES** section. If you submit information via <http://www.regulations.gov>, your entire submission—including any personal identifying information—will be posted on the Web site. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this personal identifying information from public

review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on <http://www.regulations.gov>.

Information and supporting documentation that we received and used in preparing this finding is available for you to review at <http://www.regulations.gov>, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

### Background

Section 4(b)(3)(A) of the Act requires that we make a finding on whether a petition to list, delist, or reclassify a species presents substantial scientific or commercial information indicating that the petitioned action may be warranted. We are to base this finding on information provided in the petition, supporting information submitted with the petition, and information otherwise available in our files. To the maximum extent practicable, we are to make this finding within 90 days of our receipt of the petition and publish our notice of the finding promptly in the **Federal Register**.

Our standard for substantial scientific or commercial information within the Code of Federal Regulations (CFR) with regard to a 90-day petition finding is “that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted” (50 CFR 424.14(b)). If we find that substantial scientific or commercial information was presented, we are required to promptly conduct a species status review, which we subsequently summarize in our 12-month finding.

### Petition History

On March 17, 2008, we received a petition (dated March 13, 2008) from five conservation organizations: The Center for Biological Diversity (CBD), Conservation Northwest, the Environmental Protection Information Center, the Klamath-Siskiyou Wildlands Center, and Oregon Wild. The petition asked us to list 32 species and subspecies of snails and slugs (mollusks) in the Pacific Northwest as threatened or endangered under the Act. Additionally, the petition requested that we designate critical habitat concurrent with listing. The petition clearly identified itself as a petition and included the requisite identification information for the petitioners, as required by 50 CFR 424.14(a). In a June 27, 2008, letter to the petitioners, we responded that we had reviewed the

information presented in the petition and determined that issuing an emergency regulation temporarily listing the species as per section 4(b)(7) of the Act was not warranted. We also stated that we could not address their petition at that time due to court orders and judicially approved settlement agreements for other listing and critical habitat determinations under the Act that required nearly all of our listing and critical habitat funding for fiscal year 2008.

On April 13, 2009, we received a signed e-mail from CBD providing updated taxonomic information regarding some of the 32 petitioned mollusk species (Curry 2009, pp. 1–2). The e-mail indicated that two of those species had been formally described (see Listable Entity Evaluation, below), two others had been combined into a single species that had been formally described, and that three additional petitioned species had been combined into a single species that had been formally described. The e-mail provided a citation to the article making these taxonomic changes, and asked us to consider the revised species for listing as threatened or endangered under the Act. We treated this e-mail as an amendment to the original petition. Therefore, the amended petition asks us to list 29 species and subspecies of mollusks.

### Overview of the 29 Mollusk Species and Subspecies

The 29 species and subspecies of mollusk included in the petition are endemic (native and restricted) to the Pacific Northwest, occurring in western Washington, Oregon, and Northern California. Fourteen of the petitioned species and subspecies are aquatic and 15 are terrestrial (13 land snails and 2 slugs). They exist primarily in small, isolated populations, all of which are protected under the Northwest Forest Plan’s Survey and Manage Program. Fourteen of the species and subspecies are known from 10 or fewer sites.

### Listable Entity Evaluation

Section 3(16) of the Act defines the term “species” 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.” Entities that meet the Act’s definition of a “species” can be considered for listing under the Act and are, therefore, referred to as “listable entities.” Listable entities can then be listed if they are determined to meet the definition of an endangered species or a threatened species. The petitioner requested that

we list 29 species and subspecies of mollusk (the “petitioned mollusks”); 15 of which have been formally described as species, 4 formally described as subspecies, and 10 that have not been formally described.

Prior to making a determination of whether the petition presents substantial information to indicate whether listing may be warranted, we must address the question of whether the petition presents substantial information to indicate whether the petitioned mollusks are listable entities. Nineteen of the 29 petitioned mollusks are listable entities because they are formally described as species or subspecies in recognized scientific journals. We may also consider some or all of the remaining 10 petitioned mollusks to be listable entities if information submitted with the petition or in our files indicates that treatment of these mollusks as listable entities may be warranted.

The petition cited several documents from Federal agencies demonstrating a long history of treating these 10 petitioned mollusks as species (Burke *et al.* 1999, Sect. 12, pp. 1–16; Burke *et al.* 1999, Sect. 15, pp. 1–10; Furnish and Monthey 1999, Sect. 2, pp. 2–10; Furnish and Monthey 1999, Sect. 4, pp. 3–15; Furnish and Monthey 1999, Sect. 5, pp. 1–8; Duncan 2005b, pp. 3–15; Duncan 2005c, pp. 1–19; Duncan 2005e, pp. 3–9; USDA and USDI 2007, pp. 92–94, 250, 251, 257–259, 263, 264, 266–269). The documents describe each of these 10 mollusks and their habitats. The documents also include formal reviews of management actions taken by the agencies, and their impacts on these 10 mollusks (as well as on the 19 formally described mollusks). Based on our review of the information in the petition, we conclude the reports present a clear indication that each of these 10 petitioned mollusks has been treated as a species by Federal land management agencies, even without formal description and recognition as a species. Accordingly, we find that the petition presents substantial information indicating that the 10 petitioned mollusks that have not yet been formally described may be species as defined by the Act and may thus be listable entities. Therefore, in addition to the 19 formally described species and subspecies, we consider whether the petition presents scientific or commercial information to indicate whether listing any of the 10 petitioned mollusks that have not yet been formally described may be warranted.

This finding addresses 29 mollusk species and subspecies, as identified in the table below.

LIST OF 29 SPECIES AND SUBSPECIES INCLUDED IN THIS FINDING

Common name	Scientific name	Formally described?	Finding: substantial information?
Basalt juga	<i>Juga n. sp. 2</i>	No	Yes.
Big Bar hesperian	<i>Vespericola pressleyi</i>	Yes	Yes.
Canary dusksnail	<i>Colligyrus convexus</i>	Yes	Yes.
Chelan mountainsnail	<i>Oreohelix n. sp. 1</i>	No	Yes.
Cinnamon juga	<i>Juga n. sp. 3</i>	No	Yes.
Columbia dusksnail	<i>Lyogyrus n. sp. 1</i>	No	Yes.
Columbia Oregonian	<i>Cryptomastix hendersoni</i>	Yes	Yes.
Crater Lake tightcoil	<i>Pristiloma arcticum crateris</i>	Yes	No.
Dalles sideband	<i>Monadenia fidelis minor</i>	Yes	Yes.
Diminutive pebblesnail	<i>Fluminicola n. sp. 3</i>	No	Yes.
Evening fieldslug	<i>Deroceras hesperium</i>	Yes	Yes.
Goose Valley pebblesnail	<i>Fluminicola anserinus</i>	Yes	Yes.
Hat Creek pebblesnail	<i>Fluminicola umbilicatus</i>	Yes	Yes.
Hoko vertigo	<i>Vertigo n. sp. 1</i>	No	Yes.
Keeled jumping-slug	<i>Hemphillia burringtoni</i>	Yes	Yes.
Knobby rams-horn	<i>Vorticifex n. sp. 1</i>	No	Yes.
Masked dusksnail	<i>Lyogyrus n. sp. 2</i>	No	Yes.
Nerite pebblesnail	<i>Fluminicola n. sp. 11</i>	No	Yes.
Nugget pebblesnail	<i>Fluminicola seminalis</i>	Yes	Yes.
Potem Creek pebblesnail	<i>Fluminicola potemicus</i>	Yes	Yes.
Puget Oregonian	<i>Cryptomastix devia</i>	Yes	Yes.
Shasta chaparral	<i>Trilobopsis roperi</i>	Yes	Yes.
Shasta hesperian	<i>Vespericola shasta</i>	Yes	Yes.
Shasta pebblesnail	<i>Fluminicola multifarius</i>	Yes	Yes.
Shasta sideband	<i>Monadenia troglodytes troglodytes</i>	Yes	Yes.
Siskiyou sideband	<i>Monadenia chaceana</i>	Yes	No.
Tall pebblesnail	<i>Fluminicola n. sp. 2</i>	No	Yes.
Tehama chaparral	<i>Trilobopsis tehamana</i>	Yes	No.
Wintu sideband	<i>Monadenia troglodytes wintu</i>	Yes	Yes.

*The Survey and Manage Program and Special Status Species Programs*

All of the petitioned mollusks are protected on Federal lands by the Northwest Forest Plan's (NWFP's) Survey and Manage Program (U.S. Department of Agriculture (USDA) and U.S. Department of the Interior (USDI) 2007, pp. 92–94, 249–269). The Survey and Manage Program was developed because of concerns that the NWFP would not adequately protect many species that were rare, isolated, or rare and isolated, and that could be impacted by forest management practices. The program was also developed to address concerns that additional management measures would be required to conserve the species (USDA and USDI 2001, p. 7). The program requires pre-disturbance surveys and mitigation, strategic surveys, management, and an annual species review (USDA and USDI 1994, p. 9; Olson *et al.* 2007, pp. iii, 1, 2). The Survey and Manage Program has not been managed continuously since 2001 due to a number of lawsuits and a 2007 decision to discontinue the program (USDA and USDI 2007, pp. xi, xii, xx). However, as result of a challenge to the 2007 decision, a settlement agreement was finalized in July 2011 that reinstated the Survey and Manage Program as it had been implemented in

2001 (*Conservation Northwest v. Rey*, 2009, Case No. C–08–1067–JCC (W.D. Wash.)). Many of the petition's claims, particularly as they relate to Factor D (existing regulatory mechanisms), are related to the status of the Survey and Management Program, which had been discontinued at the time of the petition.

Many of the petitioned species are recognized as sensitive species or as special status species by the U.S. Forest Service (USFS) and Bureau of Land Management (BLM), respectively (USDA and USDI 2007, pp. 25, 92–94). We refer to these programs collectively as special status species programs. The goal of these programs is to avoid the need to list a given species under the Endangered Species Act, but we do not have information in our files to show exactly what this may entail with regard to any of the petitioned mollusks addressed by a special status species program. Inclusion or removal of individual species and subspecies in the special status species program is left to the discretion of the agency's regional decision makers (USDA and USDI 2007, pp. 25, 65).

The Aquatic Conservation Strategy (ACS) is a habitat management program established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, pp. 9, 10; CBD *et al.* 2008,

p. 32). The ACS includes four components: Riparian reserves, key watersheds, watershed analysis, and watershed restoration. Riparian reserves are comprised of aquatic features and their protected riparian buffers. Buffers differ in size, dependent on the type of aquatic habitat. Under the ACS, Federal land managers establish requirements for timber management, road building, grazing, and recreation management within established riparian reserves. The strategy identifies key watersheds to be managed for at risk salmonids, or where high water quality is considered important. Information for managing reserves and key watersheds is obtained and updated through systematic procedures of watershed analysis, and that information may also be used for watershed restoration (USDA and USDI 1994, pp. 9, 10).

**Evaluation of Information for This Finding**

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations at 50 CFR 424 set forth the procedures for adding a species to, or removing a species from, the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or a threatened species due to one or more of the five factors described in section

4(a)(1) of the Act: (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.

In making this 90-day finding, we evaluated whether information regarding threats to each of the petitioned mollusks, as presented in the petition and other information available in our files, is substantial, thereby indicating that the petitioned action may be warranted. With one exception, all potential threats addressed in our analyses were alleged in the petition. The exception is the potential impact of plans to raise the Shasta Dam on the Shasta sideband, Shasta chaparral and Wintu sideband; we addressed this potential threat based on information in our files. All supporting documents used were either cited in the petition or in our files. Substantial information need only be found for one of the five factors described in section 4(a)(1) of the Act to reach a "substantial" finding for a given petitioned mollusk. As discussed above, we will conduct a 12-month review of petitioned mollusks for which a "substantial" finding is reached, and during that review we will consider all available information relating to all five factors. We ask that information relating to any of the five factors be submitted per the instructions listed above in the Information Solicited section, regardless of whether a substantial finding was determined for that factor.

#### Basalt juga (*Juga (Oreobasis) n. sp. 2*)

The basalt juga is believed to be limited to springs in the central and eastern Columbia River Gorge in Oregon and Washington (Duncan 2005b, pp. 9–10). It has 28 known occurrences and has been documented on the Gifford-Pinchot and Mount Hood National Forests, in the Columbia River Gorge National Scenic Area, and on private land. Duncan (2005b, p. 8) reported it to be sensitive to water pollution, low oxygen, increased water temperatures, and sedimentation. Population numbers are declining according to Frest and Johannes (1995a, p. 179).

**Factor A:** The petition asserts that the basalt juga is threatened by highway and railway development, logging, grazing, and water diversions (CBD *et al.* 2008, p. 55). Information cited by the petition supports these claims with regard to water diversions, and notes that some of those diversions are for purposes of

grazing and logging (Oregon Natural Heritage Information Center (ORNHC) 2004a, p. 2). The immediacy of the primary threat (water diversions) is considered "moderate," which means the threat is likely to be operating within 2 to 5 years of the ORNHIC publication in 2004 (Master *et al.* 2002, pp. 14, 15, ORNHIC 2004a, p. 2). The cited source also mentions past impacts from road construction, logging and grazing, but does not indicate the extent to which these pose present threats. The petition notes, however, that documents obtained through the Freedom of Information Act (FOIA) indicate that the species was detected at four timber sales and three road maintenance projects (CBD *et al.* 2008, p. 55). Impacts to springs in the Columbia Gorge due to diversions, highway construction, and logging are common on both private and public lands, and likely to continue (Frest and Johannes 1995a, p. 185).

Consequently, based on our evaluation of the information presented in the petition and in our files, we determined the petition presents substantial information to indicate that listing the basalt juga may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

**Factors B and C:** The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

**Factor D:** The petition asserts that basalt juga is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The basalt juga is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, the basalt juga should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

**Factor E:** The petition asserts that basalt juga is threatened by climate change (CDB *et al.* 2008, pp. 26, 27). The petition and our files contain information indicating that climate change is expected to cause significant reductions in both the volume and persistence of winter snowpack throughout the western United States (Knowles *et al.* 2006, p. 4545). Such

reductions have already been documented in the Columbia Gorge (Knowles *et al.* 2006, pp. 4545, 4546; ISAB 2007, p. 12). This trend is expected to continue, thereby further reducing summer water availability (Field *et al.* 2007, pp. 620, 627; ISAB 2007, p. 15). Such a reduction in available surface water may result in increased water diversions from groundwater and springs, but the extent to which springs supporting the basalt juga may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may result in water temperature increases (Field *et al.* 2007, p. 620; ISAB 2007, p. 16). Potential water temperature increases may be deleterious to the basalt juga, but the extent to which springs supporting the basalt juga may be affected by temperature increases is unclear, and this will likely depend on the size and depth of groundwater reservoirs, and on the flow rates of both groundwater and surface water into spring pools. However, watersheds fed by very large and deep groundwater systems are relatively uncommon in the Columbia Basin (ISAB 2007, p. 32). The basalt juga is dependent on cold, highly oxygenated water (Duncan 2005b, p. 11), so temperature increases could be deleterious.

The petition and our files also contain information indicating that climate change is also expected to further increase the frequency and intensity of wildfires in the Columbia Basin (ISAB 2007, p. 22; CDB *et al.* 2008, pp. 27, 28). Wildfire affected much of the basalt juga's range in 1993 (Frest and Johannes 1995a, p. 179; Duncan 2005b, p. 12; CDB *et al.* 2008, p. 55). The removal of cover plants by wildfires can reduce shading and increase soil erosion, thereby increasing water temperatures and sedimentation in springs occupied by the species.

**Basalt juga Summary:** Based on our evaluation of the information presented in the petition and in our files, we have determined that substantial information exists to indicate that listing the basalt juga may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from water pollution and diversions. Because we have found that the petition presents substantial information indicating that listing the basalt juga may be warranted, we are initiating a status review to determine whether listing under the Act is warranted.

Big Bar Hesperian (*Vespericola pressleyi*)

The Big Bar hesperian is a terrestrial snail known from 27 locations in the Trinity National Forest, in Trinity County, California (Burke *et al.* 1999, Sect. 16 p. 1; USDA and USDI 2007, p. 93). It is an old-growth and riparian associate according to Frest and Johannes (1993, p. 40) and it is known to inhabit forests of conifer and hardwood trees in permanently damp or moist areas within 200 meters (m) (656 feet (ft)) of seeps, springs, and stable streams (Kelley *et al.* 1999, p. 73).

**Factor A:** The petition asserts that the Big Bar hesperian is threatened by habitat alteration due to grazing and logging (CBD *et al.* 2008, p. 69). Information cited in the petition (Burke *et al.* 1999, Sect. 16, pp. 1, 6) indicates that overgrazing may adversely impact the species due to the potential for trampling and the removal of vegetation necessary for food, shade, and subsurface dampness. However, neither the petition nor our files contained any information about the presence of grazing activities within the species' habitat that would allow us to assess the likelihood of these types of impacts occurring. Burke *et al.* (1999, p. 6) also indicate that removal of trees or downed wood, such as through logging activities, may adversely affect the species due to increased sun and wind exposure with resulting soil moisture losses. Information cited in the petition indicated that habitat loss is occurring now and affecting the majority of the species (Master *et al.* 2002, pp. 14, 15; ORNHIC 2004b, p. 2).

Therefore, based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Big Bar hesperian may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

**Factors B and C:** The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

**Factor D:** The petition asserts that Big Bar hesperian is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Big Bar hesperian is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, the Big Bar hesperian should receive special management consideration on Federal

lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

**Factor E:** The petition asserts that Big Bar hesperian is threatened by fire, pesticide application, recreation, and invasive species (CBD *et al.* 2008, pp. 26, 69). The petition notes that part of the snail's habitat was destroyed by fire in 2001 (CBD *et al.* 2008, p. 69; USFWS 2001, p. 2). Additional information cited by the petition indicates that pesticides, recreational activities involving motor vehicles, and invasive species may negatively impact some populations, but the source does not provide clear information regarding the extent of these activities in the species' range (Burke *et al.* 1999, Sect. 16, pp. 1, 6).

The petition asserts that climate change could adversely affect the Big Bar hesperian (CBD *et al.* 2008, p. 26). Information in our files indicates that climate change is causing earlier melting and significant reductions in snowpack throughout the western United States, including northern California (Kapnick and Hall 2010, pp. 3446, 3448). The consequent lengthening of summer drought and associated increases in mean annual air temperature are positively correlated with increased tree mortality rates in old-growth forests, including forests in northern California (Van Mantgem *et al.* 2009, pp. 522, 523). Continuation of these trends could potentially result in loss of the damp forest conditions required by the Big Bar hesperian (Burke *et al.* 1999, Sect. 16, pp. 5, 6); however, the exact extent of these potential changes upon the species is unknown.

**Big Bar hesperian Summary:** Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Big Bar hesperian may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from grazing and logging activities. Because we have found that the petition presents substantial information indicating that listing the Big Bar hesperian may be warranted, we are initiating a status review to determine whether listing under the Act is warranted.

Canary Dusksnail (*Colligyrus convexus*) (previously referred to as *Lyogyrus* n. sp. 3)

The canary dusksnail is an aquatic snail known from one (USDA and USDI 2007, p. 260) to seven sites (Hershler *et al.* 2003, p. 284) in the Pit River drainage in Shasta County, California. Of five population sites listed in the California Natural Diversity Database (CNDDB), one is located in the Lassen National Forest and another is in McArthur-Burney Falls State Park (CNDDB 2008, pp. 2, 5). Others are on private land. Because the CNDDB (2008, pp. 2, 5) and Hershler *et al.* (2008, p. 284) provide maps of known sites, and because Hershler *et al.* (2008) is published by a peer-reviewed journal, we consider these sources to more accurately reflect the actual number of sites occupied by the canary dusksnail. The canary dusksnail is known to inhabit cold, clear, well-oxygenated, unpolluted water (Frest and Johannes 1995b, p. 3; Furnish and Monthey 1999, Sect. 4, p. 8).

**Factor A:** The petition asserts that the canary dusksnail's habitat has been severely degraded by human activities, including mining, logging, grazing, chemical pollution, road and railroad construction, and water diversions (CBD *et al.* 2008, p. 38). The petition also asserts that dams, diversions, and spring developments have caused historical habitat loss and these activities continue to threaten the species. The petition cites the BLM's management recommendations for this species, which indicate that the species is directly threatened by grazing and road and railroad construction (both of which cause water pollution and excessive sedimentation), and water diversions, which lower water levels and decrease available habitat (Furnish and Monthey 1999, Sect. 4, p. 14). The Pit River is listed on the State of California's list of water quality limited segments because of organic enrichment and high nutrient levels from grazing and agriculture (California Environmental Protection Agency (CEPA) 2002, p. 143), so water pollution may constitute a threat. In their 2004 publication, the Oregon Natural Heritage Information Center concluded that threats to the canary dusksnail are moderate to severe, and imminent (ORNHIC 2004a, p. 2).

The petition also alleges that the canary dusksnail faces threats from mining, logging, chemical pollution, dams, spring and recreational development activities (CBD *et al.* 2008, p. 38). Many of these are mentioned in the BLM's management recommendations (Furnish and

Monthey 1999, Sect. 4, p. 13), but that document implies that these are practices that have negatively impacted habitats of several mollusk species in the Pit River in the past, and does not identify the activities as current threats. The document lists threats specifically applicable to the canary dusksnail as grazing, spring diversions, and road and railroad construction (Furnish and Monthey 1999, Sect. 4, p. 14). Additionally, the petition claims that recent proposals for relicensing hydroelectric developments on the Pit River pose imminent threats to existing populations, but we were unable to confirm that claim based on a review of the Final Environmental Impact Statement (FERC 2004a, pp. xvi–xviii).

Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the canary dusksnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that Canary dusksnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Canary dusksnail is not currently considered a special status species (USDA and USDI 2007, p. 93). As discussed above under “The Survey and Manage Program and Special Status Species Programs,” the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

*Factor E:* The petition asserts that climate change is a threat to the canary dusksnail (CBD *et al.* 2008, pp. 26, 27). Information in our files indicates that climate change is causing significant reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of the snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months (Kapnick and Hall 2010, pp. 3446, 3454). Such a reduction in available surface water may result in increased water diversions from

groundwater and springs, but the extent to which springs supporting the canary dusksnail may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may also result in water temperature increases (Field *et al.* 2007, pp. 620, 629). Although potential water temperature increases could negatively impact the canary dusksnail, this species occurs in large, cold, perennial springs, and the extent to which the springs that support the canary dusksnail may be affected by this potential threat is unclear.

The petition also states that those petitioned species existing only in small, isolated colonies are threatened by increased vulnerabilities of small, isolated populations to extinction from limited gene flow and stochastic (chance) events (CBD *et al.* 2008, pp. 28, 29). The petition provided no information, and we do not have information in our files regarding the size of most local populations of this species, which would affect their susceptibility to inbreeding depression. We also do not have information regarding the likelihood of damaging stochastic events capable of threatening the species. The petition does not provide any information regarding the potential threat from isolation and limited distribution, and we do not consider isolation and limited distribution, in and of itself, to be a threat to the canary dusksnail.

*Canary dusksnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the canary dusksnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from railroad and road construction, grazing, water diversions and water pollution. Because we have found that the petition presents substantial information indicating that listing the canary dusksnail may be warranted, we are initiating a status review to determine whether listing under the Act is warranted.

#### Chelan Mountainsnail (*Oreohelix n. sp.* 1)

The Chelan mountainsnail is a terrestrial snail known from at least 104 sites in or near the Wenatchee National Forest in Chelan County, Washington (USDA and USDI 2007, pp. 93, 263, 264). Eighty-six of those known sites are on Federal land. The Chelan mountainsnail is known to inhabit grassy underbrush in, or adjacent to,

arid transition forests of Douglas-fir or ponderosa pine, often in depressions that allow slightly more moisture accumulation than surrounding areas (Burke *et al.* 1999, Sect. 12, pp. 8, 9; Duncan 2005c, pp. 1, 9). The species is sometimes found in association with schist talus (broken rock), according to Frest and Johannes (1995a, p. 113).

The number of known occupied sites for this species has increased significantly in recent years. In 1995 the species was known from only a single location (Frest and Johannes 1995a, p. 113). In 1999, 14 sites were known, 7 of which had been destroyed by fire (Burke *et al.* 1999, Sect. 12, p. 6; ORNHIC 2004b, p. 1). By 2005, 97 sites had been identified (Duncan 2005c, p. 9), and by 2007 104 sites were known (USDA and USDI 2007, p. 93). Information in our files indicates that approximately 150 occupied sites were found during Forest Service surveys in 1999 and 2000 (Murphy 2000, p. 2), but it is not clear how many of these new sites, if any, are accounted for in the 104 sites that were generally known in 2007 (USDA and USDI 2007, p. 93). It also is not clear how many of the sites found by Murphy were occupied at the time by live snails (Murphy 2000, p. 2; Tarr 2010, p. 2).

In sites containing live snails, the number of individuals appears to be low. Duncan (2005c, p. 12) reported that most sites known in 2005 contained only 1 individual, although a survey of 18 plots in the vicinity of an unreported number of previously documented sites found a total of 186 snails, thereby “suggesting that local populations may be somewhat more numerous than previously expected.”

*Factor A:* The petition asserts that timber harvest is a threat to this species (CBD *et al.* 2008, p. 64). Logging may negatively impact this species by causing soil compaction and microhabitat alteration and large machinery used for logging can also directly crush individual snails (Duncan 2005c, p. 10). Frest and Johannes (1995a, p. 113) indicate that logging has occurred and is likely to continue throughout most of this species’ potential range. According to the petition, National Forest Survey and Manage documents indicate that the Chelan mountainsnail was detected at a timber sale and at a thinning and prescribed burning project (CBD *et al.* 2008, p. 64). The prescribed burn presumably occurred on the Wenatchee National Forest in 2005 (Duncan 2005c, p. 12). The species appears to prefer areas with a somewhat more open canopy, thereby allowing for a more lush grass understory (Duncan 2005c, p.

11), so it is not clear that tree removal, in and of itself, would pose a threat.

The petition also states that ingrowth of understory vegetation may constitute a threat by reducing habitat quality and increasing the risk of wildfire (CBD *et al.* 2008, p. 63). Although Duncan (2005c, p. 14) supports this claim, she does not explain how such ingrowth would reduce habitat quality, nor does the author indicate whether such ingrowth is currently occurring or is likely to occur across the snail's range. We address the risk of fire below under *Factor E*.

Information in our files supports claims by the petitioner that heavy grazing may negatively impact the species by compacting soils and removing the snail's grassy underbrush habitat (Duncan 2005c, p. 14). According to Frest and Johannes (1995a, p. 113) grazing has occurred and is likely to continue to occur throughout most of the species' range. Road building and talus removal associated with road building and maintenance have impacted at least one occupied site by removing suitable habitat. These activities had been ongoing for several years in the early 1990s (Frest and Johannes 1995a, p. 113), and may reasonably be expected to continue in the future (Duncan 2005c, p. 10). We therefore determine there is substantial information in the petition and in our files to indicate that grazing and road building and maintenance activities may be threats to the Chelan mountainsnail, such that listing may be warranted.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that Chelan mountainsnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Chelan mountainsnail is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, the Chelan mountainsnail should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

*Factor E:* The petition asserts that high-intensity fire is a threat to this species, because the species is adapted to the historical low-intensity seasonal fire regime, but not to modern fires (CBD *et al.* 2008, p. 63). The likelihood of high-intensity fire in the future may be heightened by climate change (Westerling *et al.* 2006, pp. 940, 941). High-intensity fire may negatively impact this species by removing habitat, directly killing individual snails, and isolating remaining populations (Duncan 2005c, p. 14). The Tye Fire of 1994 destroyed seven occupied sites, which as of 2005, were still not known to have been recolonized (Duncan 2005c, p. 9).

We do not have information in our files to indicate that the effects of climate change may pose a threat to the Chelan mountainsnail in other ways, since it is already adapted to relatively arid habitats (Duncan 2005c, p. 11).

The petition lists recreational activities such as off-road vehicle use as a threat (CBD *et al.* 2008, p. 64), but we have no information in our files to indicate that such activities are occurring or are likely to occur within the range of the Chelan mountainsnail to an extent that they may pose a threat to the species.

The petition also indicates that the Chelan mountainsnail may be threatened by limited gene flow (inbreeding depression) and stochastic (chance) events (CBD *et al.* 2008, pp. 28, 29). We consider the potential threat from chance events to be low because the Chelan mountainsnail is now known from approximately 100 sites (USDA and USDI 2007, p. 93), and approximately 150 additional sites may have been located (Murphy 2000, p. 2). Although population numbers at each site appear to be low (Duncan 2005c, p. 12) (which would tend to increase the possibility of inbreeding depression) (Lande 1999, pp. 11, 12), the petition does not provide any information regarding the potential threat from isolation and limited distribution, and we do not consider isolation and limited distribution, in and of itself, to constitute a threat to the Chelan mountainsnail.

*Chelan mountainsnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Chelan mountainsnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from logging, grazing, and road building and maintenance activities. We

are initiating a status review to determine whether listing under the Act is warranted.

Cinnamon Juga (*Juga n. sp. 3*)

The cinnamon juga is an aquatic snail known from four (USDA and USDI 2007, p. 93) to eight sites (Frest and Johannes 1999, p. 90) in the Shasta Springs complex (a network of hydrologically connected springs), on the upper Sacramento River, Siskiyou County, California. None of the sites are on Federal land (USDA and USDI 2007, p. 258). It is believed to be restricted to large, cold, perennial springs with sand-cobble or basalt bedrock substrate (Furnish and Monthey 1999, Sect. 2, p. 5). There is one record of an occurrence in the Sacramento River itself, but this apparently involved a subaqueous spring (Frest and Johannes 1999, p. 90). The species is dependent on high levels of dissolved oxygen, and is sensitive to pollution, elevated temperatures, and sedimentation, according to Furnish and Monthey (1999, Sect. 2, p. 5).

*Factor A:* The petition asserts that the species may be threatened by water diversions, grazing, and water pollution (CBD *et al.* 2008, p. 55). Information cited by the petition and in our files indicates that diversions may adversely impact the species by removing habitat and reducing water flow (Frest and Johannes 1999, p. 90; Furnish and Monthey 1999, Sect. 2, p. 7; USDA and USDI 2007, p. 258). Our information also indicates that grazing may pose a threat by polluting water, increasing siltation, and raising water temperatures (Furnish and Monthey 1999, Sect. 2, p. 7; USDA and USDI 2007, p. 258). Additionally, logging may pose a threat to the species by increasing siltation in occupied habitat (Furnish and Monthey 1999, Sect. 2, p. 7), and groundwater withdrawal has caused the extinction or local extirpation of ecologically similar species by lowering water tables (USDA and USDI 2007, p. 258).

The petition also asserts that development may be a threat to the cinnamon juga, and notes that occupied springs have been negatively impacted by railroad construction (CBD *et al.* 2008, p. 56). The petition did not provide information and we did not find information in our files indicating that development is likely to impact the cinnamon juga. We did not find information to indicate how past impacts from railroad development represent a present or continuing threat, except as discussed below under *Factor E* with regard to road and trackside spraying, and catastrophic chance events.

Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the cinnamon juga may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that cinnamon juga is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy (CBD *et al.* 2008 p. 29). The cinnamon juga is not currently considered by the USFS or BLM to be a special status species (USDA and USDI 2007, pp. 93, 258). It is also unlikely to receive significant protection from the Aquatic Conservation Strategy (ACS), since the ACS only applies to Federal lands (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32), and the cinnamon juga is not known to occur on such lands (USDA and USDI 2007, p. 258). As discussed above under “The Survey and Manage Program and Special Status Species Programs,” the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

*Factor E:* The petition asserts that climate change is a threat to the cinnamon juga (CBD *et al.* 2008, p. 26). Climate change is causing significant reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months (Kapnick and Hall 2010, pp. 3446, 3454). Such a reduction in available surface water may also result in increased water diversions from groundwater and springs, but the extent to which springs supporting the cinnamon juga may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may also result in water temperature increases (Field *et al.* 2007, pp. 620, 629). Although potential water temperature increases could negatively impact the cinnamon juga, this species occurs in large, cold,

perennial springs, and the extent to which the springs that support the cinnamon juga may be affected by this potential threat is unclear.

The restriction of the cinnamon juga to only eight known sites in the same general area leaves it potentially susceptible to catastrophic chance events, such as the 1991 train derailment and subsequent spill of the herbicide metam sodium into the nearby upper Sacramento River at Cantara Bend (Furnish and Monthey 1999, Sect. 2, p. 8). Runoff from normally scheduled road and trackside herbicide spraying may also impact the species (Frest and Johannes 1999, p. 90).

Although the petition states that “recreation” may also constitute a threat (CBD *et al.* 2008, p. 56) we found no supporting information in the petition or our files to indicate which recreational activities might be involved, or how they might pose a threat to the species.

*Cinnamon juga Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the cinnamon juga may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from water diversion and groundwater withdrawal, grazing, and logging activities. We are initiating a status review to determine whether listing under the Act is warranted.

#### Columbia Dusksnail (*Lyogyrus n. sp. 1*)

The Columbia dusksnail is an aquatic snail known from 64 sites in the central and eastern Columbia Gorge in Multnomah, Clackamas and Hood River Counties, Oregon, and Klickitat and Skamania Counties, Washington (Frest and Johannes 1999, p. 70; Duncan 2005b, p. 9; USDA and USDI 2007, p. 93). Fifty-two of the sites are on Federal land (USDA and USDI 2007, p. 93). It is believed to be restricted to soft-bottomed, slow-flowing areas of cold, well oxygenated springs and spring-influenced streams tributary to the Columbia River (Duncan 2005b, p. 10). The Columbia dusksnail often occurs in very small springs, according to Frest and Johannes (1995a, p. 185). All *Lyogyrus* species are believed to be intolerant of oxygen deficits, elevated water temperatures, and sedimentation (Duncan 2005b, pp. 10, 11).

*Factor A:* The petition asserts that this species may be threatened by water diversions, road and railroad construction, and logging (CBD *et al.* 2008, p. 57). Information cited by the

petition and in our files indicates that diversions may adversely affect the species by removing and disturbing habitat; road construction and maintenance may disrupt flows and produce sediment; and logging may increase soil erosion and decrease shading (Frest and Johannes 1995a, p. 185; Furnish and Monthey 1999, Sect. 4, pp. 13, 14; Duncan 2005b, pp. 11, 12). Such modifications are relatively common in the Columbia Gorge, and because they leave less undisturbed habitat in small springs (such as those preferred by the Columbia dusksnail) their relative ecological impacts tend to be larger (Frest and Johannes 1995a, p. 185). The petitioners state that this snail was detected at 15 timber sales and 7 road maintenance projects (CBD *et al.* 2008, p. 57). Three of the timber sales included specified mitigation measures to protect the species.

The petition also alleges that there are threats from dams and grazing (CBD *et al.* 2008, p. 57), but we did not find information in the petition or our files to indicate that these activities constitute continuing threats.

Based on our evaluation of the information presented in the petition and in our files, we determined the petition presents substantial information to indicate that listing the Columbia dusksnail may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that Columbia dusksnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Columbia dusksnail is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, the Columbia dusksnail should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under “The Survey and Manage Program and Special Status Species Programs,” the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

*Factor E:* The petition asserts that climate change is a threat to the Columbia dusksnail (CBD *et al.* 2008,

p. 26). Climate change is causing significant reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of the snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months (Kapnick and Hall 2010, pp. 3446, 3454). Such a reduction in available surface water may result in increased water diversions from groundwater and springs, but the extent to which springs supporting the Columbia dusksnail may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may also result in water temperature increases (Field *et al.* 2007, pp. 620, 629). Although potential water temperature increases could negatively impact the Columbia dusksnail, the extent to which the springs that support the Columbia dusksnail may be affected by this potential threat is unclear.

Climate change is also expected to further increase the frequency and intensity of wildfires in the Columbia Basin (ISAB 2007, p. 22). Removal of cover plants by a wildfire could threaten the Columbia dusksnail by reducing shading and increasing soil erosion, thereby increasing water temperatures and sedimentation in springs occupied by the species. A conservation assessment for the Columbia dusksnail commissioned by the USFS and BLM lists "fires" as a threat (Duncan 2005b, p. 12).

The same conservation assessment lists "recreation" as a threat (Duncan 2005b, p. 12), but does not elaborate on the specific activities referred to or how they may threaten the species. The petition also states that recreation is a threat, and claims that the Columbia dusksnail was detected at two recreational projects (CBD *et al.* 2008, p. 57).

The petition also states generally that the species is threatened by "spraying" (presumably of pesticides) and by the vulnerability of small isolated populations to inbreeding depression and deleterious chance events (CBD *et al.* 2008, pp. 28, 29, 57). We did not find information to indicate that pesticide spraying occurs in the vicinity of the Columbia dusksnail at levels that may threaten the species. We also did not find information to indicate that Columbia dusksnail populations are so small and isolated that inbreeding

depression or stochastic events may threaten the species.

*Columbia dusksnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Columbia dusksnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from water diversions, road construction and maintenance, and logging activities. We are initiating a status review to determine whether listing under the Act is warranted.

#### Columbia Oregonian (*Cryptomastix hendersoni*)

The Columbia Oregonian is a terrestrial snail known from 22 to 45 sites (Duncan 2005d, pp. 6, 7; USDA and USDI 2007, p. 92). Seventeen or 18 locations are on Federal land, in the Mount Hood National Forest, Clackamas County, Oregon (Duncan 2005d, p. 7; USDA and USDI 2007, p. 92). The remaining locations are in the vicinity of the Columbia River in Wasco and Sherman Counties, Oregon, and in Klickitat County, Washington (Duncan 2005d, p. 6). The snail is believed to inhabit the semiarid habitat along the Columbia River by inhabiting moist microclimates along the margins of streams, seeps, and springs (Kelley *et al.* 1999, p. 9; Duncan 2005d, p. 7). In the Mount Hood National Forest, the Columbia Oregonian is known to occur in moist areas under closed canopy forests of western hemlock (Burke *et al.* 1999, Sect. 2, p. 7). Its population trends (numbers of both sites and individuals) are downward, according to ORNHC (2004c, p. 2).

*Factor A:* The petition asserts that the Columbia Oregonian is threatened by habitat loss due to development, logging, grazing, and agriculture, as well as by water pollution, diversions, and impoundments (CBD *et al.* 2008, p. 41). Information cited by the petition and in our files indicates that Columbia Oregonian populations near the Columbia River may be threatened by loss of habitat and groundwater withdrawals due to urban development, and by loss of perennial flow of nearby springs and streams due to agricultural diversions and impoundments (Frest and Johannes 1995a, p. 89; Duncan 2005d, p. 9). Information presented in the petition also indicates that grazing may threaten these populations, due to impacts from trampling and pollution (Frest and Johannes 1995a, p. 89; Duncan 2005d, p. 9). Additionally, information presented in the petition

indicates that populations on Mount Hood may be threatened by loss of woody debris and removal of tree canopy due to logging (Duncan 2005d, p. 9), which may reduce the suitability of microclimate habitat. Therefore, we have determined that the petition presents substantial information to indicate that listing the Columbia Oregonian may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that Columbia Oregonian is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy (CBD *et al.* 2008, p. 26). The Columbia Oregonian is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, the Columbia Oregonian should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

*Factor E:* The petition asserts that the Columbia Oregonian is threatened by climate change, fire, roadside spraying of pesticides, invasive species, and recreation (CBD *et al.* 2008, pp. 26, 41). The petition and our files contain information indicating that climate change could cause significant reductions in both the volume and persistence of winter snowpack throughout the western United States (Knowles *et al.* 2006, p. 4545). Such reductions have already been documented in the Columbia Gorge and in the vicinity of Mt. Hood (Knowles *et al.* 2006, pp. 4545, 4546). The reduction and earlier melting of the snowpack is likely to continue, and this may result in earlier and more severe drying of soils (Westerling *et al.* 2006, p. 942). Because this species requires moist microclimates (Duncan 2005d, p. 7), a reduction in soil moisture could threaten the species.

Climate change is also expected to further increase the frequency and intensity of wildfires in the Columbia Basin (ISAB 2007, p. 22). Large fires

may pose a threat to the species by directly killing snails and degrading useable habitat (Duncan 2005d, p. 9). Modern fires can effectively sterilize large areas of snails (Frest and Johannes 1995a, p. 55). For example, major brush fires impacted known occupied sites in 1994 (Frest and Johannes 1995a, p. 89).

Water pollution from roadside herbicide spraying may also threaten the species, which is dependent on clean water from seeps, springs, and streams to maintain moist microhabitats (Frest and Johannes 1995a, p. 89; Duncan 2005d, pp. 3, 7, 9).

The petition states that “recreation” threatens the species, but does not specify the type of recreation or the nature of the threat (CBD *et al.* 2008, p. 41). Two documents cited by the petition are used to support the petition’s claim, but they fail to specify the nature of the recreation or threat (Frest and Johannes 1995a, p. 89; Duncan 2005d, p. 9). We do not have information in our files to indicate that recreational activities pose a threat to the species.

The petition also states that the Columbia Oregonian is threatened by nonnative species (CBD *et al.* 2008, p. 41). Burke *et al.* (1999, Sect. 2, p. 8) notes that “[n]onnative plants and animals may be a threat and should be managed when a need is identified,” but does not otherwise indicate that nonnative plants or animals are currently affecting the persistence or survival of the Columbia Oregonian in any of its known locations. We do not have information in our files to indicate that nonnative species may be a threat to the Columbia Oregonian.

*Columbia Oregonian Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Columbia Oregonian may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from water diversions and impoundments, as well as to groundwater withdrawals, grazing and logging activities. We are initiating a status review to determine whether listing under the Act is warranted.

#### Crater Lake Tightcoil (*Pristiloma arcticum crateris*)

The Crater Lake tightcoil is small terrestrial snail known from 209 sites in the Oregon Cascades (USDA and USDI 2007, p. 93). All occupied sites occur on Federal land, including Crater Lake National Park, and the Umpqua, Winema, Deschutes, and Mount Hood

National Forests (Kelley *et al.* 1999, p. 57; Duncan 2004, pp. 7, 9). The Crater Lake tightcoil has been found in wetland areas in perennially moist forested areas; often in non-acidic fens or sedge habitats near open water (Duncan 2004, pp. 7, 8). This subspecies has been found at elevations ranging from 838 to 1,950 m (2,750 to 6,400 ft) (Duncan 2004, p. 8). Sites are generally in areas that experience snow cover for long periods (Duncan 2004, p. 8).

*Factor A:* The petition states that habitat-based threats to the Crater Lake tightcoil include water diversions from meadow habitats, logging, grazing, heavy equipment operation, and “construction” (presumably of roads) (CBD *et al.* 2008, p. 65). The petition cites three supporting documents, but two of them (Frest and Johannes 2000, p. 226; and Burke *et al.* 1999, Sect. 13, p. 1) were written when the subspecies was only known from three to eight sites. The third document cited by the petition, a conservation assessment (Duncan 2004, pp. 9), indicates that 160 occupied sites were known at the time, but its summary of threats is nearly identical (with minor changes) to the threats description of Burke *et al.* (1999, Sect. 13, p. 1). The preface of Duncan 2004 (p. 3) indicates that the purpose of that document was to convert management recommendations originally made for the Survey and Manage Program (such as those produced by Burke *et al.* (1999)) into conservation assessments fitted to the Special Status/Sensitive Species Program (SSSP). There is no indication that the hundreds of newly documented occupied locations of the subspecies were taken into account when repeating the threats assessment of Burke *et al.* (1999, Sect. 13, p. 1) in the 2004 conservation assessment (Duncan 2004, p. 4).

Two years after the completion of Duncan’s (2004) report, 49 additional occupied sites were identified (USDA and USDI 2007, p. 264). The new occurrences increased the known number of occupied sites by 25 percent, and also expanded the known distribution, indicating that the subspecies straddles the Cascade Mountains with a relatively continuous distribution. The following year (2007), the environmental impact statement for the removal of the Survey and Manage program concluded that there is sufficient habitat to support stable populations of this species in the area covered by the Northwest Forest Plan, in the absence of both Survey and Manage and Special Species Status programs (USDA and USDI 2007, pp. xiv, 93, 264) (see Factor D, below). We

have no additional information to indicate that there may be habitat-related threats across the now-larger known range of this species.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that Crater Lake tightcoil is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. This mollusk is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, the Crater Lake tightcoil should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under “The Survey and Manage Program and Special Status Species Programs,” the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The petition also states that this mollusk is threatened by the Western Oregon Plan Revision (WOPR), a set of revisions to the Northwest Forest Plan proposed for BLM lands in western Oregon (CBD *et al.* 2008, p. 34). However, the BLM withdrew this proposal in 2009 (USDA 2009, p. 1). We are unaware of any plans to reinstate the WOPR, therefore we do not have information to assess if or how the WOPR may impact the species.

*Factor E:* The petition asserts that climate change is a threat to the Crater Lake tightcoil (CBD *et al.* 2008, p. 26). The petition and our files contain information indicating that climate change is expected to cause significant reductions in both the volume and persistence of winter snowpack throughout the western United States (Knowles *et al.* 2006, p. 4545). Such reductions have already been documented in the Oregon Cascades (Knowles *et al.* 2006, pp. 4545, 4546). If reduced snowpack results in a reduction of soil moisture, the Crater Lake tightcoil, which requires perennially moist habitat (Duncan 2004, p. 8), could be impacted. However, neither the petition nor our files contain any information about the extent soil drying could occur within the Crater Lake tightcoil’s habitat or what impact that drying would have to the species.

The petition states that the Crater Lake tightcoil may be threatened by fire and recreational activities that compact

the substrate, such as snowmobiling and off-road vehicles (CBD *et al.* 2008, pp. 26, 27, 65). However, the subspecies appears well distributed on both sides of the Cascade Mountains (USDA and USDI 2007, p. 264), and is known from over 200 sites. And, any potential threat from recreational activities would likely be dispersed relative to the species' range. While fire and recreational activities could impact individual areas (Burke *et al.* 1999, Sect. 13, p. 1; Duncan 2004, p. 11), we do not have information in our files to indicate that they may pose threats to the subspecies given the high number and wide distribution of known occurrences.

*Crater Lake Tightcoil Summary:* The reinstatement of the Survey and Manage Program, the withdrawal of the WOPR proposal, and the discovery of over 200 well-distributed additional occupied sites since 2000 (when several of the petition's cited sources were written), have addressed the concerns raised by the petition. Based on our evaluation of the information presented in the petition and in our files, we have determined the petition does not present substantial information to indicate that listing the Crater Lake tightcoil may be warranted.

#### Dalles Sideband (*Monadenia fidelis minor*)

The Dalles sideband is a small, terrestrial snail known from 98 occupied sites distributed along the Columbia Gorge and Deschutes River in Wasco County, Oregon, and Klickitat County, Washington (Kelly *et al.* 1999, p. 37). Ninety-seven of the occupied sites are on Federal land (USDA and USDI 2007, p. 93). During the summer months, the Dalles sideband is usually found in moist rock talus a short distance from streams or springs, and during the wet seasons it is usually found in moist woody debris or other litter, according to Burke *et al.* (1999, Sect. 9, p. 3).

*Factor A:* The petition states that the Dalles sideband was detected at six timber sales, a road maintenance project, and a grazing allotment (CBD *et al.* 2008, p. 61). The subspecies is likely to be negatively impacted by activities that decrease moisture within the microhabitats it occupies (Burke *et al.* 1999, Sect. 9, p. 1). Timber, road maintenance, and grazing activities could result in reduced soil moisture due to compaction of soil and removal of vegetation (Burke *et al.* 1999, Sect. 9, pp. 1, 5). We determined the petition presents substantial information to indicate that listing the Dalles sideband may be warranted due to the present or

threatened destruction, modification, or curtailment of its habitat or range.

*Factor B:* The petition states that the Dalles sideband is threatened by overcollection (CBD *et al.* 2008, p. 61). Although Burke *et al.* (1999, Sect. 9, p. 1) does mention overcollection as a potential threat, they do not provide information explaining the nature or extent of collection activities. Currently, 98 occupied sites are known (USDA and USDI 2007, p. 93), as compared to the 15 occupied sites known when the Burke *et al.* (1999, Sect. 9, p. 1) report was published. We do not have information in our files to indicate whether the level of collection activities referenced by Burke *et al.* (1999, Sect. 9, p. 1) may be a threat to the species, given the increased number of known occupied sites.

*Factor C:* The petition did not present any information, nor do we have any information in our files, to indicate that this factor may pose a threat to the species.

*Factor D:* The petition asserts that Dalles sideband is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Dalles sideband is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, this mollusk should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

*Factor E:* The petition asserts that climate change is a threat to the Dalles sideband (CBD *et al.* 2008, p. 26). Information cited by the petition and in our files indicates that climate change is expected to cause significant reductions in both the volume and persistence of winter snowpack throughout the western United States (Knowles *et al.* 2006, p. 4545). Such reductions have already been documented in the Oregon Cascades (Knowles *et al.* 2006, pp. 4545, 4546). If reduced snowpack resulted in a reduction of soil moisture, the Dalles sideband could be impacted. However, neither the petition nor our files contain any information about the extent soil drying could occur within the Dalles sideband habitat or what impact that drying would have to the species.

The petition also asserts that the Dalles sideband may be threatened by fire (CBD *et al.* 2008, p. 61). Climate change is expected to further increase the frequency and intensity of wildfires in Oregon, particularly in the Oregon Cascades (Westerling *et al.* 2006, pp. 940, 942). Large fires may pose a threat to the species by directly killing snails and degrading occupied habitat (Duncan 2005a, p. 4).

The petition indicates that the Dalles sideband may be threatened by limited gene flow (inbreeding depression) and stochastic (chance) events (CBD *et al.* 2008, pp. 28, 29). We consider the threat from chance events to be very low because the species is known from 98 locations. The petition does not present any information regarding the level of gene flow, nor do we have any information in our files regarding the level of gene flow between those sites, or the species' susceptibility to inbreeding depression.

The petition also states that the Dalles sideband is threatened by pesticide application and recreation activities (CBD *et al.* 2008, p. 61). Although Burke *et al.* (1999, Sect. 9, p. 1) do mention these activities as potential threats, they do so based on the conclusion that such activities often constitute threats for land snails in general, rather than based on information specific to the Dalles sideband.

*Dalles Sideband Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Dalles sideband may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from timber, road maintenance and grazing activities that may result in reduced soil moisture due to compaction of soil and removal of vegetation. We are initiating a status review to determine whether listing under the Act is warranted.

#### Diminutive Pebblesnail (*Fluminicola n. sp.* 3)

The diminutive pebblesnail (sometimes referred to as the Klamath Rim pebblesnail (Frest and Johannes 1999, p. 25)) is a small aquatic snail known from six sites in two large spring complexes (Fall Creek and Jenny Creek watersheds) in the middle Klamath River Drainage, in Jackson County, Oregon (Frest and Johannes 2000, p. 267). Three of the six known sites for the diminutive pebblesnail occur on Federal land (USDA and USDI 2007, p. 93). This species is found only in areas of gravel-boulder substrate with very

cold, unpolluted water, according to Frest and Johannes (2000, p. 267).

*Factor A:* The petition asserts that the diminutive pebblesnail is threatened by logging, grazing, water diversions, water pollution, development, and road construction (CBD *et al.* 2008, p. 44). Information cited by the petition and in our files indicates that the species may be threatened by logging (which can lead to siltation and increased water temperatures), water diversions (which reduce available water and habitat), grazing (which can increase water temperatures, pollute water, and increase siltation), water pollution from agricultural runoff, and road building (which can also produce siltation) (Frest and Johannes 2000, p. 268; ORNHIC 2004d, p. 2; Banish 2010, p. 1). Part of the flow from the spring complexes supporting the diminutive pebblesnail is diverted for the City of Yreka, California, municipal water supply (Frest and Johannes 2000, p. 268). Irrigation diversions are also common, as is grazing on much of the larger Fall Creek and Jenny Creek system. The petition also claims “development” is a threat (CBD *et al.* 2008, p. 44), but we do not have information in our files to indicate that development may pose a threat to the species.

We have determined the petition presents substantial information to indicate that listing the diminutive pebblesnail may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that the diminutive pebblesnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. This mollusk currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, the diminutive pebblesnail should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under “The Survey and Manage Program and Special Status Species Programs,” the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The petition also states that this mollusk is threatened by the WOPR, a

set of revisions to the Northwest Forest Plan proposed for BLM lands in western Oregon (CBD *et al.* 2008, p. 34). However, the BLM withdrew this proposal in 2009 (USDA 2009, p. 1). We are unaware of any plans to reinstate the WOPR, therefore we do not have information to assess if or how the WOPR may impact the species.

*Factor E:* The petition asserts that climate change is a threat to the diminutive pebblesnail (CBD *et al.* 2008, p. 26). Climate change is causing significant reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of the snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months (Kapnick and Hall 2010, pp. 3446, 3454). Reduced snow runoff and lower flow levels may also result in water temperature increases (Field *et al.* 2007, pp. 620, 629). Although potential change in water availability and temperatures could negatively impact mollusks, the extent to which the diminutive pebblesnail may be affected by this potential threat is unclear.

The petition also indicates the diminutive pebblesnail may be threatened by limited gene flow (inbreeding depression) and stochastic (chance) events (CBD *et al.* 2008, pp. 28, 29). Although the petition and our files do not have information regarding the number of diminutive pebblesnail individuals at each occupied site (which would affect the threat of inbreeding depression), the clustering of all known populations in only two spring complexes may leave them vulnerable to any catastrophic events that might affect one or both of those complexes, such as the 1991 herbicide spill at Cantara Bend resulting in the near complete removal of aquatic mollusk populations throughout the upper Sacramento River (Frest and Johannes 1995b, pp. 72, 73).

*Diminutive pebblesnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the diminutive pebblesnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from logging, water diversions, grazing, water pollution from agricultural runoff, and road building. We are initiating a status

review to determine whether listing under the Act is warranted.

Evening Fieldslug (*Deroceras hesperium*)

The evening fieldslug is a terrestrial slug (with a small, thin shell) known from 20 sites, 4 of which are believed to be locally extinct, and 14 of which occur on Federal land (Duncan 2005a, p. 9; USDA and USDI 2007, p. 92). Occupied sites are scattered across the Oregon Cascades and northern Coast Range, extending north through western Washington and into Vancouver Island, British Columbia (Duncan 2005a, p. 4, 8). The evening fieldslug typically inhabits low elevation, perennially wet meadows in forested habitats, according to Duncan (2005a, p. 4).

*Factor A:* The petition asserts that habitat loss is the greatest threat to this species (CBD *et al.* 2008, p. 42). Information cited by the petition and in our files indicates that this species may be threatened by activities that lower the water table or reduce soil moisture, including spring diversions, grazing, and logging (Duncan 2005a, p. 10). Reduced soil moisture can lead to desiccation, which is the primary cause of land snail mortality (Frest and Johannes 1993, p. 3). The petition also claims that natural hydrological changes and ingrowth of woody plants into meadow habitats may threaten the species. Although Duncan (2005c, p. 10) supports this claim, the author does not provide information to indicate how the loss of habitat due to such natural processes may or may not be balanced by creation of new wet-meadow habitat. Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the evening fieldslug may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factor B:* The petition did not present any information, nor do we have any information in our files, to indicate that this factor may pose a threat to the species.

*Factor C:* The petition presents information to indicate that predation may be a threat (CBD *et al.* 2008, p. 43). While Duncan (2005a, p. 4) does state that natural threats may include exposure to predators, the author did not characterize predation as a primary threat, nor did the author provide information to indicate the specific predators involved or the extent of their impact to the species.

*Factor D:* The petition asserts that evening fieldslug is threatened by

inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The mollusk is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, the evening fieldslug should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The Aquatic Conservation Strategy is unlikely to provide significant protections, because the evening fieldslug is not an aquatic or riparian species (Duncan 2005a, p. 4).

The petition also states that this mollusk is threatened by the WOPR, a set of revisions to the Northwest Forest Plan proposed for BLM lands in western Oregon (CBD *et al.* 2008, p. 34). However, the BLM withdrew this proposal in 2009 (USDA 2009, p. 1). We are unaware of any plans to reinstate the WOPR, therefore we do not have information to assess if or how the WOPR may impact the species.

*Factor E:* The petition asserts that climate change is a threat to the evening fieldslug (CBD *et al.* 2008, p. 26). Information cited by the petition and in our files indicates that climate change is expected to cause significant reductions in both the volume and persistence of winter snowpack throughout the western United States (Knowles *et al.* 2006, p. 4545). Such reductions have already been documented in the Oregon Cascades (Knowles *et al.* 2006, pp. 4545, 4546). If reduced snowpack resulted in a reduction of soil moisture, the evening fieldslug could be impacted. However, neither the petition nor our files contain any information about the extent soil drying could occur within the evening fieldslug habitat or what impact that drying would have to the species.

The petition states that the evening fieldslug may be threatened by recreation such as off-road vehicle use (CBD *et al.* 2008, p. 43). Although Duncan (2005a, p. 10) supports this claim, we do not have any information in our files to indicate whether off-road vehicle use is occurring at or near enough to occupied sites to pose a threat.

The petition indicates that the evening fieldslug may be threatened by limited gene flow (inbreeding

depression) and stochastic (chance) events (CBD *et al.* 2008, pp. 28, 29). We consider the threat from chance events to be low because the occupied locations are so widely scattered. Population size would be a contributing factor to susceptibility of inbreeding depression; however, we do not have any information regarding the size of most local populations.

*Evening fieldslug Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the evening fieldslug may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from activities that lower the water table or reduce soil moisture, including spring diversions, grazing, and logging. We are initiating a status review to determine whether listing under the Act is warranted.

Goose Valley Pebblesnail (*Fluminicola anserinus*, Previously *Fluminicola n. sp.* 18)

The Goose Valley pebblesnail is a small aquatic snail known from four sites (three springs and a section of creek) in the lower Pit River drainage, Shasta County, California (Hershler *et al.* 2007, pp. 376, 409, 410; USDA and USDI 2007, p. 92). Two of the four sites appear to be located on Federal land (Shasta National Forest) (Hershler *et al.* 2007, pp. 376, 409), although the environmental impact statement for the removal of the Survey and Manage Program indicates that only one site is on Federal land (USDA and USDI 2007, p. 92). The Goose Valley pebblesnail is believed to be limited to small perennial springs and spring headwaters, and require cold, unpolluted, highly oxygenated water (Furnish and Monthey 1999, Sect. 2, pp. 2, 3, 5, 6).

*Factor A:* The petition asserts that the Goose Valley pebblesnail is threatened by water diversions, impoundments, spring developments, grazing, and water pollution (CBD *et al.* 2008, p. 50). Information cited by the petition and in our files indicates that water diversions (conducted for irrigation, fish hatcheries, and livestock) pose a potential threat by removing flowing water and thus habitat; whereas impoundments can slow current, thereby increasing water temperature and sedimentation (Hershler *et al.* 2003, p. 277; ORNHIC 2004e, p. 2). Information in our files also indicates that grazing may pose a threat as a result of increased sedimentation, pollution and temperatures caused by livestock

use of springs (ORNHIC 2004e, p. 2). Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Goose Valley pebblesnail may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that Goose Valley pebblesnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The mollusk is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, the Goose Valley pebblesnail should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The Aquatic Conservation Strategy (ACS) is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS includes four components: Riparian reserves, key watersheds, watershed analysis, and watershed restoration. Since the Goose Valley pebblesnail is an aquatic mollusk occurring in part on Federal lands, the ACS may provide some protection from potential threats. Those protections would likely be limited for populations of the Goose Valley pebblesnail occupying private lands, however.

*Factor E:* The petition asserts that climate change is a threat to the Goose Valley pebblesnail (CBD *et al.* 2008, p. 26). Climate change is causing significant reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of the snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months

(Kapnick and Hall 2010, pp. 3446, 3454). Such a reduction in available surface water may result in increased water diversions from groundwater and springs, but the extent to which the Goose Valley pebblesnail may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may also result in water temperature increases (Field *et al.* 2007, pp. 620, 629). Although potential water temperature increases could negatively impact the Goose Valley pebblesnail, how the status of the Goose Valley pebblesnail may be affected by this potential threat is unknown.

Because the Goose Valley pebblesnail is known from only four locations, the species may also be threatened by deleterious stochastic (chance) events such as the 1991 spill of the herbicide metam sodium into the nearby upper Sacramento River at Cantara Bend due to a train derailment (Furnish and Monthey 1999, Sect. 2, p. 8). An occupied location on the upper Sacramento River (Frest and Johannes 1995b, pp. 45, D19) was apparently extirpated by the 1991 Cantara Spill (Frest and Johannes 1995b, pp. 72, 73; ORNHIC 2004e, p. 2; Hershler *et al.* 2007, p. 410).

*Goose Valley pebblesnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Goose Valley pebblesnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from water diversions, impoundments, and grazing activity that can increase water temperatures and sedimentation. We are initiating a status review to determine whether listing under the Act is warranted.

#### Hat Creek Pebblesnail (*Fluminicola umbilicatus*)

The Hat Creek pebblesnail is a small aquatic snail that was formally named and described in 2007 (Hershler *et al.* 2007, p. 407). This species combines two taxa (groups) of snails that had often previously been treated as separate species, but had never been formally described. Those taxa were the umbilicate pebblesnail (*Fluminicola n. sp. 19*) and the Lost Creek pebblesnail (*Fluminicola n. sp. 20*) (Frest and Johannes 1999, pp. 55, 59), both of which were petitioned for listing (CBD *et al.* 2008, pp. 50, 51). The Hat Creek pebblesnail occurs at three sites near Lost Creek and Hat Creek, in Shasta

County, California (ORNHC 2004f, p. 1; ORNHIC 2004g, p. 1; Hershler *et al.* 2007, p. 410). All three sites appear to be within the Lassen National Forest (ORNHC 2004f, p. 1; ORNHIC 2004g, p. 1; Hershler *et al.* 2007, p. 407), although a table in the environmental impact statement for the removal of the Survey and Manage Program indicates that none of the locations are on Federal land (USDA and USDI 2007, p. 92). The Hat Creek pebblesnail is believed to occur in cold water springs and spring runs (Frest and Johannes 1995, pp. 56, 60). *Fluminicola* species in general require cold, unpolluted, well-oxygenated water with little sedimentation, according to Furnish and Monthey (1999, Sect. 2, pp. 5, 7).

*Factor A:* The petition asserts that the Hat Creek pebblesnail may be threatened by water pollution, water diversions, impoundments, spring developments, grazing, logging, mining, and road construction (CBD *et al.* 2008, pp. 50, 51). Information cited by the petition and in our files indicates that water diversions (conducted for irrigation, fish hatcheries, and livestock) may pose a potential threat to the mollusk by removing flowing water, and thus habitat; and that impoundments may pose a threat by increasing water temperature and sedimentation (Hershler *et al.* 2003, p. 277; ORNHIC 2004f, p. 2; ORNHIC 2004g, p. 2). Information in our files also indicates that grazing may pose a threat due to increased sedimentation, pollution, and temperatures caused by livestock use of springs (ORNHC 2004f, p. 2; ORNHIC 2004g, p. 2). Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Hat Creek pebblesnail may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that the Hat Creek pebblesnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Hat Creek pebblesnail is not currently considered a special status species (USDA and USDI 2007, p. 93) and would not receive any special management consideration on Federal lands. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the

claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The Aquatic Conservation Strategy (ACS) is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS includes four components: Riparian reserves, key watersheds, watershed analysis, and watershed restoration. Since the Hat Creek pebblesnail is an aquatic mollusk occurring in part on Federal lands, the ACS may provide some protection from potential threats. Those protections would likely be limited for any populations of the Hat Creek pebblesnail occupying private lands, however.

*Factor E:* The petition asserts that climate change is a threat to the Hat Creek pebblesnail (CBD *et al.* 2008, p. 26). Climate Change is causing significant reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of the snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months (Kapnick and Hall 2010, pp. 3446, 3454). Such a reduction in available surface water may result in increased water diversions from groundwater and springs, but the extent to which springs supporting the Hat Creek pebblesnail may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may also result in water temperature increases (Field *et al.* 2007, pp. 620, 629). Although potential water temperature increases could negatively impact the Hat Creek pebblesnail, the extent to which the springs that support the mollusk may be affected by this potential threat is unclear.

Because only three locations are known to be occupied by the Hat Creek pebblesnail, the species may also be susceptible to stochastic (chance) events such as the 1991 spill of the herbicide metam sodium into the nearby upper Sacramento River at Cantara Bend due to a train derailment (Furnish and Monthey 1999, Sect. 2, p. 8).

*Hat Creek pebblesnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the

Hat Creek pebblesnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from water diversions and impoundments, and grazing. We are initiating a status review to determine whether listing under the Act is warranted.

#### Hoko Vertigo (*Vertigo n. sp. 1*)

The Hoko vertigo is a small terrestrial snail known from two sites near the Hoko River in Clallam County, Washington (Burke *et al.* 1999, p. 4; USFWS 2009, pp. 3–5). One site is on private commercial timber land, and the other site is on State park land (USFWS 2009, pp. 3–5). The Hoko vertigo typically occurs on the bark of old riparian hardwood trees, particularly alders, according to Burke *et al.* (1999, Sect. 15, pp. 1, 5). A table in the environmental impact statement for the removal of the Survey and Manage program indicates that there is one occupied site for the snail on Federal land (USDA and USDI 2007, p. 93), but this was apparently a mistake, as the discussion of the snail elsewhere in the document indicates that the single known location lies on non-Federal land (USDA and USDI 2007, p. 266).

**Factor A:** The petition asserts that the Hoko vertigo may be threatened by logging (CBD *et al.* 2008, p. 68). Information cited by the petition and in our files indicates that logging may pose a threat to this species by destroying forest habitat and increasing the exposure of remaining habitat to drier air (Burke *et al.* 1999, Sect. 15, p. 6). Much of the area in the vicinity of the occupied sites has been recently logged (Burke *et al.* 1999, Sect. 15, p. 6). Consequently, based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Hoko vertigo may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

**Factor B and C:** The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

**Factor D:** The petition asserts that the Hoko vertigo is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Hoko vertigo is currently considered a special status species (USDA and USDI 2007, p. 93). As discussed above under “The Survey and

Manage Program and Special Status Species Programs,” the claims raised under the petition relative to the discontinuation of the Survey and Manage Program no longer apply, because that program is once again being implemented. However, the Survey and Manage Program is unlikely to provide significant protection to this species because the Hoko vertigo is not known to occur on Federal lands.

The Aquatic Conservation Strategy (ACS) is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS is unlikely to provide significant protections to this species, because the Hoko vertigo is not known to occur on Federal lands.

**Factor E:** The petition asserts that the Hoko vertigo is threatened by wildfire, and that wildfires will become more frequent with climate change (CBD *et al.* 2008, pp. 27, 68). Information cited by the petition mentions wildfire as a presumed threat, but does not provide information regarding the likelihood of wildfires within the species’ range (Burke *et al.* 1999, Sect. 15, p. 6). As the petition notes, however, the extremely limited distribution of the Hoko vertigo makes it more vulnerable to damaging events such as wildfires (Burke *et al.* 1999, Sect. 15, p. 6; CBD *et al.* 2008, p. 68).

The petition and our files contain information indicating that global climate change is producing warmer summer temperatures, combined with longer periods of summer drought in the western U.S., which is increasing the vulnerability of western U.S. forests to wildfire (Westerling *et al.* 2006, p. 940). Wildfire frequency and total area burned increased after the mid-1980s to levels several times those during the period 1970–1986 (Westerling *et al.* 2006, p. 941). These changes cannot be explained solely by land-use history considerations such as fire suppression (Westerling *et al.* 2006, p. 940). The Olympic Peninsula includes some of the forests most likely to suffer increased wildfires in response to climate change (Westerling *et al.* 2006, p. 942, fig. 4).

The petition indicates that the Hoko vertigo may be threatened by limited gene flow (inbreeding depression) and stochastic (chance) events (CBD *et al.* 2008, pp. 28, 29). We do not have any information in our files to indicate the size of local populations, which would affect their susceptibility to inbreeding depression. We also do not have any information in our files regarding the likelihood of damaging stochastic events, other than for wildfire, which is

discussed above. Burke *et al.* (1999, Sect. 15, p. 6) mention damaging floods as a possible threat, but do not indicate the likelihood of such events.

The petition also states that the species may be threatened by recreation, pesticides, invasive species, and the harvesting of special forest products such as mosses and lichens (CBD *et al.* 2008, p. 68). Burke *et al.* (1999, Sect. 15, p. 6) mention all these as possible threats, but provide no indication that any of these potential threats are, or will occur, in areas occupied by the species. Information in our files indicates that English ivy (*Hedera helix*), an invasive species present on the Olympic Peninsula (Hoh River Trust, 2008, p. 14 and Appendix D, pp. 19–20), can cover the bark of trees in infested areas (King County 2002, p. 1), potentially depriving the Hoko vertigo of its preferred habitat. Invasive infestation by *H. helix* could therefore pose a threat to the Hoko vertigo.

**Hoko vertigo Summary:** Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Hoko vertigo may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from logging. We are initiating a status review to determine whether listing under the Act is warranted.

#### Keeled Jumping-Slug (*Hemphillia burringtoni*)

The keeled jumping-slug (also known commonly as the Burrington jumping-slug) is a terrestrial slug known from 62 sites in Clallam, Jefferson, Grays Harbor, Mason, Pacific and Skamania Counties, Washington, and Clatsop County, Oregon (Wainwright and Duncan 2005, pp. 5, 6; USDA and USDI 2007, p. 92). Twenty-four of the occupied sites are on Federal land (USDA and USDI 2007, p. 92). According to Wainwright and Duncan (2005, p. 3), it has a small shell, visible through a slit in its mantle, and may avoid predators by using its tail to flip itself off of objects (hence the name “jumping-slug”). The species is believed to occur in moist to wet forests with dense canopy cover (heavy shading) (Wainwright and Duncan 2005, p. 6).

**Factor A:** The petition asserts that the keeled jumping-slug may be threatened by logging (CBD *et al.* 2008, p. 54). Information cited by the petition and in our files indicates that logging may pose a threat to this species by destroying forest habitat (Burke *et al.* 1999, Sect. 16, p. 9; ORNHIC 2004h, p. 2; Wainwright and Duncan 2005, p. 9). According to

the petition the keeled jumping-slug was detected at four timber sales, as well as three restoration projects and a road maintenance project (CBD *et al.* 2008, p. 54).

The petition also claims that agriculture, urbanization, and recreational developments may threaten the species (CBD *et al.* 2008, p. 54). A document cited by the petition did mention agricultural conversion among threats generally applicable to four related species of jumping slugs, including the keeled jumping slug (Burke *et al.* 1999, Sect. 6, p. 2) but did not mention it among threats specifically applicable to the keeled jumping-slug alone (Burke *et al.* 1999, Sect. 6, pp. 9, 10). Documents cited by the petition do mention housing development and recreational development as a threat to the species (Burke *et al.* 1999, Sect. 6, p. 9; Wainwright and Duncan 2005, p. 9), but they do not explain the nature of the recreational developments or provide information to indicate where urbanization and recreational development are occurring in relation to occupied sites that are vulnerable to these activities.

Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the keeled jumping-slug may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factor B:* The petition did not present any information, nor do we have any information in our files, to indicate that this factor may pose a threat to the species.

*Factor C:* The petition states that the species may be threatened by predation (CBD *et al.* 2008, p. 54), but the document cited in support of this claim only indicates that predation might threaten a related species called the warty jumping-slug (*Hemphillia glandulosa*) (Wainwright and Duncan 2005, p. 15).

*Factor D:* The petition asserts that keeled jumping-slug is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The keeled jumping-slug is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, this mollusk should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed

above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The ACS is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS includes four components: Riparian reserves, key watersheds, watershed analysis, and watershed restoration. Since the keeled jumping slug is a terrestrial mollusk occurring in part on Federal riparian lands, the ACS may provide some protection from potential threats. Those protections would likely be limited for populations of the keeled jumping slug occupying private lands, however.

*Factor E:* The petition asserts that the keeled jumping-slug is threatened by wildfires, and that these are likely to become more frequent with climate change (CBD *et al.* 2008, pp. 54, 27). Information cited by the petition or in our files indicates that global climate change is producing warmer summer temperatures, combined with longer periods of summer drought in the western United States, which is increasing the vulnerability of the western U.S. forests to wildfire (Westerling *et al.* 2006, p. 940). Wildfire frequency and total area burned increased after the mid-1980s to levels several times those during the period 1970–1986 (Westerling *et al.* 2006, p. 941). These changes cannot be explained solely by land-use history considerations, such as fire suppression (Westerling *et al.* 2006, p. 940). However, sources cited by the petition and in our files only mention wildfire among threats generally applicable to four related species of jumping slugs, including the keeled jumping-slug (Burke *et al.* 1999, Sect. 6, p. 2; Wainwright and Duncan 2005, p. 2). They do not mention wildfire as a threat specifically applicable to the keeled jumping-slug alone (Burke *et al.* 1999, Sect. 6, pp. 9, 10; ORNHIC 2005h, p. 2; Wainwright and Duncan 2005, p. 9). While the petition provided general information about fire frequencies and climate change in the Pacific Northwest, it did not include any information about the effects of fire on the keeled jumping-slug or about predicted changes in fire frequency within the species range.

The petition indicates that the keeled jumping-slug may be threatened by limited gene flow (inbreeding depression) and stochastic (chance) events (CBD *et al.* 2008, pp. 28, 29).

Population size would affect susceptibility to inbreeding depression; however, we lack information regarding the size of most local populations. We also lack information regarding the likelihood of damaging stochastic events, other than for wildfire, which is discussed above. The petition also states that the keeled jumping-slug may be threatened by invasive species (CBD *et al.* 2008, p. 54). Wainwright and Duncan (2005, p. 9) mention this as a possibility, but do not provide information to indicate which invasive species are involved, exactly how they may pose a threat, or the extent to which these species co-occur with the keeled jumping-slug.

*Keeled Jumping Slug Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the keeled jumping-slug may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from logging. We are initiating a status review to determine whether listing under the Act is warranted.

Knobby Rams-Horn (*Vorticifex n. sp.* 1)

The knobby rams-horn is an aquatic snail known from two sites located on private land in Shasta County, California (USDA and USDI 2007, pp. 94, 268). Those sites are part of a large, pristine spring complex in the Pit River drainage (Frest and Johannes 1995, pp. 58, D38). Knobby rams-horns are believed to occur on rocky substrates in cold, clear water with high dissolved oxygen levels (Frest and Johannes 1999, p. 99).

*Factor A:* The petition asserts that the knobby rams-horn may be threatened by road building, logging, grazing, mining, and water diversions (CBD *et al.* 2008, p. 71). Information cited by the petition and in our files indicates that road building (which can cause sedimentation that smothers eggs and covers the rocky substrate on which the snails' food grows) and water diversions (which can remove habitat and reduce water flow) may pose threats to the knobby rams-horn (Furnish and Monthey 1999, Sect. 4, pp. 3, 4, 14). The petition (CBD *et al.* 2008, p. 71) also presents information indicating that logging, grazing, mining, and dam construction activities may also pose threats to the species, but the cited source only refers to these threats generally when discussing several species at once (Furnish and Monthey 1999, Sect. 4, p. 13). When discussing direct actions that specifically threaten

the knobby rams-horn, the only habitat-based threats mentioned by the source are road building and water diversions (Furnish and Monthey 1999, Sect. 4, p. 14).

Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the knobby rams-horn may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that the knobby rams-horn is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The knobby rams-horn is not currently considered a special status species (USDA and USDI 2007, p. 93) and, unless subsequently assigned such status, would therefore not receive special management consideration on Federal lands (were it to be found on such lands). As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The ACS is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS is unlikely to provide significant protection for this species, because the knobby rams-horn is not known to occur on Federal land.

*Factor E:* The petition asserts that climate change is a threat to the knobby rams-horn (CBD *et al.* 2008, p. 26). Climate change is causing significant reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of the snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months (Kapnick and Hall 2010, pp. 3446, 3454). Such a reduction in available surface water may result in increased water diversions from groundwater and springs, but the extent to which springs supporting the knobby

rams-horn may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may also result in water temperature increases (Field *et al.* 2007, pp. 620, 629). Although potential water temperature increases could negatively impact the knobby rams-horn, this species occurs in large, cold perennial springs, and the extent to which the springs that support this mollusk may be affected by this potential threat is unclear.

The petition also indicated that the knobby rams-horn is threatened by the vulnerability of small, isolated populations to inbreeding depression and deleterious stochastic events (CBD *et al.* 2008, pp. 28, 29). We lack information regarding local population sizes, and therefore cannot determine the likelihood of inbreeding depression. However, because the knobby rams-horn occupies only two known sites on private land the species may be threatened by deleterious stochastic events such as the 1991 spill of the herbicide metam sodium into the nearby upper Sacramento River at Cantara Bend due to a train derailment (Furnish and Monthey 1999, Sect. 4, pp. 13, 14).

The petition states that the species may be threatened by chemical pollution (CBD *et al.* 2008, p. 71), but the petition did not provide information directly indicating that pollution may be a threat, nor did we find such information in our files (except as discussed above with regard to accidental spills).

*Knobby ram's-horn Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the knobby ram's-horn may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from road building and water diversions. We are initiating a status review to determine whether listing under the Act is warranted.

#### Masked Dusksnail (*Lyogyrus n. sp. 2*)

The masked dusksnail is an aquatic snail known from three or four sites at two large lakes in Washington State (Duncan 2005e, p. 3; USDA and USDI 2007, p. 93). One lake (Curlew Lake) is in Ferry County, while the other (Fish Lake) is in Chelan County, and is partially within the Wenatchee National Forest (Duncan 2005e, p. 3). Three of the occupied sites are on Federal land (USDA and USDI 2007, p. 93). The masked dusksnail appears to require cool water, oxygenated mud substrates,

and water plants (Furnish and Monthey 1999, Sect. 5, p. 2).

*Factor A:* The petition asserts that threats to the masked dusksnail include urbanization, water pollution and eutrophication from various sources, and (possibly) water diversions (CBD *et al.* 2008, p. 58). Information cited by the petitioner or that is in our files indicates that water pollution and eutrophication from pesticides, petroleum products, and nitrogenous compounds may threaten the species, but characterizes urbanization as a threat only because it increases the likelihood of impacts from pollution (Frest and Johannes 1995a, p. 186; Furnish and Monthey 1999, Sect. 5, p. 2; Duncan 2005e, p. 3). Eutrophication problems have resulted in citizen complaints and the initiation of cleanup programs in both lakes where this species occurs (Duncan 2005e, p. 8). Water diversions constitute a less serious threat due to the large size of the lakes in which the masked dusksnail resides (Furnish and Monthey 1999, Sect. 5, p. 2; Duncan 2005e, p. 3).

Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the masked dusksnail may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that the masked dusksnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The masked dusksnail is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, this mollusk should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The ACS is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32).

The ACS includes four components: Riparian reserves, key watersheds, watershed analysis, and watershed restoration. Since the masked dusksnail is an aquatic mollusk occurring in part on Federal lands, the ACS may provide some protection from potential threats. Those protections would likely be limited for populations of the masked dusksnail occupying private lands, however.

*Factor E:* The petition asserts that climate change is a threat to the masked dusksnail (CBD *et al.* 2008, p. 26). Information cited by the petition (CBD *et al.* 2008, p. 81) indicates that global climate change may result in increased air and surface water temperatures in central and northern Washington (ISAB 2007, p. 32). The maximum water temperature preferred by the masked dusksnail is 18 degrees Celsius (°C) (65 degrees Fahrenheit (°F)) (Duncan 2005e, p. 6). It is unclear from information presented by the petition and in our files whether the water temperatures in Curlew or Fish Lakes are likely to exceed that limit within the foreseeable future.

The petition indicates that the masked dusksnail may be threatened by limited gene flow (inbreeding depression) and stochastic (chance) events (CBD *et al.* 2008, pp. 28, 29). We have little information regarding the size of local populations, but the population at Fish Lake was apparently described as “dense” in the 1970s. Large or “dense” populations tend to be less susceptible to inbreeding depression (Lande 1999, p. 11). The limitation of the species to only two populations leaves each population potentially vulnerable to deleterious stochastic events, such as chemical spills, but we lack information to indicate that any such events may occur within the foreseeable future.

The petition states that the masked dusksnail is potentially threatened by invasive nonnative fish, or by chemical treatments to remove such fish (CBD *et al.* 2008, p. 58). Although Duncan (2005e, p. 7) supports this claim, we have no information as to the likelihood of either occurrence.

*Masked dusksnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the masked dusksnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from water pollution from pesticides, petroleum products, and nitrogenous compounds. We are initiating a status

review to determine whether listing under the Act is warranted.

Nerite Pebblesnail (*Fluminicola n. sp.* 11)

The nerite pebblesnail (sometimes referred to as the Fredenburg pebblesnail (Frest and Johannes 1999, p. 29)) is a small aquatic snail known from approximately 19 sites in the Fall and Jenny Creek watersheds, located in the middle Klamath River Drainage, Jackson County, Oregon (Frest and Johannes 2000, p. 181; USDA and USDI 2007, p. 92). Fifteen of the 19 known sites occur on Federal land (USDA and USDI 2007, p. 93). The species has been found in large, cold springs with gravel-boulder substrate and “exceptional water quality” (Frest and Johannes 2000, p. 265).

*Factor A:* The petition asserts that this species may be threatened by logging, water diversions, and grazing (CBD *et al.* 2008, p. 46). Information cited by the petition and in our files indicates that these activities may constitute threats, because logging can produce water siltation and increased water temperatures; diversions can reduce available water and habitat; and grazing can increase water temperatures, pollute water, and increase siltation (Frest and Johannes 2000, p. 265; ORNHIC 2004j, p. 2). Part of the flow from the spring complexes supporting the nerite pebblesnail is diverted for the City of Yreka, California, municipal water supply (Frest and Johannes 2000, p. 265). Irrigation diversions are also common, as is grazing on much of the larger Fall Creek and Jenny Creek system. Logging has been extensive in the surrounding watershed (Frest and Johannes 2000, p. 265).

Based on our evaluation of the information presented in the petition and in our files, we determined the petition presents substantial information to indicate that listing the nerite pebblesnail may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that the nerite pebblesnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The nerite pebblesnail is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, this mollusk

should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under “The Survey and Manage Program and Special Status Species Programs,” the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The ACS is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS includes four components: Riparian reserves, key watersheds, watershed analysis and watershed restoration. Since the nerite pebblesnail is an aquatic mollusk occurring in part on Federal lands, the ACS may provide some protection from potential threats. Those protections would likely be limited for populations of the nerite pebblesnail occupying private lands, however.

The petition also states that this mollusk is threatened by the WOPR, a set of revisions to the Northwest Forest Plan proposed for BLM lands in western Oregon (CBD *et al.* 2008, p. 34). However, the BLM withdrew this proposal in 2009 (USDA 2009, p. 1). We are unaware of BLM’s plans to reinstate the WOPR; therefore, we do not have the information to assess if, or how, WOPR may impact the species.

*Factor E:* The petition asserts that climate change is a threat to the nerite pebblesnail (CBD *et al.* 2008, p. 26). Climate change is causing significant reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of the snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months (Kapnick and Hall 2010, pp. 3446, 3454). Such a reduction in available surface water may result in increased water diversions from groundwater and springs, but the extent to which springs supporting the nerite pebblesnail may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may also result in water temperature increases (Field *et al.* 2007, pp. 620, 629). Although potential water temperature increases could negatively impact the mollusk, this species occurs in large, cold, perennial springs, and the extent to which the springs that support

the nerite pebblesnail may be affected by this potential threat is unclear.

The petition also presents information to indicate that the nerite pebblesnail may be threatened by limited gene flow (inbreeding depression) and stochastic (chance) events (CBD *et al.* 2008, pp. 28, 29). Although we do not have information in our files regarding the number of nerite pebblesnails at each occupied site (which would affect the threat of inbreeding depression), the clustering of all known populations in only two spring complexes does leave them vulnerable to any catastrophic events that might affect one or both of those complexes, such as the 1991 herbicide spill at Cantara Bend resulting in the near complete removal of aquatic mollusk populations throughout the upper Sacramento River (Frest and Johannes 1995b, pp. 72, 73; ORNHIC 2004j, p. 2).

*Nerite pebblesnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the nerite pebblesnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from logging, water diversions, and grazing. We are initiating a status review to determine whether listing under the Act is warranted.

#### Nugget Pebblesnail (*Fluminicola seminalis*)

The nugget pebblesnail is an aquatic snail known from 15 to 22 sites, 5 of which are on Federal land, in the Pit and McCloud River drainages in Shasta County, California (Furnish and Monthey 1999, Sect. 3, p. 5; USDA and USDI 2007, p. 92). The species is believed to have been extirpated over most of its former range in the Sacramento River by the 1991 Cantara herbicide spill (Frest and Johannes 1995b, p. 50; Furnish and Monthey 1999, Sect. 3, p. 5). According to Furnish and Monthey (1999, Sect. 3, p. 5), the nugget pebblesnail is typically found on gravel-cobble substrate in large creeks and rivers, but also occurs on mud substrates in large spring pools. It is believed to prefer cool, clear, flowing water (Frest and Johannes 1995b, p. 50). *Fluminicola* species in general require cold, unpolluted, well-oxygenated water with little sedimentation, according to Furnish and Monthey (1999, Sect. 2, pp. 5, 7).

*Factor A:* The petition asserts that the nugget pebblesnail is threatened by water pollution, logging, dams, diversions, spring developments, road

and railroad construction, urbanization, mining, and grazing (CBD *et al.* 2008, p. 52). Information cited by the petition and in our files indicates that water diversions, spring developments, and impoundments may threaten the species by removing flowing water and thus habitat (Furnish and Monthey 1999, Sect. 3, pp. 2, 3; Hershler *et al.* 2003, p. 277). Grazing, logging, and other sources of water pollution and sedimentation also pose potential threats (Furnish and Monthey 1999, Sect. 3, pp. 2, 3). The Pit River is listed on the State of California's list of water quality limited segments because of organic enrichment and high nutrient levels from grazing and agriculture (CEPA 2002, p. 143). Mining and road and railroad construction are also potential sources of excessive sedimentation, but we were unable to find information regarding the extent to which such activities occur in the vicinity of the nugget pebblesnail (Furnish and Monthey 1999, Sect. 3, p. 6). We did not find information to support the petition's claim that urbanization constitutes a threat to this species.

Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the nugget pebblesnail may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that the nugget pebblesnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The nugget pebblesnail is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, this mollusk should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The ACS is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and

USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS includes four components: Riparian reserves, key watersheds, watershed analysis, and watershed restoration. Since the nugget pebblesnail is an aquatic mollusk occurring in part on Federal lands, the ACS may provide some protection from potential threats. Those protections would likely be limited for populations of the nugget pebblesnail occupying private lands, however.

*Factor E:* The petition asserts that climate change is a threat to the nugget pebblesnail (CBD *et al.* 2008, p. 26). Climate change is causing significant reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of the snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months (Kapnick and Hall 2010, p. 3446, 3454). Such a reduction in available surface water may result in increased water diversions from groundwater and springs, but the extent to which springs supporting the nugget pebblesnail may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may also result in water temperature increases (Field *et al.* 2007, pp. 620, 629). Although potential water temperature increases could negatively impact the nugget pebblesnail, the extent this mollusk may be affected by this potential threat is unclear.

The petition indicates that the nugget pebblesnail may be threatened by limited gene flow (inbreeding depression) and stochastic (chance) events (CBD *et al.* 2008, pp. 28, 29). Frest and Johannes (1995b, p. 50) indicate that local populations "can be very abundant locally," which would make inbreeding depression less likely (Lande 1999, p. 11). However, since the species has been extirpated over much of its former range by the Cantara herbicide spill (Furnish and Monthey 1999, Sect. 3, p. 5; ORNHIC 2004k, p. 2), it has demonstrated itself to be susceptible to stochastic events.

The petition also states that fire may threaten the species. The Burney Fire of 1992 is described by several sources as having (in conjunction with subsequent salvage logging) caused significant impacts to populations of nugget pebblesnails (Furnish and Monthey 1999, Sect. 3, pp. 6, 8; ORNHIC 2004k, p. 2). We therefore consider large fires to constitute a possible threat.

Although the petition indicates that the nugget pebblesnail may be threatened by recreation, we were not able to find information supporting that claim.

*Nugget pebblesnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the nugget pebblesnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from water diversions, impoundments, pollution and sedimentation. We are initiating a status review to determine whether listing under the Act is warranted.

#### Potem Creek Pebblesnail (*Fluminicola potemicus*)

The Potem Creek pebblesnail is an aquatic snail known from 12 sites in the upper Sacramento River system and Pit River tributaries in Shasta County, California (ORNHIC 2004l, pp. 1, 6; USDA and USDI 2007, p. 92). Three of the sites are on Federal land. The Potem Creek pebblesnail is known to occur on muddy substrates in spring runs that are small, perennial, cold, and shallow (ORNHIC 2004l, pp. 1, 3). According to Furnish and Monthey (1999, Sect. 2, p. 5), *Fluminicola* species in general require cold, unpolluted, and well oxygenated water with little sedimentation.

*Factor A:* The petition asserts that the Potem Creek pebblesnail is threatened by water diversions, impoundments, spring developments, grazing, logging, mining, road construction, and pollution. Information cited by the petition and in our files indicates that water diversions and impoundments may threaten the Potem Creek pebblesnail by removing flowing water and thus habitat (Frest and Johannes 1995b, p. 43; Hershler *et al.* 2003, p. 277; ORNHIC 2004l, p. 2). Use of springs and channel bottoms by livestock may also threaten the species by polluting the water (ORNHIC 2004l, p. 2). Road construction may impede flows (resulting in less snail habitat), and cause sedimentation resulting in smothered substrates and impaired egg survivorship (Furnish and Monthey 1999, Sect. 2, pp. 3, 7; ORNHIC 2004l, p. 2). Because the Potem Creek pebblesnail is only known to occur at 12 sites, any such impacts to even a few such sites could pose a threat to the species as a whole. Logging and mining activities may cause excessive sedimentation and thereby impair survivorship of Potem Creek pebblesnail

eggs (Furnish and Monthey 1999, Sect. 2, p. 7; ORNHIC 2004l, p. 2).

Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Potem Creek pebblesnail may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that the Potem Creek pebblesnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Potem Creek pebblesnail is not currently considered a special status species (USDA and USDI 2007, p. 93), and therefore would not receive special management consideration on Federal lands. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The ACS is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS includes four components: Riparian reserves, key watersheds, watershed analysis, and watershed restoration. Since the Potem Creek pebblesnail is an aquatic mollusk occurring in part on Federal lands, the ACS may provide some protection from potential threats. Those protections would likely be limited for populations of the Potem Creek pebblesnail occupying private lands, however.

*Factor E:* The petition asserts that climate change is a threat to the Potem Creek pebblesnail (CBD *et al.* 2008, p. 26). Climate change is causing significant reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of the snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months (Kapnick and Hall 2010, p. 3446, 3454). Such a reduction in available surface water may result in increased water

diversions from groundwater and springs, but the extent to which springs supporting the Potem Creek pebblesnail may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may also result in water temperature increases (Field *et al.* 2007, pp. 620, 629). Although potential water temperature increases could negatively impact the Potem Creek pebblesnail, this species occurs in large, cold, perennial springs, and the extent to which the springs that support the mollusk may be affected by this potential threat is unclear.

The petition also indicates that the Potem Creek pebblesnail may be threatened by limited gene flow (inbreeding depression) and stochastic events (CBD *et al.* 2008, pp. 28, 29). We do not have any information regarding the number of Potem Creek pebblesnails at each occupied site (which would affect the threat of inbreeding depression). However, the fact that the species occupies only 12 known sites, all of which are in the same general area in which a major deleterious event occurred historically (the 1991 metam sodium spill into the upper Sacramento River). This indicates that the species may be susceptible to stochastic events (Furnish and Monthey 1999, Sect. 2, p. 7).

*Potem Creek pebblesnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Potem Creek pebblesnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from water diversions, impoundments, grazing, road construction, logging and mining. We are initiating a status review to determine whether listing under the Act is warranted.

#### Puget Oregonian (*Cryptomastix devia*)

The Puget Oregonian (*Cryptomastix devia*) is a terrestrial snail known from approximately 177 sites in Washington and Oregon, 148 of which are on Federal land (Kogut and Duncan 2005, pp. 4–5; USDA and USDI 2007, p. 92). Most occupied sites are located in the Cowlitz and Gispus River drainages of the Gifford Pinchot National Forest, in southwestern Washington State. The Puget Oregonian is characterized by the Oregon Natural Heritage Program as "in strong decline throughout its range," with only 13 to 40 occupied sites considered to have good viability (ORNHIC 2004q, pp. 1, 2). The Puget

Oregonian is believed to be associated with big-leaf maple (*Acer macrophyllum*) in mature to old-growth moist conifer forests that have over 70 percent canopy cover (Kogut and Duncan 2005, pp. 5, 6).

*Factor A:* The petition asserts that the Puget Oregonian is threatened by logging, urbanization, and agricultural conversion (CBD *et al.* 2008, pp. 39, 40). Information presented by the petition indicates that the Puget Oregonian may be threatened by loss of habitat due to logging and conversion for agriculture or development (Kogut and Duncan 2005, p. 1). Forest Service documents obtained by the petitioners indicate the snail was detected in nine timber sales and a commercial thinning project, thereby demonstrating that logging occurs within the species range (CBD *et al.* 2008, p. 39). The petition states that mitigation measures were likely taken under the Survey and Manage Program for all of the sales, but their information only specifically mentions mitigation for a single project.

The petition also states that grazing threatens the species (CBD *et al.* 2008, p. 39). Presumably, the petition refers to the threat posed to the species by the grazing of areas that have already been logged (Frest and Johannes 1995a, p. 229; ORNHIC 2004q, p. 2). Since we lack evidence that grazing is threatening the species in areas that haven't first been logged, and since the Puget Oregonian is dependent on mature forests with extensive canopy cover, we consider grazing to be covered by the term "conversion for agriculture," rather than an independent threat.

*Factor B:* The petition did not present any information, nor do we have any information in our files, to indicate that this factor may pose a threat to the species.

*Factor C:* The petition indicates that predation may constitute a threat (CBD *et al.* 2008, p. 40). While Kogut and Duncan (2005, pp. 1, 8) do state that vertebrate and invertebrate predators (including predatory snails and ground beetles specifically adapted for feeding on snails) may concentrate in isolated small habitat patches where Puget Oregonian snails would be most vulnerable, they do not characterize predation as a primary threat, and do not offer substantial information to indicate that it is impacting the species. We have no information in our files to indicate that predation is a potential threat to this species. Neither the petition nor the information in our files identifies disease as a potential threat to the species.

*Factor D:* The petition asserts that the Puget Oregonian is threatened by

inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Puget Oregonian is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, this mollusk should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The ACS is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS includes four components: Riparian reserves, key watersheds, watershed analysis, and watershed restoration. Since the Puget Oregonian is a terrestrial mollusk occurring in part on Federal riparian lands, the ACS may provide some protection from potential threats. Those protections would likely be limited for populations of the Puget Oregonian occupying private lands, however.

The petition also states this mollusk is threatened by the WOPR, a set of revisions to the Northwest Forest Plan proposed for BLM lands in western Oregon (CBD *et al.* 2008, p. 34). However, the BLM withdrew this proposal in 2009 (USDA 2009, p. 1). We are unaware of any BLM plans to reinstate the WOPR; therefore, we do not have the information to assess if, or how, WOPR may impact the species.

*Factor E:* The petition (CBD *et al.* 2008, p. 40) presents information to indicate that high-intensity fire may pose a threat to the species by removing habitat, directly killing individual snails, and isolating remaining populations (Kogut and Duncan 2005, p. 1).

The petition also claims that Puget Oregonian is threatened by climate change (CBD *et al.* 2008, pp. 26, 27), and notes that the likelihood of high-intensity fire in forests occupied by the Puget Oregonian may be heightened by climate change, due to increased summer temperatures and lengthened summer drought (Westerling *et al.* 2006, pp. 940–942). Additionally, summer water stress due to climate change in western forests, including the heart of the species' distribution in the Cowlitz and Cispus River drainages, is currently

causing increased tree mortality (Van Mantgem *et al.* 2009, pp. 521–522) which may lead to changes in forest structure and composition and decreased canopy cover that may pose a threat to the Puget Oregonian (Kogut and Duncan 2005, pp. 5, 6; Van Mantgem *et al.* 2009, p. 523). Finally, climate change is increasing the susceptibility of western forests to various species of forest pests with the capacity to kill large stands of mature trees (Logan *et al.* 2003, p. 130). Specifically, the Douglas-fir beetle (*Dendroctonus pseudotsugae*), which infests and kills Douglas-fir throughout the range of the Puget Oregonian, tends to undergo large outbreaks following droughts (Schmitz and Gibson 1996, p. 1).

The petition indicates that the Puget Oregonian may be threatened by limited gene flow (inbreeding depression) and stochastic events (CBD *et al.* 2008, pp. 28, 29). Although only one to three individual snails have typically been found at occupied sites (Kogut and Duncan 2005, p. 6), we consider actual population numbers likely to be higher, since "populations" of one to three individuals would be unlikely to persist. Moreover, Kogut and Duncan (2005, p. 6) note that individuals of this species may easily be overlooked. We do not have any information in our files regarding the size of most local populations, which would affect their susceptibility to inbreeding depression. We also do not have any information in our files regarding the likelihood of damaging stochastic events, other than for wildfire, which is covered above.

The petition also states that the Puget Oregonian may be threatened by competition with invasive slugs, harvest of special forest products such as mushrooms and moss, and recreation (camping) (CBD *et al.* 2008, pp. 39, 40). Although invasive slugs and harvest of special forest products are mentioned by Kogut and Duncan (2005, p. 1) as possible concerns, we lack information to indicate that their influence on Puget Oregonian populations is significant enough to constitute a threat. Similarly, while the petitioner's claims that a Puget Oregonian population was detected at a campground (CBD *et al.* 2008, p. 39), neither the petition nor our files contain any information that demonstrates how the species may be threatened by camping or other recreational activities.

*Puget Oregonian Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Puget Oregonian

may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from logging and conversion for agriculture; and other natural or manmade factors affecting its current existence (Factor E) resulting from high intensity fire, and from increased tree mortality due to various causes associated with climate change. While we expect the reinstatement of the Survey and Manage Program to help address threats to the species resulting from logging and agricultural conversion on Federal land, information indicating that population numbers are in decline throughout the species' range, and that only 13 to 40 populations are considered to have good viability (ORNHC 2004q, pp. 1, 2) leads us to conclude that information presented by the petition regarding the overall level of threat to the species; including threats from logging, agricultural conversion, high intensity fire, and climate change; is substantial. We are initiating a status review to determine whether listing under the Act is warranted.

#### Shasta Chaparral (*Trilobopsis roperi*)

The Shasta chaparral is a terrestrial snail known from 146 occurrences in Shasta County, California, 140 of which are on Federal land (Burke *et al.* 1999, Sect. 14 p. 5; USDA and USDI 2007, p. 93). The Shasta chaparral has been found within 100 m (328 ft) of limestone rockslides, draws, or caves with a cover of shrubs or oak (Kelley *et al.* 1999, p. 61). Forest litter and coarse woody debris are considered necessary to provide food and temporary cover from the semi-xeric (dry) conditions of the surrounding environment, according to Burke *et al.* (1999, Sect. 14, p. 6).

*Factor A:* Information in our files indicates that the Shasta chaparral may be threatened by a proposal to raise Shasta Dam, which if carried out, would likely inundate important habitat and occupied sites (USBR 2007, p. ES 6; Terry 2008, p. 1).

The petition states that the Shasta chaparral is threatened by road building and maintenance, limestone quarrying and mining, recreation, and urbanization in the Redding area (CBD *et al.* 2008, p. 66). Although these claims are supported by Frest and Johannes (2000, p. 319), that document relies on the assumption that only five occupied sites exist. However, information in our files shows that 146 such sites are now known, and Frest and Johannes (2000, p. 319) do not elaborate regarding the extent or locations of the listed activities in relation to occupied sites or potential

habitat, we do not consider the information supporting these claims to be substantial.

Based on our evaluation of the information presented in the petition and in our files, we determined the petition presents substantial information to indicate that listing the Shasta chaparral may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factor B:* The petition states that the Shasta chaparral is threatened by overcollecting (CBD *et al.* 2008, p. 66). Although Burke *et al.* (1999, Sect. 14, p. 1) do mention this as a potential threat, they do not provide substantial information to indicate that collecting is taking place at a level that could threaten this species.

*Factor C:* The petition did not present any information, nor do we have any information in our files, to indicate, that this factor may pose a threat to the species.

*Factor D:* The petition asserts that the Shasta chaparral is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Shasta chaparral is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, this mollusk should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The ACS is unlikely to provide significant protections, because the Shasta chaparral is not an aquatic or riparian species (Burke *et al.* 1999, Sect. 14, p. 6).

*Factor E:* The petition asserts that the Shasta chaparral is threatened by wildfire that will become more frequent with climate change (CBD *et al.* 2008, pp. 27, 66). The Shasta chaparral depends on forest litter and woody debris to provide microclimate conditions with lower temperatures and higher humidity than surrounding areas, so high-intensity fire could pose a threat to the species by removing those refugia (Burke *et al.* 1999, Sect. 14, pp. 6, 7). The petition and our files contain information indicating that global climate change is producing warmer summer temperatures, combined with

longer periods of summer drought in the western U.S., which is increasing the vulnerability of western U.S. forests to wildfire (Westerling, *et al.* 2006, p. 940). Wildfire frequency and total area burned increased after the mid-1980s to levels several times those during the period 1970–1986 (Westerling, *et al.* 2006, p. 941). These changes cannot be explained solely by land-use history considerations such as fire suppression (Westerling *et al.* 2006, p. 940).

The petition states that the Shasta chaparral is threatened by pesticide application (CBD *et al.* 2008, p. 66). Although Burke *et al.* (1999, Sect. 14, p. 7) do mention herbicide use as a potential threat, they do not provide information to indicate what herbicides, if any, are used in or near sites occupied by this species, or in what amounts, or to what extent the Shasta chaparral may be susceptible to the herbicides used.

The petition also indicates that the Shasta chaparral may be threatened by limited gene flow (inbreeding depression) and stochastic events (CBD *et al.* 2008, pp. 28, 29). We lack information regarding the size of most local populations of these subspecies, which would affect their susceptibility to inbreeding depression. We also lack information regarding the likelihood of damaging stochastic events capable of threatening the subspecies, other than for wildfire, which is covered above.

*Shasta chaparral Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Shasta chaparral may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from the potential raising of Shasta Dam. We are initiating a status review to determine whether listing under the Act is warranted.

#### Shasta Hesperian (*Vespericola shasta*)

The Shasta hesperian is a terrestrial snail known from 78 sites in Shasta County, California (Burke *et al.* 1999, Sect. 17 p. 1; USDA and USDI 2007, p. 94). Seventy-two of those occupied sites are federally owned (USDA and USDI 2007, p. 94). The Shasta hesperian is considered an old-growth and riparian associate (Frest and Johannes 1993, p. 41) and is believed to inhabit damp ground at the margins of streams (Burke *et al.* 1999, Sect. 17 p. 1).

*Factor A:* The petition asserts that the Shasta hesperian is threatened by habitat loss due to timber harvest and grazing (CBD *et al.* 2008, p. 70). The petition presents information to indicate that the Shasta hesperian may be

threatened by logging and grazing, both of which can directly remove habitat and also alter hydrology, thereby increasing the likelihood of both flooding and loss of soil moisture (Burke *et al.* 1999, Sect. 17, p. 7). The petition states that the species was detected at a timber sale and a fuels reduction project (CBD *et al.* 2008, p. 70).

Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Shasta hesperian may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that the Shasta hesperian is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Shasta hesperian is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, this mollusk should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under “The Survey and Manage Program and Special Status Species Programs,” the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The ACS is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS includes four components: Riparian reserves, key watersheds, watershed analysis, and watershed restoration. Since the Shasta hesperian is a terrestrial mollusk occurring in part on Federal riparian lands, the ACS may provide some protection from potential threats. Those protections would likely be limited for populations of the Shasta hesperian occupying private lands, however.

*Factor E:* The petition asserts that the Shasta hesperian is threatened by wildfire that will become more frequent with climate change (CBD *et al.* 2008, pp. 27, 28). The petition and our files contains information indicating that global climate change is producing warmer summer temperatures,

combined with longer periods of summer drought in the western U.S., which is increasing the vulnerability of western U.S. forests to wildfire (Westerling *et al.* 2006, p. 940). Wildfire frequency and total area burned increased after the mid-1980s to levels several times those during the period 1970–1986 (Westerling *et al.* 2006, p. 941). These changes cannot be explained solely by land-use history considerations such as fire suppression (Westerling *et al.* 2006, p. 940). Although no information cited by the petition or in our files provided direct examples of wildfire impacts to the Shasta hesperian, the petition does note that, according to Survey and Manage documents, this mollusk was directly affected by at least one underburn or fuel reduction project (CBD *et al.* 2008, p. 28).

The petition asserts that climate change is a threat to the Shasta hesperian (CBD *et al.* 2008, p. 26). The petition provides information indicating that climate change is expected to cause significant reductions in both the volume and persistence of winter snowpack throughout the western United States (Knowles *et al.* 2006, p. 4545). Such reductions have already been documented in the Oregon Cascades (Knowles *et al.* 2006, pp. 4545, 4546). If reduced snowpack resulted in a reduction of soil moisture, the Shasta hesperian, which requires damp ground at the margins of streams (Burke *et al.* 1999, Section 17, p. 1), could be impacted. However, neither the petition nor our files contain information about the extent soil drying could occur within the Shasta hesperian’s habitat or what impact that drying would have to the species.

The petition states that chemical pollution may threaten the species (CBD *et al.* 2008, p. 70). Burke *et al.* (1999, Sect. 14, p. 7) mentions this as a possible threat due to the danger of large spills, such as the 1991 Cantara spill of herbicide into the upper Sacramento River, and to the potential for numerous smaller spills “that could come from roads and railroads.” We do not have information to indicate that the likelihood of such spills, or to estimate their impact to a terrestrial snail such as the Shasta hesperian.

The petition states that invasive species may threaten the Shasta hesperian (CBD *et al.* 2008, p. 70). Although Burke *et al.* (1999, Sect. 17, p. 7) mention this as a possibility, they do not provide information to indicate the invasive species involved or their likely impacts.

The petition also indicates that the Shasta hesperian may be threatened by

limited gene flow (inbreeding depression) and stochastic events (CBD *et al.* 2008, pp. 28, 29). We lack information regarding the size of most local populations of this species, which would affect their susceptibility to inbreeding depression. We also lack information regarding the likelihood of damaging stochastic events capable of threatening the species, other than for wildfire which is covered above. However, given the large number of known occurrences (78), the threat from stochastic events is likely low.

*Shasta hesperian Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Shasta hesperian may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from logging and grazing activities. We are initiating a status review to determine whether listing under the Act is warranted.

#### Shasta Pebblesnail (*Fluminicola multifarius*)

The Shasta pebblesnail was formally named and described in 2007 (Hershler *et al.* 2007, pp. 415–419). This species combines four groups of snails previously considered likely to be species but never formally described. Those were the Sacramento pebblesnail (*Fluminicola n. sp. 1*, from Frest and Johannes 1995b, pp. 42, D14) (not the same as *Fluminicola n. sp. 1* from USDA and USDI 2007, p. 250) and three provisional species discussed in Frest and Johannes 1999 (pp. 39–50): The flat top pebblesnail (*Fluminicola n. sp. 15*), the Shasta Springs pebblesnail (*Fluminicola n. sp. 16*), and the disjunct pebblesnail (*Fluminicola n. sp. 17*). The latter three of these groups were included under the Northwest Forest Plan’s Survey and Manage Program (USDA and USDI 2007, pp. 169, 252), and were included as separate species in the original petition (CBD *et al.* 2008, pp. 45–48). However, in a letter dated April 13, 2009 (Curry 2009, pp. 1, 2), the petitioners informed us that these three groups had been combined into a single species, which had been formally described by Hershler *et al.* (2007). The letter amended the original petition by petitioning for the listing of the combined entity—the Shasta pebblesnail.

Neither the petition nor the 2009 amending letter includes information on the group formerly known as the Sacramento pebblesnail. We know that a survey of mollusks in the upper

Sacramento River found the Sacramento pebblesnail at 13 sites (Frest and Johannes 1995b, p. 42), but we lack information regarding whether this erstwhile species was known from additional areas. We are therefore proceeding with our discussion of the Shasta pebblesnail by combining our information regarding the flat top, Shasta Springs, and disjunct pebblesnails with such data as we have in our files regarding the Sacramento pebblesnail.

The Shasta pebblesnail is an aquatic snail known from at least 36 sites (including the 13 sites mentioned above that are occupied by the group formerly known as the Sacramento pebblesnail) in the upper Sacramento River watershed in Shasta County, California (Frest and Johannes 1995b, p. 42; Furnish and Monthey 1999, Sect. 2, p. 5; USDA and USDI 2007, p. 92). Two sources indicate that all occupied sites of those groups previously known as the flat top, disjunct, and Shasta Springs pebblesnails are on private land (Furnish and Monthey 1999, Sect. 2, p. 5; USDA and USDI 2007, p. 92). However, a third source indicates that “some” sites occupied by the group previously known as the Shasta Springs pebblesnail are on the Shasta National Forest (Frest and Johannes 1999, p. 44). We have no information regarding land ownership for sites occupied by the group previously known as the Sacramento pebblesnail. According to Furnish and Monthey (1999, Sect. 2, pp. 2, 5), the Shasta pebblesnail lives in cold perennial springs, and is highly sensitive to water pollution, oxygen deficits, elevated water temperatures, and sedimentation.

*Factor A:* The petition asserts that the Shasta pebblesnail is threatened by habitat loss due to water diversions, impoundments, spring developments, grazing, logging, mining, road construction, and pollution (CBD *et al.* 2008, pp. 45, 48, 49). Information cited in the petition or in our files indicates that the Shasta pebblesnail may be exposed to, and threatened by, water diversions and by water pollution, including eutrophication and sedimentation, resulting from a variety of sources such as logging and grazing (Furnish and Monthey 1999, Sect. 2, p. 7; USDA and USDI 2007, p. 252). Water diversions can reduce flows, and reduce available habitat, while eutrophication can decrease oxygen, and sedimentation can cover substrates needed for feeding and egg-laying. Water impoundments have also been identified as a potential threat (Furnish and Monthey 1999, Sect. 2, p. 7), but we do not have information in our files to indicate that their impacts

are ongoing, as opposed to being completely historical in nature.

Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Shasta pebblesnail may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that the Shasta pebblesnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Shasta pebblesnail is not currently considered a special status species (USDA and USDI 2007, p. 93) and therefore would not receive special management consideration on Federal lands. As discussed above under “The Survey and Manage Program and Special Status Species Programs,” the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The Aquatic Conservation Strategy (ACS) is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS includes four components: Riparian reserves, key watersheds, watershed analysis, and watershed restoration. Since the Shasta pebblesnail is an aquatic mollusk occurring in part on Federal lands, the ACS may provide some protection from potential threats. Those protections would likely be limited for populations of the Shasta pebblesnail occupying private lands, however.

*Factor E:* The petition asserts that climate change is a threat to the Shasta pebblesnail (CBD *et al.* 2008, p. 26). Climate change is causing significant reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of the snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months (Kapnick and Hall 2010, pp. 3446, 3454). Such a reduction in available surface water may result in

increased water diversions from groundwater and springs, but the extent to which springs supporting the Shasta pebblesnail may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may also result in water temperature increases (Field *et al.* 2007, pp. 620, 629). Such increases could pose a threat to the Shasta pebblesnail, which is highly sensitive to elevated water temperatures (Furnish and Monthey 1999, Sect. 2, pp. 2, 5).

The petition indicates the Shasta pebblesnail may be threatened by limited gene flow (inbreeding depression) and stochastic events (CBD *et al.* 2008, pp. 28, 29). The size of local populations would affect their susceptibility to inbreeding depression; however, we lack information regarding the size of most local populations of this species. We also lack information regarding the likelihood of damaging stochastic events capable of threatening the species.

*Shasta pebblesnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Shasta pebblesnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from water diversions and water pollution. We are initiating a status review to determine whether listing under the Act is warranted.

Shasta Sideband (*Monadenia troglodytes troglodytes*) and Wintu Sideband (*M. t. wintu*)

The Shasta sideband and Wintu sideband are terrestrial snails inhabiting the vicinity of Shasta Lake, in Shasta County, California (Burke *et al.* 1999, Sect. 11, pp. 1, 5). The Shasta sideband is known from nine sites, most of which are located along the McCloud River Arm of the lake (Burke *et al.* 1999, Sect. 11, p. 5; USDA and USDI 2007, p. 93). Eight of the nine sites are on Federal land (USDA and USDI 2007, p. 93). The Wintu sideband occurs at eight sites, most of which are along the Pit River arm of the lake (Burke *et al.* 1999, Sect. 11, p. 5; USDA and USDI 2007, p. 93). Seven of those eight sites are on Federal land (USDA and USDI 2007, p. 93). Both subspecies are apparently restricted to limestone outcrops or related substrates, and are associated with caves, talus, or rocky outcrops in open, brushy, and late-successional pine-oak woodland areas (Burke *et al.* 1999, Sect. 11, p. 5). Forest litter and coarse woody debris are

considered necessary to provide food and temporary cover.

*Factor A:* The petition asserts that the Shasta and Wintu sidebands are threatened by habitat loss due to logging, road construction and maintenance, and recreation (CBD *et al.* 2008, pp. 61, 62). We did not find information to support these claims, although Burke *et al.* (1999, p. 7) note that forest management activities have significantly impacted other mollusk species. Information provided by the petition cites an environmental impact statement indicating that both subspecies may be threatened by road building and maintenance (Burke *et al.* 1999, Sect. 11, pp. 6, 10). Burke *et al.* (1999, p. 6) also state that habitat alteration, including recreation development, may constitute a threat, but they do not provide information on the extent to which this activity is actually occurring or is likely to occur in sites occupied by either subspecies.

Substantial information in our files also indicates that these mollusks may be threatened by a proposal to raise Shasta Dam, which if carried out, would be likely to inundate important habitat and occupied sites (USBR 2007, p. ES 6; Terry 2008, p. 1).

Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Shasta sideband and Wintu sideband may be warranted due to the present or threatened destruction, modification, or curtailment of their habitat or range.

*Factor B:* The petition states that both subspecies are threatened by overcollecting (CBD *et al.* 2008, pp. 61, 62). Although Burke *et al.* (1999, Sect. 11, p. 6) do mention this as a potential threat, they do not elaborate on whether collection is taking place at a level that could threaten either subspecies.

*Factor C:* The petition did not present any information, nor do we have any information in our files, to indicate that this factor may pose a threat to either subspecies.

*Factor D:* The petition asserts that Shasta sideband and Wintu sideband are threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. Both mollusk species are currently considered special status species (USDA and USDI 2007, p. 93). As special status species, these mollusks should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed

above under “The Survey and Manage Program and Special Status Species Programs,” the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The Aquatic Conservation Strategy is unlikely to provide significant protections for these organisms, because the Shasta sideband and Wintu sideband are not aquatic or riparian subspecies (Burke *et al.* 1999, Sect. 11, p. 5).

*Factor E:* The petition asserts that the Shasta sideband and Wintu sideband are threatened by wildfire that will become more frequent with climate change (CBD *et al.* 2008, pp. 27, 28, 61, 62). The petition and our files contain information indicating that global climate change is producing warmer summer temperatures, combined with longer periods of summer drought in the western United States, which is increasing the vulnerability of western U.S. forests to wildfire (Westerling *et al.* 2006, p. 940). Wildfire frequency and total area burned increased after the mid-1980s, to levels several times those of 1970–1986 (Westerling *et al.* 2006, p. 941). These changes cannot be explained solely by land-use history considerations such as fire suppression (Westerling *et al.* 2006, p. 940). While the petition provided general information about fire frequencies and climate change in the Pacific Northwest, it did not include any information about the effects of fire on these subspecies or about predicted climate change-induced changes in fire frequency within the subspecies’ ranges.

The petition states that the Shasta and Wintu sidebands are threatened by pesticide application (CBD *et al.* 2008, pp. 61, 62). Although Burke *et al.* (1999, Sect. 6, p. 6) mention herbicide use as a potential threat, they do not provide information to indicate what herbicides, if any, are used in the vicinity of the mollusks, or in what amounts, or to what extent the Shasta or Wintu sidebands may be susceptible to the herbicides used.

The petition also indicates the Shasta and Wintu sidebands may be threatened by limited gene flow (inbreeding depression) and stochastic events (CBD *et al.* 2008, pp. 28, 29). We lack information regarding the size of most local populations of these subspecies, which would affect their susceptibility to inbreeding depression. We also lack information regarding the likelihood of damaging stochastic events capable of threatening the subspecies, other than for wildfire, which is covered above.

*Shasta sideband and Wintu sideband Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the Shasta sideband and Wintu sideband may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from road building and the potential raising of the Shasta dam. We are initiating a status review to determine whether listing under the Act is warranted.

#### Siskiyou Sideband (*Monadenia chaceana*)

The Siskiyou sideband is a terrestrial snail known from 223 sites scattered widely across southwestern Oregon and northwestern California, of which 206 are federally managed (USDA and USDI 2007, pp. 93, 261). According to Burke *et al.* (1999, Sect. 7 p. 4), it occupies moist microhabitats in late-successional forest and talus slopes or rocky areas.

*Factor A:* The petition (CBD *et al.* 2008, p. 59) asserts that the Siskiyou sideband may be threatened by logging, which can “alter the necessary microclimate conditions that allow populations to persist” (USDA and USDI 2007, p. 261). According to Frest and Johannes (1993, p. 3) logging specifically reduces canopy cover; decreases shade; increases ground temperature; decreases soil moisture; compacts the soil; removes cover objects, such as woody debris; and increases wind, all of which contribute to desiccation. Burke *et al.* (1999, Sect. 7, p. 7) reaffirm that forest management activities that affect shade have significantly impacted other species of this genus in the Pacific Northwest. The petition states that the mollusk has been identified at three timber sales (CBD *et al.* 2008, p. 53). The petition also documents that the Forest Service and BLM addressed the effects of forest management practices on the 223 locations and concluded that, due to those potential impacts, the Survey and Manage and Special Species Status programs were necessary to conserve the mollusk (USDA and USDI 2007, pp. 93, 262). However, as discussed above under “The Survey and Manage Program and Special Status Species Programs,” the Survey and Manage program has since been reinstated. Given that 206 of the 223 known occupied sites are on Federal land where the Survey and Manage Program applies, we consider the logging-related concerns raised by the petition to be adequately addressed by this Program.

The petition also states that the Siskiyou sideband is threatened by urban and agricultural expansion, talus mining, and road construction (CBD *et al.* 2008, p. 60). Although the petition cites Frest and Johannes (2000, p. 308) to support these claims, Frest and Johannes (2000, p. 308) state that the species is known from only six sites. Given that the Siskiyou sideband is now known to occupy more than 223 sites, and that the information presented in the petition only speaks to potential threats to 6 of the 223 locations, the available information does not indicate that the species may be threatened by those activities.

*Factor B:* The petition states that the Siskiyou sideband is threatened by overcollection (CBD *et al.* 2008, p. 24). Although Burke *et al.* (1999, Sect. 7, p. 6) do mention overcollection as a potential threat, they do not provide information that explains the nature or extent of collection activities. Because only 33 occupied sites were known when Burke's report was published, and because we have no information to indicate that overcollection is occurring at the additional 190 sites, the available information does not indicate that the levels of collection may pose a threat now that 223 occupied sites have been identified (USDA and USDI 2007, p. 93).

*Factor C:* The petition did not present any information, nor do we have any information in our files, to indicate that this factor may pose a threat to the species.

*Factor D:* The petition asserts that Siskiyou sideband is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Siskiyou is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, this mollusk should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The ACS is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS includes four components: Riparian reserves, key watersheds, watershed analysis, and watershed

restoration. Since the Siskiyou sideband is a terrestrial mollusk, occurring in part on Federal riparian lands, the ACS may provide some protection from potential threats. Those protections would likely be limited for populations of the Siskiyou sideband occupying private lands, however.

The petition also states that this mollusk is threatened by the WOPR, a set of revisions to the Northwest Forest Plan proposed for BLM lands in western Oregon (CBD *et al.* 2008, p. 34). However, the BLM withdrew this proposal in 2009 (USDA 2009, p. 1). We are unaware of any BLM plans to reinstate the WOPR; therefore, we do not have the information to assess if, or how, WOPR may impact the species.

*Factor E:* The petition asserts that climate change is a threat to the Siskiyou sideband (CBD *et al.* 2008, p. 26). Information cited by the petition or in our files indicates that climate change is expected to cause significant reductions in both the volume and persistence of winter snowpack throughout the western United States (Knowles *et al.* 2006, p. 4545). Such reductions have already been documented in the Oregon Cascades (Knowles *et al.* 2006, pp. 4545, 4546). If reduced snowpack resulted in a reduction of soil moisture, the Siskiyou sideband, which requires moist habitat (Duncan 2004, p. 8), could be impacted. However, neither the petition nor our files contain information to indicate the extent to which soil drying could occur within the Siskiyou sideband's habitat or what impact that drying would have on the species.

The petition also claims the Siskiyou sideband may be threatened by prescribed burns (CBD *et al.* 2008, p. 59). The environmental impact statement for the removal of the Survey and Manage Program notes that prescribed burns are typically conducted during the spring or fall, when individuals of the species are more likely to be active and exposed. By contrast, summer wildfires occur when the Siskiyou sideband is more likely to be aestivating (similar to hibernating) in a secure location (USDA and USDI 2007, p. 261). The coincidence of prescribed burns within the mollusk's active periods could pose a threat to local populations within the area of the burn; however, neither the petition nor our files contains any information about the likelihood of prescribed burns being conducted within the species' range.

The petition also claims that the Siskiyou sideband may be threatened by limited gene flow (inbreeding depression) and stochastic events (CBD *et al.* 2008, pp. 28, 29). We do not have

any information regarding the size of most local populations of this species, which would affect their susceptibility to inbreeding depression. We also do not have information regarding the likelihood of damaging stochastic events capable of threatening the species, other than for wildfire which is discussed above. Additionally, since the Siskiyou sideband is known from 223 occupied sites, any stochastic event would be unlikely to impact a large enough number of populations to threaten the species.

*Siskiyou Sideband Summary:* The reinstatement of the Survey and Manage Program, the withdrawal of the WOPR proposal, and the discovery of over 200 additional occupied sites since 2000, when some of the petition's cited sources were written, have addressed the concerns raised by the petition. Based on our evaluation of the information presented in the petition and in our files, we have determined the petition does not present substantial information to indicate that listing the Siskiyou sideband may be warranted.

#### Tall Pebblesnail (*Fluminicola n. sp. 2*)

The tall pebblesnail is an aquatic snail known from only a single site: Harriman Spring, along the margin of Upper Klamath Lake, Klamath County, Oregon (Duncan 2005b, p. 10; USDA and USDI 2007, p. 92). Harriman Spring is on private land adjacent to Winema National Forest lands. Like other *Fluminicola* species, the tall pebblesnail appears to require cold, unpolluted, well-oxygenated water (Duncan 2005b, pp. 10, 11).

*Factor A:* The petition asserts that the tall pebblesnail is threatened by habitat loss or impairment resulting from grazing, water diversion, irrigation, lake level fluctuation, and various sources of water pollution (CBD *et al.* 2008, p. 44). Information cited by the petition or in our files indicates that the tall pebblesnail may be threatened by grazing in the Fourmile Creek watershed, which feeds into the water near Harriman Spring (Furnish and Monthey 1999, Sect. 4, p. 14; Banish 2010, p. 2). Overgrazing near flowing water can cause increased sedimentation and eutrophication downstream (Banish 2010, p. 2), which can in turn lower oxygen levels and smother eggs and preferred substrates (Furnish and Monthey 1999, Sect. 4, pp. 3, 4, 14).

The petition also states that the species is threatened by urban pollution (CBD *et al.* 2008, p. 44). Information in our files indicates that the development of vacation homes at nearby Rocky Point may threaten the snail due to the

potential for water pollution from urban runoff or septic tank failure (Banish 2010, p. 2). Since the species is only known from one site, it may also be threatened by water diversions for irrigation and livestock (which can lower water flows and diminish available habitat), dredging (which can produce sedimentation and disturb or remove substrate), and lake level fluctuation (which can leave snails cut off from flows) (Furnish and Monthey 1999, Sect. 4, p. 14; Duncan 2005b, p. 11).

The petition also states that the species is threatened generally by road building and log storage and transport, but we did not find information in our files to support these claims.

Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the tall pebblesnail may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

*Factors B and C:* The petition did not present any information, nor do we have any information in our files, to indicate that these factors may pose a threat to the species.

*Factor D:* The petition asserts that tall pebblesnail is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The tall pebblesnail is currently considered a special status species (USDA and USDI 2007, p. 92). As a special status species, this mollusk would receive special management consideration on Federal lands if it were to be found on such lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented. The Survey requirements of the Survey and Manage Program will help assure that any currently unknown populations of tall pebblesnails that may be located on Federal lands are identified prior to the commencement of habitat modifying activities. The ACS is unlikely to provide significant protection for this species, because the tall pebblesnail is not known to occur on Federal lands.

*Factor E:* The petition asserts that climate change is a threat to the tall pebblesnail (CBD *et al.* 2008, p. 26). Climate change is causing significant

reductions in both the volume and persistence of winter snowpack throughout the western United States, including northern California (Knowles *et al.* 2006, pp. 4545, 4546; Kapnick and Hall 2010, pp. 3446, 3454). The reduction and earlier melting of the snowpack is likely to continue, and this may result in a reduction in the amount of water that is available during summer months (Kapnick and Hall 2010, p. 3446, 3454). Such a reduction in available surface water may result in increased water diversions from groundwater and springs, but the extent to which springs supporting the tall pebblesnail may be affected by potential increased water diversions is unclear. Reduced snow runoff and lower flow levels may also result in water temperature increases, which could negatively impact the tall pebblesnail (Field *et al.* 2007, pp. 620, 629).

The petition also indicates that the tall pebblesnail may be threatened by limited gene flow (inbreeding depression) and stochastic events (CBD *et al.* 2008, pp. 28, 29). Although we do not have information regarding the number of tall pebblesnails at the species' single occupied site (which would affect the threat of inbreeding depression), the restriction of the species to one occupied site does leave it vulnerable to catastrophic events, such as the 1991 herbicide spill at Cantara Bend that removed mollusk populations throughout the upper Sacramento River (Frest and Johannes 1995b, pp. 72, 73).

*Tall Pebblesnail Summary:* Based on our evaluation of the information presented in the petition and in our files, we have determined the petition presents substantial information to indicate that listing the tall pebblesnail may be warranted due to the present or threatened destruction, modification or curtailment of its habitat or range (Factor A) resulting from water pollution produced by grazing and urban runoff. We are initiating a status review to determine whether listing under the Act is warranted.

#### Tehama Chaparral (*Trilobopsis tehamana*)

The Tehama chaparral is a terrestrial snail known from 12 sites in Tehama, Butte and Siskiyou Counties, California, 9 of which are on Federal land (ORNHIC 2004p, pp. 1–2; USDA and USDI 2007, p. 93). The Tehama chaparral has been found within 100 m (328 ft) of limestone outcrops with a cover of shrubs or oak (Kelley *et al.* 1999, p. 65). It is usually associated with rocky talus, but may also be found under leaf litter and woody debris, all of which are

considered necessary to provide food and temporary cover, according to Burke *et al.* (1999, Sect. 14, pp. 5, 6).

*Factor A:* The petition asserts that the Tehama chaparral is threatened by habitat loss due to urbanization and road construction (CBD *et al.* 2008, p. 67). Information cited by the petition or in our files identifies road building, recreation, and urban expansion as potential threats (Frest and Johannes 2000, p. 320; ORNHIC 2004p, p. 2). However, the petition does not provide any information regarding the extent of these activities in areas occupied by the species.

*Factor B:* The petition states that the Tehama chaparral is threatened by overcollecting (CBD *et al.* 2008, p. 66). Although Burke *et al.* (1999, Sect. 14, p. 1) does mention this as a potential threat, they do not provide information to indicate that collecting is taking place at a level that could threaten the species. We have no additional information in our files to indicate that overcollection poses a threat to the overall status of the species.

*Factor C:* The petition did not present any information, nor do we have any information in our files, to indicate that this factor may pose a threat to the species.

*Factor D:* The petition asserts that Tehama chaparral is threatened by inadequate regulatory mechanisms associated with the Survey and Manage program, the Special Status Species Program, and the Aquatic Conservation Strategy. The Tehama chaparral is currently considered a special status species (USDA and USDI 2007, p. 93). As a special status species, this mollusk should receive special management consideration on Federal lands; however, maintenance of special species status is left to the discretion of the Federal land managers. As discussed above under "The Survey and Manage Program and Special Status Species Programs," the claims raised under the petition relative to the discontinuation of the Survey and Management Program no longer apply, because that program is once again being implemented.

The ACS is a set of standards established under the Northwest Forest Plan for protecting aquatic and riparian habitat on Federal land (USDA and USDI 1994, p. 9; CBD *et al.* 2008, p. 32). The ACS is unlikely to provide significant protections for this species, because the Tehama chaparral is not an aquatic or riparian species (Burke *et al.* 1999, Sect. 14, p. 6).

The petition also states this mollusk is threatened by the WOPR, a set of revisions to the Northwest Forest Plan proposed for BLM lands in western

Oregon (CBD *et al.* 2008, p. 34). However, the BLM withdrew this proposal in 2009 (USDA 2009, p. 1). We are unaware of any BLM plans to reinstate the WOPR; therefore, we do not have the information to assess if, or how, WOPR may impact the species.

**Factor E:** The petition asserts that the Tehama chaparral is threatened by fire that will become more frequent with climate change (CBD *et al.* 2008, pp. 27, 28, 67). The petition and our files contain information indicating that global climate change is producing warmer summer temperatures, combined with longer periods of summer drought in the western U.S., which is increasing the vulnerability of western U.S. forests to wildfire (Westerling *et al.* 2006, p. 940). Wildfire frequency and total area burned increased after the mid-1980s to levels several times those during the period 1970–1986 (Westerling *et al.* 2006, p. 941). These changes cannot be explained solely by land-use history considerations such as fire suppression (Westerling *et al.* 2006, p. 940). While the petition provided general information about fire frequencies and climate change in the Pacific Northwest, it did not include any information about the effects of fire on the Tehama chaparral or about predicted climate change induced changes in fire frequency within the species range.

The petition states that the Tehama chaparral is threatened by pesticide application (CBD *et al.* 2008, p. 67). Although Burke *et al.* (1999, Sect. 14, p. 7) does mention herbicide use as a potential threat, they do not provide information to indicate which herbicides, if any, are used in or near sites occupied by this species, or in what amounts, or to what extent the Tehama chaparral may be susceptible to the herbicides used. We have no information in our files to indicate that pesticide application may be a threat to the species.

The petition also indicates that the Tehama chaparral may be threatened by limited gene flow (inbreeding depression) and stochastic events (CBD *et al.* 2008, pp. 28, 29). We do not have any information in our files regarding the size of most local populations of this species, which would affect its susceptibility to inbreeding depression.

We also lack information regarding the likelihood of damaging stochastic events capable of threatening the species, other than for wildfire, which is covered above.

**Tehama Chaparral Summary:** Although the petition claims the Tehama chaparral may be threatened by urbanization and road construction (Factor A), and by fire, climate change, pesticides, limited gene flow, and deleterious stochastic events (Factor E), it does not provide sufficient information regarding the specific applicability of these threats to areas occupied by the species. The petition also states that the species is threatened due to the discontinuation of the Survey and Manage Program, and the enactment of the WOPR program, but the Survey and Manage Program has been reinstated, and the WOPR program has been withdrawn. Based on our evaluation of the information presented in the petition and in our files, we have determined the petition does not present substantial information to indicate that listing the Tehama chaparral may be warranted.

**Wintu Sideband (*Monadenia troglodytes wintu*)**

See discussion for “Shasta Sideband (*Monadenia troglodytes troglodytes*) and Wintu Sideband (*M. t. wintu*)” above.

### Finding

On the basis of our evaluation of the petition under section 4(b)(3)(A) of the Act, we find that the petition presents substantial scientific or commercial information to indicate that listing 26 of the 29 petitioned mollusks as threatened or endangered under the Act may be warranted. We are therefore initiating status reviews for the following 26 species and subspecies: Basalt juga, Big Bar hesperian, canary duskysnail, Chelan mountainsnail, cinnamon juga, Columbia duskysnail, Columbia Oregonian, Dalles sideband, diminutive pebblesnail, evening fieldslug, Goose Valley pebblesnail, Hat Creek pebblesnail, Hoko vertigo, keeled jumping-slug, knobby rams-horn, masked duskysnail, nerite pebblesnail, nugget pebblesnail, Potem Creek pebblesnail, Puget Oregonian, Shasta chaparral, Shasta hesperian, Shasta pebblesnail, Shasta sideband, tall pebblesnail, and Wintu sideband. We

did not find substantial information to support listing (and will not proceed to a status review) for the following petitioned mollusks: Crater Lake tightcoil, Siskiyou sideband, and Tehama chaparral (see table above). Our findings for each petitioned mollusk are also provided in the table under “Listable entity evaluation,” above.

After completing our status reviews for the 26 mollusks listed above, we will publish “12-month findings,” in which we will determine whether listing any of these 26 petitioned mollusks under the Act is warranted. The “substantial information” standard for a 90-day finding differs from the Act’s “best scientific and commercial data” standard that applies to a status review to determine whether a petitioned action is warranted. Because the Act’s standards for 90-day and 12-month findings are different, a substantial 90-day finding does not mean that the 12-month findings will result in a warranted finding.

The petition also requests that critical habitat be designated for the species concurrent with final listing under the Act. If we determine in our 12-month finding, following the status review of the species, that listing is warranted, we will address the designation of critical habitat in a subsequent proposed rule.

### References Cited

A complete list of references cited is available on the Internet at <http://www.regulations.gov> and upon request from the Sacramento Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

### Author

The primary authors of this document are staff members of the Sacramento Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

### Authority

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

Dated: September 26, 2011.

**Rowan W. Gould,**

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

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