

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R8-ES-2011-0001]

[92210-0-0008-B2]

Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to List 42 Great Basin and Mojave Desert Springsnails as Threatened or Endangered with Critical Habitat

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 90-day petition finding and initiation of status reviews.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 90-day finding on a petition to list 42 Great Basin and Mojave Desert springsnails as threatened or endangered under the Endangered Species Act of 1973, as amended (Act). We addressed 3 of the 42 petitioned species in a 90-day finding dated August 18, 2009, in which we found that substantial scientific or commercial information was presented indicating that listing may be warranted for those 3 species. In this finding, we find that the petition does not present substantial scientific or commercial information indicating that listing 7 of the remaining 39 may be warranted. In addition, we find that the petition presents substantial scientific or commercial information indicating that listing may be warranted for 32 of the remaining 39 species. Therefore, with the publication of this notice, we are initiating status reviews of these 32 species to determine if listing is

warranted. To ensure that the status reviews are comprehensive, we are requesting scientific and commercial data and other information regarding these 32 species. Based on the status reviews, we will issue 12-month findings on these 32 species, which will address whether the petitioned actions are warranted, as provided in the Act. If an emergency situation develops for any of the 42 petitioned species that warrants emergency listing, we will act immediately to provide necessary protection.

DATES: To allow us adequate time to conduct the status reviews, we request that we receive information on or before **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. Please note that if you are using the Federal eRulemaking Portal (see **ADDRESSES** section, below), the deadline for submitting an electronic comment is midnight Eastern Daylight Saving Time on this date.

ADDRESSES: You may submit information by one of the following methods:

- *Federal eRulemaking Portal:* <http://www.regulations.gov>. In the box that reads “Enter Keyword or ID,” enter the Docket number for this finding, which is FWS-R8-ES-2011-0001. You should then see an icon that reads “Submit a Comment.” Please ensure that you have found the correct rulemaking before submitting your comment.
- *U.S. mail or hand-delivery:* Public Comments Processing, Attn: [FWS-R8-ES-2011-0001]; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, Suite 222; Arlington, VA 22203.

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

After [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER], you must submit information directly to the Field Office (see **FOR FURTHER INFORMATION CONTACT** section below). Please note that we might not be able to address or incorporate information that we receive after the above requested date.

FOR FURTHER INFORMATION CONTACT: Jill Ralston, Deputy State Supervisor, Nevada Fish and Wildlife Office, U.S. Fish and Wildlife Service, 1340 Financial Blvd, Suite 234, Reno, NV 89502, by telephone 775-861-6300, or by facsimile 775-861-6301. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800-877-8339.

SUPPLEMENTARY INFORMATION:

Request for Information

When we make a finding that a petition presents substantial information indicating that listing a species may be warranted, we are required to promptly review the status of the species (status review). For the status review to be complete and based on the best available scientific and commercial information, we request information on the 32 springsnail species from governmental agencies, Native American Tribes, the scientific community, industry, and any other interested parties. We seek information on:

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

- (a) Habitat requirements for feeding, breeding, and sheltering;
 - (b) Genetics and taxonomy;
 - (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, their habitat, or both.
- (2) The factors that are the basis for making a listing determination for a species under section 4(a) of the Act (16 U.S.C. 1531 *et seq.*), 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.

If, after the status review, we determine that listing any of the 32 springsnail species is warranted, we will propose critical habitat (see definition in section 3(5)(A) of the Act), under section 4 of the Act, to the maximum extent prudent and determinable at the time we propose to list the species. Therefore, within the geographical range currently occupied by each of the 32 springsnail species, we 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.

Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

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 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 website. If you submit 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 you may make an appointment during normal business hours at the U.S. Fish and Wildlife Service, Nevada Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Background

Section 4(b)(3)(A) of the Act (16 U.S.C. 1533(b)(3)(A)) 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 February 27, 2009, we received a formal petition dated February 17, 2009, from the Center for Biological Diversity (CBD), Tierra Curry, Noah Greenwald, Dr. James Deacon, Don Duff, and the Freshwater Mollusk Conservation Society (hereinafter referred to as the petitioners), requesting that we, the Service, list 42 species of Great Basin springsnails in Nevada, Utah, and California as threatened or endangered with critical habitat under the Act. The petition clearly identified itself as a petition and included the appropriate identification information for the petitioners, as required in 50 CFR 424.14(a).

In an October 19, 2009, letter to the petitioners, we acknowledged receipt of the petition, and responded that we reviewed the information presented in the petition and determined that issuing an emergency regulation temporarily listing the species under section 4(b)(7) of the Act was not warranted. We also stated that compliance with various court orders, settlement agreements and other statutory deadlines required us to expend all of our listing and critical habitat funding for Fiscal Year 2009; thus, we anticipated making an initial finding in Fiscal Year 2010. This finding addresses the petition.

Previous Federal Actions

Three of the 42 petitioned springsnail species were addressed in a separate 90-day finding on a petition to list 206 species in the midwest and western United States (August 18, 2009; 74 FR 41649); thus, these three species are not included in this finding. In the finding dated August 18, 2009, we found substantial scientific or commercial information was presented indicating that listing may be warranted for the longitudinal gland pyrg (*Pyrgulopsis anguina*), Hamlin Valley pyrg (*Pyrgulopsis hamlinensis*), and sub-globose snake pyrg (*Pyrgulopsis saxatilis*). Therefore, this finding addresses the remaining 39 springsnail species from the petition dated February 17, 2009.

On December 14, 2009, one of the petitioners, CBD, filed a 60-day notice of intent to sue indicating that the Service failed to comply with its mandatory duty to make a preliminary 90-day finding on the petition to list these 42 springsnail species, as well as findings for numerous other species. On April 26, 2010, CBD amended its complaint in *Center for Biological Diversity v. Salazar, U.S. Fish and Wildlife Service*, Case No.: 1:10-cv-230-PLF (D.D.C.), adding an allegation that the Service failed to issue its 90-day petition findings on the 42 springsnail species within the mandatory statutory timeframe.

Evaluation of Information for this Finding

Section 4 of the Act 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 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 the 39 springsnail species as presented in the petition and other information available in our files, is substantial, thereby indicating that the petitioned action may be warranted. Our evaluation of this information is presented below.

Summary of Common Species Information

The 39 species of springsnails included in the petition and evaluated in this finding are endemic, aquatic macroinvertebrates of Great Basin and Mojave Desert freshwater springs of Nevada, Utah, and California (Table 1). All of the petitioned species are from the phylum Mollusca, class Gastropoda, superorder Caenogastropoda (Bouchet and Rocroi 2005, pp. 4-368). Thirty-four of the species are in the genus *Pyrgulopsis*, family Hydrobiidae, and five species are in the genus *Tryonia*, family Cochliopidae (Table 1) (Wilke *et al.* 2001, pp. 1-21). Both in the petition and in our files, little to no information is available on population numbers or population trends for the

majority of these springsnail species. Life history information for the 39 species is available in the petition, and in references cited in the petition and this finding. In this finding, we included a short summary of distribution information for each species.

Table 1—Names and locations of 39 springsnail species included in this finding.

SCIENTIFIC NAME	COMMON NAME	HYDROGRAPHIC AREA(S)	COUNTY (Co.), STATE
Species for which substantial information indicating listing may be warranted was not presented or available:			
<i>Pyrgulopsis aloba</i>	Duckwater pyrg	Railroad Valley North	Nye Co., NV
<i>Pyrgulopsis anatine</i>	Southern Duckwater pyrg	Railroad Valley North	Nye Co., NV
<i>Pyrgulopsis gracilis</i>	Emigrant pyrg	White River Valley	Nye Co., NV
<i>Pyrgulopsis lockensis</i>	Lockes pyrg	Railroad Valley North	Nye Co., NV
<i>Pyrgulopsis montana</i>	Camp Valley pyrg	Meadow Valley Wash (Camp Valley)	Lincoln Co., NV
<i>Pyrgulopsis papillata</i>	Big Warm Spring pyrg	Railroad Valley North	Nye Co., NV
<i>Pyrgulopsis villacampae</i>	Duckwater Warm Spring pyrg	Railroad Valley North	Nye Co., NV
Species for which substantial information indicating listing may be warranted was presented or available:			
<i>Pyrgulopsis avernalis</i>	Moapa pebblesnail	Upper Muddy River Springs	Clark Co., NV
<i>Pyrgulopsis breviloba</i>	Flag pyrg	Dry Lake and White River	Lincoln and Nye Cos., NV
<i>Pyrgulopsis carinifera</i>	Moapa Valley pyrg	Upper Muddy River Springs	Clark Co., NV
<i>Pyrgulopsis coloradensis</i>	Blue Point pyrg	Black Mountains Area (Lake Mead)	Clark Co., NV
<i>Pyrgulopsis crystalis</i>	Crystal springsnail	Amargosa Desert	Nye Co., NV

<i>Pyrgulopsis deaconi</i>	Spring Mountains pyrg	Las Vegas Valley and Pahrump Valley	Clark Co., NV
<i>Pyrgulopsis erythropoma</i>	Ash Meadows pebblesnail	Amargosa Desert	Nye Co., NV
<i>Pyrgulopsis fairbanksensis</i>	Fairbanks springsnail	Amargosa Desert	Nye Co., NV
<i>Pyrgulopsis fausta</i>	Corn Creek pyrg	Las Vegas Valley	Clark Co., NV
<i>Pyrgulopsis hubbsi</i>	Hubbs pyrg	Pahrnagat Valley	Lincoln Co., NV
<i>Pyrgulopsis isolatus</i>	Elongate gland springsnail	Amargosa Desert	Nye Co., NV
<i>Pyrgulopsis landyei</i>	Landyes pyrg	Steptoe Valley	White Pine Co., NV
<i>Pyrgulopsis lata</i>	Butterfield pyrg	White River Valley	Nye Co., NV
<i>Pyrgulopsis marcida</i>	Hardy pyrg	Cave Valley and White River Valley	Lincoln, Nye, and White Pine Cos., NV
<i>Pyrgulopsis merriami</i>	Pahrnagat pebblesnail	Pahrnagat Valley and White River Valley	Lincoln and Nye Cos., NV
<i>Pyrgulopsis nanus</i>	Distal gland springsnail	Amargosa Desert	Nye Co., NV
<i>Pyrgulopsis neritella</i>	Neritiform Steptoe Ranch pyrg	Steptoe Valley	White Pine Co., NV
<i>Pyrgulopsis orbiculata</i>	Sub-globose Steptoe Ranch pyrg	Steptoe Valley	White Pine Co., NV
<i>Pyrgulopsis peculiaris</i>	Bifid duct pyrg	Snake Valley and Spring Valley	White Pine Co., NV; Millard Co., UT
<i>Pyrgulopsis pisteri</i>	Median gland Nevada pyrg	Amargosa Desert	Nye Co., NV
<i>Pyrgulopsis planulata</i>	Flat-topped Steptoe pyrg	Steptoe Valley	White Pine Co., NV
<i>Pyrgulopsis sathos</i>	White River Valley pyrg	White River Valley	Lincoln, Nye and White Pine Cos., NV

<i>Pyrgulopsis serrata</i>	Northern Steptoe pyrg	Steptoe Valley	Elko and White Pine Cos., NV
<i>Pyrgulopsis sterilis</i>	Sterile Basin pyrg	Ralston Valley and Stone Cabin Flat	Nye Co., NV
<i>Pyrgulopsis sublata</i>	Lake Valley pyrg	Lake Valley	Lincoln Co., NV
<i>Pyrgulopsis sulcata</i>	Southern Steptoe pyrg	Steptoe Valley	White Pine Co., NV
<i>Pyrgulopsis turbatrix</i>	Southeast Nevada pyrg	Las Vegas Valley, Indian Springs, Pahrump Valley, Amargosa Flat, and Frenchman Flat	Clark and Nye Cos., NV
<i>Tryonia angulata</i>	Sportinggoods tryonia	Amargosa Desert	Nye Co., NV
<i>Tryonia clathrata</i>	Grated tryonia	Upper Muddy River Springs, White River Valley, and Pahrnatag Valley	Clark, Lincoln, and Nye Cos., NV
<i>Tryonia elata</i>	Point of Rocks tryonia	Amargosa Desert	Nye Co., NV
<i>Tryonia ericae</i>	Minute tryonia	Amargosa Desert	Nye Co., NV
<i>Tryonia variegata</i>	Amargosa tryonia	Amargosa Desert	Inyo Co., CA; Nye Co., NV

Summary of Common Threats

The petition identified several potential threats common to most, if not all, of the petitioned springsnail species: groundwater development (withdrawal, extraction, pumping, etc.), spring development, water pollution, recreation, grazing, invasive species, global climate change, isolated populations, and inadequate regulatory mechanisms (CBD *et al.* 2009, pp. 21-60). These threats are generally described in the petition with little to no information in the petition or available in our files that correlates

the threats to existing or probable impacts on the individual springsnail species. In this section, we summarize these common threats and provide the rationale as to whether or not information in the petition and available in our files is substantial, thereby indicating that listing any of the 39 petitioned species may be warranted. Our conclusion for each species as it relates to each of the five factors, as well as specific threat information if available, is then summarized later in the finding in species sections below.

Factor A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Groundwater Development

The petition identifies groundwater development (withdrawal, extraction, pumping, etc.) as “an overarching and imminent threat” (CBD *et al.* 2009, p. 23) to the persistence of the petitioned springsnail species and their aquatic habitats as this may reduce or eliminate spring discharge, thus altering the springhead environment and the specific conditions (e.g., flow, substrate, water temperature) required by springsnails. As this threat relates to impacts to the petitioned species, it is primarily characterized in the petition as “unsustainable groundwater withdrawal rates” from: (1) existing water rights and applications for water rights that exceed the amount of perennial yield of a specific basin or sub-basin where springsnails occur; and (2) existing and proposed groundwater development and pumping projects in groundwater basin(s) where springsnails occur or basin(s) hydrologically connected to other basins where springsnails occur (CBD *et al.* 2009, pp. 23-32).

The petition presented significant information regarding groundwater development as it relates to perennial yield versus committed water resources within hydrographic basins where the petitioned springsnails may occur. The information they provide is referenced to the Nevada Division of Water Resources (NDWR) database (<http://water.nv.gov/>). We accessed and reviewed the NDWR database on January 12, 2010, and saved hard copies of pertinent information for each basin where the petitioned springsnails may occur. Where we discuss perennial yield, committed water resources, and effects of groundwater development within this finding we are referring to information we have reviewed from the NDWR database. The Nevada State Engineer (NSE) approves and permits groundwater rights in Nevada, and defines perennial yield as “the amount of usable water from a ground-water aquifer that can be economically withdrawn and consumed each year for an indefinite period of time. It cannot exceed the natural recharge to that aquifer and ultimately is limited to maximum amount of discharge that can be utilized for beneficial use.” In some basins, system yield estimates may also be included with perennial yield estimates. System yield is defined as “the amount of usable groundwater and surface water that can be economically withdrawn and consumed each year for an indefinite period of time without depleting the source.” The NSE considers system yield with perennial yield estimates in basins with “significant groundwater discharges to streams.” The NSE estimates perennial yield for 256 basins and sub-basins (areas) in Nevada, and may “designate” a groundwater basin, meaning the basin “is being depleted or is in need of additional administration, and in the interest of public welfare, [the NSE may] declare preferred uses (such as municipal, domestic) in

such basins.” Many of the hydrographic areas in which the petitioned springsnails occur are “designated” by the NSE, and permitted groundwater rights approach or exceed the estimated average annual recharge. Furthermore, the petition provides evidence that such commitment of water resources beyond perennial yield may result in detrimental impacts to spring and stream conditions, and thereby could impact habitats and microhabitat conditions of many of the petitioned species in the designated basins. When groundwater extraction exceeds aquifer recharge it may result in surface water level decline, spring drying and degradation, or the loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). Based on this summary, groundwater development resulting from permitted groundwater rights that approach or exceed perennial yield may be a potential threat and is identified as such for specific species in the species sections below.

As noted in the petition, several groundwater development projects have been proposed by various entities and are at different stages of planning and implementation. The petition asserts which springs and springsnails would be affected by these groundwater development projects (CBD *et al.* 2009, pp. 23-32). However, based on the information in the petition and in our files, we determined for certain springs and their associated petitioned springsnails there is not substantial information indicating that they may be threatened by the proposed groundwater projects because the basins in which groundwater development is proposed do not have a hydrologic connection to the springs and flow systems where the species occur (Welch *et al.* 2007, pp. 71-79). These springs are upgradient and outside of the zone of influence of the carbonate aquifer (e.g., in the alluvial aquifer or mountain block aquifer). Therefore based on this summary, there is

not substantial information indicating that listing may be warranted for 9 of the 39 petitioned springsnail species because the proposed groundwater projects in these systems are not potential threats. This is appropriately noted for each specific species it applies to in the species sections below.

For other systems, significant uncertainties still remain regarding many of the groundwater development projects and these uncertainties are factored into our evaluation of the information. These uncertainties include, but are not limited to: (1) timing of pending applications for water rights not yet permitted by the NSE; (2) timing of authorization by the NSE to use those existing, permitted water rights that are required to perform testing, monitoring, or other measures before they can be fully utilized; (3) outcome of protests, lawsuits, and legal proceedings against water rights applications and groundwater development projects; (4) progress of project planning, timing of issuance of necessary permits (e.g., right-of-way permits, National Environmental Policy Act compliance), and project analyses that may correlate impacts to spring systems; (5) varying results of different models being used to determine project impacts and timing of projected impacts (e.g., some project impacts are projected to be 100-200 years in the future); (6) availability of funding for construction and implementation of projects, including monitoring; and (7) locations of wells and other infrastructure in relation to the petitioned species. Whether or not there is substantial information indicating that listing may be warranted due to groundwater development from existing and proposed projects is appropriately identified for the specific species it applies to in the species sections below.

In addition to habitat impacts from groundwater development, inadequate regulation of groundwater development is cited as a threat in the petition (CBD *et al.* 2009, pp. 28-29, 57); therefore, as the potential threat of groundwater development relates to regulatory mechanisms, we analyzed this potential threat under Factor D below.

Spring Development, Grazing, and Recreation

The petition identifies spring development (e.g., capturing and piping spring flow), grazing, and recreation as threats to the persistence of the petitioned springsnails (CBD *et al.* 2009, pp. 33-39). In general, all of these activities have been known to degrade spring environments by decreasing or eliminating flow and altering water quality, substrate condition, and vegetative cover, composition, and structure. This, in turn, decreases available habitat for species that require flowing, high-quality water, such as springsnails. Sada and Vinyard (2002, pp. 277 and 283) reviewed historical anthropogenic changes in the aquatic biota of the Great Basin and found that water flow diversions and livestock grazing in riparian areas likely contributed to historical declines or losses of several springsnail species. Yet, overall site disturbance from spring development and grazing did not always equate to low numbers of springsnails, as some sites classified as moderately to highly disturbed were also described as having springsnails that were common or abundant (Sada 2006, p. 6).

In many cases, these activities have been occurring on the landscape for some time, and for the majority of species, the petition does not present specific information

that there may be an increase in the intensity of the activity or that the activity may expand into additional occupied sites in the future. The petition does not directly relate loss of springsnail populations or reduction in numbers of individuals to these activities for 31 of the petitioned springsnail species. In addition, State and Federal agencies, conservation organizations, and private landowners are conducting management actions, restoration, and planning activities that remove spring developments, restore systems to a more natural state, and control or reduce the impacts of livestock grazing and recreationists at springs occupied by five of the petitioned springsnails. Specific information pertaining to each of the petitioned species is included in the species sections below. Based on this summary, there is not substantial information to indicate that 26 of the petitioned springsnail species may warrant listing due to spring development, grazing, and recreation and this is noted in the individual species sections below. However, for the remaining 8 petitioned springsnail species specific information indicates that these activities may be potential threats, and as appropriate, is noted below in the species sections.

The petition identifies invasive, nonnative species as a threat to the persistence of the petitioned springsnails through: habitat loss and degradation such as alteration of water quality, substrate condition, or vegetative cover, composition, and structure; predation; and competition (CBD *et al.* 2009, pp. 33-39). Since these potential impacts of invasive species raised in the petition cross several of the five factors, we analyzed this potential threat under Factor E.

Factor B. Overutilization for commercial, recreational, scientific, or educational purposes.

The petition identifies improper collection for scientific, educational and recreational purposes as a potential threat that could contribute to the decline of the petitioned springsnails (CBD *et al.* 2009, p. 42). The petition indicates that unauthorized collection of invertebrates was observed at one location where a petitioned springsnail species occurs, but no information was included on whether or not the petitioned springsnail species was collected or if the invertebrate collection activity affected the springsnail population. The petition also cites a location in central Arizona where population sampling without replacement of aquatic organisms resulted in a stark but temporary (1 year) decline in the population size of the springsnail species sampled at that location (CBD *et al.* 2009, p. 42). However, the petition provides no data or information that directly relates overutilization or collection to loss of springsnail populations or reduction in numbers of individuals for any of the petitioned springsnails. We have no information in our files to indicate that overutilization may be a threat to any of the petitioned springsnail species. Therefore, we conclude there is not substantial information indicating that listing may be warranted due to overutilization for commercial, recreational, scientific, or educational purposes for all of the 39 petitioned springsnail species because these activities do not pose a potential threat.

Factor C. Disease or predation.

The petition asserts the risk of predation and disease is increased for springsnail populations with the invasion of exotic species, but provides no supporting information. Natural predation of springsnails by various taxa is also noted but no information is provided as to the significance of this threat to springsnails or their populations. We have no information in our files to indicate that disease and predation may be threats to any of the petitioned springsnail species. Therefore, based on this summary, there is not substantial information indicating that listing may be warranted due to disease and predation for all of the 39 petitioned springsnails species. In regard to invasive (exotic) species, we address this potential threat under Factor E.

Factor D. The inadequacy of existing regulatory mechanisms.

The petitioned springsnails occur on private, Federal, and State lands, and as such are subject to a variety of land management strategies. The petition states that none of the 39 petitioned springsnail species have legal protective status and asserts that all are imperiled or critically imperiled (CBD *et al.* 2009, p. 47). The petition maintains that, although Federal and State land management may incorporate conservation for fish, wildlife and plant resources, conservation for springsnails is often by default through other species' conservation, is not generally given high priority, or is limited by lack of funding or staff (CBD *et al.* 2009, pp. 47-56). In addition, the petition asserts that an expired 1998 Memorandum of Understanding among the Forest Service, Bureau of Land Management, National Park Service, Geological Survey, Fish and Wildlife Service, Smithsonian Institution, and The Nature Conservancy, as well as State wildlife

conservation strategies/plans, State Natural Heritage Programs, other conservation programs, habitat conservation plans, and groundwater development stipulated agreements do not provide regulatory protection to any of the petitioned springsnails (CBD *et al.* 2009, pp. 51-59). Furthermore, according to the petition, despite Federal or State conservation programs, springsnails are threatened on State and Federal lands by invasive species; overgrazing by cattle, feral horses, and burros; spring development and groundwater pumping; and climate change (CBD *et al.* 2009, pp. 48-52).

We do not consider land ownership and associated management activities, memorandums of understanding, conservation strategies, or other conservation agreements, plans, or programs to be regulatory mechanisms since the conservation activities associated with these types of documents are discretionary. Many of these agreements, strategies, and plans were not intended to provide regulatory protection, but rather to facilitate voluntary cooperation or partnerships between and among agencies and entities to promote conservation. If specific laws, statutes, permits, or other mechanisms regulate specific activities and actions by landowners, entities, or agencies that relate to a potential threat to the petitioned springsnails, we have determined whether there is substantial information regarding the inadequacy of those mechanisms in this finding.

Specifically, the inadequate regulation of groundwater development is considered a threat in the petition (CBD *et al.* 2009, p. 57). Through various permit and approval mechanisms, the NSE regulates groundwater rights in Nevada. In many hydrologic

basins in Nevada where the petitioned springsnails occur, the permitted groundwater usage approaches or exceeds the estimated perennial yield of the basin. This commitment of water resources by the NSE beyond perennial yield may result in detrimental impacts to spring and stream condition in the designated basins, and thereby could impact habitats and microhabitat conditions of many of the petitioned species. For the springsnail species where substantial information indicates that listing may be warranted based on the inadequacy of this regulatory mechanism, it is noted in the individual species sections below.

Factor E. Other natural or manmade factors affecting its continued existence.

Nonnative and Invasive Species

The petition identifies invasive, nonnative species (fish, invertebrates, amphibians, and vegetation) as a threat to the persistence of the petitioned springsnails through: habitat loss and degradation such as alteration of water quality, substrate condition, or vegetative cover, composition, and structure; predation; and competition (CBD *et al.* 2009, pp. 43-45). Since the potential impacts of invasive species raised in the petition cross several of the five factors, we have determined whether there is substantial information regarding this potential threat under Factor E. As summarized above for the common threats under Factor A, Sada and Vinyard (2002, pp. 277 and 283) found that nonnative species was one of several prevalent threats to springsnail species of the Great Basin, and historical declines or losses of several springsnail species, in some cases, have been attributed to the introduction of nonnative species. Thirty-four of the 42

petitioned species were included in the study, but Sada and Vinyard did not conclude that a population decline in any of the 34 species occurred as a result of nonnative species introductions (Sada and Vinyard 2002, pp. 284-287). Sada and Vinyard (2002, pp. 277 and 286-287) did have sufficient information to confirm that major population declines occurred in 1970 in 7 out of the 10 petitioned Amargosa Desert species due to regional economic conditions and human immigration (see species section for the Amargosa Desert for more information). At one thermal spring system (Upper Muddy River) in southern Nevada, Sada (2008, p. 69) observed that the niche overlap between the nonnative red-rimmed melania (*Melanoides tuberculata*) and native springsnails (Moapa pebblesnail, Moapa Valley pyrg, and grated tryonia) was small and that competitive interactions were minor. The abundance of, or habitat use by, the native springsnails was minimally affected by the presence of the nonnative red-rimmed melania. Sada (2008, p. 69) states that these observations provide insight into the potential impacts of nonnative red-rimmed melania on native springsnails. The negative impacts or influences of competition, or other life-history interactions, may be negligible at other thermal springs as well, if nonnative and native snail species utilize different temperatures, substrates, and water velocities within the systems.

In many cases, nonnative species have been present on the landscape for some time, and for 36 of the 39 springsnail species, the petition does not present specific information that additional occupied springsnail sites may be threatened by an increase or expansion of nonnative species. The petition also does not correlate loss of springsnail populations or reduction in numbers of individuals directly to the introduction or

presence of invasive, nonnative species for the majority of species. Management actions and restoration activities have been implemented by various agencies to avoid or reduce the potential impacts of nonnative species to fish and wildlife resources in certain areas. Some of these actions have occurred at springs with petitioned springsnails; however, we are unaware of information supporting the benefit or detriment of such actions to springsnails. If available, specific nonnative species information pertaining to the petitioned species or the springs systems they occupy is included in the species section below. Therefore based on this summary, there is not substantial information to indicate that listing may be warranted for 36 of the 39 petitioned springsnail species, due to threats from nonnative and invasive species; this is reiterated for specific species in the individual species sections below. However, for three of the petitioned species, specific information regarding effects from nonnative and invasive species is available to indicate a potential threat, and as appropriate, is noted for specific species in those species sections below.

Inherent Vulnerability of Isolated Populations and Limited Distribution

The petition asserts that springsnails are inherently vulnerable to extirpation due to their isolation and limited distribution (CBD *et al.* 2009, p. 47). Local endemism is common in springsnails (Hershler and Sada 2002, p. 225), with many of the species in the western United States restricted to a single spring, spring complex, or drainage system (Hershler 1998, p. 1; Hershler *et al.* 1999, p. 377, Liu *et al.* 2003, p. 2775). Additionally, the spring systems in which these species are located are typically isolated and separated from other surface waters by large expanses of dry land. This isolation and limited

distribution, coupled with low vagility, increases the vulnerability of species or local populations of springsnails to extirpation from stochastic demographic and natural events, and anthropogenic factors.

However, many springsnails have evolved and continue to persist in isolation with limited distribution (Hershler and Sada 2002, p. 255). Thus, for all 39 of the petitioned springsnail species, we do not find substantial information indicating that isolation with limited distribution, in and of itself, is a potential threat. For some of the petitioned springsnail species, isolation and limited distribution are aspects we considered in determining whether there is substantial information that indicates that a natural or anthropogenic threat, or a combination of threats, may be affecting a specific springsnail species, and as appropriate, this is discussed for those specific species in the species sections below.

Global Climate Change

The petition identified global climate change (CBD *et al.* 2009, p. 46) as a significant threat to the petitioned springsnail species “due to potential increased frequency and intensity of drought, altered precipitation patterns, shifting ecological zones, decreased groundwater levels and increasing demand for freshwater.” Climate, particularly temperature and precipitation, is a primary factor affecting spring system structure, function, and dynamics in the Great Basin and Mojave Desert. In general, spring ecosystems are adapted to short-term climatic changes and the highly variable and unpredictable climatic patterns characteristic of the Basin and Range Province. Because

springsnails are aquatic obligates with limited dispersal ability, their presence in a spring is indicative of perennial water that has likely persisted for thousands of years (Sada and Pohlmann 2006, p. 10), including through past climatic fluctuations.

In the long term, major and relatively rapid shifts in climatic patterns that are characteristic predictions of global climate change have the potential to cause large-scale changes to spring ecosystems. Climate change has occurred over the past century in high northern latitudes (increased precipitation) and areas below 10 degrees south and 30 degrees north (decreased precipitation), with associated changes in components of the hydrologic cycle (e.g., precipitation patterns, snow melt, evaporation, soil moisture, and runoff) (Bates *et al.* 2008, p. 3).

The petition did not provide climate change information specific to Nevada, Utah, and California, or the basins and spring systems occupied by the 39 petitioned springsnails species. Based on information in our files, the recent projections of climate change in the Great Basin and Mojave Desert over the next century include: increased temperatures, with an increased frequency of extremely hot days in summer; more variable weather patterns and more severe storms; more winter precipitation in the form of rain, with potentially little change or decreases in summer precipitation; and earlier, more rapid snowmelt (United States Environmental Protection Agency (US EPA) 1998, pp. 1-4; Chambers and Pellant 2008, pp. 29-33). According to a report of the Intergovernmental Panel on Climate Change (Bates *et al.* 2008, p. 36), higher temperatures and earlier snow melt due to climate change could result in increased

evapotranspiration and shifts in the timing or amount of groundwater recharge and runoff (EPA 1998, pp. 1-4), potentially resulting in decreased summer flows in springs and streams. Compounding these issues could be increased water demand and groundwater development for human consumption.

In summary, it is difficult to predict local climate change impacts due to substantial uncertainty in trends of hydrological variables (e.g., natural variability can mask long-term climate trends); limitations in spatial and temporal coverage of monitoring networks; and differences in the spatial scales of global climate models and hydrological models (Bates *et al.* 2008, p. 3). Thus, while the information in the petition and our files indicates that climate change from a large-scale or regional level has the potential to affect spring ecosystems in the Great Basin and Mojave Desert in the longterm, there is much uncertainty and the information is unreliable at a finer scales to predict what habitat attributes could be affected by climate change. Given the current uncertainty and unreliability of information as summarized above, we determine that there is not substantial information indicating that listing may be warranted for all of the 39 petitioned springsnail species due to global climate change; this is identified as such for specific species in the species sections below.

Species For Which Substantial Information Was Not Presented

In this summary section, the springsnail species are grouped by hydrographic areas or basins in alphabetical order for ease in discussing common threats within those

areas. Within each hydrographic area, the springsnails are listed in alphabetical order by their scientific name.

Railroad (Duckwater) Valley Northern Hydrographic Area Species

Pyrgulopsis aloba (Duckwater pyrg): known from two unnamed springs northwest and southeast of Duckwater on tribal lands within the Duckwater Reservation, Nye County, Nevada (Hershler 1998, p. 62).

Pyrgulopsis anatine (southern Duckwater pyrg): occurs at a single spring southeast of Old Collins Spring on tribal lands within the Duckwater Reservation, Nye County, Nevada (Hershler 1998, p. 64).

Pyrgulopsis lockensis (Lockes pyrg): known from one spring on Lockes Ranch, State of Nevada lands, Nye County, Nevada (Hershler 1998, p. 58).

Pyrgulopsis papillata (Big Warm Spring pyrg): occurs at Big Warm Spring and Little Warm Spring on tribal lands within the Duckwater Reservation, Nye County, Nevada (Hershler 1998, p. 59).

Pyrgulopsis villacampae (Duckwater Warm Spring pyrg): known from Big Warm Spring and Little Warm Spring on tribal lands within the Duckwater Reservation, Nye County, Nevada (Hershler 1998, p. 63).

Factor A: The petition states that groundwater development, spring development, water pollution, recreation, and grazing are threats that may affect the five petitioned Railroad Valley springsnails. The petition mentions that groundwater resources in the Railroad Valley Southern hydrographic area (#173A) are over committed; however, none of the five petitioned species of Railroad Valley springsnails occur in that area. Rather, these species occur in the Railroad Valley Northern hydrographic area. The perennial yield of the Railroad Valley Northern hydrographic area (#173B) is 75,000 acre-feet per year (afy) (92,510,000 cubic-meters per year (m^3/year)), and there are 24,943 afy (30,770,000 m^3/year) committed; thus, the permitted groundwater rights do not approach or exceed the estimated average annual recharge in this hydrographic area. Based on the preceding discussion, the information presented in the petition for these species is incorrect, and there is no information providing evidence that groundwater development may affect habitat for the five petitioned Railroad Valley springsnails. Neither the petition, nor our files contain substantial information indicating that listing the five petitioned Railroad Valley springsnails may be warranted due to threats from groundwater development.

The petition specifically cites a diversion (spring development) in Big Warm Spring as a threat to the five Railroad Valley springsnails. However, in 2006 and 2008, Big Warm Spring and Little Warm Spring underwent extensive restoration efforts, including removal of the cited diversion, which have reduced or eliminated the threats to the habitat for these species (Poore 2008b, pp. 1-10). Through a Safe Harbor Agreement and several grants from the Service's Partners for Fish and Wildlife Program and through

section 6 of the Act, conservation is being implemented to avoid threats such as spring development, water pollution, recreation, and grazing to Big Warm Spring and Little Warm Spring (Service 2007, pp. 1-25; Service 2009, pp. 1-36). In 2005, Lockes Ranch was purchased by the State of Nevada through a Recovery Lands Acquisition grant for protection of the federally threatened Railroad Valley springfish (*Crenichthys nevadae*). Although the State does not regulate invertebrates, this purchase provides protection to riparian habitat, spring systems, and associated wildlife. The State of Nevada actively manages grazing and recreation, or has eliminated these activities from portions of Lockes Ranch such that these past threats to the species are reduced. In fall 2008, the four springs on Lockes Ranch underwent extensive restoration, which included creation of a new sinuous channel, improvement of existing channels, dewatering of a man-made irrigation ditch that was previously used for stock watering, and removal of nonnative vegetation surrounding the four spring systems (Poore 2008a, pp. 1-4). The petition does not provide evidence suggesting that these restoration efforts are beneficial or detrimental to the petitioned Railroad Valley springsnail species.

In summary, these restoration activities and acquisition have significantly reduced the threat of grazing and recreation, and eliminated the threats associated with spring diversions. Based on the preceding discussion we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Railroad Valley springsnail species, may be warranted due to threats from spring development, water pollution, recreation, and grazing

Based on the above discussions, we have determined that the petition does not present substantial information to indicate that listing the Duckwater pyrg, southern

Duckwater pyrg, Lockes pyrg, Big Warm Spring pyrg, or the Duckwater Warm Spring pyrg as threatened or endangered may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range.

Factors B and C: The petition asserts that the five Railroad Valley petitioned springsnails are threatened by collection for scientific or educational purposes and disease or predation.. The petition does not provide any information to indicate that collection, disease or predation is impacting the any of the five Railroad Valley species or to indicate these activities are occurring in, or are likely to occur in their habitats. The petitioners offer no evidence of population decline for any of the five Railroad Valley springsnail species as a result of Factors B or C, and these species continue to persist in their habitats. Therefore based on the preceding discussion and the discussion in the “Summary of Common Threats” for Factors B and C, we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Duckwater pyrg, southern Duckwater pyrg, Lockes pyrg, Big Warm Spring pyrg, or the Duckwater Warm Spring pyrg may be warranted due to the overutilization for commercial, recreational, scientific or educational purposes and disease or predation.

Factor D: We have determined that the information in the petition and in our files does not present substantial information to indicate that listing the five Railroad Valley springsnails may be warranted due to threats associated with Factors A, B, C, and E. It follows that the adequacy or inadequacy of mechanisms to regulate any of these threats is not at issue. Further, the petition does not present any additional information

that there are existing regulatory mechanisms designed to protect the species that are inadequate. Therefore, we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Duckwater pyrg, southern Duckwater pyrg, Lockes pyrg, Big Warm Spring pyrg, or the Duckwater Warm Spring pyrg may be warranted due to the inadequacy of existing regulatory mechanisms..

Factor E: The petition states that inherent vulnerability of isolated springsnail populations, invasive species, and global climate change are threats that may affect the five Railroad Valley petitioned springsnails. Specifically regarding invasive species and the five Railroad Valley springsnails, the Service and NDOW are continuously working to eradicate nonnative species in Big Warm Spring (Goldstein and Hobbs 2009, pp. 1-14). Little Warm Spring and the spring system at Lockes Ranch currently do not contain nonnative species that could threaten the petitioned Railroad Valley springsnails, and it is unknown if the two other unnamed springs where the petitioned Railroad Valley springsnails are known to occur contain nonnative species. The petition does not provide any information regarding the potential threat from isolation and limited distribution. We do not consider isolation and limited distribution, in and of itself, to be a threat to the five Railroad Valley species. The petitioners offer no evidence of population decline for any of the five Railroad Valley springsnail species as a result of isolated populations, invasive species, and global climate change under Factor E. The petitioned Railroad Valley springsnails continue to persist in their habitats. Therefore, based on the preceding discussion and discussion of isolated springsnail populations, invasive species, and global climate change in the “Summary of Common Threats,” we have determined that the

information in the petition and in our files does not present substantial information to indicate that listing the Duckwater pyrg, southern Duckwater pyrg, Lockes pyrg, Big Warm Spring pyrg, or the Duckwater Warm Spring pyrg may be warranted due to other natural or manmade factors such as threats from isolation,, invasive species, and global climate change..

Railroad Valley Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition does not present substantial information to indicate that listing of the Duckwater pyrg, southern Duckwater pyrg, Lockes pyrg, Big Warm Spring pyrg, or the Duckwater Warm Springs pyrg may be warranted due to threats associated with any of the five factors.

Spring Valley (Meadow Valley Wash / Camp Valley) Hydrographic Area Species

The *Pyrgulopsis montana* (Camp Valley pyrg) is known from a single unnamed spring on private land in Camp Valley, Lincoln County, Nevada (Hershler 1998, pp. 31-33; Garside and Schilling 1979, p. 46). Data from the 1992 survey indicates that the Camp Valley pyrg was abundant (abundant is the highest qualitative population description; e.g. abundant > common > scarce > absent.) (Sada 2003, database record 701).

Factor A: The petition identifies groundwater development, spring development, water pollution, recreation, and grazing as threats. The petition incorrectly asserts that

the unnamed spring where the Camp Valley pyrg occurs is within the region of influence to be affected by groundwater development projects (CBD *et al.* 2009, p. 89). The petition cites generalized studies of that model future groundwater development (Schaefer and Harrill 1995; Harrill and Prudic 1998; Deacon *et al.* 2007) to support its assertion that it will affect the Camp Valley pyrg and its habitat. Schaefer and Harrill (1995, p. 7) indicated that, for their analysis, the data that were used in their model were highly generalized and that their assumptions were simplifications of the actual system. In addition, the locations of proposed wells and the pumping schedule were likely to be revised. Thus, their results were only indications of potential generalized results and are not specific to the Camp Valley pyrg. Harrill and Prudic (1998) and Deacon *et al.* (2007) present overviews of the groundwater system in southern Nevada, western Utah, and southeastern California; however, neither study presents specific information regarding potential impacts to the Camp Valley pyrg.

References cited in the petition regarding groundwater development projects that petitioners use to assert that this activity is a potential threat to the species (cited below) do not support the claims in the petition that the Camp Valley pyrg or its habitat will be affected by proposed groundwater development projects. The Camp Valley pyrg occurs in an unnamed spring within the Spring Valley hydrographic area (#201). This hydrographic area was not identified as being within the Region of Influence for two groundwater development projects in Lincoln County (Lincoln County Land Act Groundwater Development and Utility Right-of-Way Project (BLM 2008, pp. 3-12) and Kane Springs Valley Groundwater Development Project (BLM 2008, pp. 3-10)). After evaluating the hydrologic evidence presented, the NSE did not identify the unnamed

spring where the Camp Valley pyrg occurs as a location where impacts will occur as a result of the groundwater development (NDWR 2007, pp. 1-23; NDWR 2008, pp. 1-40). The Spring Valley hydrographic area has not been classified as a “Designated Groundwater Basin” by the NSE. The perennial yield of the Spring Valley hydrographic area is 25,000 afy (30,840,000 m³/year), and there are 1,112 afy (1,372,000 m³/year) committed; thus, permitted groundwater rights do not exceed the estimated average annual recharge. Based upon the preceding discussion we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Camp Valley pyrg may be warranted due to threats from groundwater development.

The unnamed spring where the Camp Valley pyrg occurs was assessed as being heavily disturbed by cattle (ranking ranged from 1 if undisturbed to 4 if heavily disturbed) during a 1992 survey (Hershler 1998, p. 33; Sada 2003, database record 701), however Sada showed that the Camp Valley pyrg was abundant (Sada 2003, database record 701). Based on this information, the species was abundant despite livestock activity in its habitat. There is no indication that livestock activity has or may increase in intensity or extent, or that the activity ceased.. Therefore, we have determined that the information in the petition and in our files does not present substantial information that listing may be warranted because grazing does not seem to be affecting the species.

The petition does not present specific information with regard to the potential threats of spring development, and groundwater water development. Although the

petition mentions water pollution, and recreation it does not present any supporting information to its assertions that these activities are impacting or are likely to impact the Camp Valley pyrg or its habitat. Therefore, based on the preceding discussion and the discussion of spring development, water pollution, and recreation in the “Summary of Common Threats” section above, for, we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Camp Valley pyrg may be warranted due to threats from spring development, water pollution, or recreation.

We have determined that the petition does not present substantial information to indicate that listing the Camp Valley pyrg as threatened or endangered may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range

Factors B, C, and E: The petition proposes that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change are threats. As discussed in the “Summary of Common Threats Section” above, the petition does not provide any specific information relative to the Camp Valley pyrg to indicate that collection for scientific or education purposes, disease or predation, invasive species, and global climate change are threats to the species. The Camp Valley pyrg is currently known from one spring, and the extent of springsnail surveys in the area is unknown. The petition (CBD *et al.* 2009, p. 89) does not provide any specific information regarding the potential threat from isolation and limited distribution. We do not consider isolation and limited

distribution, in and of itself, to be a threat to the Camp Valley pyrg. Therefore based on the preceding discussion and the discussion of potential threats of overutilization, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change in the “Summary of Common Threats” section above, we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Camp Valley pyrg may be warranted due to overutilization for commercial, recreational, scientific, or educational purposes, disease or predation, or other natural or manmade factors such as threats from invasive species, isolation, and global climate change..

Factor D: We have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Camp Valley pyrg under Factors A, B, C, and E may be warranted as detailed above. It follows that the adequacy or inadequacy of mechanisms to regulate these threats is not at issue. Further, the petition does not present any additional information that there are existing regulatory mechanisms designed to protect the species that are inadequate. Therefore, based on the preceding discussion we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Camp Valley pyrg may be warranted due to the inadequacy of existing regulatory mechanisms.

Spring Valley Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition does not

present substantial information to indicate that listing of the Camp Valley pyrg may be warranted due to threats associated with any of the five factors.

White River Valley Hydrographic Area Species

Pyrgulopsis gracilis (Emigrant pyrg): found on private land in Emigrant Springs, Nye County, Nevada (Hershler 1998, pp. 45 and 47). Emigrant Springs is located in White River Valley (HB #207). Sada (2003, database record 734) identified that the Emigrant pyrg was common at Emigrant Springs during a survey in 1992.

Factor A: The petition identifies groundwater development, spring development, water pollution, recreation, and grazing as threats to the Emigrant pyrg. The petition provided information (Schaefer and Harrill 1995; Harrill and Prudic 1998; Deacon *et al.* 2007) that broadly describes predicted impacts of groundwater development to general areas, but did not provide any information to indicate that groundwater development is a potential threat to Emigrant Springs or the Emigrant pyrg. The Southern Nevada Water Authority (SNWA) is proposing to withdraw groundwater from the Cave Valley hydrographic area (#180) (SNWA 2008, p. 1-1). There is evidence for a hydrologic connection suggesting that groundwater may flow between Cave Valley and White River Valley based on isotopic similarities of groundwater in Cave Valley that emerge at Butterfield Springs and Flag Springs, but not at Emigrant Springs where this springsnail species occurs (NDWR 2008, pp. 16-17). After evaluating all hydrological evidence presented, the NSE did not identify Emigrant Springs as a location where impacts will

occur as a result of the groundwater development in Cave Valley (NDWR 2008, pp. 16-17). The White River hydrographic area (#207) has not been classified as a “Designated Groundwater Basin” by the NSE. The perennial yield of the White River hydrographic area is 37,000 afy (45,640,000 m³/year), and there are 31,699 afy (39,100,000 m³/year) committed; thus, permitted groundwater rights do not exceed the estimated average annual recharge. Therefore, the information in the petition does not provide reliable information that groundwater providing habitat for the Emigrant pyrg will be affected from current or by proposed groundwater development.. Based on the above discussion we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Emigrant pyrg may be warranted due to groundwater development.

A survey of Emigrant Springs (southernmost of the complex) in 1992 (Hershler (1998, p. 12; Sada 2003, database record X) described it as highly impacted by cattle, but effects on the springsnail population were not described. Springsnails were described as common during the survey though it is unknown whether there were differences in abundance of the sympatric Emigrant pyrg and Hardy pyrg. Sada (2005; as cited in Golden *et al.* 2007, p. 162) indicated that the Emigrant pyrg was common. We have no additional information, nor was any information presented in the petition, on whether livestock activity has or may increase in intensity or extent, or if it has ceased. The species remains common in abundance despite this potential activity in its habitat, which may suggest that grazing under past conditions and use levels has not acted as a threat to the Emigrant pyrg. Therefore, we have determined that the information in the petition

and in our files does not present substantial information to indicate that listing the Emigrant pyrg may be warranted because grazing does not seem to be affecting the species.

Although the petition mentions spring development, water pollution, and recreation it does not present any supporting information to its assertions that these activities are impacting or are likely to impact the Emigrant pyrg, or its habitat. Therefore, based on this preceding discussion we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Emigrant pyrg may be warranted due to spring development, water pollution, or recreation.

Factors B, C, and E: The petition proposes that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change are threats to the Emigrant pyrg. The petition does not cite any specific information (CBD *et al.* 2009, p. 114) correlating these potential threats with impacts to the Emigrant pyrg or provide any specific information to indicate the activities are occurring in or are likely to occur in its habitat at Emigrant Spring, where the Emigrant pyrg occurs. The petition does not provide any specific 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 Emigrant pyrg. Therefore, based on the preceding discussion and the discussion of the potential threats of overcollection, disease or predation, invasive

species, inherent vulnerability of isolated springsnail populations, and global climate change in the “Summary of Common Threats” section above, we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Emigrant pyrg may be warranted due to overutilization for commercial, recreational, scientific, or educational purposes, disease or predation, or other natural or manmade factors such as threats from invasive species, isolation, and global climate change.

Factor D: Since we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Emigrant pyrg may be warranted due to threats associated with Factors A, B, C, and E as detailed above, the adequacy or inadequacy of mechanisms to regulate these threats is not at issue. Further, the petition does not present any additional information that there are existing regulatory mechanisms designed to protect the species that are inadequate. Therefore, based on the preceding discussion we have determined that the information in the petition and in our files does not present substantial information to indicate that listing the Emigrant pyrg may be warranted due to the inadequacy of regulatory mechanisms.

White River Valley Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition does not present substantial information to indicate that listing of the Emigrant pyrg may be warranted due to threats associated with any of the five factors.

Species For Which Substantial Information Was Presented

In this summary section, the springsnail species are grouped by hydrographic areas or basins in alphabetical order for ease in discussing common threats within those areas. Within each hydrographic area, the springsnails are listed in alphabetical order by their scientific name.

Amargosa Desert Hydrographic Area Species

Ten species from the Amargosa Desert hydrographic area were included in the petition. All but one of these species occur only in Nye County, Nevada, and most are present on Service-managed lands at Ash Meadows National Wildlife Refuge (NWR).

Pyrgulopsis crystalis (Crystal springsnail) is limited to Crystal Pool (Hershler and Sada 1987, p. 801; Hershler 1994, p. 32) located in Ash Meadows NWR.

Pyrgulopsis erythropoma (Ash Meadows pebblesnail) is distributed primarily within Ash Meadows NWR among 6 springs and 5 spring brooks, all of which are located within 0.5-kilometer (km) (0.3-mile (mi)) of one another, at the Point of Rocks Spring complex (Hershler and Sada 1987, p. 795).

Pyrgulopsis fairbanksensis (Fairbanks springsnail) is restricted to its type locality at Fairbanks Spring, within Ash Meadows NWR, where it is common on the travertine at the spring orifice (Hershler and Sada 1987, p. 796).

Pyrgulopsis isolatus (elongate-gland springsnail) is restricted to its type locality at an unnamed spring west of Carson Slough and south of the claypits on private land (Hershler and Sada 1987, pp. 807 and 810).

Pyrgulopsis nanus (distal-gland springsnail) is known from four small springbrooks within 10 km (6.2 mi) of one another (Hershler and Sada 1987, p. 804) and is found primarily on public land. These springs and their associated springbrooks include: Collins Ranch on Ash Meadows NWR, Five Springs on private land and Ash Meadows NWR, North Collins Ranch on Ash Meadows NWR, and Mary Scott Spring on BLM-managed land (Service 1990, p. 10).

Pyrgulopsis pisteri (median-gland springsnail or Median-gland Nevada pyrg) is located at Marsh Spring on BLM-managed land, North Scruggs Springs on Ash Meadows NWR, and below School Springs in an observation pond on Ash Meadows NWR, all within 2 km (1.2 mi) of each other (Hershler and Sada 1987, p. 807).

Tryonia angulata (Sportinggoods tryonia) is common in three springs, which include Fairbanks Spring on Ash Meadows NWR, Crystal Pool on Ash Meadows NWR, and Big Spring on BLM land (Hershler and Sada 1987, pp. 811 and 817).

Tryonia elata (Point of Rocks tryonia) is found on travertine mound in two small springs at Point of Rocks where it is common in stream outflows in silted areas (Hershler and Sada 1987, p. 831) on BLM land and Ash Meadows NWR.

Tryonia ericae (minute tryonia) occurs in North Scruggs Spring and a spring north of Collins Ranch Spring, which are located within 4 km (2.5 mi) of each other on Ash Meadows NWR (Hershler and Sada 1987, p. 830).

Tryonia variegata (Amargosa tryonia) occurs on private and public land in at least 21 small springs in Nye County, Nevada, and 2 springs in Inyo County, California (Hershler and Sada 1987, p. 826).

Factor A: The petition proposes groundwater development, spring development, water pollution, recreation, and grazing are threats to all 10 species of springsnails occurring in the Amargosa Desert hydrographic area. The Amargosa Desert hydrographic area (#230) has been classified as a “Designated Groundwater Basin” by the NSE in which permitted groundwater rights exceed the estimated average annual recharge. The perennial yield of Amargosa Desert is 24,000 afy (29,600,000 m³/year), and approximately 25,282 afy (31,180,000 m³/year) are committed for use. When groundwater extraction exceeds aquifer recharge, it may result in surface water level decline, spring drying and degradation, or loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). On July 16, 2007, the Nevada State Engineer issued Ruling 5750 denying

numerous water rights applications in the Amargosa Valley, and finding that the groundwater basin is over-appropriated (NDWR 2007, p. 22). On November 4, 2008, the Nevada State Engineer issued Order 1197 further stipulating that any new applications for water rights in the Amargosa Valley will be denied (NDWR 2008, p. 1). Most groundwater monitoring wells in the Amargosa Valley have shown a significant decline in water levels since 1992, especially in the Amargosa Farms area (northwest of Ash Meadows). In some areas of Amargosa Valley, groundwater pumping is currently occurring at about twice the rate predicted to be sustainable. Water levels for some wells in the Ash Meadows area were relatively stable 1992-2002 (USGS 2002, pp. 1, 53 and 66). Mayer (2006, pp. 19 and 28) indicates groundwater monitoring wells and spring discharges on the Refuge are currently stable to slightly declining. The Service has permitted water rights for 16,376 afy ($20,200,000 \text{ m}^3/\text{year}$) of annual spring discharge on Ash Meadows NWR (Mayer 2005, pp. 2-3). This constitutes approximately 96 percent of the 17,025 afy ($21,000,000 \text{ m}^3/\text{year}$) annual discharge by the springs and seeps at Ash Meadows (Mayer 2000, pp. 2-3), and offers some protection for the springsnails and other aquatic species; however, as previously noted, permitted groundwater rights exceed the estimated average annual recharge in the hydrographic area where the 10 Amargosa Desert springsnails and their spring habitats occur. Based upon the preceding discussion and additional rationale discussing groundwater development in the “Summary of Common Threats,” we have determined there is substantial information in the petition and our files to indicate that listing the 10 Amargosa Desert springsnails may be warranted due to threats from groundwater development.

The petition does not provide specific information regarding spring development, recreation, and grazing as potential threats to the 10 Amargosa Desert springsnails. Based on information in our files, the Service and other partnering agencies have completed and continue to implement extensive efforts to restore wetland, riparian, and spring systems and other protective measures (e.g., installation of boardwalks and fencing in sensitive areas to manage use) at Ash Meadows NWR and on BLM land within the Ash Meadows NWR boundary that benefit aquatic and riparian species, including 9 of the Amargosa Desert species that occur on the Ash Meadows NWR and on BLM land. These actions have reduced or eliminated the potential threats from spring diversion, grazing, and recreation for the springsnail populations on Ash Meadows NWR and on BLM land within the Ash Meadows NWR boundary. In 1995, the Service excluded grazing from springsnail habitats by constructing roughly 16 mi (25.7 km) of perimeter fencing around Ash Meadows NWR (including BLM land within Ash Meadows NWR) and any trespass animals, such as burros, cattle, or horses, are removed. It is unknown if the two springs in California occupied by the Amargosa tryonia springsnail are grazed or if fencing excludes grazing. The petition does not provide specific information regarding water pollution as a potential threat to the 10 Amargosa Desert springsnails, nor is there any information in our files regarding water pollution in the springs where the 10 Amargosa Desert springsnails occur. Therefore, based on the preceding discussion and additional rationale in the “Summary of Common Threats,” in which we conclude the petition does not directly relate loss of springsnail populations or reduction in numbers of individuals to these activities for the majority of species, we have determined that the information in the petition and our files does not indicate that spring development, water

pollution, recreation, and grazing may be threats to any of the 10 Amargosa Desert springsnails. However, we will further consider this and any additional information on these activities received during our status review for these species.

Factors B, C, and E: The petition proposes that collection for scientific or educational purposes, disease or predation, inherent vulnerability of isolated springsnail populations, and global climate change are threats to all 10 Amargosa Desert springsnails. The petition does not provide specific information regarding the potential threat from isolation and limited distribution, and we do not consider inherent vulnerability due to isolation and limited distribution, in and of itself, as a threat to the 10 Amargosa Desert springsnails. As discussed in the “Summary of Common Threats” section above, the petition does not provide specific information, nor does the Service have any information in its files regarding collection for scientific or educational purposes, disease or predation for any of the petitioned springsnails, including the 10 Amargosa Desert species. Additionally, the petition does not specific information, nor does the Service have specific information about the potential effects of global climate change as potential threats to the 10 Amargosa Desert springsnails due to the current uncertainty in model predictions. Therefore, based on this and the preceding discussion in the “Summary of Common Threats,” we have determined that there is not substantial information in the petition and our files indicating that collection for scientific or educational purposes, disease or predation, inherent vulnerability of isolated springsnail populations, and global climate change may be threats to any of the 10 Amargosa Desert springsnails. However, we will further consider this and any additional information on

these activities and other potential threats received during our status review for these species.

The petition further asserts that invasive species are a threat to the 10 Amargosa Desert springsnails. Hershler and Sada (1987, pp. 778-779 and 839-843) indicate that invasive species are present in the springs. The nonnative red-rimmed melania is present in thermal springs on Ash Meadows NWR and on BLM land within the Ash Meadows NWR boundary. A study in the thermal, Upper Muddy River spring system of competition from red-rimmed melania suggest that this competition may not be a threat because there are only minor niche overlap and interactions between native and nonnative snails (Sada 2008, p. 69). Other nonnatives species (fish, amphibians, crustaceans, and vegetation) have been present in the past or currently exist in the springs on Ash Meadows NWR and on BLM land within the Ash Meadows NWR boundary; however, the Service and its partners have implemented and continue to implement ongoing management actions and restoration activities to eradicate, manage, or reduce the impacts of nonnative species at springs with springsnails on Ash Meadows NWR and on BLM land within the Ash Meadows NWR boundary. Information is not available in the petition or our files about the status of any threat from nonnative species on private land. Based on the preceding discussion and additional rationale regarding invasive species in the “Summary of Common Threats,” we have determined that there is not substantial information in the petition and our files indicating that invasive species may be a threat to any of the 10 Amargosa Desert springsnails. However, we will further consider this and

any additional information on these potential threats received during our status review for these species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the 10 Amargosa Desert springsnails due to the permitting of groundwater rights by the NSE that exceed perennial yield. Permitted groundwater rights in the Amargosa Desert hydrographic area currently exceed the average annual recharge (see details under Factor A above). Based on the preceding discussion and additional rationale discussing regulatory mechanisms in the “Summary of Common Threats,” we have determined that there is substantial information in the petition and in our files to indicate that listing the 10 Amargosa Desert springsnails may be warranted due to the inadequacy of existing regulatory mechanisms related to the permitting of groundwater rights and use..

Amargosa Desert Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of Crystal springsnail, Ash Meadows pebblesnail, Fairbanks springsnail, elongate-gland springsnail, distal gland springsnail, median-gland springsnail, sportinggoods tryonia, Point of Rocks tryonia, minute tryonia, and Amargosa tryonia may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development and the inadequacy of existing regulatory mechanisms (Factor D) related to the permitting of groundwater rights and use.

Black Mountains (Lake Mead) Hydrographic Area Species

Pyrgulopsis coloradensis (Blue Point pyrg) is found in Blue Point Spring in Lake Mead National Recreation Area (National Park Service managed lands), Clark County, Nevada (Hershler 1998, p. 29). Hershler (1998, p. 29) described the population as occurring in limited abundance and becoming increasingly scarce in the past decade. The Blue Point pyrg was not located during intensive surveys between 1999 and 2001, and was believed to be extinct (Sada field notes 2001 as cited in Sada 2002, pp. 2-3). The petition indicates that the Blue Point pyrg was found during a survey in 2008 (CBD *et al.* 2009, p. 82).

Factor A: The petition proposes that groundwater development, spring development, water pollution, recreation, and grazing are threats to this species. The Black Mountains hydrographic area (#215) has been classified as a “Designated Groundwater Basin” by the NSE in which permitted groundwater rights approach or exceed the estimated average annual recharge. The perennial yield of the Black Mountains hydrographic area is 1,300 afy (1,604,000 m³/year) and system yield is 7,000 afy (8,634,000 m³/year), while 6,882 afy (8,489,000 m³/year) are committed for use – which is approaching the estimated average annual recharge. When groundwater extraction exceeds aquifer recharge, it may result in surface water level decline, spring drying, and degradation or loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). Therefore, based on the preceding discussion and additional rationale discussing groundwater development in the “Summary of Common Threats,” we have determined

that there is substantial information in the petition and in our files to indicate that listing the Blue Point pyrg may be warranted due to threats from groundwater development.

As discussed in the “Summary of Common Threats” section above, the petition does not present any specific information, nor is there any information in our files regarding spring development, water pollution, recreation, and grazing as potential threats to the Blue Point pyrg. Therefore, we have determined that there is not substantial information in the petition and in our files indicating that spring development, water pollution, recreation, and grazing may be threats to the Blue Point pyrg. However, we will further consider this and any additional information on these activities received during our status review for this species.

Factors B and C: The petition proposes that collection for scientific or educational purposes and disease or predation are threats to the Blue Point pyrg. As discussed in the “Summary of Common Threats” section, the petition does not present any specific information, nor is there any information in our files regarding collection for scientific or educational purposes and disease or predation as potential threats to the Blue Point pyrg. Therefore, we have determined that there is not substantial information in the petition and in our files indicating that collection for scientific or educational purposes and disease or predation may be threats to the Blue Point pyrg. However, we will further consider this and any additional information on these activities received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the Blue Point pyrg due to the permitting of groundwater rights by the NSE that exceed perennial yield. Permitted groundwater rights in the hydrographic area currently approach the average annual recharge (see details under Factor A). Therefore, based on this and the preceding discussion of regulatory mechanisms pertaining to permitting of groundwater rights and use in the “Summary of Common Threats,” we have determined that there is substantial information in the petition and our files indicating that listing the Blue Point pyrg may be warranted due to the inadequacy of existing regulatory mechanisms related to the permitting of groundwater rights and use..

Factor E: The petition proposes that invasive species, inherent vulnerability of isolated springsnail populations, and global climate change are threats to the Blue Point pyrg. The petition does not provide and specific information, nor is there any information in our files, regarding global climate change as a potential threat to the Blue Point pyrg. The petition does not provide any specific 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 Blue Point pyrg.

Specifically regarding invasive species, Sada (2002, p. 4) indicates that nonnative convict cichlids (*Amatitlania nigrofasciata*) are present and may feed on members of the macroinvertebrate community. The nonnative red-rimmed melania is present in Blue Point Spring, and its appearance coincided with declines of the Blue Point pyrg (Sada 2002, p. 2). A study in the thermal, Upper Muddy River spring system of competition

from red-rimmed melania suggests that this competition may not be a threat because there are only minor niche overlaps and interactions between native and nonnative snails (Sada 2008, p. 69). This information suggests that the Blue Point pyrg's limited distribution and isolation appear to make it more susceptible to other potential natural or anthropogenic threats, including potential predation by or other effects of nonnative species such as convict cichlids. Therefore, based on the preceding discussion and the discussion in the "Summary of Common Threats," we have determined that there is not substantial information in the petition and our files indicating that inherent vulnerability of isolated springsnail populations and global climate change may be threats to the Blue Point pyrg. However, we have determined that there is substantial information in the petition and our files to indicate that listing the Blue Point pyrg may be warranted due to threats from invasive species. Nevertheless, we will further consider this and any additional information received on these potential threats during our status review for this species.

Black Mountains Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of the Blue Point pyrg may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development, the inadequacy of existing regulatory mechanisms (Factor D) related to the permitting of groundwater rights and

use, and other natural or manmade factors affecting its survival (Factor E) from the introduction or presence of invasive species.

Cave Valley and White River Valley Hydrographic Area Species

Pyrgulopsis lata (Butterfield pyrg) is found in Butterfield Springs on private land in Nye County, Nevada (Hershler 1998, p. 43).

Pyrgulopsis marcida (Hardy pyrg) is located in several springs or spring complexes in Nye, Lincoln, and White Pine Counties, Nevada (Hershler 1998, pp. 48–50; Golden *et al.* 2007, p. 162). Sada (2003, database records 723, 726, 734, 735 and 737) reported that the Hardy pyrg was common at Emigrant Springs, Arnoldson Spring, Hardy Spring, and Silver Spring. The species is also present at Butterfield Springs.

Pyrgulopsis sathos (White River Valley pyrg) occurs in Flag Springs (north and middle), Nye County, Nevada; Camp Spring, Lincoln County, Nevada; and Lund Spring, Arnoldson Spring, Preston Big Spring, and Nicholas Spring, White Pine County, Nevada (Hershler 1998, p. 39; Golden *et al.* 2007, p. 160).

Factor A: The petition proposes that groundwater development, spring development, water pollution, recreation, and grazing are threats. The perennial yield of the White River hydrographic area is 37,000 (afy) (45,640,000 m³/year), and there are 31,699 afy (39,100,000 m³/year) committed; thus, permitted groundwater rights do not

exceed the estimated average annual recharge. However, SNWA is proposing to develop 134,000 afy (165,288,100 m³/year) of groundwater from the Cave Valley hydrographic area (#180) (SNWA 2008, p. 1-1). There is evidence for a hydrologic connection suggesting that groundwater may flow between Cave Valley and White River Valley based on isotopic similarities of groundwater in Cave Valley that emerge at Butterfield Springs and Flag Springs, where these three springsnail species occur (NDWR 2008, pp. 16–17). The NSE expressed concern for potential impacts to these springs from groundwater development in Cave Valley (NDWR 2008, p. 17). Based on the preceding discussion, we have determined that there is substantial information in the petition and our files to indicate that listing the Butterfield pyrg, Hardy pyrg, and White River Valley pyrg may be warranted due to threats from groundwater development.

As discussed in the “Summary of Common Threats” section above, the petition does not present specific information, nor is there any information in our files regarding spring development, water pollution, recreation, and grazing as potential threats to the any of the petitioned springsnail species, which includes the Butterfield pyrg, Hardy pyrg, and White River Valley pyrg. Therefore, we have determined there is not substantial information in the petition and our files indicating that spring development, water pollution, recreation, and grazing may be threats to the Butterfield pyrg, Hardy pyrg, and White River Valley pyrg. However, we will further consider this and any additional information on these activities received during our status review for this species.

Factors B, C, and E: The petition proposes that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail population, and global climate change are threats to the Butterfield pyrg, Hardy pyrg, and White River Valley pyrg. The petition does not provide any specific 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 Butterfield pyrg, Hardy pyrg, and White River Valley pyrg. As discussed in the “Summary of Common Threats” section above, the petition does not provide any specific information, nor is there any information in our files regarding collection for scientific or educational purposes, disease or predation, invasive species, and global climate change as potential threats to any of the petitioned springsnail species, which includes the Butterfield pyrg, Hardy pyrg, and White River Valley pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change may be threats to the Butterfield pyrg, Hardy pyrg, and White River Valley pyrg. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the Butterfield pyrg, Hardy pyrg, and White River Valley pyrg due to the permitting of groundwater rights by the NSE. The NSE expressed concern for potential impacts to Butterfield Springs and Flag Springs, where the three springsnail species occur, from the

proposed groundwater development by SNWA in the Cave Valley hydrographic area (see details under Factor A). Based on the preceding discussion, we have determined there is substantial information in the petition and in our files to indicate that listing the Butterfield pyrg, Hardy pyrg, and White River Valley pyrg due to the inadequacy of existing regulatory mechanisms related to permitting of groundwater rights and use .

Cave Valley Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of the Butterfield pyrg, Hardy pyrg, and White River Valley pyrg may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development and the inadequacy of existing regulatory mechanisms (Factor D) related to the permitting of groundwater rights and use.

Dry Lake Valley and White River Valley Hydrographic Area Species

Pyrgulopsis breviloba (Flag pyrg) is found at the Flag Springs complex (North, Middle, and South springs), Nye County, Nevada; and Meloy Spring, Lincoln County, Nevada (Hershler 1998, p. 39; Golden *et al.* 2007, pp. 161–162).

Factor A: The petition proposes that groundwater development, spring development, water pollution, grazing, and recreation are threats to the Flag pyrg. The perennial yield of the White River hydrographic area is 37,000 (afy) (45,640,000

m³/year), and there are 31,699 afy (39,100,000 m³/year) committed; thus, permitted groundwater rights do not exceed the estimated average annual recharge. The perennial yield of the Dry Lake Valley hydrographic area is 12,700 afy (15,670,000 m³/year), and there are 1,066 afy (1,315,000 m³/year) committed; thus, permitted groundwater rights do not exceed the estimated average annual recharge. However, SNWA is proposing to develop 134,000 afy (165,288,100 m³/year) of groundwater from the Cave Valley hydrographic area (#180) (SNWA 2008, p. 1-1). There is evidence for a hydrologic connection suggesting that groundwater may flow between Cave Valley and White River Valley based on isotopic similarities of groundwater in Cave Valley that emerge at Butterfield Springs and Flag Springs (NDWR 2008, pp. 16–17). The NSE expressed concern for potential impacts to these springs from groundwater development in Cave Valley (NDWR 2008, p. 17), and a large proportion of habitat of Flag pyrg occurs at Flag Springs. Therefore, based on the preceding discussion, we have determined there is substantial information in the petition and in our files to indicate that listing the Flag pyrg may be warranted due to threats from groundwater development .

As discussed in the “Summary of Common Threats” section, the petition does not present any specific information, nor is there any information in our files regarding spring development, water pollution, grazing, and recreation as potential threats to the Flag pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that spring development, water pollution, grazing, and recreation may be threats to the Flag pyrg. However, we will further consider this and

any additional information on these activities received during our status review for this species.

Factors B, C, and E: The petition proposes that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change are threats to the Flag pyrg. The petition does not provide specific 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 Flag pyrg. As discussed in the “Summary of Common Threats” section above, the petition does not provide specific information, nor is there any information in our files, regarding collection for scientific or educational purposes, disease or predation, invasive species, and global climate change as potential threats to any of the petitioned springsnail species, which includes the Flag pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change may be threats to the Flag pyrg. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the Flag pyrg due to the permitting of groundwater rights by the NSE. The NSE expressed concern for potential impacts to Flag Springs, where the species occurs, from

the proposed groundwater development by SNWA in the Cave Valley hydrographic area (see details under Factor A). Based on the preceding discussion, we have determined there is substantial information in the petition and in our files to indicate that listing the Flag pyrg may be warranted due to the inadequacy of existing regulatory mechanisms related to the permitting of groundwater rights and use.

Dry Lake Valley Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of the Flag pyrg may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development and the inadequacy of existing regulatory mechanisms (Factor D) related to the permitting of groundwater rights and use.

Lake Valley Hydrographic Area Species

Pyrgulopsis sublata (Lake Valley pyrg) is found in Wambolt Springs, Lincoln County, Nevada (Hershler 1998, p. 57). Golden *et al.* (2007, p. 133) indicate that there are at least six spring sources, of which they focused their attention at two. During surveys in 1992, Sada (2003, database record 717) described Lake Valley pyrg as common. During surveys in 2004, Golden *et al.* (2007, p. 136) observed that Lake Valley pyrg was common at one spring head and scarce 5-15 meter (m) (16 feet (ft)-49 ft) downstream. Brief surveys of the remaining springs by Golden *et al.* 2007, p. 136)

showed that springsnails were scarce at one and absent from the remaining four. Golden *et al.* (2007, p. 137) found that Lake Valley pyrg was the fourth most dominant taxa in the macroinvertebrate samples collected at springs they surveyed.

Factor A: The petition proposes that groundwater development, spring development, water pollution, recreation, and grazing are threats to the Lake Valley pyrg. The Lake Valley hydrographic area (#183) has been classified as a “Designated Groundwater Basin” by the NSE in which permitted groundwater rights exceed the estimated average annual recharge. The perennial yield of Lake Valley is 12,000 afy (14,800,000 m³/year), while 21,868 afy (26,970,000 m³/year) are committed for use. When groundwater extraction exceeds aquifer recharge it may result in surface water level decline, spring drying and degradation or loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). A berm (spring development) is present at the complex and was potentially created to pool water (Golden *et al.* 2007, p. 137). Pooling of water can alter springsnail habitat conditions from flowing to standing water. Therefore, based on the preceding discussion and the discussion of groundwater and spring development in the “Summary of Common Threats,” we have determined there is substantial information in the petition and our files to indicate that listing the Lake Valley pyrg may be warranted due to threats from groundwater development and spring development.

As discussed in the “Summary of Common Threats” section above, the petition does not present any specific information, nor is there any information in our files regarding water pollution and recreation as potential threats to any of the petitioned

spring snail species, which includes the Lake Valley pyrg. Specifically regarding grazing, Golden *et al.* (2007, p. 137) described the two springs surveyed as slightly disturbed indicating that livestock were prevalent, but damage to habitat was minimal. Therefore, based on the preceding discussion and the discussion of water pollution, recreation, and grazing in the “Summary of Common Threats,” we have determined that there is not substantial information in the petition and our files indicating that water pollution, recreation, and grazing may be threats to the Lake Valley pyrg. However, we will further consider this and any additional information on these activities received during our status review for this species.

Factors B, C, and E: The petition proposes that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated spring snail populations, and global climate change are threats to the Lake Valley pyrg. 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 Lake Valley pyrg. As discussed in the “Summary of Common Threats” section above, the petition does not provide any information, nor is there any information in our files regarding collection for scientific or educational purposes, disease or predation, invasive species, and global climate change as potential threats to any of the petitioned spring snail species, which includes the Lake Valley pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated spring snail

populations, and global climate change may be threats to the Lake Valley pyrg.

However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the Lake Valley pyrg due to the permitting of groundwater rights by the NSE that exceed perennial yield. Permitted groundwater rights in the hydrographic area currently exceed the average annual recharge (see details under Factor A). Based on this and the discussion of regulatory mechanisms related to the permitting of groundwater rights and use in the “Summary of Common Threats,” we have determined there is substantial information in the petition and our files to indicate that listing the Lake Valley pyrg may be warranted due to the inadequacy of existing regulatory mechanisms related to the permitting of groundwater rights and use.

Lake Valley Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of Lake Valley pyrg may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development and spring development, and due to the inadequacy of existing regulatory mechanisms (Factor D) related to the permitting of groundwater rights and use.

Las Vegas Valley, Indian Springs, Pahrump Valley, Amargosa Flat, and Frenchman Flat
Hydrographic Areas Species

Pyrgulopsis deaconi (Spring Mountains pyrg) is found on Federal land at Kiup Spring, Red Spring, and Willow Spring, Clark County, Nevada (Hershler 1998, p. 25; Sada and Nachlinger 1998, p. 15). A population described as scarce is also present at Rainbow Spring (Sada and Nachlinger 1998, p. 28 as confirmed by Sada (2002, p. 2)). Previously unknown populations were documented at Horse Spring 1 and 2 in the late 1990s and early 2000s (Sada 2002, p. 2). A population at Manse Spring in Nye County, Nevada, has been extirpated (Sada 2002, p. 4).

Sada (2002, p. 3) surveyed areas in Clark County for the Spring Mountains pyrg between 1999 and 2001, and described their estimated abundance in occupied habitat. The Spring Mountains pyrg was described as abundant at Horse Spring 1 and 2; common at Red Spring; and scarce at Kiup Spring and Rainbow Spring. In 2001, the Spring Mountains pyrg was repatriated to Willow Spring from Lost Canyon Creek. Springsnails were found during surveys in 2002 at Willow Spring, but no collections were made to identify species (Sada 2002, p. 6).

Factor A: The petition proposes that groundwater development, spring development, water pollution, recreation, and grazing are threats to the Spring Mountains pyrg. The Pahrump Valley (#162) and Las Vegas Valley (#212) hydrographic areas have each been classified as a “Designated Groundwater Basin” by the NSE in which

permitted groundwater rights exceed the estimated average annual recharge. The perennial yield of Pahrump Valley hydrographic area is 12,000 afy (14,800,000 m³/year), while 62,740 afy (77,390,000 m³/year) are committed for use. The perennial yield of Las Vegas Valley hydrographic area is 25,000 afy (30,840,000 m³/year), while 92,406 afy (114,000,000 m³/year) are committed for use. When groundwater extraction exceeds aquifer recharge it may result in surface water level decline, spring drying and degradation or loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). Sada (2002, p. 4) reported that the extirpation of the Spring Mountains pyrg from Manse Spring is believed to coincide with its drying in 1975, which occurred as a result of localized groundwater development (Soltz and Naiman 1978, p. 24). Therefore, based on this and the discussion of groundwater development in the “Summary of Common Threats” section, above, we have determined there is substantial information in the petition and our files to indicate that listing the Spring Mountains pyrg may be warranted due to threats from groundwater development.

The springsnail population at Willow Spring (on Bureau of Land Management (BLM) lands, not Willow Creek on Forest Service lands) was extirpated between 1992 and 1995 as a result of spring diversion and channel modification for recreation (Sada and Nachlinger 1996, pp. 17 and 29; Sada 2002, p. 4). In 2001, Willow Spring was restored, including a boardwalk to protect the spring, and the Spring Mountains pyrg was repatriated using individuals from Lost Canyon Creek. Red Spring had a high level of use by the public in the past (Sada and Nachlinger 1996, p. 29). Recreationists may have dammed and diverted stream flow from the spring (Putnam and Botsford 2002, as cited in

CBD *et al.* 2009, p. 87). Areas around Red Spring have been restored, including the installation of a boardwalk to limit further disturbance. Based on the preceding discussion, we have determined there is substantial information in the petition and our files to indicate recreation may be a threat to the Spring Mountains pyrg, but there is not substantial information in the petition and our files indicating spring development may be a threat to the Spring Mountains pyrg. As discussed in the “Summary of Common Threats Section” above, the petition does not present any specific information, nor is there any information in our files regarding water pollution and grazing as potential threats to the Spring Mountains pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating water pollution, grazing, and spring development may be threats to the Spring Mountains pyrg. However, we will further consider this and any additional information on these activities received during our status review for this species.

Factors B, C, and E: The petition proposes that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change are threats to the Spring Mountains pyrg. The petition does not provide any specific 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 Spring Mountains pyrg. As discussed in the “Summary of Common Threats” section above, the petition does not provide any specific information, nor is there any information in our files regarding collection for scientific or educational purposes, disease or predation, invasive species,

and global climate change as potential threats to the Spring Mountains pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change may be threats to the Spring Mountains pyrg. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the Spring Mountains pyrg due to the permitting of groundwater rights by the NSE that exceed perennial yield. Permitted groundwater rights in the hydrographic areas currently exceed the average annual recharge (see details under Factor A). Based on this and the discussion of regulatory mechanisms related to the permitting of groundwater rights and use in the “Summary of Common Threats above,” we have determined there is substantial information in the petition and our files to indicate that listing the Spring Mountains pyrg may be warranted due to the inadequacy of existing regulatory mechanisms related to the permitting of groundwater rights and use.

Spring Mountains Pyrg Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of the Spring Mountains pyrg may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development and recreation,

and due to the inadequacy of existing regulatory mechanisms (Factor D) related to the permitting of groundwater rights and use.

Pyrgulopsis fausta (Corn Creek pyrg) is found at Corn Creek Springs on the Desert NWR, Clark County, Nevada (Hershler 1998, p. 23).

Factor A: The petition proposes that groundwater development, spring development, water pollution, recreation, and grazing are threats to the Corn Creek pyrg. The Las Vegas Valley hydrographic area (#212) has been classified as a “Designated Groundwater Basin” by the NSE in which permitted groundwater rights exceed the estimated average annual recharge. The perennial yield of Las Vegas Valley hydrographic area is 25,000 afy (30,840,000 m³/year), while 92,406 afy (114,000,000 m³/year) are committed for use. When groundwater extraction exceeds aquifer recharge it may result in surface water level decline, spring drying and degradation, or loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). Based on this and the preceding discussion of groundwater development in the “Summary of Common Threats,” we have determined there is substantial information in the petition and our files to indicate that listing the Corn Creek pyrg may be warranted due to threats from groundwater development.

Development of the springs at and near Corn Creek Springs dates back to the early 1900s. Reduction in abundance of the Corn Creek pyrg from when it was first collected (Hershler 1998, p. 23) was attributed to the historical lining of the main outflow

of Corn Creek Springs with cement, which eliminated all but 5 m (16.4 ft) of Corn Creek pyrg habitat (Sada 2002, p. 4). This past spring development action impacted the abundance of the Corn Creek pyrg. Estimates of abundance from surveys conducted at two springs at Corn Creek between 1999 and 2001 indicated that the Corn Creek pyrg was scarce at both springs and that the species was restricted to estimated 5-m and 1-m (16.4-ft and 3.3-ft) lengths of habitat in each spring, respectively (Sada 2002, p. 3). However, in 2002, the Service removed the channel modifications and restored the springs. Sada (2002, p. 4) projected the abundance of the Corn Creek pyrg would increase as habitat stabilized, thereby removing the past impacts of spring development, and anecdotal observations support this, although formal surveys for the Corn Creek pyrg have not been conducted since the restoration. Based on the preceding discussion regarding the current habitat conditions and conservation management, which have alleviated the threat of spring development, we have determined that there is not substantial information in the petition and our files indicating that spring development may be a threat to the Corn Creek pyrg. However, we will further consider this and any additional information on this activity received during our status review for this species.

As discussed in the “Summary of Common Threats” section above, the petition does not present any specific information, nor is there any information in our files regarding water pollution, recreation, and grazing as potential threats to any of the petitioned springsnail species, which includes the Corn Creek pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating

that water pollution, recreation, and grazing may be threats to the Corn Creek pyrg. However, we will further consider this and any additional information on these activities received during our status review for this species.

Factors B, C, and E: The petition proposes that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change are threats. The petition does not provide any specific 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 Corn Creek pyrg. As discussed in the “Summary of Common Threats” section above, the petition does not provide any specific information, nor is there any information in our files regarding collection for scientific or educational purposes, disease or predation, invasive species, and global climate change as potential threats to any of the petitioned springsnails, which includes the Corn Creek pyrg. Therefore, we have determined that there is not substantial information in the petition and our files does indicating that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change may be threats to the Corn Creek pyrg. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the Corn Creek pyrg due to the permitting of groundwater rights by the NSE that

exceed perennial yield. Permitted groundwater rights in the hydrographic area currently exceed the average annual recharge (see details under Factor A). Therefore, based on this and the discussion of regulatory mechanisms related to the permitting of groundwater rights and use in the “Summary of Common Threats” section above, we have determined there is substantial information in the petition and our files to indicate that listing the Corn Creek pyrg may be warranted due to the inadequacy of existing regulatory mechanisms related to the permitting of groundwater rights and use.

Corn Creek Pyrg Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing the Corn Creek pyrg may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development, and due to the inadequacy of existing regulatory mechanisms (Factor D) related to the permitting of groundwater rights and use.

Pyrgulopsis turbatrix (Southeast Nevada pyrg) is found in approximately 10 spring or creek areas around the Spring Mountains of southern Nevada in Clark and Nye Counties, Nevada; Grapevine Springs in Amargosa Flat of Nye County, Nevada; and Cane Spring in Frenchman Flat, Nye County, Nevada. The Southeast Nevada pyrg is one of the most widely distributed springsnail species in southern Nevada (Sada 2002, p. 4). This species has previously been misidentified as or confused with *Pyrgulopsis micrococcus* (Oasis Valley springsnail (Hershler 1998, p. 53)).

Factor A: The petition proposes that groundwater development, spring development, water pollution, recreation, and grazing are threats to the Southeast Nevada pyrg. The Indian Springs Valley (#161), Pahrump Valley (#162), and Las Vegas Valley (#212) hydrographic areas each have been classified as “Designated Groundwater Basin” by the NSE in which permitted groundwater rights exceed the estimated average annual recharge. The perennial yield of Indian Springs Valley hydrographic area is 500 afy (616,700m³/year), while 1,380 afy (1,702,000 m³/year) are committed for use. The perennial yield of Pahrump Valley hydrographic area is 12,000 afy (14,800,000 m³/year), while 62,740 afy (77,390,000 m³/year) are committed for use. The perennial yield of Las Vegas Valley hydrographic area is 25,000 afy (30,840,000 m³/year), while 92,406 afy (114,000,000 m³/year) are committed for use. When groundwater extraction exceeds aquifer recharge it may result in surface water level decline, spring drying, and degradation or loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). Based on this and the discussion of groundwater development in the “Summary of Common Threats,” we have determined there is substantial information in the petition and our files to indicate that listing the Southeast Nevada pyrg may be warranted due to threats from groundwater development.

Horseshutem Springs has been highly impacted by ungulate grazing and water diversion (Sada and Nachlinger 1996, p. 22; Hershler 1998, p. 53), but the Southeast Nevada pyrg remains common (Sada 2002, p. 3). Sada (2002, p. 4) observed levels of ungulate grazing disturbance at Horseshutem Springs and Grapevine Springs that may

have reduced the levels of springsnail abundance but appeared insufficient to extirpate populations. Based on the preceding discussion, we have determined there is substantial information in the petition and our files to indicate that listing the Southeast Nevada pyrg may be warranted due to threats from grazing.

At Grapevine Springs one of four populations was extirpated when one of the springs dried as a result of a diversion (spring development) between 1992 and 1995 (Sada and Nachlinger 1996, p. 17). The population at Willow Spring (on BLM lands) was extirpated between 1992 and 1995 as a result of spring development (diversion and channel modification) for recreation (Sada and Nachlinger 1996, p. 17; Sada 2002, p. 4). In 2001, Willow Spring was restored, including a boardwalk to protect the spring, and the Southeast Nevada pyrg was repatriated using individuals from Lost Canyon Creek. Springsnails were found during surveys in late 2002 at Willow Spring, but no collections were made to identify species (Sada 2002, p. 6). Based on the preceding discussion, we have determined there is substantial information in the petition and our files to indicate that listing the Southeast Nevada pyrg may be warranted due to threats from spring development and recreation.

The petition does not present any specific information, nor is there any information in our files regarding water pollution as a potential threat to the Southeast Nevada pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that water pollution may be a threat to the Southeast

Nevada pyrg. However, we will further consider this and any additional information on this activity received during our status review for this species.

Factors B, C, and E: The petition proposes that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change are threats to the Southeast Nevada pyrg. The petition does not provide any specific 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 Southeast Nevada pyrg. As discussed in the “Summary of Common Threats” section above, the petition does not provide any specific information, nor is there any information in our files regarding collection for scientific or educational purposes, disease or predation, invasive species, and global climate change as potential threats to any of the petitioned springsnails, which includes the Southeast Nevada pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change may be threats to the Southeast Nevada pyrg. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the Southeast Nevada pyrg due to the permitting of groundwater rights by the NSE that

exceed perennial yield. Permitted groundwater rights in the hydrographic areas currently exceed the average annual recharge (see details under Factor A). Therefore, based on this and the discussion of regulatory mechanisms related to the permitting of groundwater rights and use in the “Summary of Common Threats” section above, we have determined there is substantial information in the petition and our files to indicate that listing the Southeast Nevada pyrg may be warranted due to the inadequacy of existing regulatory mechanisms related to the permitting of groundwater rights and use.

Southeast Nevada Pyrg Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of the Southeast Nevada pyrg may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development, spring development, recreation, and grazing, and due to the inadequacy of existing regulatory mechanisms (Factor D) related to the permitting of groundwater rights and use.

Pahranagat Valley Hydrographic Area Species

Pyrgulopsis hubbsi (Hubbs pyrg) is found on private land at Hiko Spring and Crystal Springs in Lincoln County, Nevada (Hershler 1998, p. 35; Golden *et al.* 2007, p. 197). Springsnails were not observed at Hiko Spring during surveys in 2000 (Sada 2003, database records) or 2006 and may be extirpated there (Golden *et al.* 2007, pp. 197–198). At Crystal Springs, Hubbs pyrg was abundant during 1992 surveys (Sada 2003, database

record 804 and 805), but scarce during surveys in 2006 (Golden *et al.* 2007, pp. 197–198).

Pyrgulopsis merriami (Pahranagat pebblesnail) is found in four springs in Nevada including: Ash Springs in Pahranagat Valley, Lincoln County (Hershler 1994, p. 41); and Hot Creek Spring, Moon River Spring, and Moorman Spring of White River Valley, Nye County (Hershler 1998, p. 31). Of the public lands surveyed, Golden *et al.* (2007, p. 198) described Pahranagat pebblesnail as common to scarce at two spring heads in Ash Springs, absent in much of the pool area, and common in a stretch 60 m (197 ft) downstream to an area discharging to private property. Pahranagat pebblesnail was common in Hot Creek Spring, Moon River Spring, and Moorman Spring during 1992 surveys (Sada 2003, database record 806). Springsnails were scarce throughout most, but common in a few, areas of Hot Creek Spring during 2006 surveys (Golden *et al.* 2007, p. 162).

Factor A: The petition asserts that groundwater development, spring development, water pollution, recreation, and grazing are threats to the Hubbs pyrg and Pahranagat pebblesnail. The SNWA is proposing to develop groundwater from the Cave Valley (#180), Dry Lake Valley (#181), and Delamar Valley (#182) hydrographic areas, (SNWA 2008, p. 1-1). There is evidence suggesting a hydrologic connection between these basins and the Pahranagat Valley as discussed in NSE ruling #5875 (NSE 2008, p. 18). However, groundwater development model scenarios indicate that potential effects may not express themselves at down-gradient springs in Pahranagat Valley for centuries

(NSE 2008, pp. 22–23). In addition, a monitoring and mitigation plan is required as a condition of approval (NSE 2008, p. 23). Based on the preceding discussion, we have determined that there is not substantial information in the petition and our files indicating that groundwater development may be a threat to the Hubbs pyrg or the Pahrnagat pebblesnail. However, we will further consider this and any additional information on this activity received during our status review for this species.

Golden *et al.* (2007, p. 200) observed that Hiko Spring, Crystal Springs, and Ash Springs were highly disturbed by water diversions (spring development) and recreation. Sada and Vinyard (2002, p. 286) identified water diversion at Crystal Springs as a threat to the Hubbs pyrg. Based on this information, coupled with the available population abundance information for Hubbs pyrg and Pahrnagat pebblesnail as cited above, we have determined that there is substantial information in the petition and in our files indicating that listing the Hubbs pyrg and Pahrnagat pebblesnail may be warranted due to threats from spring development and recreation.

As discussed in the “Summary of Common Threats” section above, the petition does not present any specific information, nor is there any information in our files, regarding water pollution and grazing as potential threats to any of the petitioned springsnails, which includes the Hubbs pyrg and Pahrnagat pebblesnail. Therefore, we have determined that there is not substantial information in the petition and our files indicating that water pollution and grazing may be threats to the Hubbs pyrg and

Pahranagat pebblesnail. However, we will further consider this and any additional information on these activities received during our status review for this species.

Factors B, C, and D: The petition proposes that collection for scientific or educational purposes, disease or predation, and inadequate regulatory mechanisms are threats to the Hubbs pyrg and Pahranagat pebblesnail. The petition does not provide specific information, nor is there any information in our files regarding collection for scientific or educational purposes, disease or predation, and inadequate regulatory mechanisms as potential threats to the Hubbs pyrg and Pahranagat pebblesnail.

Therefore, based on this and the discussion in the “Summary of Common Threats,” we have determined that there is not substantial information in the petition and our files indicating that collection for scientific or educational purposes, disease or predation, and inadequate regulatory mechanisms may be threats to the Hubbs pyrg and Pahranagat pebblesnail. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor E: The petition proposes that invasive species, inherent vulnerability of isolated springsnail populations, and global climate change are threats to the Hubbs pyrg and Pahranagat pebblesnail. Nonnative, invasive species (fish, invertebrates, amphibians and vegetation) are present—and in some locations are the dominant species—in Ash Springs, Hiko Spring, and Crystal Springs, which may be affecting the Hubbs pyrg and Pahranagat pebblesnail (Golden *et al.* 2007, pp. 184–199). Presence of nonnative species

in these three springs, particularly nonnative fishes, has resulted in extirpations and negative interactions with native fish species, although the information in the petition and in our files does not directly correlate presence of nonnative species with impacts to the Hubbs pyrg and Pahranaagat pebblesnail (Golden *et al.* 2007, p. 194). Based on the information in the petition and in our files, we are unable to identify any single potential threat that is affecting the abundance of the Hubbs pyrg and Pahranaagat pebblesnail, and it is likely that their abundance is being affected by a combination of threats, including nonnative species. Therefore, we have determined there is substantial information in the petition and our files to indicate that listing the Hubbs pyrg and Pahranaagat pebblesnail may be warranted due to potential threats from invasive species.

The petition asserts that inherent vulnerability of isolated springsnail populations and global climate change are threats to the Hubbs pyrg and Pahranaagat pebblesnail. The petition does not provide any specific 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 Hubbs pyrg and Pahranaagat pebblesnail. The petition does not provide any specific information, nor is there any information in our files regarding global climate change as a potential threat to the Hubbs pyrg and Pahranaagat pebblesnail. Based on this and the discussion in the “Summary of Common Threats,” we have determined that there is not substantial information in the petition and our files indicating that inherent vulnerability of isolated springsnail populations and global climate change may be threats to the Hubbs pyrg and Pahranaagat pebblesnail.

However, we will further consider this and any additional information on this and other potential threats received during our status review for this species.

Pahranagat Valley Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of the Hubbs pyrg and Pahranagat pebblesnail may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from spring development and recreation, and due to other natural or manmade factors affecting its continued existence (Factor E) resulting from invasive species.

Ralston Valley and Stone Cabin Flat Hydrographic Areas Species

Pyrgulopsis sterilis (Sterile Basin pyrg) is known from two springs on private lands, Hunts Canyon Ranch and Sidehill Spring, Nye County, Nevada (Hershler 1998, p. 54).

Factor A: The petition states that groundwater development, spring development, water pollution, recreation, and grazing are threats that may affect the Sterile Basin pyrg. The Stone Cabin Flat (#149) and Ralston Valley (#141) hydrographic areas each have been classified as “Designated Groundwater Basins” by the NSE. The permitted groundwater rights in the Stone Cabin Flat hydrographic area exceed the estimated average annual recharge. The perennial yield of Stone Cabin Flat hydrographic area is

2,000 afy (2,467,000 m³/year), while 11,532 afy (14,220,000 m³/year) are committed. The permitted groundwater rights in the Ralston Valley hydrographic area do not exceed, but are approaching the estimated average annual recharge with the perennial yield at 6,000 afy (7,401,000 m³/year), and 4,415 afy (5,446,000 m³/year) are committed. When groundwater extraction exceeds aquifer recharge it may result in surface water level decline, spring drying, and degradation or loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). Based upon this and the discussion of groundwater development in the “Summary of Common Threats” section above, we have determined there is substantial information in the petition and our files to indicate that listing the Sterile Basin pyrg may be warranted due to threats from groundwater development.

The petition asserts spring development, water pollution, recreation, and grazing are threats to the Sterile Basin pyrg. As discussed in the “Summary of Common Threats” section above, the petition does not present any specific information, nor is there any information in our files regarding spring development, water pollution, recreation, and grazing as potential threats to the Sterile Basin pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that spring development, water pollution, recreation, and grazing may be threats to the Sterile Basin pyrg. However, we will further consider this and any additional information on these activities received during our status review for this species.

Factors B, C, and E: The petition states that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of

isolated springsnail populations, and global climate change are threats that may affect the Sterile Basin pyrg. The petition provides little 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 Sterile Basin pyrg. As discussed in the “Summary of Common Threats” section above, the petition does not provide any specific information, nor is there any information in our files regarding collection for scientific or educational purposes, disease or predation, invasive species, and global climate change as potential threats to the Sterile Basin pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that collection for scientific or educational purposes, disease or predation, invasive species, and global climate change may be threats to the Sterile Basin pyrg. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the Sterile Basin pyrg due to the permitting of groundwater rights by the NSE that exceed perennial yield. Permitted groundwater rights in the hydrographic areas currently approach or exceed the average annual recharge (see details under Factor A). Based on this and the discussion of regulatory mechanisms related to the permitting of groundwater rights and use in the “Summary of Common Threats” section above, we have determined there is substantial information in the petition and our files to indicate that listing the Sterile Basin pyrg may be warranted due to the inadequacy of existing regulatory mechanisms related to the permitting of groundwater rights and use.

Ralston Valley Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of the Sterile Basin pyrg may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development, and due to the inadequacy of existing regulatory mechanisms (Factor D) related to the permitting of groundwater rights and use.

Snake Valley and Spring Valley Hydrographic Area Species

Pyrgulopsis peculiaris (bifid duct pyrg) occurs at 6 sites in Millard County, Utah, and two sites in White Pine County, Nevada (Hershler 1998, p. 110).

Factor A: The petition states that groundwater development, spring development, agricultural development, water pollution, recreation, and grazing are threats to the bifid duct pyrg. The Snake Valley (#195) and Spring Valley (#184) hydrographic areas are not classified as “Designated Groundwater Basins” by the NSE. The permitted groundwater rights in the Snake Valley hydrographic area do not exceed the estimated average annual recharge. The perennial yield of Snake Valley hydrographic area is 25,000 afy (30,840,000 m³/year), and there are 10,720 afy (13,220,000 m³/year) committed. However, the permitted groundwater rights in the Spring Valley hydrographic area exceed the estimated average annual recharge. The perennial yield of the Spring Valley

hydrographic area is 80,000 afy (98,680,000 m³/year), and there are 86,085 afy (106,200,000 m³/year) committed. When groundwater extraction exceeds aquifer recharge it may result in surface water level decline, spring drying, and degradation or loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). Based upon this and the discussion of groundwater development in the “Summary of Common Threats” section above, we have determined there is substantial information in the petition and our files to indicate that listing the bifid duct pyrg may be warranted due to threats from groundwater development.

The petition states that spring development, agricultural development, water pollution, recreation, and grazing are threats to the bifid duct pyrg. As discussed in the “Summary of Common Threats” section above, the petition does not present any specific information, nor is there any information in our files regarding spring development, agricultural development, water pollution, recreation, and grazing as potential threats to the bifid duct pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that spring development, agricultural development, water pollution, recreation, and grazing may be threats to the bifid duct pyrg. However, we will further consider this and any additional information on these activities received during our status review for this species.

Factors B, C, and E: The petition states that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change are threats to the bifid duct

pyrg. The petition does not provide any specific 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 bifid duct pyrg. As discussed in the “Summary of Common Threats” section above, the petition does not present any specific information, nor is there any information in our files regarding collection for scientific or educational purposes, disease or predation, invasive species, and global climate change as potential threats to any of the petitioned springsnail species, which includes the bifid duct pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change may be threats to the bifid duct pyrg. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the bifid duct pyrg due to the permitting of groundwater rights by the NSE that exceed perennial yield. Permitted groundwater rights in the Spring Valley hydrographic area currently exceed the average annual recharge (see details under Factor A). Based on this and the discussion of regulatory mechanisms relating to the permitting of groundwater rights and use in the “Summary of Common Threats,” we have determined there is substantial information in the petition and our files to indicate that listing the bifid duct

pyrg may be warranted due to the inadequacy of existing regulatory mechanisms relating to the permitting of groundwater rights and use.

Snake Valley Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of bifid duct pyrg may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development, and due to inadequacy of existing regulatory mechanisms (Factor D) relating to the permitting of groundwater rights and use.

Steptoe Valley Hydrographic Area Species

Pyrgulopsis landyei (Landyes pyrg) occurs at one rheocrene spring (flowing directly out of the ground, typically under pressure) north-northwest of Steptoe Ranch, White Pine County, Nevada (Hershler 1998, p. 70).

Pyrgulopsis neritella (neritiform Steptoe Ranch pyrg) occurs at two rheocrene springs located on private land north of Steptoe Ranch, White Pine County, Nevada (Hershler 1998, p. 70).

Pyrgulopsis orbiculata (sub-globose Steptoe Ranch pyrg) is restricted to two springs in White Pine County, Nevada (Hershler 1998, p. 68).

Pyrgulopsis planulata (flat-topped Steptoe pyrg) occurs on private land at one spring northwest of Clark Spring, White Pine County, Nevada (Hershler 1998, p. 66).

Pyrgulopsis serrata (northern Steptoe pyrg) occurs at Twin Springs and springs south of Currie in Steptoe Valley, Elko County, Nevada, and at Indian Ranch Spring and Indian Creek in Steptoe Valley, White Pine County (Hershler 1998, p. 71). The species also occurs at 10 springs in northern Steptoe Valley (Sada 2006, p. i).

Pyrgulopsis sulcata (southern Steptoe pyrg) occurs at two spring complexes in White Pine County, Nevada (Hershler 1998, p. 67).

Factor A: The petition asserts that these six Steptoe Valley springsnail species are threatened by groundwater development, spring development, water pollution, recreation, and grazing (Hershler 1998, p. 70; Sada and Vinyard 2002, p. 277). The Steptoe Valley hydrographic area (#179) has been classified as a “Designated Groundwater Basin” by the NSE in which permitted groundwater rights approach or exceed the estimated average annual recharge. The perennial yield of Steptoe Valley is 70,000 afy (86,340,000 m³/year), and approximately 97,000 afy (119,600,000 m³/year) are committed for use. When groundwater extraction exceeds aquifer recharge, it may result in surface water level decline, spring drying, and degradation or loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). Therefore, based on this and the discussion of discussing groundwater development in the “Summary of Common Threats,” we have

determined there is substantial information in the petition and our files to indicate that listing the six petitioned springsnail species of the Steptoe Valley may be warranted due to threats from groundwater development.

Within Steptoe Valley, surveys for springsnails were conducted in the early 1990s in springs near Bassett Lake (Sada 2006, p. i). These surveys found all six petitioned Steptoe Valley springsnail species. Due to potential groundwater pumping by the previously proposed White Pine Energy Project (application is no longer active), Sada (2006, p. i) surveyed 44 springs in Steptoe Valley in 2005 that were located within the zone of potential impact by the energy project. It was noted that all of the springs surveyed were moderately to highly disturbed due to spring diversion and livestock trampling (2006, p. 4). Ten of the 44 springs were occupied by northern Steptoe pyrgs, which were scarce at 3 sites, common at 6 sites, and abundant at 1 site (Sada 2006, p. 5 and Table 6). The surveys conducted in the 1990s did not include any of the 44 springs surveyed by Sada in 2005, where 10 previously unrecorded populations of the northern Steptoe pyrg were found. Although Sada (2006, pp. i-27) states that the springs surveyed in 2005 were degraded and had variable levels of occupation by the northern Steptoe pyrg, it is not clear whether these activities have resulted in the loss of or decline in springsnail populations in the Steptoe Valley. Based on the preceding discussion, we have determined that there is not substantial information in the petition and our files indicating that spring development and grazing may be threats to the six petitioned springsnail species of the Steptoe Valley. However, we will further consider this and any

additional information on these activities received during our status review for this species.

The petition also claims that the springsnails of Steptoe Valley are threatened by the proposed White Pine Energy Station (BLM 2008, Volumes 1 through 4); however, the White Pine Energy project application is currently withdrawn, and the future of the project is uncertain; therefore, there is not substantial information indicating that this project may threaten these six Steptoe Valley springsnail species.

The petition does not present any specific information, nor is there any information in our files regarding water pollution and recreation as potential threats to the six Steptoe Valley springsnail species. Therefore, based on this and the discussion in the “Summary of Common Threats” section above, we have determined that there is not substantial information in the petition and our files indicating that water pollution, and recreation may be threats to the six Steptoe Valley springsnail species. However, we will further consider this and any additional information on these activities received during our status review for this species.

Factors B, C, and E: The petition states that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change are threats that may impact the six Steptoe Valley springsnail species. The petition does not provide any specific 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 six

Steptoe Valley springsnail species. As discussed in the “Summary of Common Threats” section above, the petition does not present any specific information, nor is there any information in our files regarding collection for scientific or educational purposes, disease or predation, invasive species, and global climate change as potential threats to the six Steptoe Valley springsnail species. Therefore, we have determined that there is not substantial information in the petition and our files indicating that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change may be threats to the six Steptoe Valley springsnail species. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the six Steptoe Valley springsnails due to the permitting of groundwater rights by the NSE that exceed perennial yield. Permitted groundwater rights in the hydrographic area currently exceed the average annual recharge (see details under Factor A). Therefore, based on this and discussion of regulatory mechanisms related to the permitting of groundwater rights and use in the “Summary of Common Threats” section above, we have determined there is substantial information in the petition and our files to indicate that listing the six Steptoe Valley springsnail species may be warranted due to the inadequacy of existing regulatory mechanisms related to the permitting of groundwater rights and use.

Steptoe Valley Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of the Landy's pyrg, neritiform Steptoe Ranch pyrg, sub-globose Steptoe Ranch pyrg, flat-topped Steptoe pyrg, northern Steptoe pyrg, and southern Steptoe pyrg may be warranted due to the present or threatened destruction, modification, or curtailment of their habitat or range (Factor A) resulting from groundwater development, and due to the inadequacy of existing regulatory mechanisms (Factor D) related to the permitting of groundwater rights and use.

Upper Muddy River Springs Hydrographic Area Species

Pyrgulopsis avernalis (Moapa pebblesnail) is documented at more than five spring locations in Moapa Valley, Clark County, Nevada (Hershler 1994, pp. 19–21; Service 1995, pp. 15–16; Hershler 1998, pp. 29–30; Sada 2008, p. 60). The documented spring locations in the Moapa Valley are found within an approximately 1.5-km (0.9-mi) radius (Hershler 1994, p. 19).

Pyrgulopsis carinifera (Moapa Valley pyrg) occurs at more than five spring locations in Moapa Valley, Clark County, Nevada (Hershler 1994, pp. 26–27; Hershler 1998, p. 31; Sada 2008, p. 60). The documented spring locations are found in an approximately 1.5-km (0.9-mi) radius.

Factor A: Potential threats to the Moapa pebblesnail and Moapa Valley pyrg identified in the petition are groundwater development, spring development, water pollution, recreation, and grazing. The Upper Muddy River Springs hydrographic area (#219) has been classified as a “Designated Groundwater Basin” by the NSE in which permitted ground water rights exceed the estimated average annual recharge. The perennial yield of the Upper Muddy River Springs is 100-36,000 afy (123,300-44,410,000 m³/year), while approximately 14,558 afy (17,960,000 m³/year) are committed for use. Since 1998, there has been a small and widespread decline in carbonate aquifer water levels in the Upper Muddy River Springs area because of groundwater pumping (Mayer and Congdon 2007, p. 13). When groundwater extraction exceeds aquifer recharge, it may result in surface water level decline, spring drying, and degradation or loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). Regarding spring development, Sada (2008, p. 69) reported that reduced habitat quality and heterogeneity caused by diversions, channelization, and siltation resulted in reductions of springsnails (including the Moapa pebblesnail and Moapa Valley pyrg) such that they were scarce or absent at 85 percent of the springbrooks where they historically occurred at Warm Springs.

The Service and other partnering agencies have completed, and continue to implement extensive efforts to restore the spring systems in the Upper Muddy River Springs area and to reduce or eliminate past spring diversion impacts to aquatic species including springsnails; however, not all of the impacts of spring diversion have been removed or reduced. Therefore, based on the preceding discussion, we have determined there is substantial information in the petition and our files to indicate that listing the

Moapa pebblesnail and Moapa Valley pyrg may be warranted due to threats from groundwater development and spring development.

The petition states that water pollution, recreation, and grazing are potential threats to the Moapa pebblesnail and Moapa Valley pyrg. As discussed in the “Summary of Common Threats” section, above the petition does not present any specific information, nor is there any information in our files regarding water pollution, recreation, and grazing as potential threats to the Moapa pebblesnail and Moapa Valley pyrg. Therefore, we have determined there is not substantial information in the petition and our files indicating that water pollution, recreation, and grazing may be threats to the Moapa pebblesnail and Moapa Valley pyrg.

Factors B and C: The petition asserts collection for scientific or educational purposes and disease or predation as potential threats to the Moapa pebblesnail and Moapa Valley pyrg. The petition did not present any specific information, nor is there any information in our files regarding collection for scientific or educational purposes, and disease or predation as potential threats to the Moapa pebblesnail and Moapa Valley pyrg. Therefore, we have determined that there is not substantial information in the petition and our files indicating that collection for scientific or educational purposes and disease or predation may be threats to the Moapa pebblesnail and Moapa Valley pyrg. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat to the Moapa pebblesnail and Moapa Valley pyrg due to the permitting of groundwater rights by the NSE that exceed perennial yield. Permitted groundwater rights in the hydrographic area currently approach the average annual recharge (see details under Factor A). Based on this and the discussion of regulatory mechanisms related to the permitting of groundwater rights and use in the “Summary of Common Threats,” we have determined there is substantial information in the petition and our files to indicate that listing the Moapa pebblesnail and Moapa Valley pyrg may be warranted due to the inadequacy of existing regulatory mechanisms related to the permitting of groundwater rights and use.

Factor E: The petition asserts that invasive species, inherent vulnerability of isolated populations, and global climate change are potential threats to the Moapa pebblesnail and Moapa Valley pyrg. Specifically regarding invasive species, a study in the thermal, Upper Muddy River spring system of competition from the invasive red-rimmed melania suggests that this may not be a threat because there is only a minor niche overlap between nonnative snails and the native Moapa pebblesnail and Moapa Valley pyrg (Sada 2008, p. 69). The petition does not provide any specific information regarding other invasive species in the springs occupied by the Moapa pebblesnail and Moapa Valley pyrg. The petition does not provide any specific 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 Moapa pebblesnail and Moapa Valley pyrg. The petition does not provide any specific information, nor is there

any information in our files regarding global climate change as a potential threat to the Moapa pebblesnail and Moapa Valley pyrg. Therefore, based on the preceding discussion, we have determined that there is not substantial information in the petition and our files indicating that invasive species, inherent vulnerability of isolated springsnail populations, and global climate change may be threats to the Moapa pebblesnail and Moapa Valley pyrg. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Upper Muddy River Springs Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of the Moapa pebblesnail and Moapa Valley pyrg may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development and spring development, and due to the inadequacy of existing regulatory mechanisms (Factor D) permitting groundwater rights and use.

Upper Muddy River Springs, White River Valley, and Pahrnagat Valley Hydrographic Areas Species

Tryonia clathrata (grated tryonia) is found in approximately 12 spring systems in Clark, Lincoln, and Nye Counties, Nevada (Hershler, 1999, pp. 331–332).

Factor A: The petition proposes that groundwater development, spring development, water pollution, recreation, and grazing are threats to the grated tryonia. The grated tryonia occurs in springs in the Upper Muddy River Springs hydrographic area (#219), which has been classified as a “Designated Groundwater Basin” by the NSE where permitted groundwater rights exceed the estimated average annual recharge. The perennial yield of the Upper Muddy River Springs area is 100-36,000 afy (123,300-44,410,000 m³/year), while approximately 14,558 afy (17,960,000 m³/year) are committed for use. Since 1998, there has been a small and widespread decline in carbonate aquifer water levels in the Upper Muddy River Springs area because of groundwater pumping (Mayer and Congdon 2007, p. 13). When groundwater extraction exceeds aquifer recharge, it may result in surface water level decline, spring drying, and degradation or loss of aquatic habitat (Zektser *et al.* 2005, pp. 396-397). Based on the preceding discussion, we have determined there is substantial information in the petition and our files to indicate that listing the grated tryonia may be warranted due to threats from groundwater development.

Regarding spring development, Sada (2008, p. 69) reported that reduced habitat quality and habitat heterogeneity caused by diversions, channelization, and siltation resulted in reductions of springsnails (including the grated tryonia) such that they were scarce or absent at 85 percent of the springbrooks where they historically occurred at Warm Springs. The Service and other partnering agencies have completed and continue to implement extensive efforts to restore the spring systems in the Upper Muddy River Springs Area and reduce or eliminate past spring diversion impacts to aquatic species

including springsnails; however, not all of the impacts of spring diversion have been removed or reduced. Golden *et al.* (2007, p. 200) observed that Crystal Springs, where grated tryonia are also found, was highly disturbed by diversion. Golden *et al.* (2007, p. 197) did not document grated tryonia at Crystal Springs during their surveys. Therefore, based on the preceding discussion, we have determined there is substantial information in the petition and our files to indicate that listing the grated tryonia may be warranted due to threats from spring development.

The petition asserts that water pollution, recreation, and grazing are threats to the grated tryonia. As discussed in the “Summary of Common Threats” section above, the petition does not present any specific information, nor is there any information in our files regarding water pollution, recreation, and grazing as potential threats to the grated tryonia. Therefore, we have determined there is not substantial information in the petition and our files indicating that water pollution, recreation, and grazing may be threats to the grated tryonia. However, we will further consider this and any additional information on these activities received during our status review for this species.

Factors B, C, and E: The petition proposes that collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change are threats to the grated tryonia. Specifically regarding invasives, a study in the thermal, Upper Muddy River spring system of competition from the invasive red-rimmed melania suggests that this may not be a threat because there is only a minor niche overlap between nonnative snails

and the native grated tryonia (Sada 2008, p. 69). The petition does not provide any specific information regarding other invasive species in the springs occupied by the grated tryonia. The petition does not provide any specific 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 grated tryonia. As discussed in the “Summary of Common Threats” section above, the petition does not provide any specific information, nor is there any information in our files regarding collection for scientific or educational purposes, disease or predation, and global climate change as potential threats to any of the petitioned springsnails, which includes the grated tryonia. Therefore, we have determined that there is not substantial information in the petition and our files indicating collection for scientific or educational purposes, disease or predation, invasive species, inherent vulnerability of isolated springsnail populations, and global climate change may be threats to the grated tryonia. However, we will further consider this and any additional information on these activities and other potential threats received during our status review for this species.

Factor D: The petition states that inadequate regulatory mechanisms are a threat due to the permitting of groundwater rights by the NSE that exceed perennial yield. Permitted groundwater rights in the Upper Muddy River Springs hydrographic area currently approach the average annual recharge (see details under Factor A). Based on this and additional rationale discussing regulatory mechanisms in the “Summary of Common Threats,” we have determined there is substantial information in the petition and our files to indicate that listing the grated tryonia may be warranted due to the

inadequacy of existing regulatory mechanisms related to the permitting of groundwater rights and use .

Grated Tryonia Summary: Based on our evaluation of the information provided in the petition and available in our files, we have determined that the petition presents substantial information to indicate that listing of the grated tryonia may be warranted due to the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A) resulting from groundwater development and spring development, and due to the inadequacy of existing regulatory mechanisms (Factor D) related to the permitting of groundwater rights and use.

Finding

We reviewed and evaluated 39 of the 42 petitioned springsnail species, based on the information in the petition and the literature cited in the petition. We have evaluated the information to determine whether the sources cited support the claims made in the petition relating to the five listing factors. We also reviewed reliable information readily available in our files.

On the basis of our evaluation of the petition under section 4(b)(3)(A) of the Act, we find that the petition does not present substantial scientific or commercial information that listing may be warranted for 7 species: *Pyrgulopsis gracilis* (Emigrant pyrg), *Pyrgulopsis montana* (Camp Valley pyrg), *Pyrgulopsis aloba* (Duckwater pyrg), *Pyrgulopsis anatine* (southern Duckwater pyrg), *Pyrgulopsis lockensis* (Lockes pyrg),

Pyrgulopsis papillata (Big Warm Spring pyrg), *Pyrgulopsis villacampae* (Duckwater Warm Spring pyrg).

We find that the petition presents substantial scientific or commercial information that listing the remaining 32 of the 39 species that we evaluated as threatened or endangered under the Act may be warranted. Because we have found that the petition presents substantial information that listing these 32 species may be warranted, we are initiating status reviews (12-month findings) to determine whether listing any of these 32 species under the Act is warranted.

We previously determined that emergency listing of any of the 39 species is not warranted. However, if at any time we determine that emergency listing of any of the 39 petitioned species is warranted, we will initiate an emergency listing.

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 the subsequent proposed rule.

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. A 90-day finding does not constitute a status review under the Act. In 12-month findings, we will determine whether a petitioned action is warranted after we have completed thorough status reviews of the species, which is conducted following a substantial 90-day finding. Because the Act’s standards

for 90-day and 12-month findings are different, as described above, a substantial 90-day finding does not mean that the 12-month findings will result in a warranted finding.

References Cited

A complete list of references cited is available on the Internet at Docket No. FWS-R8-ES-2011-0001 at <http://www.regulations.gov> and upon request from the Nevada Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Author

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

Authority

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

Dated August 22, 2011

Gregory E. Siekaniec

Deputy Director, U.S. Fish and Wildlife Service

Billing Code 4310-55

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