SPECIES FACT SHEET

Common Names: Blue mountainsnail
Scientific Name: Oreohelix strigosa delicata (Pilsbry, 1934)
Phylum: Mollusca
Class: Gastropoda
Order: Stylommatophora
Family: Oreohelicidae

Conservation Status
Global Status (2003): G5T1 (last reviewed 6 August 2003)
Rounded Global Status: T1 – Critically Imperiled
National Status (US): N1 (18 Jun 2003) – Critically imperiled
State Status: S1 (Oregon), S1? (Washington) – Critically Imperiled
(NatureServe 2014, WNHP 2014)
IUCN Red List: NE – Not evaluated

Technical Description
Oreohelix is a genus within the terrestrial pulmonate snail family, Oreohelicidae. The genus is distinguished from other closely related taxa in the Pacific Northwest as follows (Burke 2013): “solid and calcareous shells, heliciform with very low to moderately well elevated spire. Shells usually light brown or white with two darker bands (sometimes lacking or with narrower, supernumerary bands) and sometimes with flammules or other mottling. Some species with ribs and/or peripheral carinae.”

Numerous “forms”, “variants”, or “subspecies” of O. strigosa have been recognized, however little molecular work has been done on the group as a whole to establish taxonomic relationships at the DNA level (Duncan 2008). The form O. strigosa delicata is described as lacking strong color bands (Frest and Johannes 1995), or having the peripheral color bands weak or distinct but narrow (Burke 2013). It is relatively thin-shelled (Frest and Johannes 1995). The finely striate shell has a much stronger spiral striation than in typical strigosa, and the striation produces a more distinct surface granulation texture than other variants of this species (Frest and Johannes 1995), leaving the shell sculpture appearing granular (Burke 2013). Pilsbry (1939) describes the subspecies as a weakly characterized local race in which the spiral striation is often strongly developed above and beneath, producing a much more distinct granulation than in typical strigosa. The dark bands are often weak or wanting, the shell is rather thin and variable in degree of depression (Pilsbry 1939).
The specimens from 4 miles up the South Fork Walla Walla River Canyon measure 15 to 20 mm in diameter with 5.5 whorls, while those from 2 to 3 miles up the North Fork are smaller, measuring 12 to 15 mm diameter with 5 whorls (Pilsbry 1939). Recently collected specimens from the South Fork on Vale BLM District land are small for the species, measuring 10.1 to 14.4 mm diameter with 4⅔ to 5½ whorls (Jepsen et al 2012). See Pilsbry (1933) for the original description and illustrations, and Pilsbry (1939) for illustrations comparing this subspecies with other O. strigosa subspecies. Other strigosa subspecies from eastern Washington east of Walla Walla are thicker-shelled, 18 to 20 mm in diameter, and 12 mm in height with a wide umbilicus (3.5 mm) and two strong, dark brown bands on the spire (Duncan 2008).

**Life History**

The life history of this subspecies is mostly unknown. The parent species is semelparous, with separate sexes. Oreohelix species live several years, possibly up to five or more; the active period of the year being limited to the warmer, moist months, generally April-May and September-October (Duncan 2008). It is important to note that surveyors searched for O. strigosa delicata in both the fall of 2010 and the spring of 2012 near the type locality on the South Fork Walla Walla River, yet the species was encountered only in the spring at the same site (Jepsen et al 2010, 2012). Individuals typically mature and breed the second spring. Reproduction in the Oreohelix is viviparous (more probably ovoviviparous), in which the eggs hatch before leaving the uterus of the parent (Pilsbry 1939; Bequaert and Miller 1973). This is apparently an adaptation to arid climates where small, thin shelled eggs may not survive to hatch (Duncan 2008).

Pilsbry (1939:415) notes that “the opaque whitish and earthy texture of Oreohelix shells of the semiarid states is a protective adaptation for retaining body moisture and reflecting solar radiation in the strong light of a high country with little shade. In addition, Oreohelix species also form an epiphram (a layer of fibrous material secreted by the mantle) over the aperture to seal it against water loss; this epiphram is often enhanced by sealing the aperture against the surface of a rock in a cool protected location” (Duncan and Burke 2005).

This genus browses plant and rock surfaces for detritus, microscopic fungi, plants and animals. These snails may be found under the litter, where they apparently find food within the duff layer, and may occasionally feed on live plant tissues. Surface activity may be stimulated by very slight moisture input, such as early morning frost or light dew, and then animals retreat underground as the sun rises and humidity drops (Duncan 2008).
Small colonies of *Oreohelix* are typically widely separated, with populations often having slightly different appearances in adjacent valleys. This separation of habitat patches and populations is one factor that has led to the very plastic morphology and sub-speciation noted in this genus (Duncan 2008).

**Range, Distribution, and Abundance**

**Range and distribution:** All known sites of *O. strigosa delicata* are located in the Walla Walla River Canyon in northeast Oregon. The historical site for *O. s. delicata* is described as the “Walla Walla River canyon above Milton, from the forks to four miles up the south fork... [and] from 2-3 miles up the north fork, on lava slides mainly facing south” (Pilsbry 1933, 1939). Current distribution of this subspecies is not well known; however, recent (2012) spring surveys by the Xerces Society uncovered several individuals near the type locality along the South Fork Walla Walla River, but not in other areas surveyed (North and South Forks of the Umatilla River, North Fork John Day River, Wenaha River, Joseph Creek, and Lime Hill). It is likely this subspecies is restricted to the Blue Mountains.

It should be noted that a report by Frest and Johannes (1995) indicates that “other specimens from indefinite localities in [the Blue Mountain] range in both OR and WA are found in museum collections," yet the author was unable to find any specimens labeled from WA in any museum collections consulted, including California Academy of Science (CAS-IIZ), Academy of Natural Sciences Philadelphia (ANSP), Smithsonian National Museum of Natural History (NMNH), Harvard University Museum of Comparative Zoology (MCZ), University of Michigan Museum of Zoology (UMMZ), Santa Barbara Museum of Natural History (SBMNH), Illinois Natural History Survey (INHS), and Carnegie Museum of Natural History (CMNH).

**BLM/Forest Service land:** This subspecies is Documented on the Vale-OR BLM District and suspected on the Umatilla and Wallowa-Whitman National Forests in Oregon. It is not currently known from any sites in Washington, although it is suspected on the Vale-WA and Spokane BLM Districts and the Umatilla National Forest in Washington.

**Abundance:** Abundance estimates at known population sites have not been conducted. Recorded collections range from 3 to over 50 specimens.

**Habitat Associations**

The parent species *Oreohelix strigosa* generally occurs in open forested areas and sometimes in riparian areas where it may be found in forest floor litter, under shrubs, or in rock talus (Burke 2013). The type locality
for the *delicata* subspecies is in “moderately steep basalt creek canyon in fairly open ponderosa pine and Douglas-fir forest with some deciduous understory and common grasses” (Niwa et al 2001:32). Specimens collected along the South Fork Walla Walla River in 2012 were found on rock outcrops and in talus with small seeps (Jepsen et al 2012). Vegetation included blackberry, horsetail, maple, and Pacific ninebark. In general, *Oreohelix* species “live near the surface, with a single stone, a bit of bark or a few leaves for cover” (Pilsbr 1939:415). Aestivation refugia sites are assumed to be located under more stable rock schist and woody debris (Duncan 2008). This species is likely mesophilic or weakly xerophilic (Frest and Johannes 1995).

**Threats**

Frest and Johannes (1995) cite grazing, logging, and road construction as key threats to the area around the type locality, and Niwa et al (2001) add that much of the Blue Mountains have been affected by logging, insect infestations, and fires, all of which threaten this subspecies throughout its range. This species occurs in areas that burned naturally at relatively short intervals. Prior to fire suppression, these forests were under a low intensity fire regime, burning often enough to keep fuel accumulations low so fires were generally not severe, but fire protection over most of the past century has allowed fuels to accumulate so that wildfires in the area may be large, intense, and devastating to sedentary organisms. Wildfire may be the biggest large-scale threat to *O. strigosa* throughout its range (Duncan 2008). Disturbance of rock talus accumulations during road construction and forestry activities may cause loss of microhabitat quality affecting the species’ ability to survive fire events and climate variations when aestivating.

**Conservation Considerations**

Inventory: Populations of this rare species appear to be restricted to the Blue Mountains. Additional surveys further upstream from prior survey areas on both the North Fork and the South Fork of the Walla Walla River would be useful for determining the extent of this species in these canyons. In addition, Frest and Johannes (1995) recommend looking for it in more intact portions of the Blue Mountains, *e.g.* undisturbed areas in the Umatilla and possibly Wallowa-Whitman National Forests. However, Xerces staff conducted surveys along several rivers in the Umatilla National Forest in fall 2010 and spring of 2012 but did not find this subspecies. Very little potentially suitable habitat for this species has been surveyed on the Umatilla National Forest along the Wenaha or Grande Ronde Rivers on the eastern side of the Blue mountains, and the species may be encountered there.

Research: Population size, trends, and abundance are all unknown for this subspecies. In addition, habitat requirements and food preferences
are poorly known. Historically, most distinctions in *O. strigosa* subspecies have been based on differences in shell morphology, while the details of the internal reproductive anatomy of all forms agreed with typical *O. strigosa* (Duncan 2008). Little molecular work has been done on the group as a whole to establish taxonomic relationships at the DNA level, but preliminary genetic work conducted on a number of *Oreohelix* specimens from the Entiat, Chelan, and Wenatchee River watersheds suggests that morphological characters are not necessarily diagnostic for the various subspecies examined (Morales et al, unpublished research). This genus would benefit from genetic work.

Management: Nothing is currently known of the aestivation or hibernation habits of these snails, nor of the habitat used during those periods. Until more is learned about these subjects, consider protecting occupied habitat areas for these snails against burning and other activities that disturb the litter, duff, or shading of the habitat. However, to protect these habitat areas from intense burns, the adjacent areas should be managed to reduce the likelihood of stand replacing wildfires. Management and/or avoidance of rock talus accumulations during road construction and forestry activities may help protect important refugia sites used by these species.

**Version 2**
Prepared by Candace Fallon and Sarah Foltz Jordan (Xerces Society), February 2015
Edited by Sarina Jepsen (Xerces Society), February 2015

**Version 1**
Prepared by Nancy Duncan, April 2008
Edited by Rob Huff, May 2008

**ATTACHMENTS:**
(1) References
(2) List of pertinent or knowledgeable contacts
(3) Maps of known records in Oregon
(4) Photographs of this species
(5) Gastropoda Survey Protocol, including specifics for this subspecies
Attachment 1: References


**Attachment 2: List of pertinent, knowledgeable contacts**

Taxonomic experts experienced with collecting and identifying this subspecies:

- Tom Burke
- Ed Johannes, Deixis Consultants
Attachment 3: Maps of known O. s. delicata distribution

Known records and suspected distribution of *Oreohelix strigosa delicata* in Oregon and Washington, relative to Forest Service and BLM land.

Note: The suspected distribution polygon was drawn by Foltz (2009) with the assistance of regional gastropod expert, Ed Johannes. This polygon encompasses the current suspected distribution of this subspecies based on known records, expert opinion, and extent of previous survey effort, in addition to vague historic records in the Blue Mountains of Oregon and Washington (Frest and Johannes 1995). This subspecies is known from relatively few sites within its range and is only expected to occur at appropriate habitat within the polygon shown.
Known records of *Oreohelix strigosa delicata* in Oregon, relative to BLM land.
Attachment 4: Photographs of this subspecies

*Oreohelix strigosa delicata* (width 10.1 mm.). Photographs by Tom Burke (used with permission).

Attachment 5: Gastropoda Survey Protocol

Survey Protocol (adapted from Foltz 2009)

**Taxonomic Group:**
Gastropoda

**Species:**
*Oreohelix strigosa delicata*

Please refer to the following documents for detailed mollusk survey methodology:

1. General collection and monitoring methods for both aquatic and terrestrial mollusks (pages 64-71):


2. Pre-disturbance surveys for terrestrial mollusk species, the objective of which is to establish whether a specific mollusk is present in proposed project areas with a reasonable level of confidence, and to document known sites discovered during surveys:

Oreohelices are generally more easily found during wet seasons or after several days of rain; in dry periods they appear to be in aestivation and are much more difficult to find (Jepsen et al 2012).

**Species-specific survey details, including:**
1. Historic and current distribution
2. Federal Units where species is suspected or documented
3. Areas where surveys are recommended
4. Habitat where surveys should take place
5. Commonly associated mollusk species
6. General survey method and instructions (e.g. time of year)

**Oreohelix strigosa delicata** (Blue Mountainsnail)

The *Oreohelix* genus occurs from the eastern Cascades, eastward and south through the Rocky Mountain states (Burke 2013). Scattered colonies of *O. strigosa* are distributed through the Columbia River and Snake River basins of Oregon and Washington, the Umatilla and John Day River basins of Oregon, and into Idaho and western Montana. It has a markedly discontinuous range in Washington, being restricted mostly to the dry side of mountains (Pilsbry 1939) with the westernmost limits of its range lying well into the Wenatchee National Forest (Branson and Branson 1984). The *O. strigosa delicata* subspecies ranges from southeastern Washington to northeastern Oregon (Burke 2013), but has only been noted with any degree of precision from the type locality (Frest and Johannes 1995) and surveys conducted in the vicinity of the type locality 2012 (Jepsen et al 2012). Frest and Johannes (1995) report museum specimens of *O. s. delicata* from indefinite localities in the Blue Mountain range of both Oregon and Washington, suggesting that this subspecies may have been historically rather widespread in the Blue Mountains, although Xerces staff have been unable to find any Washington *O. s. delicata* specimens in the following collections that were reviewed: California Academy of Science (CAS-I), Academy of Natural Sciences Philadelphia (ANSP), Smithsonian National Museum of Natural History (NMNH), Harvard University Museum of Comparative Zoology (MCZ), University of Michigan Museum of Zoology (UMMZ), Santa Barbara Museum of Natural History (SBMNH), Illinois Natural History Survey (INHS), and Carnegie Museum of Natural History (CMNH).

The current distribution of this subspecies is uncertain. Frest and Johannes (1995) recommend looking for it in more intact portions of the Blue Mountains, such as undisturbed areas in Umatilla and possibly
Wallowa-Whitman National Forests. Spring surveys by the Xerces Society have encountered this subspecies near its type locality in the South Fork Walla Walla River Canyon, but not at suitable habitat along the North or South Fork Umatilla Rivers, the North Fork John Day River, the Wenaha River, Joseph Creek, or Lime Hill (Jepsen et al 2012). Surveyors in this area should be aware that Pilsbry (1939, p. 425) alludes to another (undescribed) subspecies of *Oreohelix strigosa* in the Blue Mountains which Frest and Johannes (1995) were unable to resolve. In Oregon, this subspecies is documented on Vale District BLM land and suspected in Wallowa-Whitman and Umatilla National Forests; in Washington, it is suspected in Umatilla National Forest and Vale and Spokane District BLM land (Jepsen et al 2012; Johannes 2009, *pers. comm.*).

Surveys by the Xerces Society in the fall of 2010 and spring of 2012 (see Jepsen et al 2012) covered much of the potential habitat for this subspecies on the west side of the Blue Mountains. However, very little potentially suitable habitat for this subspecies has been surveyed on the Umatilla National Forest along the Wenaha or Grande Ronde Rivers on the eastern side of the Blue mountains, and the subspecies may be encountered there. Future surveys could target this region.

The *Oreohelix strigosa* species generally occurs in open forested areas and sometimes in riparian areas where it may be found in forest floor litter, under shrubs, or in rock talus (Burke 2013). The type locality for the *delicata* subspecies is in a moderately steep basalt creek canyon with short basalt cliffs and small-scale talus piles in some areas (Frest and Johannes 1995). The locality is further characterized as a fairly open ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*) forest, with deciduous understory vegetation and grasses. It is suggested that this is a mesophilic or weakly xerophilic species (Frest and Johannes 1995).

*Oreohelix* species live several years, possibly up to five or more (Duncan 2008). Members of this genus should be surveyed for during their active period which is limited to the warmer, moist months, generally April to May and September to October (Duncan 2008). Living individuals of this genus are most easily found during or shortly after rains, or in aestivation among talus (Duncan *et al.* 2003). Refugia sites for aestivation are assumed to be located under more stable rock schist and woody debris (Duncan 2008). As a general rule, *Oreohelix* species live near the surface, with a single stone, a bit of bark, or a few leaves for cover. This genus browses plant and rock surfaces for detritus, microscopic fungi, plants and animals, and the snails may be found under the litter where they apparently find food within the duff layer and may occasionally feed on live plant tissues (Duncan 2008). Surface
activity may be stimulated by very slight moisture input, such as early morning frost or light dew. As the sun rises and humidity drops, the animals retreat underground (Duncan 2008).

References Cited (survey protocol only)


Johannes, Ed. 2009. Personal communication with Sarah Foltz Jordan, the Xerces Society for Invertebrate Conservation.