

Conservation Assessment and Strategy

Wet Canyon talussnail *Sonorella macrophallus*  
(Gastropoda: Pulmonata: Helminthoglyptidae)

Pinaleno Mountains, Graham County, Arizona

USDA Forest Service  
Coronado National Forest  
Safford Ranger District

Final: December 15, 1999

## EXECUTIVE SUMMARY

The Wet Canyon talussnail (*Sonorella macrophallus*) is a pulmonate land snail inhabiting Wet Canyon in the Pinaleno Mountains, Graham County, Arizona. It apparently is restricted to limestone talus slopes in a one-mile reach of Wet Canyon between 6,050 and 6,900 feet in elevation. A 1989 status survey on land snails endemic to the Pinaleno Mountains stated that "the population of *S. macrophallus* appears to be stable", and that "shells were found up to a mile above the type locality in slides along Wet Canyon" (Hoffman, 1990). The observation on stability, however, may be misleading as no data are available on population size, reproduction and recruitment, or other demographic variables.

Land ownership is entirely held by the United States Government under administration of the National Forest System, Coronado National Forest. The land is managed as a multiple-use forest and is primarily used for recreation and watershed protection. Potential human-caused threats to the species and its habitat include increased development and recreational use near and in Wet Canyon, and wildfire.

Wet Canyon talussnail is a highly localized relict of the Pleistocene era. Factors that may have contributed to its restriction include a general drying trend since the Pleistocene, which has led to desert expansion and a contraction of southwestern forest communities. Whether the distribution of Wet Canyon talussnail has changed in response to climatic variations cannot be

stated with certainty, but there is evidence that suspected limiting environmental factors of high temperature and low moisture were more relaxed during pluvial periods.

The Wet Canyon talussnail was placed on the Federal Notice of Review as a Candidate species because of its extremely limited range and amount of development in its habitat. The Service requested further information to help in determining threats to the species, and the USDA Forest Service (USFS) responded by providing information about past and present land uses in the area. The USFS noted the species was an endemic with a limited range whose population was considered stable, and thus did not need listing at this time. USFS did agree, however, that development and implementation of a management plan or conservation agreement for the species could provide sufficient protection to the species and its habitat without listing under the Endangered Species Act.

This Conservation Assessment and Strategy will lead to a Conservation Agreement between the cooperating management agencies. It has been initiated to effectively remove all human-caused threats to the Wet Canyon talussnail, to maintain stability of the population, and to protect the watershed containing the habitat. This document's primary purpose is to conserve the Wet Canyon talussnail through interim conservation measures under the Endangered Species Act of 1973, as amended. Protection of the Wet Canyon talussnail through a Conservation Agreement is particularly relevant because of the following factors:

- F The habitat is entirely under the control of the USFS, which is signatory to this agreement.
  
- F There is rudimentary understanding of the relationship between proper habitat management and maintenance of the species, and of the specific management actions that will be needed for its conservation.
  
- F Habitat of the talussnail appears intact and in sufficiently good condition to continue to support the species.
  
- F Other than re-routing a 30-foot length in Wet Canyon, conservation actions mainly involve refraining from some activity that would lessen the value of habitat for the talussnail, rather than undertaking corrective or restorative action.
  
- F Cooperators in this agreement commit to seek funding sources to implement all aspects of this Conservation Agreement.

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## I. SPECIES INVOLVED

Common Name: Wet Canyon talussnail

Scientific name: *Sonorella macrophallus* Fairbanks and Reeder

(Gastropoda: Pulmonata: Helminthoglyptidae)

## II. INVOLVED PARTIES

A. USDA Forest Service

Coronado National Forest

Safford Ranger District

B. U. S. Fish and Wildlife Service

Arizona Ecological Services Field Office

C. Arizona Game and Fish Department

Nongame and Endangered Wildlife Program

### III. STATUS AND DISTRIBUTION

*Status*—The Wet Canyon talussnail is a highly localized endemic whose total range is apparently restricted to talus slopes in a one-mile reach of Wet Canyon in the Pinaleno Mountains Graham County, Arizona (Figures 1 and 2). It was described from specimens found during several collecting trips to the area between 1965 and 1978 (Fairbanks and Reeder, 1980). This species appears to require a somewhat wetter and possibly a lower elevation habitat than other talussnails in this mountain range. Fluctuations in its population appear dependent on local moisture conditions. Hoffman (1990) noted that the population appeared stable, and was probably in no danger unless local conditions changed considerably. The strength of these assertions may be misleading given the minimal information on past and present status of the talussnail. If for no other reason, natural wasting of slope soils and infilling of talus in the limited talussnail habitat may portend an uncertain future for this highly localized species.

The ESA requires the U.S. Fish and Wildlife Service to identify species of wildlife and plants that may be endangered or threatened, based on the best available scientific and commercial information. As part of this responsibility, the Service maintains a list of species that are considered Candidates for listing. The Service placed the Wet Canyon talussnail on the Federal Notice of Review as a Category 1<sup>1</sup> species because of its extremely limited range, the

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<sup>1</sup>Category 1 comprised taxa for which the FWS has sufficient information on vulnerability and threats to support a proposal to list them as threatened or endangered. Category 2 taxa were those that listing as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat are not currently available to support proposed rules. Category 3 included taxa that once were considered for listing as threatened or endangered but are no longer under such consideration. On February 28, 1996, the Service issued the Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates for Listing as Endangered or Threatened

amount of recreational development within that range, and the uncertainty of our knowledge regarding the status and population trend of the species and its habitat (Metz, 1990; FWS, 1991; S. E. Stefferud, FWS, pers. comm.). The Service requested further information to help in determining threats to the species (Spiller, 1992), and the USDA Forest Service (USFS) responded providing information about past and present land uses in the area. The USFS noted the species was an endemic with a limited range whose population was considered stable, and thus did not need listing at this time. Development of a management plan or conservation strategy<sup>2</sup> for the species was suggested to avoid the increase in administrative burdens associated with listed species was suggested (Carpenter, 1993).

On February 28, 1996, the Service issued the Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates for Listing as Endangered or Threatened Species, in which it was proposed to discontinue the practice of maintaining a list of species regarded as Category 1 or Category 2 Candidates (Service, 1996). When the rule was

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Species, in which it proposed to discontinue the practice of maintaining a list of species regarded as Category 1 and 2 Candidates. Species that were a Category 1 became the only candidates. This classification meant that the Service had on file sufficient information on biological vulnerability and threats to support issuance of a proposed rule to list as threatened or endangered (Service 1996).

<sup>2</sup>In 1994, the FWS, USFS, Bureau of Land Management, National Park Service, and National Marine Fisheries Service signed a Memorandum of Understanding (MOU). The purpose of the MOU is to "... establish a general framework for cooperation and participation in the conservation of species that are tending toward federal listing as threatened or endangered under the Endangered Species Act." The MOU provided that the cooperators would work together and participate in the conservation of selected plant and animal species and their habitats to reduce, mitigate, and possibly eliminate the need for their listing under the Endangered Species Act by developing habitat conservation assessments leading to conservation agreements (Anonymous, 1994).

The five-member federal agency MOU was later amended to include the International Association of Fish and Wildlife Agencies as a co-signor, thus bringing representation from state wildlife agencies into the development and implementation of conservation agreements. Arizona Game and Fish Department also has independently signed MOU's with the USFS and the FWS to cooperate in activities pursuant to recovery of federally-listed species and the removal of threats from species considered for listing.

finalized on December 5, 1996, any species that had been a Category 1 Candidate simply became a Candidate. Since then the Wet Canyon talussnail has maintained status as a Candidate for listing, and has been included in the most recent review of plant and animal taxa (Service 1999). Sufficient biological information is currently on file to support a proposed rule for listing.

**Description**—The Wet Canyon talussnail is a land snail with a globose shell with about 4.5 whorls (Figure 3). The shell has a tan to olive tint and a chestnut-brown shoulder band that has indistinctly pallid borders. It is approximately 0.7 inches in diameter. Wet Canyon talussnail has a shell that is essentially identical to that of Pinaleno talussnail *S. grahamensis*, and which cannot be reliably distinguished from shells of other species of *Sonorella* in the Pinaleno Mountains. Positive identification of the species depends on examination of soft body parts, in particular the reproductive organs (Fairbanks and Reeder, 1980). Members of the genus *Sonorella* may even be confused with closely related genera including *Eremarionta*, *Mohavelix*, or *Helminthoglypta* (Bequaert and Miller 1973).

**Distribution**--Present knowledge indicates that Wet Canyon talussnail occurs only in Wet Canyon on the northeast slope of the Pinaleno Mountains, Graham County, Arizona. Legal location is Township 09 South, Range 25 East, Sections 17 and 18, Gila and Salt River Meridian, Arizona. The known extent of the talussnail's range within Wet Canyon is from the crossing of Highway 366 to about one mile further upstream. It lives in talus slopes along the canyon bottom adjacent to the perennially flowing portion of stream between 6,050 and 6,900 feet in elevation. A status survey on land snails endemic to the Pinaleno Mountains stated that "the population of

*S. macrophallus* appears to be stable", and that "shells were found up to a mile above the type locality in slides along Wet Canyon" (Hoffman, 1990).

Access to Wet Canyon is from Safford, Arizona. From the junction of U. S. Highway 70 travel south on U. S. Highway 191 to the junction with Arizona Highway 366 (also known as the Swift Trail). Proceed on Highway 366 to Wet Canyon Picnic Area, which is signed.

Wet Canyon talussnail is a highly localized relict of the Pleistocene era. Whether the distribution of Wet Canyon talussnail has changed in response to climatic variations cannot be stated with certainty, but there is evidence that suspected limiting environmental factors of high temperature and low moisture were more relaxed during pluvial periods. Given the climate and topographic conditions of present day arid Southwest, dispersal into new territories by *Sonorella* would be difficult (Bequaert and Miller, 1973). Factors that may have contributed to its restriction include a general drying trend since the Pleistocene, which has led to desert expansion and a contraction of southwestern forest communities (Van Devender, 1977 *in* Johnson, 1988). The extent of changes in the distribution of vegetation communities in the Sonoran Desert during the Ice Ages has been the subject of numerous scientific studies. Palynological studies in dry lakes of New Mexico (Clisby and Sears, 1956) and Arizona (Martin, 1963) indicate that forest and woodland communities grew as much as 3,300 feet lower in elevation during the last glacial period, the Wisconsin, than at present. Packrat midden studies have further identified the dynamic changes in distribution of many species of Sonoran Desert vegetation accompanying the changes in glacial and interglacial climates (Van Devender et al., 1987; Van Devender, 1990).

The interpretation of comparable distributional changes for animal species from their remains in packrat middens is more equivocal and problematic (Van Devender et al., 1991a; 1991b).

*Existing Land Uses*--The eastern slopes of the Pinaleno Mountains have a long history of human occupation and use. Wet Canyon, along with other canyons, was logged extensively during the late 1800's to early 1900's. In the upper reaches of the canyon, about a mile upstream from occupied habitat, pieces of a cast iron stove and other evidence of human habitation and development have been found. In addition, several old logging skid trails run directly into the canyon bottom (Carpenter, 1993). To what extent logging and other activities may have altered the canyon or affected the range of the talussnail is unknown. Currently, sawtimber or fuelwood harvest is done only to enhance recreation, visual quality, and wildlife values, or to reduce hazards. Any harvest of standing trees is limited to individual tree selection, and is done under permit (less than one issued per year). Gathering of small amounts of firewood for local use occurs in and near the developed recreation sites. Fuelwood harvesting of dead and down material occurs on the mountain but is believed to be insignificant in the Wet Canyon watershed.

Current human activity in the habitat of the talussnail is primarily dispersed recreation, i.e., hiking and picnicking. Search and rescue training occurs in the watershed three times a year but does not affect the talus slope. Two USFS developed sites exist nearby: Arcadia Campground, located on a knoll above Wet Canyon, and Wet Canyon Picnic Site, located where Highway 366 crosses Wet Canyon at the lower end of occupied habitat. Arcadia has 26 units (including one group site) available for overnight visits, and Wet Canyon has three day-use-only

units. Both are open from May to December, and campfires are permitted in metal fire-rings or barbecues provided at each unit. No data are available on the amount of use at either site.

On May 13, 1995, a human-caused fire burned about 150 acres of ponderosa pine/oak community near the Arcadia Campground; about one-half of the burned area was within the Wet Canyon watershed. The closest the fire line and burned area came to an active drainage was approximately 30 to 50 feet. No ash or line crossed the creek, and no talus was disturbed. Because the fire was a low intensity ground fire with very little crowning, it should have an overall positive impact on the ecosystem, and no impact on the talussnail or its habitat (G. Froehlich, USFS, pers. comm.).

Drinking water for Arcadia Campground is supplied via pipeline from a horizontal well near Wet Canyon Creek. The system is treated using household bleach diluted to provide 0.02 to 1.0 parts per million chlorine in the drinking water. A fountain at Wet Canyon Picnic Site was used for many years by local residents seeking "pure, mountain" water. Evidence of surface contamination of that water was found, and a horizontal well was drilled adjacent to Wet Canyon Creek about 250 feet upstream from the road crossing. Recently, surface contamination was found in that water also, and the drinking fountain was disconnected.

Arcadia National Recreation Trail is used by hikers between Shannon and Arcadia campgrounds, and crosses Wet Canyon about one mile upstream from Wet Canyon Picnic Site. A self-guided nature trail (Johnson, 1989) that is not maintained by the USFS leads from Arcadia

Campground to Wet Canyon. An extension of that trail leads downstream along Wet Canyon to intersect with a user-built trail back to the campground. Another user-built trail extends along Wet Canyon from the picnic area upstream about one mile to Arcadia National Recreation Trail. This trail passes over and through talus slopes occupied by the talussnail. Construction and use of the trail may have caused disturbance to habitat of the talussnail. It is not part of the USFS trail system. However, as a result of the July 1998 amendment to the Coronado Land and Resource Management Plan, this trail will be relocated outside of Wet Canyon talussnail's habitat. No data are available on extent of use of any of the trails in the vicinity.

Designated roads and trails are open to vehicular travel; cross country travel by vehicles is prohibited. Highway 366 is generally open past Wet Canyon year-round, but is seasonally closed (November 15 to April 15) above the intersection of Forest Road 507, the access to High Peak. Occasionally during snow removal operations, the road may be closed by gates as far downslope as Wet Canyon Picnic Area.

Twilight Road (Forest Road 819) extends north from Highway 366 towards Wet Canyon at about 7,500 feet elevation and terminates on the watershed boundary between Twilight and Wet canyons. There are no plans to extend Twilight Road into the Wet Canyon watershed. Currently, dispersed camping is allowed along the road and at the road end, where a toilet has been constructed. A developed campground is still under consideration at the road end.

There are no certified water rights in Wet Canyon. The USFS has begun the procedure of applying for four water rights: two claims for recreation (0.11 and 0.01 acre-feet), an application for domestic use (0.61 acre-feet), and a notice of intent to drill a well for domestic use (1.00 acre-feet) (R. Lefevre, USFS, pers. comm.).

The east-facing slopes of the Pinaleno Mountains, starting at approximately 6,000 feet in elevation and extending over the crest, were closed to domestic livestock grazing in the 1940's. Although current livestock allotment boundaries extend to about 6,000 feet, cattle are generally restricted by topography to below about 4,500 feet. Rangeland within the area occupied by Wet Canyon talussnail is managed at Level A (no livestock).

*Habitat/Ecosystem*--In addition to the Wet Canyon talussnail, five other talussnails are endemic to the Pinaleno Mountains: Pinaleno talussnail, Clark Peak talussnail *S. christenseni*, mimic talussnail *S. imitator*, Pinaleno mountainsnail *Oreohelix grahamensis*, and an undescribed species of *Sonorella*. Pinaleno, Clark Peak, and the undescribed talussnail were formerly designated as Category 2 species, whereas mimic talussnail and Pinaleno mountainsnail were formerly in Category 3C (Service, 1991). None of these five species are currently considered Candidates for Federal listing. All are inhabitants of wet mountain slopes above 6,000 feet in elevation, where they are normally found in limestone rock slides that face northward, are overgrown, or are otherwise protected from summer sun. These slides are fairly deep, with at least four feet of talus rocks unchoked by soil or humus. In localities where it is dry or very cold in winter, talus must be six to eight feet deep in order to support talussnails. Depth of the talus

protects the talussnail from desiccation or freezing, and calcium carbonate aids in shell deposition and buffers the carbonic acid produced by the animal's inability to significantly expire carbon dioxide during estivation. In addition to the talussnails, at least 22 other species of land snails inhabit the Pinaleno Mountains (Hoffman, 1990).

Talussnails in the Pinaleno Mountains subsist primarily on fungus and decaying plant matter. This diet is often supplemented with young green shoots when available. There are no known significant predators of land snails on the Pinaleno Mountains. Talussnails are presumably eaten by rodents or birds, but this is probably sporadic or of random occurrence. In 1989, an exotic pulmonate gastropod, *Limax flavus*, a large slug of creek banks and boggy areas of central and northern Europe was collected in Wet Canyon (Hoffman, 1990).

*Life History/Ecology*--Wet Canyon talussnail is a Pleistocene relict and a highly localized endemic species. It occupies talus slopes composed of rocks high in calcium carbonate along north-facing banks of the perennial stream in Wet Canyon. These rock slides have a high soil content, but retain sufficient interstitial spaces required by the talussnail for living space. The dense vegetative overstory is composed of conifers and Arizona walnut. This habitat has a high moisture content which probably prevents invasion by other species of *Sonorella* present on uphill slopes (Hoffman, 1990).

Wet Canyon talussnail appears to require a somewhat wetter and possibly a lower elevation habitat than other talussnails found in the Pinaleno Mountains. Moisture conditions

suitable for this talussnail to become active are likely to occur during most summers, but it spends a large part of the year in estivation and may have limited activity in dry summers.

To prepare for estivation, the talussnail uses mucus and calcium to attach the aperture of its shell to the face of a rock to make a waterproof seal. Once sealed, the individual is completely isolated from the air outside. Respiration does not stop completely in an estivating talussnail; the individual does generate small amounts of carbon dioxide. The carbon dioxide combines with water molecules to produce carbonic acid, which is neutralized by calcium carbonate. Talussnails that estivate for comparatively short periods survive by mining calcium carbonate from their shells, which is redeposited when active feeding resumes.

Talussnails are hermaphroditic, and when two talussnails meet, both are usually inseminated. Most hermaphroditic pulmonates seem to be capable of self-fertilization, but only do so as a last resort after failing to meet conspecifics for several years. Each talussnail lays a clutch of thirty to forty eggs once, or in particularly good years, twice during summer. Fluctuations in humidity may cause large variations in rates of maturation and life span of talussnails. The life span of land snails is dependent on their cycle of activity, and talussnails in the Pinaleno Mountains are active for a much greater number of days per year than are land snails inhabiting the desert below. Most Pinaleno talussnails reach maturity in from two to three years and their life span is approximately six years (Hoffman, 1990).

Talusnails are occasionally eaten by rodents or birds. When snails are eaten by rodents, their shells are found with the top, or apical whorls, broken away so that the snail can be removed from the shell by the rodent. Rodent predation, though it exists, is apparently random and sporadic (Hoffman, 1990), and does not represent a significant threat to Wet Canyon talussnail. The presence of *Limax flavus* should not affect the Wet Canyon talussnail, though it may impact other invertebrates or plants within the wet part of Wet Canyon Creek (Hoffman, 1990).

*Conservation Measures*--During summer 1989, likely habitats for talussnails within the Pinaleno Mountains were explored, as well as those in the immediately surrounding Santa Teresa, Dos Cabeza, Galiuro, Winchester, and Peloncillo mountains. The location of all north-facing slopes and those otherwise protected from summer sun was determined. If these areas had talus slopes that appeared suitable for talussnail habitat, they were searched to determine the type of rock, depth to which rocks were clear of choking soil, and presence of snail sign. Snail sign included seals (marks indicating that snails had sealed to rocks during estivation), slime trails if there had been recent moisture, "bones" (shells and pieces of shells), or presence of live snails (Hoffman, 1990). Mountain ranges surrounding the Pinaleno Mountains are generally lower in elevation than the Pinaleno Mountains, and no populations of Wet Canyon talussnail were found in those ranges. Other nearby, higher elevation ranges, such as the Chiricahua Mountains, were not surveyed. There is a very remote possibility that these nearby ranges offer suitable habitat for the species.

No other suitable areas of habitat similar to Wet Canyon were found in the Pinaleno Mountains during Hoffman's surveys. His survey, although thorough in searching for habitats comparable to Wet Canyon, may have overlooked other, less similar, habitats. Slopes of the Pinaleno Mountains are inaccessible and some of the best talus slopes are often obscured by foliage and leaf litter to the point that detection is problematic. Also, many good limestone outcrops are composed of such large boulders that it is impossible to uncover talussnails or sign even though they are present. Finally, talussnails are often rare within even a good slide, so the only way to be certain that a slide is uninhabited is to return to it repeatedly and to be present, at least once, at dawn after a good soaking summer rain (Hoffman, 1990).

#### IV. PROBLEMS FACING THE SPECIES

*Present or threatened destruction, modification, or curtailment of the species' habitat or range.* Wet Canyon talussnail is a limited endemic that is vulnerable to any disturbance that would remove talus, increase interstitial sedimentation, open forest canopy, alter stream discharge, or otherwise change moisture conditions.

Suppression of wildfires during the past half-century has resulted in considerable amounts of dead woody material and decaying plant matter near to and/or on top of talus slopes within the range of Wet Canyon talussnail. This material has built up to an extent that the heat of a large fire may be intense enough to kill talussnails within. Thus intense wildfire could impact the species.

*Over-utilization for commercial, recreational, scientific, or educational purposes.* A trail exists from Wet Canyon Picnic Area up the canyon. This trail tends to follow the bottom of the canyon along the riparian bottom. This trail is not a "system" trail, which means that it was not built nor is it maintained by the Forest Service. The trail was originally designed and constructed by a local schoolteacher, and over time has been maintained by hiker use. This trail crosses several talus slopes that likely provide habitat for the talussnail. There is concern that the trail and its associated recreational use may be impacting the talussnail. Potential problems could include trampling of individual animals, and degradation of talus habitat. Habitat degradation could include compaction of the talus substrate and/or removal of talus habitat in the trail "tread". Trail maintenance might result in compaction and/or removal of habitat, which could fragment range of the species.

The collection factor has unknown significance. The species is difficult to collect due to its life habits and position in talus slopes, and therefore it is unlikely to be impacted by collection, over-utilization, recreational, or commercial interests. It is not known if the highly restricted distribution of this species will make it vulnerable to excessive collection from either vandals or individuals curious about the talussnail. Monitoring of the population must involve take of some individuals if identification to species level is necessary.

*Disease or predation.* Remarkable occurrences of disease or predation over and above what is background for the species are unknown, thus cannot be considered a threat at this time. There are no known significant predators of land snails in the Pinaleno Mountains. Occasionally

talussnails are eaten by rodents or birds, but this is of only sporadic or random occurrence. The recent introduction of the exotic slug *Limax flavus* into Wet Canyon should not affect the talussnail, although it may impact other invertebrates or plants within Wet Canyon. Even though this particular introduction may be benign, it does demonstrate the continuing threat to the biodiversity of the area by unauthorized or inadvertent introductions of nonnative species.

*Other natural or manmade factors affecting the species' continued existence.* Natural wasting of slope soils in Wet Canyon, as evidenced by "pistol-butted" or leaning trees, slumping or slope failures, and a "hummocky" appearance of the slopes, may cause infilling of the talus slopes needed by this species for survival. Fragmentation of the habitat by user-built trails may restrict natural movement of talussnails, and thus restrict colonization of existing talus slopes.

Due to its current configuration, location, and surfacing, Highway 366 is unlikely to contribute sediment to Wet Canyon in the known range of the talussnail. The highway is being widened to improve sight distance, safety, and remove slide material up to a point just below Wet Canyon. Widening the highway beyond that point has been discussed but is not planned at this time. If Highway 366 is widened where it crosses Wet Canyon, the existing crossing will have to be replaced, which may have an impact on habitat of the talussnail. In addition, widening of the highway may involve earth movement to accommodate a wider roadbed, which may increase erosion and sedimentation of habitat of the talussnail.

Increased public use of Mt. Graham may indirectly affect habitat of the talussnail through increased vehicle traffic and demands for an upgraded road. Any plans for improvement of the highway or expanded recreation development near Wet Canyon must fully consider the needs of the species. In addition, increased visitor use may elevate the risk of human-caused fire. The last half-century of fire suppression has resulted in a build-up of dead brush and other fine fuels on talus slopes used by the species to such an extent that heat of a wildfire may be intense enough to kill snails within the talus.

It appears that the talussnail is dependent on moist conditions in Wet Canyon, thus some perennial discharge in the creek can be considered necessary for continued existence of the species. No claims for water rights exist in the area, but Coronado National Forest may apply for water rights in support of recreational developments nearby. In total, potential applications by Coronado National Forest amount to 0.73 acre-feet per year, plus an additional use of 1.00 acre-feet to be supplied by a well. Discharge in Wet Canyon is not gauged, and no data exist on its annual, monthly, or daily flow regime. Diversion of water from Wet Canyon, or its aquifer, could have deleterious consequences for the talussnail if the moisture regime of Wet Canyon is changed due to water withdrawal.

## V. HABITAT CONSERVATION STRATEGY

*Existing direction* — Standards and guidelines applicable to all areas of the Forest in the Coronado National Forest Land and Resource Management Plan (USFS, 1988), as amended,

(Forest Plan) provide for protection and improvement of habitat of threatened and endangered species, and coordination with Arizona Game and Fish Department in the management of wildlife habitat. The 1998 Forest Plan amendment specifically calls for the protection of approximately 1,220 acres of the Wet Canyon watershed (USFS, 1998).

Standards and guidelines applicable to specific units of land were prescribed in the Forest Plan. Wet Canyon watershed is included within Management Area 2B as follows:

Management Emphasis and Intensity: Manage to perpetuate the unique wildlife or vegetative species, in particular the Wet Canyon talussnail, present within this management area. Provide for an increase in habitat stability for the Wet Canyon talussnail, while allowing for other uses in the area. Dispersed and developed recreation activities and other uses may be allowed to the extent they do not degrade the unique values of the management area. Facilities may be allowed and maintained as long as the unique resource values are protected (USFS, 1998).

Management Area Description: Located in the Pinaleno Mountain Range, this management area includes the Wet Canyon watershed downstream to the mouth of Twilight Creek, but not including Twilight Creek or its associated watershed.

Capability Area Types: Total Acres = 1,220 acres.

Timber suitability: All acres unsuitable.

Proposed Vegetation Manipulation: None.

### Specific Management Prescription

#### *Recreation Management.*

1. During periods of fire closure, the Wet Canyon Picnic area will be closed to campfires.
2. Open trails will be identified and signed. Non-system trails will be closed. The monitoring program should evaluate the continued use of the closed portion of the trail through the talus slope. Eliminate direct trail impact in talusnail habitat as soon as possible. Trees and other natural debris that fall across the closed portion of the trail will be allowed to remain.
3. Use existing water system at Arcadia Campground to supply drinking water to Wet Canyon Picnic Site, if needed.
4. Provide a "Visitor Information Sign" at the loop trail in Arcadia Campground presenting information about the floral and faunal components within Wet Canyon

stream/riparian complex. Provide information on the uniqueness of "Sky Island" biogeography, the presence of Pleistocene relicts in the area, and the need to conserve ecosystems intact while providing for human use and enjoyment should be highlighted.

*Wildlife and Fish.*

1. Inventory the riparian area in Wet Canyon using current Forest Service Riparian Area Survey and Arizona Game and Fish Department standards. Document riparian conditions and occupied talussnail habitats to serve as baseline for future monitoring activities. Evaluate whether exact map locations and extent of habitats occupied by Wet Canyon talussnail can be verified using Global Positioning System technology. This could be advantageous for recovering locations for successive measurements during monitoring. Complete by end of FY 00.

2. Evaluate the potential of Wet Canyon Creek aquatic macroinvertebrates for tracking aquatic health trends as part of the monitoring program. Initiate in FY 00 to establish baseline information.

*Range Management.*

1. Manage the rangeland at Level A (no livestock). See Appendix C in the Forest Plan for definition of range management levels.

### *Timber Management.*

1. Manage for a dense overstory canopy within the Wet Canyon riparian area. Do not allow live or standing dead trees to be cut for recreational or fuelwood purposes. Limit wood gathering to dead and down wood for recreational campfires. Individual tree selection may be used to accomplish other management objectives such as hazard reduction, visual quality enhancement, and wildlife habitat improvement.

### *Watershed/Soils*

1. Maintain satisfactory watershed condition.
2. Submit an "Application for Permit" for an instream water right on Wet Canyon Creek by the end of FY00 to help maintain a suitable environment for Wet Canyon talussnail and to promote the health of the canyon's riparian and aquatic systems. Monitor discharge in Wet Canyon to establish a hydrographic baseline by the end of FY 01. Monitoring procedures to be developed by the Forest Hydrologist.

### *Minerals Management.*

1. Common materials may not be removed for any purpose. As needed, recommend withdrawal from mineral entry and mineral leasing on entire area to protect essential habitat for Wet Canyon talussnail. Issue "no surface occupancy" stipulations for mineral leasing activities within the Management Area.

*Road Maintenance and Construction.*

1. Give full consideration to the habitat and movement needs of the talussnail when the Highway 366 road crossing at Wet Canyon is upgraded. Road construction or reconstruction projects should be designed to eliminate further fragmentation of the talussnail's habitat (e.g. use a bridge or arched culvert over Wet Canyon crossing). Other proposals for improvement will be evaluated in terms of their potential indirect impacts to the Wet Canyon talussnail from increased public use of the area.

*Fire Management.*

1. Wet Canyon is within Fire Suppression Zone 1, (i.e. immediate suppression action to protect high value resources).
2. Evaluate fuel loading situation and prescribe actions that reduce potential fire hazards related to talussnail protection.

*Insect/Disease Management.*

1. Manage ecosystem health to prevent catastrophic impacts to talussnail habitat from insect and disease infestation.

*Talussnail Research.*

1. Encourage scientific investigation of talussnail reproduction, recruitment, mortality, population trends, ecology, etc. Encourage investigation of the Wet Canyon talussnail with other species within the genus *Sonorella* in the Pinaleno Mountains.

New Direction - New actions that will help the species that are included in the Conservation Agreement

*Monitoring.*

1. A monitoring plan for Wet Canyon talussnail and its habitat will be developed and initiated by the Cooperators in the first 12 months of the Agreement. Monitoring of the species is problematic because of the need to dissect individual talussnails for specific identification, and the need to remove rocks and otherwise alter habitat in order to find individuals. Monitoring efforts that place emphasis on non-destructive techniques (e.g., remote sensing, surrogate monitoring, photopoints, limits to acceptable change, etc.) should be emphasized. Methods that require alteration of habitat or handling of individual talussnails will be kept to a minimum, and done only after full consideration of the effects on the species have been analyzed and documented.
2. Monitoring of habitat that focuses on recognition and reporting of events that deviate from normal (e.g., significant flood or drought, wild or human-caused fires, severe insect

or disease defoliation) in the watershed may be considered as an alternative to detailed habitat measurements on a scheduled basis.

3. Photopoints or other appropriate methods will be established to document habitat conditions in occupied habitat, and will be retaken on a schedule acceptable to the Cooperators. A narrative monitoring report to accompany the photos will be prepared. The monitoring plan will define a photopoint monitoring protocol for locations where the trail previously crossed the talus substrate. Photographs will be taken before and after removal of the trail through the talus. Re-establishment of user built trails through the talus slope will also be monitored and eliminated.

*Administration records and protection.*

1. Administration and protection of habitat to ensure survival and proliferation of Wet Canyon talussnail will be the responsibility of Coronado National Forest. District Ranger, Safford Ranger District, Safford, Arizona has direct responsibility. The primary function of the Service will be to provide technical assistance and support to the Forest. The Arizona Game and Fish Department will cooperate with the Forest Service to provide technical assistance, monitoring, and analysis of studies.

2. Careful administrative records will be kept on development, maintenance, and review of this Conservation Agreement. Records will be maintained in the following offices of the Cooperators:

Coronado National Forest, Tucson, AZ

Safford Ranger District, Safford, AZ

Arizona Ecological Services Field Office, Phoenix, AZ

Arizona Game and Fish Department

Nongame and Endangered Wildlife Program, Phoenix, AZ

Arizona Game and Fish Department, Region V, Tucson, AZ

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VI. IMPLEMENTATION SCHEDULE

FISCAL YEAR	ACTIVITY DESCRIPTION	RESPONSIBILITY			COSTS (dollars)
		FS	FWS	AGFD	
1998	Amend Forest Plan to designate Wet Canyon as a Special Management Area	X			3,000
2001	Develop information and education program	X	X	X	1,500
2000	Develop monitoring program	X	X	X	5,000
2000	Remove trail from talus slope	X			1,000
2000	Perform fuels evaluation	X			750
2002	Issue "no surface occupancy" stipulations for mineral leasing	X			500
2000	Submit an "Application for Permit" for an instream water right	X			1,500
2000	Inventory riparian area of Wet Canyon	X	X	X	500
2000	Evaluate the potential of Wet Canyon Creek aquatic macroinvertebrates for tracking aquatic health trends as part of the monitoring program.			X	2,000
Ongoing	Give full consideration to the talussnail during reconstruction of Highway 366	X	X		none
Done	Implement fire restriction during high fire risks	X			200
TOTAL					15,950

FS - Forest Service; FWS - Fish and Wildlife Service, AGFD - Arizona Game and Fish Department

## VII. LITERATURE CITED

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## VII. ATTACHMENTS

- Figure 1. General location of Wet Canyon in Graham County, Arizona, showing access from nearby communities. Source: USDA Forest Service, Coronado National Forest, Safford and Santa Catalina Ranger Districts.
- Figure 2. Specific location of Wet Canyon, with elevations shown in feet. Source: USGS 7.5' Quadrangle Sheet MT. GRAHAM, ARIZONA.
- Figure 3. Wet Canyon talussnail *Sonorella macrophallus*. Sketch by Douglas W. Moore, Fish and Wildlife Service files.





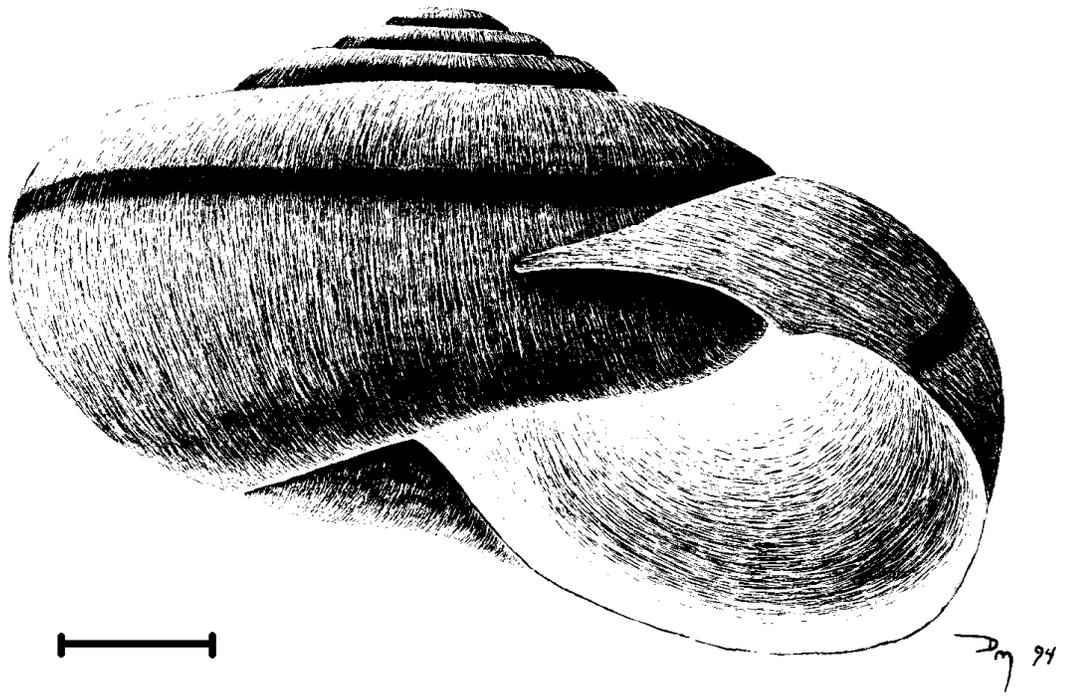


Figure 3. Wet Canyon talussnail *Sonorella macrophallus*. Sketch by Douglas W. Moore, Fish and Wildlife Service files.