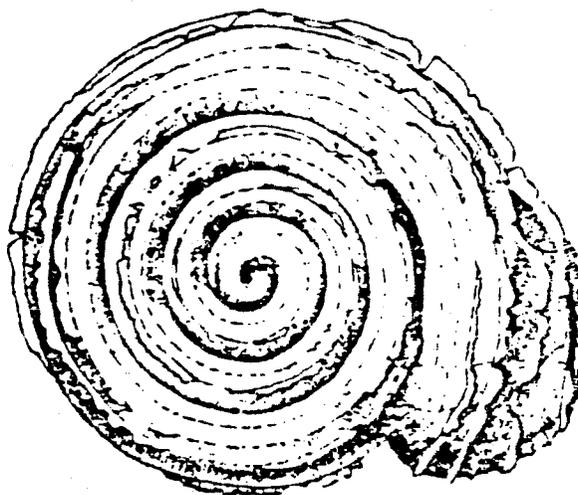


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VIRGINIA FRINGED MOUNTAIN SNAIL
(Polygyriscus virginianus)
RECOVERY PLAN



Prepared by
Region Five
U.S. Fish and Wildlife Service



JANUARY 1983

VIRGINIA FRINGED MOUNTAIN SNAIL

RECOVERY PLAN

Prepared by

Region 5

U.S. Fish and Wildlife Service

APPROVAL:

Edward N. Loren
Regional Director, Region 5, U.S. Fish and Wildlife Service

DATE:

May 9, 1983

This is the completed Virginia Fringed Mountain Snail Recovery Plan. It has been approved by the U.S. Fish and Wildlife Service. It does not necessarily represent official positions or approvals of cooperating agencies. This plan is subject to modification as dictated by new findings and changes in species status and completion of tasks described in the plan. Goals and objectives will be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints.

Acknowledgements should read as follows:

The Virginia Fringed Mountain Snail Recovery Plan, dated January 1983, prepared by Region 5 of the U.S. Fish and Wildlife Service.

Additional copies may be obtained from:

Fish and Wildlife Reference Service
Unit i
Denver, Colorado 80205
Telephone: 303/571-4656

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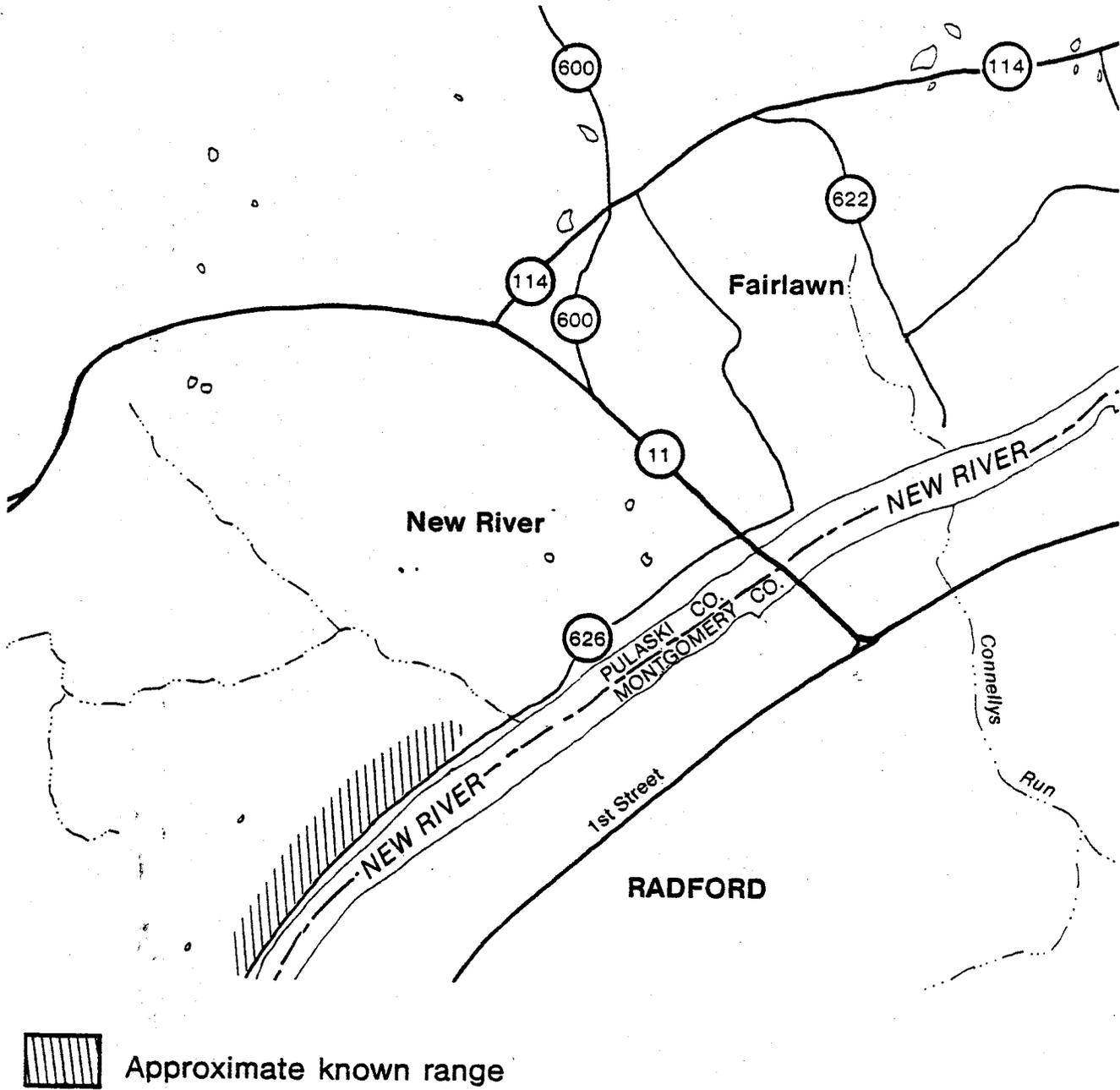
I. INTRODUCTION

The Virginia fringed mountain snail, Polygyriscus virginianus is a geographically restricted species known only from a single site on the north bank of the New River, opposite Radford, Virginia, in Pulaski County (Figure 1). It is one of the rarest and most unusual land snails in North America (Solem, 1975). This species was originally described by P.R. Burch in 1947 from weathered shells found in the soil. It was not known as a living species until September 1971, when Leslie Hubricht (1972) found 14 living adults and 7 immature specimens. Living specimens have been most recently confirmed at the site by F.W. Grimm (1981).

Since the publication of the original description in 1947, this peculiar land snail has eluded study because of its rarity, highly limited distribution, and secretive habits. As a result, little is known about the life history of this species.

Description: Polygyriscus is a monotypic genus within the family Helicodiscidae. Anatomically, North American helicodiscids have been figured, described, and reviewed by Pilsbry (1948) and Polygyriscus virginianus was treated by Solem (1975) who firmly established its taxonomic status. Most, if not all, North American helicodiscids (including Polygyriscus) are white and their eye-stalks are unpigmented. They are probably blind. All are burrowers or troglodytes, occupying lower layers of leaf litter, loose surface soil, talus, or caves. Most species are obligate calciphiles.

FIGURE 1. Approximate known range of *Polygyriscus virginianus*.



The shell of P. virginianus is small (greater diameter 3.9 - 4.5 mm) and discoidal with a wide and shallow umbilicus, exhibiting all the whorls. There are 4.0 - 4.6 tubular whorls, slowly increasing in size; the last 1/4 whorl is swollen exteriorly and contracted interiorly, deflected downward, and twisted (Figure 2). The parietal wall of most adult specimens is either partially or wholly detached from the penultimate whorl. The aperture of the shell is slightly expanded dorsally and slightly reflected ventrally. There are 8 - 10 spiral, comb-like periostracal fringes that occupy low calcareous spiral ridges on the surface of the shell. Usually four of these are conspicuously prominent, the others are reduced in size. The fringes are easily worn away, leaving the calcareous ridges to mark their former positions.

The basal margin and parietal wall are invaginated, with low foldlike nodules interior to the invaginations. There is a transverse barrier inside the basal lip and a long, sharply defined, recessed, low tooth on the upper palatal wall (see Figure 2). The shell's color, when containing a living snail, is pale, greenish brown with a white aperture.

Juveniles resemble the adults but their apertures are simple and thin, without barriers until deflection begins to take place.

Habitat and Geographic Range: Polygyriscus virginianus has more restrictive habitat requirements than other obligatory calciphile helicodiscids. It has been observed alive (by Hubricht in 1971 and Grimm in 1981) only on permanently damp ground at least 25 cm beneath the

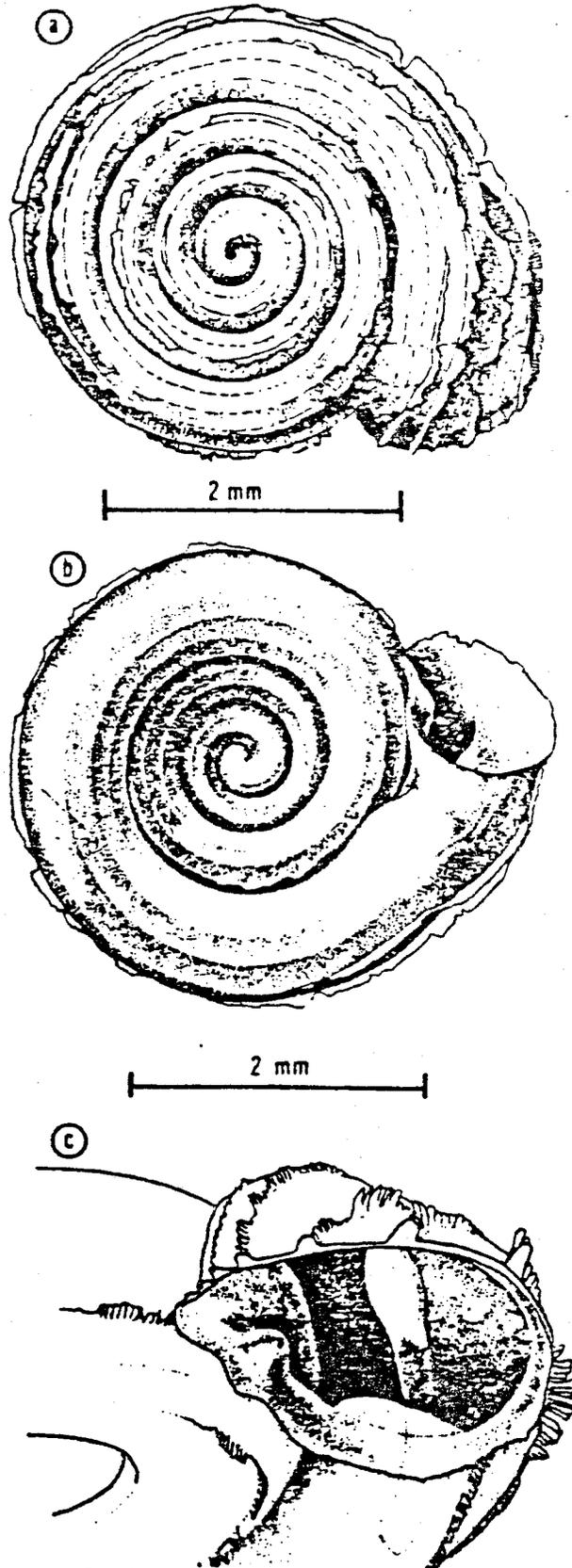


FIGURE 2

SHELL OF POLYGYRISCUS VIRGINIANUS

- a) top view
- b) bottom view
- c) aperture

From Solem (1975)

surface of the soil among fragments of Elbrook dolomite in loose clay-like soil loosened by roots and worm castings, and entirely free of leaf litter.

Shells of Polygyriscus have been found conclusively only in Pulaski Co., Virginia across the New River from Radford, and in this area only along the low bluffs and steep embankment (talus apron) directly above the New River along and above River Road. The entire known range of P. virginianus is confined to a 2.5 km strip of this embankment, bluff, and limestone talus. Within this area, shells have been found only in soil and rock fragments beneath overhanging roots at the top of the low bluffs (0.7 - 2.0 m beneath the soil surface) and in soft-rock fragment mixtures a few meters above the base of the talus apron.

The apron of soil-covered talus in this area is clad in a stand of small trees (Robinia, Quercus, Acer, Juglans, Carya, Liriodendron, and others), and honeysuckle has overgrown much of the habitat available to Polygyriscus. Although this area is exceedingly rich in species of land snails, living snails are not abundant and all populations observed are small. The growth of honeysuckle and other vines has acted to protect all of the populations of snails that occupy this low bluff-talus area.

The Elbrook dolomite has crumbled into small, thin, flat, angular fragments, most of which are less than 10 cm in diameter and only 1-3 cm thick.

Between these fragments is loose clay-like soil and large numbers of roots. Boulders and large rocks are present, but rare, and leaf litter and humus layers are thin.

Grimm (1981) states that living Polygyriscus are confined to damp, rocky soil free of humus and in the rootlet zones between the larger rock fragments and beneath boulders, at least 25 cm beneath the soil surface on a steep, stable, soil-covered talus. Although Grimm and Hubricht (pers. communication) consider it likely that the species never approaches the soil surface, Solem (1975) states that the snails would move to the surface of the talus during wet weather. The species has been found alive at only one site. The site is shaded and overgrown with vines.

Burrowing species found living with Polygyriscus at the same soil level include: Glyphyalinia lewisiana, Glyphyalinia cf. rhoadsi, Paravitrea reesei, Helicodiscus parallelus, Helicodiscus notius, Helicodiscus hadenoecus. All of these species are more active than Polygyriscus, and all have a much wider distribution.

Population Numbers and Reproduction: Almost nothing is known about the numbers, population dynamics or reproduction of P. virginianus. There is no reliable estimate of the total number of Virginia fringed mountain snails in existence, largely because of the difficulty of obtaining such an estimate for a burrowing snail. Furthermore, the very act of surveying for living specimens results in severe disturbance to the species' habitat. For example, Grimm (1981) located only three living adults in the type locality in 5 square meters of ground which were excavated to a depth of from 10-40 cm. Based on his field surveys, Grimm has concluded that the species is "very, very rare" and certainly maintains its population at a very low density.

Reproduction has never been observed in this species. However, its reproduction capacity may be similar to that of Helicodiscus parallelus which lays 1-2 eggs per clutch.

Potential threats to survival: Any organism with such a restricted distribution that is also severely limited in habitat can be seriously endangered by activities and processes that have little influence on other organisms. It may be argued that such an organism can be easily wiped out by natural processes, but this applies in this case only to major occurrences, such as climatic change or earthquakes, because the talus zone which the snail inhabits is exceedingly stable, and is overlaid by much vegetation and soil. P. virginianus does not appear to be enroute to extinction through any known natural processes, despite the fact that burrowing habits, a cumbersome shell, small size, probable low reproductive capacity, and stenotype seriously impact its ability to disperse.

Potential threats to the species include:

1. Treatment of the roadside with herbicide.
2. The possibility of a fire which would remove vine and tree cover, exposing ground to erosion and weathering. This is a relatively minor threat because the species burrows and regrowth of cover can be rapid.

3. Widening of River Road on its western side. This is potentially a serious threat to the survival of the species, area forest floor community and to talus inhabitants. It may be possible to widen the road without harm to the snail's habitat, but only if the area is surveyed with the aid of a scientist thoroughly familiar with the species and special efforts are made to avoid its habitat.
4. Reactivation of the quarry which is located in the center of its known range, and immediately north of the only station from which it is known alive.
5. Collecting. Although the species is most difficult to find, the activities of collectors at and near the site from which living specimens have been observed or taken may disturb the habitat beyond its ability to recover. It is not known whether the species remains living at the stations where shells have been found, nor is its depth limit known.

The most serious of the potential threats to the survival of the species are possible road-widening or quarry reactivation. A single dynamite blast or scoop by a bulldozer could erase the entire colony from its only known station. Although there are no known plans for either road-widening or quarry reactivation, these remain potential threats.

II. RECOVERY

Recovery objective: To bring about complete recovery of the Virginia fringed mountain snail, allowing the species to be delisted.

This objective will be reached when the following conditions are met:

1. All habitats where the species is shown to occur are assured of long-term protection from adverse impacts, by cooperative agreements, easements or acquisitions.
2. A long-term land management and monitoring program is established throughout the species' range.
3. The monitoring program shows there is no downward trend in distribution or habitat quality and availability.

Condition 1 can best be achieved through a combination of cooperative agreements with land-owners and possible land acquisition by the Fish and Wildlife Service or by state or private conservation agencies. If acquisition of essential habitat areas is not possible, establishment of easements or cooperative agreements concerning management of the snail's habitat may allow down-listing to threatened status, but is unlikely to result in the permanent protection needed for complete delisting.

STEP-DOWN OUTLINE

- 1.0 Protect known habitat of Polygyriscus virginianus.
 - 1.1 Determine land ownership of known snail habitat.
 - 1.2 Evaluate options for protection--cooperative agreements, easements and acquisitions.
 - 1.3 Determine and implement the most practical methods of protection.
- 2.0 Systematically survey potential habitats within a 10-mile radius of the known habitat site.
 - 2.1 Utilize aerial photographs and surface geology maps to identify potential habitat sites.
 - 2.2 Survey potential sites for "recently dead" shells during the summer and fall.
 - 2.3 Conduct sampling for living specimens at selected sites where "recently dead" shells have been located.
- 3.0 Protect any additional habitat of Polygyriscus virginianus discovered during implementation of 2.0.
 - 3.1 Determine land ownership of newly discovered snail habitat.
 - 3.2 Evaluate options for protection--cooperative agreements, easements and acquisitions.
 - 3.3 Determine and implement the most practical methods of protection.

- 4.0 Establish a program to periodically monitor P. virginianus distribution and habitat quality.
- 5.0 Establish a long-term land management program throughout the species' known range.
 - 5.1 Determine essential elements of the snail's habitat.
 - 5.2 Consider wet weather surveys at the known habitat site for surface activity of P. virginianus.
 - 5.3 Identify existing and potential activities which conflict with (or are compatible with) the maintenance of the snail's habitat.
 - 5.4 Based on findings in 5.1 through 5.3, develop and implement a management plan for habitat protected in 1.0 and 5.0.

RECOVERY PLAN NARRATIVE

1.0 Protect known habitat of *Polygyriscus virginianus*.

The area to be protected is a strip of land approximately 1 mile long and 1/2 mile wide along the New River across from Radford, Virginia. This area would include all sites at which shells or living specimens of *P. virginianus* have been found. Once the owners of this area have been identified, alternatives for protection will be evaluated and the most practical methods of protection, with the funds available, will be determined. As pointed out previously, acquisition of the snail's essential habitat (site where living snails have been found) is in all probability the only method which can provide the permanent protection needed at this site. However, any acquisition should probably not be implemented until after a more certain knowledge of the species' total range is obtained as a result of completion of 2.0 and 3.0. For other properties in the area occupied by the snail, cooperative agreements or easements may be more appropriate.

2.0 Systematically survey potential habitats within a 10-mile radius of the known habitat sites.2.1 Utilize aerial photographs and surface geology maps to identify potential habitat sites.

By utilization of currently available aerial photographs, it should be possible to locate limestone outcrops and quarries with the potential for supporting *P. virginianus*.

2.2 Survey potential sites for "recently dead" shells during summer and fall.

Sampling of potential sites have been divided into two sequential steps (2.2 and 2.3) to make this process more efficient. Because surveying for shells is easier and less disruptive to the snail's habitat than excavating for living specimens, it will be done prior to selection of sites for intensive sampling.

2.3 Conduct sampling for living specimens at selected sites where "recently dead" shells have been located.

Because of the difficulty of sampling for burrowing snails, the process of adequately surveying these sites will be a laborious one. However, if additional snail populations are found, it will be well worth the effort.

3.0 Protect any additional habitat of *Polygyriscus virginianus* discovered during the implementation of 2.0.

The actions taken to implement step 1.0 will be repeated here for any additional habitat sites discovered during surveys.

4.0 Establish a program to periodically monitor *P. virginianus* distribution and habitat quality.

The monitoring program should be limited to:

- (a) Evaluation of habitat quality throughout the species' range.
- (b) Spot sampling to insure that the species is surviving in previously documented sites.

5.0 Establish a long-term land management program throughout species' known range.

5.1 Determine essential elements of the snail's habitat.

This task involves basic research on the snail's natural history and biology. Extensive research will be required to determine the snail's reproductive requirements, feeding behavior, temperature tolerance, substrate requirements, etc. In all probability this will require establishment of a captive laboratory population to facilitate continuous observation and experimentation.

5.2 Conduct wet weather surveys at the known habitat site for surface activity of *P. virginianus*.

There is some question as to whether *P. virginianus* ever comes up to ground surface. This determination will have implications for management of the species' habitat.

5.3 Identify existing and potential activities which conflict with or are compatible with maintenance of the snail's habitat.

This task involves, first, a survey and evaluation of existing or potential activities and projects planned for the area. The Virginia Department of Highways and Transportation will be contacted for information concerning herbicide use and any potential modifications of River Road. Their cooperation will be sought in controlling the use of herbicides and in the careful design of any highway projects which may affect the species. Potential for reactivation of quarrying activity in the snail's habitat will be evaluated.

The second element of this task is identification of those types of activities (recreational, construction, etc.) within the snail's habitat which may be compatible with habitat maintenance. Grimm (1981) has suggested that the base of the quarry where P. virginianus lives may be developed as a parking lot for fishermen utilizing the New River or as a picnic area, with no adverse effect on P. virginianus.

5.4 Based on findings in 5.1 through 5.3 develop and implement a management plan for habitats protected in 1.0 and 3.0.

The management plan for the protected areas would consist of a program to limit human activities in areas where they are incompatible with habitat maintenance, but to allow or even suggest development of alternate areas for human activities where there is no potential for adverse effects.

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PART III

SUGGESTED IMPLEMENTATION SCHEDULE

The following implementation schedule specifies tasks to be implemented over a three-year planning horizon. Each task has been assigned a priority based on the following criteria:

Priority 1 - All actions that are absolutely essential to prevent extinction of the species.

Priority 2 - All actions necessary to maintain the species' current population status.

Priority 3 - All other actions necessary to provide for full recovery of the species.

The "responsible agency" designation denotes responsibility for implementation of specific tasks, but does not necessarily indicate the source of funding. In many instances there is a shared responsibility for implementation of the tasks. Where appropriate, funding may originate from cooperative agreements between state and federal agencies.

IMPLEMENTATION SCHEDULE
VIRGINIA FRINGED MOUNTAIN SNAIL RECOVERY PLAN

General Category	Plan Task	Task #	Priority	Task Duration	Responsible agency		Fiscal Year Costs (Est.)			Comments/Notes
					FWS-Region	Other	1984	1985	1986	
I-14	Determine Land Ownership	1.1	1	1 year	5	VOGIF/TNC	1000			
I-4	Evaluate options for protection	1.2	1	1 year	5	VOGIF/TNC	2000			
A-1	Determine and Implement Protection	1.3	1	Unknown	5	VOGIF/TNC		2000	2000	Acquisition costs may be incurred in future years. by contract
I-2	Monitor distribution and habitat	4.0	2	Continuous	5	VOGIF	2000	2000	2000	
I-3	Determine essential elements of habitat	5.1	2	2 years	5			4000	4000	by contract
I-3	Conduct wet weather survey	5.2	2	1 year	5		3000			by contract
I-14	Identify conflicting activities	5.3	2	1 year	5	VOGIF		3000		by contract
M-3	Develop and implement management plan	5.4	2	Ongoing	5	VOGIF			1000	Actual implementation of the management plan is unlikely to begin before FY 87. 16
I-1	Identify potential habitat sites	2.1	1	1 year	5		1000			by contract
I-1	Survey potential sites for shells	2.2	1	3 years	5		3000	3000	3000	by contract
I-1	Sample for living snails	2.3	1	3 years	5			5000	5000	by contract
I-14	Determine land ownership of additional areas	3.1	1	2 years	5	VOGIF			1000	
I-4	Evaluate option for protection of additional areas	3.2	1	2 years	5	VOGIF			1000	
A-1	Determine and implement protection of additional areas	3.3	1	2 years	5	VOGIF				Implementation of this step is unlikely to occur before FY 87.

VOGIF - Virginia Commission of Game and Inland Fisheries
FWS - U.S. Fish and Wildlife Service
TNC - The Nature Conservancy

APPENDIX A

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COMMONWEALTH of VIRGINIA

COMMISSION OF GAME AND INLAND FISHERIES

Box 11104

Richmond, 23230-1104

R.H. CROSS, JR., EXECUTIVE DIRECTOR
401 WEST BROAD STREET
BOX 11104
RICHMOND 23230

September 30, 1982

Mr. Howard N. Larsen
Regional Director
U. S. Fish and Wildlife Service
One Gateway Center, Suite 700
Newton Corner, Massachusetts 02158

Dear Howard:

We have reviewed the Recovery Plan for the Virginia Fringed Mountain Snail and we are in concurrence with the plan as written.

Regarding potential threats to the species, please know that the reactivation of the quarry located within the snail's limited known range is most unlikely since this particular site has been abandoned for approximately 25 years.

Also, we were pleased to note (Page 12) that there is no apparent conflict with the use of the quarry by fishermen utilizing the New River.

Thank you for the opportunity to review and comment on the recovery plan, and if you have any questions please let us know.

Sincerely,

A handwritten signature in cursive script, appearing to read "R.H. Cross, Jr.".

R. H. Cross, Jr.
Executive Director

RWD/gmc

cc: J. P. Randolph
J. W. Raybourne

4026 - 35th St.
Meridian, Miss. 39301

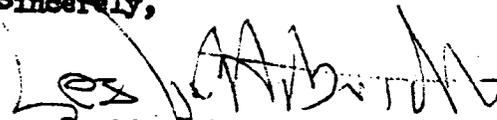
Sept. 22, 1982

Mr. Howard N. Loren
Fish & Wildlife Service
One Gateway Center,
Suite 700
Newton Corner, Mass. 02158

Re: the Virginia Fringed Mountain Snail (Polyceriscus virginianus)
Recovery Plan.

I have only one comment, and that is about whether or not the snail ever comes to the surface. Dr. Paul R. Burch, who lived at Radford, visited the locality repeatedly after rains and was not able to find it. He even went over at night but was unable to find it. The day I found it there it had rained the night before and the weather was cloudy and muggy. I found them only in the lower levels of the rock slide, and am inclined to the belief that it does not come to the surface.

Sincerely,


Leslie Hubricht

RECEIVED

SEP 27 1982

FIELD MUSEUM
OF NATURAL HISTORY

October 7, 1982

Mr. Howard N. Larsen,
Regional Director
U. S. D. I., Fish & Wildlife Service
One Gateway Center, Suite 700
Newton Corner, Massachusetts 02158

Dear Mr. Larsen:

Thank you very much for the opportunity to comment upon the Recovery Plan for Polygyriscus virginianus.

This is a very well laid out document that acknowledges the paucity of knowledge, difficulty of obtaining knowledge without possibly destroying the habitat itself, and in summarizing the potential dangers to this species.

I would simply like to emphasize a few points. First, the survey for additional colonies need not, in its initial stages, involve major "burrowing" and thus habitat disturbance. August and September hunting in rocky debris at the base of potential bluff habitat should turn up "recently dead" shells that have been washed down by rains. This would pin-point sites for Spring study, when hopefully the snails would be nearer the surface.

Extensive excavating, such as was reported by Grimm (1981) should be undertaken only as a last resort. This, in effect, destroys that site for the snails, and recovery to a suitable set of microconditions may be a matter of decades at the least. We do not have adequate data on this point, since the lifetime of collectors is short and, to my knowledge, no actual study of recovery time has been accomplished. I can cite a meaningful anecdote. In the period from 1900-1910, several malacologists made extensive collections of land snails from mountain ranges in Arizona and New Mexico. In 1960 and 1964, I revisited many of their exact stations with malacologists who had spent many months previously hunting out these places. The scars in talus slopes from the pre-1910 efforts were still visible, and THESE WERE MOSTLY WITHOUT LAND SNAILS although live specimens could be found only three feet away. Thus, any massive burrowing after Polygyriscus should be done only as a last resort. I cannot emphasize this too strongly.

If I can be of any further assistance, please do not hesitate to contact me.

Sincerely,



Alan Solem, Curator and Head
Division of Invertebrates
AS:vc-j



United States Department of the Interior

ADDRESS ONLY THE DIRECTOR,
FISH AND WILDLIFE SERVICE

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

In Reply Refer To:
FWS/OES

Memorandum

To: Regional Director, Region 5 (ARD/FA)
Action Associate
From: Director

Subject: Review of the Virginia Fringed Mountain Snail Recovery Plan -
Technical Draft

We would like to commend your staff for a well written plan. It is thoroughly prepared and appears to adequately address the issues concerning this species even though there is a paucity of information.

Our only comments include:

1. Figures 1 and 2 are difficult to read. Please improve the quality of these figures before printing the final version of the plan.
2. On page 5 it would be useful to expand on your mention of the treatment of the roadside with herbicide. Has it been a common practice in this area? Are there any indications that the Department of Transportation (we assume they are responsible for the treatment) would be willing/unwilling to cooperate in a conservation program for this species?

If you feel that the above comments do not justify the revision of the next draft, please explain in your return cover memo.

Please return two copies of the agency draft to the Washington office for review.

Richard M. Parsons

RECEIVED
U.S. Fish & Wildlife Service

DEC 7 1982

MAIL ROOM
Region 5 - Newton, Mass.