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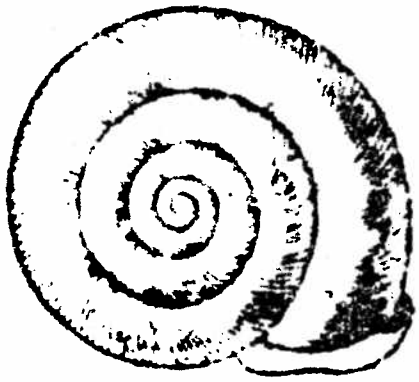
FLAT-SPIRED THREE-TOOTHED SNAIL
(Triodopsis platysayoides)
RECOVERY PLAN



Prepared by

Region Five
U.S. Fish and Wildlife Service

MARCH 1983

FLAT-SPIRED THREE-TOOTHED SNAIL

RECOVERY PLAN

Prepared by

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U.S. Fish and Wildlife Service

APPROVAL: Howard N. Larsen
Regional Director, Region 5, U.S. Fish and Wildlife Service

DATE: May 9, 1983

This is the completed Flat-spired, Three-toothed 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 Flat-spired, Three-toothed Snail Recovery Plan, dated March 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 flat-spired three-toothed land snail, Triodopsis platysayoides is a geographically restricted species known only from a small area adjacent to the Cheat River Canyon in Monongalia County, West Virginia (Figure 1). Most of the species' known range is within Cooper's Rock State Forest. First described from this area in 1933 by S. T. Brooks, T. platysayoides has been found in no other localities despite intensive collecting in West Virginia and western Pennsylvania. It was listed as a threatened species by the U. S. Fish and Wildlife Service in the Federal Register of July 3, 1978.

Although this species is extremely rare, the genus Triodopsis is widespread in North America, particularly in the East. Thirty-eight species occurring in eastern North America belong to the genus (Hubricht, personal communication). They live for the most part in the leaf litter layer in various types of deciduous and mixed pine-deciduous forests.

Description: The shell of T. platysayoides is thin, flattened and shiny, ranging in color from light brown to light red-brown. It is obliquely striated and 18-27 mm in diameter and 7-11 mm in height. The umbilicus is wide, nearly cylindrical, and exhibits all of the 5 whorls. The shell's aperture is oblique with a narrow, white, reflected lip. The lip teeth are absent, but the lip swelling is somewhat thicker in those places where the lip teeth would occur in other members of the genus. A thick, short, white conical tooth is present on the parietal wall.

Distinguishing Characteristics: This snail is similar to Triodopsis complanata which occurs in eastern Kentucky, and to T. tennesseensis which occurs to the south of T. platysayoides in Kentucky, Tennessee and the adjoining regions of West Virginia, Virginia, and North Carolina. Based on rather limited information, Vagvolgyi (1968) classified T. platysayoides as a subspecies of T. complanata. This reclassification has not been widely accepted and Solem (1974) states that available evidence supports full species status. T. platysayoides can be distinguished from T. complanata and T. tennesseensis by the complete absence of outer lip teeth, its more open umbilicus, and differences in detail of the shell sculpture.

Population numbers: Grimm (1972) observed fifty individuals on one occasion and estimated the total population to be 300 to 500. This estimate appears to be based in part on the assumption that the species is confined to an area of less than one quarter square mile. However, in the spring of 1982 the species was found at several discrete sites outside this quarter square mile area during field surveys by Fish and Wildlife Service and West Virginia Department of Natural Resources personnel. Therefore, the population may be several times as large as Grimm's 1972 estimate. In summary, we do not consider existing surveys to be extensive enough to provide reliable population estimates.

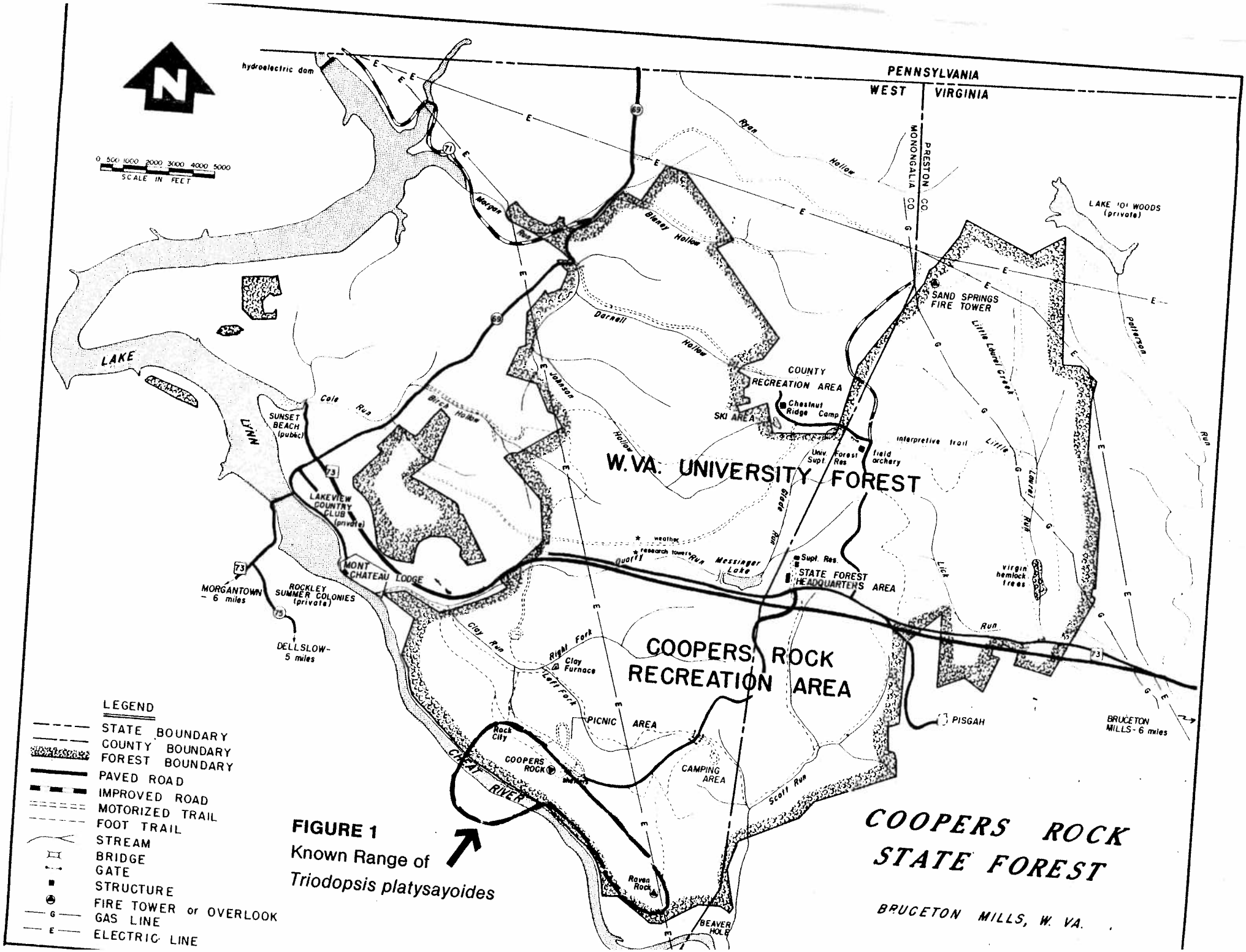

FIGURE 1
Known Range of
Triodopsis platysayoides

Reasons for Current Status: Most of the known range of this snail occurs in Cooper's Rock Recreation Area within Cooper's Rock State Forest at locations regularly and frequently visited by the public. In fact, according to the State Forester this is West Virginia's most heavily utilized State Forest area attracting nearly 450,000 visitors annually. Facilities at the top of Cooper's Rock include a concession stand and a moderately extensive parking area. The species is threatened because heavy trampling of the leaf litter by park visitors is reducing the available cover and feeding habitat for this highly restricted species. In addition to the direct effect of trampling leaf litter, visitor use contributes to the fire hazard in the area, particularly as a result of unextinguished cigarettes being thrown to the forest floor. Fire could destroy both the leaf litter habitat and the lichens upon which the species may depend for food. Over the long-term, air pollution, to which lichens are especially sensitive, has the potential to severely affect the snail's food supply. However, as yet no effects of air pollution have been documented at Cooper's Rock.

Habitat: This species is restricted to isolated patches of deep leaf litter and sheltered retreats among the sandstone boulders just below the summit of Cooper's Rock and similar rock outcroppings within an area of one to two square miles. In damp, cool weather the snails venture out into the deep, shaded litter at the base of the major rocks, but in drier periods the snails retreat into the crevices of exposed sandstone boulders and talus. The species occurs at elevations between 1800 and 2000 feet in mixed mesophytic forest. Grimm (1972) states that

the species feeds upon lichens on rock surfaces while Solem (1974) indicates that their feeding niche is apparently among seasonal leaf litter alongside the rocks. Presumed predators include shrews, carabid beetles and lampyrid beetles.

Reproductive requirements: What little is known about reproduction is based on the observations of Grimm (1972). He found that T. platysayoides would breed in captivity if kept at temperatures between 5° and 15°C on a lime-rich, insect-free substrate with much cover. The snails must be maintained at low densities (up to 3-4 per square foot) to prevent cannibalism.

II. RECOVERY

Recovery objective: The ultimate objective of this recovery plan is to provide sufficient protection for the habitats of Triodopsis platysayoides so that it can be delisted. T. platysayoides will no longer need Endangered Species Act protection when either of the following sets of criteria are met:

Recovery Option A: T. platysayoides is found at less than three additional sites.

1) All known habitat sites supporting T. platysayoides are protected from foreseeable human impacts by acquisition, easements or cooperative agreements and management plans. This requires protection of at least eighty percent of the snail's habitat at each of the sites from impacts of recreational usage, adverse management practices, land use changes or other actions that would adversely affect the species.

2) A long-term management and monitoring program is established for the species.

3) The monitoring program shows that there is no downward trend in distribution, number and extent of populations, or habitat quality for a ten-year period.

Recovery Option B:

1) *T. platysayoides* is found at a minimum of three additional sites (i.e., in addition to the known sites in Cooper's Rock State Park and at Table Rock), each at least a mile from the other, and from the known sites.

2) At least 60 percent of these sites are protected from foreseeable human impacts by acquisition, easement or cooperative agreements and management plans.

3) A long-term management and monitoring program is established for the species.

4) The monitoring program shows that there is no downward trend in distribution, number and extent of populations, or habitat quality for a ten-year period.

The two options are provided to address different sets of circumstances which may arise as additional field surveys are conducted. Option B, which involves a lower intensity of habitat management and protection will come into play only if the distribution of the species turns out to be significantly greater than now known.

Based on the results of the 1982 field survey by Fish and Wildlife Service and West Virginia DNR personnel and the presence of habitats

in other areas similar to those at the known locations of the snail, there appears to be a fair probability that this option can be realized.

Option B has the advantage that it will require much less modification of the current recreational management at Cooper's Rock State Park, provided that other habitat sites are found and can be adequately protected

The step-down outline which follows will provide the information and actions needed to meet the criteria of either Recovery Option A or B.

STEP-DOWN OUTLINE

1. Protect and manage the habitat of *Triodopsis platysayoides* throughout its range.

   1.1 Determine total distribution by conducting systematic surveys along sandstone cliffs of the Cheat River Canyon and at similar outcrops within a 25-mile radius of Cooper's Rock.

   1.2 Protect locations outside Cooper's Rock State Park which support *T. platysayoides*.

      1.2.1 Determine land ownership of snail habitats.

      1.2.2 Evaluate options for protection--cooperative agreements, easements and acquisitions.

      1.2.3 Determine and implement the most practical methods of protection.

   1.3 Determine impacts of recreational activities in State Park/Forest.

      1.3.1 Determine periods of snail activity/inactivity.

      1.3.2 Determine microhabitats used by snail during active and inactive periods.

      1.3.3 Determine intensity, timing, and location of recreational use in the State Forest.

1.4 Collect data on other potential threats to the species, including forest management practices, land use changes, collection of snails, predation, fire and acid rain.

1.5 Determine essential elements of the snail's habitat.

1.6 Develop and implement a Management Plan for the species in Cooper's Rock State Park in cooperation with State Park/ Forest and Wildlife Division personnel (degree and type of protection necessary will depend on results of tasks 1.1 through 1.5).

2. Establish a long-term monitoring program to determine population and habitat trends and evaluate the success of recovery measures.

2.1 Develop a systematic monitoring methodology.

2.2 Implement monitoring program.

NARRATIVE

1. Protect and manage the habitat of Triodopsis platysayoides throughout its range.

This is the key element in the recovery of this species. However, because the habitat requirements, limiting factors, and distribution of Triodopsis are very poorly understood, a great deal of basic information must be gathered before this element can be fully accomplished.

1.1 Determine total distribution by conducting systematic surveys along sandstone cliffs of the Cheat River Canyon and at similar outcrops within a 25-mile radius of Cooper's Rock.

Priority has been given to this task primarily because it must be completed before we determine which recovery option to pursue. Few of the other steps necessary to bring about recovery of this species can be completed until a concerted effort has been made to determine the species' distribution. Furthermore, there should be a solid basis for any recommendations that may be made in the future for limiting recreational use of any part of Cooper's Rock State Forest, since it is the most heavily utilized State Forest in West Virginia. This task and the majority of tasks 1.2, 1.3 and 1.5 must be completed before any park management plan intended to protect the snail is developed.

1.2 Protect locations outside Cooper's Rock State Park which support T. platysayoides.

The total area to be protected and, to a lesser extent, the degree of protection needed will depend on the findings of Task 1.1.

1.2.1 Determine land ownership of snail habitats.

County courthouse records and any information available from the West Virginia Chapter of the Nature Conservancy will be utilized to complete this task.

1.2.2 Evaluate options for protection--cooperative agreements, easements and acquisitions.

The feasibility of cooperative agreements will be evaluated based on information concerning current land-use practices and discussions with landowners, where appropriate. Where such agreements are not feasible (or where unusually significant habitat occurs) easements or acquisition will be given greater consideration.

1.2.3 Determine and implement the most practical methods of protection.

The most practical methods of protection, with the funds available, will be determined. Although any land acquisition should probably await the completion of

Task 1.1, discussions and establishment of cooperative agreements with landowners should proceed as new sites supporting T. platysayoides are found.

1.3 Determine impacts of recreational activities in State Park/Forest.

This task involves gathering specific information on time periods and locations of snail activity and of human recreational activity in Cooper's Rock State Park to provide a basis for accurately determining potential for conflict between snail and human usage.

1.3.1 Determine periods of snail activity/inactivity.

It is currently believed that maximum activity occurs during April and May. However, little work has been done to determine if snail activity occurs in the fall or follows summer rains.

1.3.2 Determine microhabitats used by the snail during active and inactive periods.

To pinpoint exact areas utilized by snails, living specimens must be observed and locations plotted during periods of maximum activity.

1.3.3 Determine intensity, timing, and location of recreational use in the State Forest.

Areas impacted by human recreational activities should be plotted and timing noted to determine if such activities adversely affect the snails.

1.4 Collect data concerning other potential threats including forest management practices, land use changes, collection of snails, predation, fire, and acid rain.

Forest management practices, proposed recreational developments and land use changes will be reviewed with the State Forest Service to determine if there are any potential effects on Triodopsis. If so, modifications will be discussed and studied, as appropriate.

A past history of fires in the State Forest will be compiled and potential for future fires and their effects on the snail evaluated.

A determination will be made as to whether collection of the snails is a threat to the species.

Information concerning acid rain and air pollution in northern West Virginia will be collected. Because of the low $CACO_3$ content of rocks and soils in the Cooper's Rock Area, acid rain may be especially significant here. Existing studies

on this phenomenon will be reviewed to determine potential impacts of lichens, upon which Triodopsis feeds, in the Cooper's Rock Area.

Not all of the data called for in this task can be gathered prior to the development of a park management plan (Task 1.6) aimed at protecting the snail.

1.5 Determine essential elements of the snails' habitat

To successfully protect or manage the species, it is necessary to understand what features of the environment are critical to the completion of all aspects of the species' life cycle. Especially important are substrate, cover, space, food, and reproductive requirements. Completion of Tasks 1.3.1 and 1.3.2 will provide at least a partial understanding of these requirements. The methods of Lawrey (1980) may serve as a valuable model for determining the food habits of this species.

1.6 Develop and implement Management Plan for the species in Cooper's Rock State Park in cooperation with State Park/ Forest and Wildlife Division personnel.

The information gathered in completing tasks 1.1, 1.3 and 1.5 and the initial results of 1.4 should be sufficient to develop a park management plan which will provide protection for this

species' habitat while still meeting other major park goals. Because all of the data called for in Task 1.4 cannot be gathered prior to development of this management plan, the plan should be periodically updated to consider new data as it becomes available.

2. Establish a long-term monitoring program to determine population and habitat trends and evaluate the success of recovery measures.

This task must be completed to determine if success in maintaining a stable population of T. platysayoides has been achieved.

2.1 Develop a systematic monitoring methodology.

It is unlikely that any method can be developed to accurately census the numbers of this snail without having a serious adverse impact on the snail and its habitat. Instead, periodic systematic surveys should be undertaken in known habitats to determine whether the number and extent of the known populations has decreased and to evaluate the quality of the snails' habitat. A methodology to effectively do this without adversely affecting this species is needed.

2.2 Implement monitoring program.

An effective monitoring program must be established and continued for at least a ten-year period in order to achieve this recovery plan's goals.

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PART III

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

FLAT-SPIRED THREE-TOOTHED SNAIL RECOVERY PLAN

Plan Status: Final

General Category	Plan Task	Task #	Priority	Task Duration	Responsible Agency	Fiscal Year Costs (Est.) 1983	1984	1985	Comments/Notes
I-1	Determine total distribution	1.1	1	3 years	FWS (Region 5) DNR (WRD)	2500 2000	2600 2000	2700 2000	
I-14	Determine land ownership	1.2.1	1	3 years	DNR (WRD)		1000	1000	
I-4	Evaluate options for protection	1.2.2	1	3 years	DNR (WRD)		1000	1000	
A-1	Determine and implement protection	1.2.3	1	3 years	DNR (WRD)		1000	2000	
R-14	Determine periods of snail activity	1.3.1	1	2 years	FWS (Region 5)		4000	4000	By contract
R-3	Determine snail microhabitats	1.3.2	1	2 years	FWS (Region 5)		2000	2000	By contract
I-14	Determine recreational use	1.3.3	1	1 year	DNR (DPR)		1000		
I-14	Collect data concerning potential threats	1.4	2	3 years	DNR (WRD)		2000	2000	
R-3	Determine essential elements of habitat	1.5	2	2 years	FWS (Region 5)		3000	3000	By contract
M-3	Develop and implement management plan	1.6	1	ongoing	DNR (WRD & DPR) FWS (Region 5)				The management plan would not be developed until after 1985
R-1	Develop a systematic monitoring methodology	2.1	1	1 year	FWS (Region 5)		6000		By contract
I-1	Implement monitoring program	2.2	1	ongoing	DNR (WRD) FWS (Region 5)		1500 1500	1500 1500	

DNR - W. VA Department of Natural Resources
DPR - W. VA Division of Parks and Recreation
FWS - U. S. Fish and Wildlife Service
WRD - W. VA Wildlife Resources Division

APPENDIX A

LIST OF REVIEWERS

State of West Virginia
Division of Wildlife Resources
Department of Natural Resources
Operations Center
P.O. Box 67
Elkins, WV 26241

State of West Virginia
Division of Parks and Recreation
Department of Natural Resources
1800 Washington Street, East
Charleston, WV 25305

Mr. Leslie Hubricht
4026 35th Street
Meridian, MS 39301

Dr. Alan Solem
Department of Zoology
Field Museum of Natural History
Chicago, IL 60605