RECOVERY PLAN

ROYAL SNAIL

(Pyrgulopsis ogmorhaphe)

U.S. Fish and Wildlife Service
Southeast Region
Atlanta, Georgia

RECOVERY PLAN

for

Royal Snail (*Pyrgulopsis ogmorhaphe*)

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Date: August 11, 1995

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Literature citations should read as follows:

U.S. Fish and Wildlife Service. 1995. Royal Snail Recovery Plan. Atlanta, GA. 20 pp.

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EXECUTIVE SUMMARY

Current Status: The royal snail is known from only two spring runs flowing out of two caves in the Sequatchie River system in Marion County, Tennessee. It is found in Blue Spring, which is the water supply for the town of Jasper, Tennessee, and downstream to the State Highway 64 bridge for about 0.5 mile (0.81 kilometer). Downstream of the bridge, suitable habitat (as currently known) appears unavailable. The royal snail is also found in Owen Spring, about 4 miles (6.4 kilometers) northeast, up the Sequatchie River valley. This Tennessee endemic is listed as endangered. No critical habitat has been designated for the species.

Habitat Requirements and Limiting Factors: Potential degradation of the water quality of the two spring runs is the most significant threat to the species' continued survival. Because the royal snail is believed to have a 1-year life cycle, it is subject to sudden extinction should its habitat deteriorate, even for a short term, to the point where a single year's reproduction fails or is significantly reduced. Human-related activities that could prove detrimental to the water quality of the spring runs (by causing and/or increasing siltation, nutrient, or pollutant loading, or by altering water levels, temperature, or pH) include, but are not limited to, increased development, indiscriminate logging and other land use changes, stream alteration (such as channelization or impoundment), excessive water withdrawal from the aquifer that supplies the springs, road and bridge construction, runoff of pesticides and fertilizers, leachate from septic systems and coal mines, and other point and nonpoint pollution discharge. Further, these impacts could possibly come from distant sources because the recharge areas for the springs could extend for several miles.

The introduction or invasion of nonnative species into either spring run inhabited by the royal snail poses another serious threat. The invasion or introduction of nonnative aquatic weeds into the spring runs could eventually result in the elimination of the habitat required by the royal snail and require intensive and potentially harmful control measures. Another concern is the possible invasion by the zebra mussel (*Dressena polymorpha*). The tremendous filtering activity exerted by high-density populations of the nonnative species could disrupt the natural food chain and affect entire aquatic communities.

Recovery Objective: The recovery objective is to maintain self-sustaining populations of the royal snail in both of the spring runs it is presently known to inhabit and protect its habitat from present and foreseeable threats. Based on available information concerning the range, biology, and threats to its continued survival, delisting of the royal snail does not appear to be feasible.

Recovery Criteria: The species' biology and restricted distribution make it unlikely that the royal snail can be sufficiently protected from all threats associated with potential degradation and alteration of the water and/or habitat quality of the spring runs it inhabits. Delisting is unlikely. However, as additional data on the species and threats to its continued existence are obtained, the potential for developing the recovery criteria will be reevaluated.

Actions Needed:

1. Protect the existing population and essential habitat.
2. Identify threats to the species, conduct research necessary for the species' management, and implement management where needed.
3. Develop artificial holding and propagation techniques and, if feasible, establish captive populations.
4. Develop and implement cryogenic techniques to preserve the species' genetic material.
5. Develop and implement a program to monitor royal snail population levels and water and/or habitat conditions of each of the spring runs.
6. Annually assess the overall success of the recovery program and recommend action (changes in recovery objectives, continue to protect, implement new measures, other studies, etc.).

Cost ($000s):

Year	Need 1	Need 2	Need 3	Need 4	Need 5	Need 6	Total
1996	20.0	10.0	12.5	20.0	3.0	1.5	67.0
1997	3.0	17.5	12.5	20.0	3.0	1.5	57.5
1998	3.0	17.5	5.0	1.0	3.0	1.5	31.0
1999	2.0	3.0	1.0	1.0	3.0	1.5	11.5
2000	2.0	3.0	1.0	1.0	3.0	1.5	11.5
2001	2.0	3.0	1.0	1.0	3.0	1.5	11.5
2002	2.0	3.0	1.0	1.0	3.0	1.5	11.5
2003	2.0	3.0	1.0	1.0	3.0	1.5	11.5
2004	2.0	3.0	1.0	1.0	3.0	1.5	11.5
2005	2.0	3.0	1.0	1.0	3.0	1.5	11.5
2006	2.0	3.0	1.0	1.0	3.0	1.5	11.5
TOTAL	42.0	69.0	38.0	49.0	33.0	16.5	247.5

Date of Recovery: Total recovery is unlikely for this species.

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PART I

INTRODUCTION

On April 15, 1994, the U.S. Fish and Wildlife Service (Service) listed the royal snail (*Pyrgulopsis ogmorhaphe*) as an endangered species (Service 1994). Critical habitat was not designated. This species has been recorded from only two spring runs (Owen Spring/Town Creek and Blue Spring) in the Sequatchie River valley of Marion County in southeastern Tennessee. Its continued existence is dependent upon maintaining the water and habitat quality of these two sites.

Description, Ecology, and Life History

The royal snail (*Marstonia ogmorhaphe*) was described by Thompson (1977) and was later reassigned to the genus *Pyrgulopsis* by Hershler and Thompson (1987). The royal snail is a small, presumably annual species (usually less than 5 millimeters [0.2 inches]), distinguished from other closely related species by: (1) its relatively large size; (2) its large number of whorls (5.2 to 5.8); (3) its deeply incised suture, producing strongly shouldered whorls that are almost flat above; (4) its complete aperture that is broadly ovate in shape with a rounded posterior corner; (5) its outer lip that is slightly arched forward in lateral profile; (6) its thin shell; (7) its conical-terete shape; and (8) its enlarged bursa copulatrix with a completely exposed duct (Thompson 1977).

The royal snail is known from only two spring runs flowing out of two caves in the Sequatchie River system in Marion County, Tennessee. It is found in Blue Spring, which is the water supply for the town of Jasper, Tennessee, and is also found downstream, for about 0.5 mile (0.8 kilometer), to the State Highway 64 bridge. Downstream of the bridge, suitable habitat (as currently known) appears absent. The royal snail is also found in Owen Spring, about 4 miles (6.4 kilometers) northeast, up the Sequatchie River valley. Owen Spring is in a public park owned by the Tennessee Department of Transportation, but the park is in the process of being transferred to county ownership. The snail is found in about a 50-meter (150-foot) stretch of the spring outflow, about 50 meters (150 feet) from where surface flow begins. Royal snails are generally found in the diatomaceous "ooze" and on leaves and twigs in the quieter pools downstream from the spring source. No other life history information is known.

No populations of the royal snail are known to have been lost. However, the general deterioration of water quality in the region from siltation and other pollutants contributed by coal mining, poor land use practices, and waste discharges have the potential to impact the species and could result in a serious, irreversible decline. Most of these impacts are likely to come from discharges within the recharge area of the springs and not from direct spring impacts.

Additionally, because both existing populations inhabit extremely limited areas, they are vulnerable to extirpation from accidental toxic chemical spills or vandalism.

Distribution and Threats to Its Continued Existence

The royal snail is found in only two spring runs in Marion County, Tennessee. The species has never been taken from outside these two areas. Specimens have not been reported in the spring runs from more than 0.5 mile (0.8 kilometer) downstream of the surface flow of the springs.

Potential degradation of the water quality of the two spring runs is the most significant threat to the species' continued survival. Because the royal snail is believed to have a 1-year life cycle, it is subject to sudden extinction should its habitat deteriorate, even for a short period, to the point where a single year's reproduction fails or is significantly reduced. Human-related activities that could prove detrimental to the water quality of the spring runs (by causing or increasing siltation, nutrient, or pollutant loading or by altering water levels, temperature, or pH) include, but are not limited to, increased development, indiscriminate logging and other land use changes, stream alteration (such as channelization or impoundment), withdrawal of water, road and bridge construction, runoff of pesticides and fertilizers, leachate from septic systems and coal mines, and other point and nonpoint pollution discharge. Further, these impacts could possibly come from distant sources because the recharge areas for the springs could extend for several miles. Information received from the U.S. Department of the Interior, Office of Surface Mining (OSM), states the following:

> ...information currently available to OSM does not indicate the presence of active or proposed mining in the recharge area [as determined by ground water divides associated with stream valley dissection of overlying caprock of the Southern Cumberland Plateau] for either spring.

However, OSM also states that "...it is not unlikely that applications for mining within the potential recharge areas may be received in the future...."

The introduction or invasion of nonnative species into either spring run inhabited by the royal snail poses another serious threat. The invasion or introduction of nonnative aquatic weeds (e.g., *Hydrilla*) into the spring runs could result in the elimination of the habitat required by the royal snail and require intensive and potentially harmful control measures. Another concern is the zebra mussel (*Dressena polymorpha*). There is fear that the tremendous filtering activity exerted by high-density populations of this species could disrupt the natural food chain and affect entire aquatic communities of infested lakes and streams (Weigmann *et al.* 1991). However, it is not clear whether the zebra mussel can colonize headwater streams such as those occupied by the royal snail.

PART II

RECOVERY

A. Recovery Objectives

The Fish and Wildlife Service's goal in developing and implementing recovery plans is to recover a species to the point where Endangered Species Act protection is no longer required. This is often accomplished through the establishment and protection of some specified number of self-sustaining populations throughout a significant portion of the species' historic range. A self-sustaining population is a reproducing population that is large enough to maintain sufficient genetic variation to enable it to survive and respond to natural habitat changes without intensive management. These populations must be sufficiently dispersed or must occur on large enough tracts to ensure their perpetuation. However, based on available information concerning the range, biology, and threats to its continued survival, recovery of the royal snail does not appear to be likely (unless other populations are discovered or established in some presently unknown historic habitat). It is doubtful that the royal snail can be sufficiently protected from all threats associated with potential degradation or alteration of the water and/or habitat quality of the spring runs it inhabits. Therefore, delisting is unlikely. However, as additional data on the species and threats to its continued existence are obtained, the potential for developing the recovery criteria will be reevaluated.

Accordingly, the objective of this recovery plan is to protect and maintain self-sustaining populations of the royal snail in the two known sites, to protect its habitat from present and foreseeable threats, and to downlist the species to threatened.

B. Narrative Outline

1. Protect the existing populations and essential habitat. The royal snail occurs in only two spring runs in the Sequatchie River valley, Marion County, Tennessee. Although there are many other springs in the Sequatchie River valley and other southeastern Tennessee counties, the royal snail has never been found outside its present range. Because the species is believed to have a 1-year life cycle, it depends upon successful reproduction each year for its survival. Any activity, incident, etc., adversely affecting the water or habitat quality of the springs, even for brief periods during a given year, could result in the extinction of the royal snail. All actions and activities around the springs and their watersheds must be carefully reviewed, planned, and implemented with the protection of the royal snail in mind. Lack of proper protection and management of these populations and the springs will ultimately lead to the species' extinction.

   1.1 Utilize existing legislation and regulations (Federal Endangered Species Act, Federal and State water quality regulations, stream alteration regulations, surface mining laws, etc.) to protect the species and its habitat. Degradation of the water quality of the springs appears to be the most significant potential threat to the survival of the royal snail. Complete compliance with Federal and State laws and regulations designed to protect water and habitat quality must be ensured if the species is to survive. Unless this objective is met, any other recovery activities would be futile.

   The current use classification for the current occupied range of the royal snail is *Fish and Aquatic Life, Recreation, Irrigation*, and *Livestock Watering* and *Wildlife*[1]. At a minimum, the current occupied range of the royal snail should be classified by the State of Tennessee as *Fish and Aquatic Life*, with existing water quality standards governing this use classification. The existing water quality standards defined for *Fish and Aquatic Life* will be considered protective of the royal snail unless new information is provided to the contrary.

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[1]State of Tennessee. September 1991. Rules of the Department of Environment and Conservation, Bureau of Environment, Division of Water Pollution Control: Chapter 1200--4--4, Rule 1200--4--4--.01. Pp. 348 and 349.

The Fish and Wildlife Service should work with the State of Tennessee to have the springs added to the 305(b) report as being "threatened not to meet use" based on the *Fish and Aquatic Life* classification. This threat is on the recharge area being contaminated by changes in land use that would threaten water quality. Additionally, this will further assist the town of Jasper, Tennessee, in maintaining a healthy drinking water supply.

The Environmental Protection Agency's (EPA) Wellhead Protection Plan should also be investigated as a possible tool to protect the springs.

1.2 Work with appropriate Federal and State regulatory and review agencies to identify and assess projects and/or activities that could have negative effects on the species and to ensure incorporation of measures for protecting the species and its habitat into such activities. Through Section 7 of the Endangered Species Act, the Fish and Wildlife Coordination Act, Clean Water Act, etc., Federal and State regulatory and review agencies must work together to carefully evaluate and identify actions and activities that have the potential to adversely affect the species and/or its habitat. Once impacts have been identified, regulatory and/or permitting agencies must utilize their authorities to ensure that the species and its habitat are adequately protected.

1.3 Solicit help in protecting and enhancing the species and its essential habitat. The assistance and support of conservation groups, local governments, and regional and local planners will be essential in meeting the goal of maintaining the royal snail. Also, the support of local industrial, business, and agriculture communities, as well as local residents, is vital. Construction, forestry, and agricultural "best management practices" must be implemented by all landowners. Local and county land use planning must be designed and implemented to protect the royal snail and its watersheds. Individuals should be educated regarding the natural processes of the springs, how human activities influence these processes, and measures needed to protect the springs and the royal snail. Without a continuing commitment from the local people who have an influence on the water and habitat quality of the springs, any efforts to maintain the royal snail will meet with little success.

1.3.1 Meet with local government officials and regional and local planners to inform them and solicit their support for the protection of the species and its essential habitat.

1.3.2 Meet with local business, farming, logging, and industry interests and solicit their support; where feasible, provide them assistance in implementing protective actions.

1.3.3 Develop an educational program using such items as slide/tape programs, brochures, etc. Present this material to business groups, civic groups, schools, church organizations, etc. Educational material outlining the goals and emphasizing the benefits of maintaining and upgrading habitat quality will be extremely useful in informing the public of our actions and implementing Tasks 1.3.1 and 1.3.2.

1.4 Encourage the establishment of high-quality water designations, buffer zones, conservation easements, and other protection strategies. The Service should work with the appropriate State agencies in Tennessee to have special status assigned to the springs and their recharge areas, which would provide increased protection to the royal snail.

During the triennial review of the State of Tennessee's program, the EPA should encourage the State's development of a high quality surface use classification. EPA should encourage the State's development of such a use classification to include waters that (1) provide habitat for ecologically significant populations of aquatic or aquatic-dependent life (i.e., State or Federal lists of rare, special concern, threatened or endangered plant and animal life), (2) provide specialized activities related to existing water quality (i.e., recreation, State Heritage, historical), (3) have outstanding scenic or geologic values, and (4) have conditions that are better than the most restrictive water quality standards.

1.4.1 Determine the recharge areas for both springs. To most effectively protect the quality of the water in the springs, the surface area recharging the systems must be determined. This will not only benefit the snail but will also help the city of Jasper, Tennessee, better protect its water supply.

1.4.2 Work with landowners to establish conservation management agreements (or similar arrangements) for areas occupied by the royal snail and any adjacent areas that would aid in its protection (buffer zones). To provide the most effective habitat protection for the quality of the water in the spring and stream habitat, land mangers within the recharge area of the spring or stream should be informed as to what they can do to benefit the snail. Using existing financial incentives, such as the Service's Partners for Wildlife program, encourage landowners to manage their land in a way that benefits the snail. Again, this will not only benefit the snail but will also help the city of Jasper better protect its water supply.

2. Isolate threats to the species, conduct research necessary for the species' management, and implement management where needed.

2.1 Conduct research on the species and characterize the specific habitat requirements (relevant physical, biological, and chemical components) for all life history stages. Detailed knowledge of the habitat requirements of the species; water quality parameters (temperature, dissolved oxygen, etc.); community structures of associated flora and fauna; and how these biotic and abiotic factors interact and affect reproduction, growth, and mortality rates of the royal snail is needed in order to focus management and recovery efforts on specific problems within the species' habitat. Knowledge of the environmental requirements of all life history stages of the species and an understanding of the nature of the habitat occupied by the species are essential in order to manage for the species' long-term survival.

Assessment of the biotic and abiotic factors associated with the current occupied range of the royal snail should be described. An equally intensive survey of similar adjacent communities should also be completed. An analytical review of the two areas should be completed to determine if there are unique physical or biological features limiting the range of the royal snail. Indicator species and particulate organics should be investigated to determine if they are correlated with the royal snail's range.

If no limiting factors are found after the biotic community assessment has been completed, chemical analysis of the benthic substrate and water column should be undertaken to determine if

there is a chemical limiting factor. Because this is a shell-encapsulated mollusk, calcium studies for the availability of this mineral should be assessed to determine if this is a limiting factor. Currently there are no chemical factors suspected to be limiting the historic range of the species.

Concurrent with the physical and biological community assessments, detailed water quality parameters for the springs should be completed to obtain a baseline condition for comparison over time. These parameters should be as extensive as possible, with as broad an analysis of metals and pesticides as practical.

2.2 Determine the number of individuals required to maintain a viable population. Many species are well adapted to inbreeding, including many mollusks (Selander 1983), although their evolutionary longevity may be limited. In general, however, inbreeding depression can be a major obstacle to species recovery, especially if the remaining population sizes are small and/or have gone through some type of genetic bottleneck. The actual number of individuals in a population is not necessarily a good indication of a population's genetic viability; rather, the "effective population" size is needed. The effective population size is the size of an "ideal" population in which genetic drift takes place at the same rate as in the actual population (Chambers 1983). The effective population size is typically only one-third to one-fourth the actual population size (being affected by sex ratio, overlapping generations, generally nonrandom distribution of offspring, and nonrandom mating) (Soulé 1980). Some of these factors can be addressed under Task 2.1, while others will need to be addressed as part of this task.

2.3 Isolate and eliminate current and future threats to the species' survival. Water and habitat quality deterioration or alteration (by increasing siltation, nutrient, or pollutant loading or by altering water retention time, temperature, or pH) and the introduction or invasion of nonnative species appear to be the primary threats to the royal snail. Once specific ecological requirements have been identified (see Task 2.1), potential sources of these threats (and other potential threats) will need to be isolated and methods and effects of controlling and/or altering these sources will need to be

determined. To minimize and eliminate these threats, the information gathered in Task 2.1 must be utilized to target and correct specific problem areas and isolate the specific causative agent(s).

2.4 Based on the biological data and threat analysis, investigate the need for management, including habitat improvement. Implement management, where needed, to secure the species. Specific components of the royal snail's habitat may be stressed or threatened, and this may limit the species' potential for survival. Habitat improvement programs may be needed to alleviate these threats to the species.

3. Develop artificial holding and propagation techniques and, if feasible, establish captive populations. There is an immediate need to develop techniques for holding and propagating the royal snail to allow for the reestablishment or augmentation of the existing populations. Under present conditions, with the species occurring in only two small spring runs, it would be easy to lose one or both populations. This, coupled with the species' biology, makes the royal snail extremely vulnerable to extinction from a single catastrophic event or a combination of events or activities adversely affecting the two spring runs, even for a short period of time. Because the species is found in only two springs, reintroduction into other areas may not be appropriate or feasible. The development of artificial holding and propagation techniques and, if feasible, the establishment of captive populations would allow for the reestablishment of a population in the springs, if either or both of the populations were lost, or for population augmentation, if the present populations were significantly reduced in number to a point where their viability and survival were threatened. The number of individuals necessary to maintain viability will be determined in Task 2.2.

4. Develop and implement cryogenic techniques to preserve the species' genetic material. No attempts have been made to transport and hold royal snails or to develop artificial propagation techniques (Task 3 above). This may take a substantial period of time. Also, because of the species' biology, long-term maintenance of captive populations may not be feasible. Cryogenic preservation of the royal snail could indefinitely maintain genetic material (much like seed banks for endangered plants) from the extant populations. Once artificial holding and propagation techniques are developed, cryopreservation could then allow for the eventual creation and reestablishment of royal snail populations (if necessary), using genetic material preserved from that population without requiring the continuous maintenance of a captive population.

5. Develop and implement a program to monitor royal snail population levels and the water and habitat conditions of each of the spring runs. The status of the species and its habitat must be continually monitored to assess its condition and identify any potential problems. Quantitative samples should be taken to determine royal snail population densities and the chemical, physical, and biological quality of each of the spring runs. This monitoring should be conducted at least on an annual schedule.

6. Annually assess the overall success of the recovery program and recommend action (changes in recovery objectives, continue to protect, implement new measures, other studies, etc.). The recovery plan must be evaluated periodically to determine if it is on track and to recommend future actions. As more is learned about the species and as conditions change, recovery objectives may need to be modified.

C. Literature Cited

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Weigmann, D. L., L. A. Helfrich, R. Speenburgh, R. Neves, L. Kitchel, and S. Bruenderman. 1991. Zebra mussels pose a threat to Virginia's waters. Virginia Cooperative Extension Service, Publication 420-900. 5 pp.

PART III

IMPLEMENTATION SCHEDULE

Priorities in column one of the following Implementation Schedule are assigned as follows:

1. Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.

2. Priority 2 - An action that must be taken to prevent a significant decline in the species' population and/or habitat quality or some other significant negative impact short of extinction.

3. Priority 3 - All other actions necessary to meet the recovery objective.

Key to Acronyms Used in This Implementation Schedule

COE - U.S. Army Corps of Engineers
EPA - U.S. Environmental Protection Agency
FWS - U.S. Fish and Wildlife Service
LE - Law Enforcement Division of the U.S. Fish and Wildlife Service
NRCS - U.S. Natural Resources Conservation Service
R4 - Region 4 (Southeast Region), U.S. Fish and Wildlife Service
TDEC - Tennessee Department of Environment and Conservation
TE - Endangered Species Division of the U.S. Fish and Wildlife Service
TNC - The Nature Conservancy
TWRA - Tennessee Wildlife Resources Agency
USGS - U.S. Geological Survey

ROYAL SNAIL IMPLEMENTATION SCHEDULE

Priority	Task Number	Task Description	Task Duration	Responsible Agency FWS	Responsible Agency Other	Cost Estimates ($000s) FY1	FY2	FY3	Comments
1	1.1	Utilize existing legislation and regulations to protect the species and its habitat.	Continuous	R4/TE and LE	COE, EPA	---	---	---	
1	1.2	Work with appropriate Federal and State agencies to identify actions that could negatively affect the species and incorporate protective measures into such actions.	Continuous	R4/TE	COE, EPA, TDEC, TWRA, NRCS	---	---	---	
1	1.4	Encourage the establishment of outstanding resource water designations and other protective strategies as a means of protecting the species.	Ongoing	R4/TE	COE, EPA, TDEC, TWRA, NRCS, TNC	---	---	---	
1	1.4.1	Determine recharge areas for both springs.	2 years	R4/TE	Contract or USGS	15.0	15.0	---	
See comments.	2.3	Based on the biological data and threat analysis, investigate the need for management and implement where needed.	2 years	R4/TE	COE, EPA, TDEC, TWRA, NRCS	---	10.0	10.0	Priority 1, 2, or 3, depending on the result of 2.1, 2.2, 1.4.1, and 2.3.
2	1.3.1, 1.3.2	Meet with local government officials and business interests and solicit their support for recovery.	3 years	R4/TE	COE, EPA, TDEC, TWRA, NRCS, TNC	---	---	---	
2	1.3.3	Develop information and education program and present.	Ongoing	R4/TE	TWRA, TNC	3.0	1.0	1.0	Task duration: 1 year to develop, then continuous.
2	1.4.2	Work with landowners to establish agreements for areas occupied by the snail and any adjacent areas that would aid in its protection.	Ongoing	R4/TE	TWRA, TNC	2.0	2.0	2.0	

ROYAL SNAIL IMPLEMENTATION SCHEDULE (continued)

Priority	Task Number	Task Description	Task Duration	Responsible Agency FWS	Responsible Agency Other	Cost Estimates ($000s) FY1	FY2	FY3	Comments
2	2.1 2.2 2.3 2.4	Conduct research necessary for the species' protection and management; i.e., habitat requirements, biology, and threat analysis.	3 years	R4/TE	TWRA	10.0	7.5	7.5	
2	3	Develop artificial holding and propagation techniques and, if feasible, establish captive populations.	Ongoing	R4/TE	Contract	12.5	12.5	5.0	Annual cost should remain relatively constant after techniques established.
2	4	Develop and implement cryogenic techniques.	Ongoing	R4/TE	Contract	20.0	20.0	1.0	Annual cost should remain relatively constant after techniques established.
2	5	Develop and implement a monitoring program.	Ongoing	R4/TE	TWRA	3.0	3.0	3.0	
3	6	Annually assess the overall success of the recovery program and recommend action.	Ongoing	R4/TE	TWRA	1.5	1.5	1.5	

PART IV

LIST OF RECIPIENTS

The following agencies, organizations, and individuals were mailed copies of this recovery plan. This does not imply that they provided comments or endorsed the contents of this plan.

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