Appendix B-8

LAKE TAHOE RESTORATION PROJECTS
ESTIMATED DIRECT COSTS & KEY MILESTONE DATES

Project Name: Continued Implementation of the Conservation Strategy for the Tahoe Yellow Cress (*Rorippa subumbellata*)
Agency: U.S. Forest Service, Lake Tahoe Basin Management Unit; U.S. Fish and Wildlife Service
Prepared by: Jody Fraser
Phone: (530) 543-2842 EIP #: 10159
SNPLMA Project #:_____

Identify estimated costs of eligible reimbursement expenses:

1. Planning, Environmental Assessment and Research Costs (specialist surveys, reports, monitoring, data collection, analysis, NEPA, etc.)	$ 14,000	8	%
2. Direct Labor (Payroll) to Perform the Project	$ 45,000	27	%
3. Project Equipment (tools, software, specialized equipment, etc.)	$ 18,000	11	%
4. Travel (including per diem where official travel status required to carry out project, such as serve as COR, experts to review reports, etc.)	$		%
5. Official Vehicle Use (pro rata cost for use of Official Vehicles when required to carry out project)	$ 3,000	2	%
6. Cost of Contracts, Grants and/or Agreements to Perform the Project	$ 70,000	42	%
7. Other Direct Costs (direct labor for agency personnel to do education and outreach)	$ 3,000	2	%
8. Indirect Costs (10% of lines 1 – 6)	$ 15,000	9	%
TOTAL:	$ 168,000	100	%

Estimated Key Milestone Dates:

Milestones/Deliverables:	Date:
TYC soil analyses field data collection	November 30, 2006
Reproductive biology/metapopulation dynamic studies- data collection	December 31,2006
Ident. & protection materials available for partners	January 15, 2007
Conference presentations to private partners	August 2006
Protective structures and 2007 TYC installation	June 15, 2007
2006 data analysis and annual report	June 30, 2007
TYC soil analyses final report	June 30, 2007
Conference presentations to private partners	August 2007
2007 field monitoring, seed collection, and interagency annual survey	September 30, 2007
Signage & fencing options available for private partners	October 31, 2007

Reproductive biology/,metapopulation dynamic studies- data analysis and interim report	December 31,2007
Reproductive biology- 2007 data collection	December 31,2007
Site management plan template	December 31, 2007
Visitor awareness campaign fully operational	March 30, 2007
Protective structures and 2008 TYC installation	June 15, 2008
2007 data analysis and annual report	June 30, 2008
Conference presentations to private partners	August 2008
2008 field monitoring, seed collection, and interagency annual survey	September 30, 2008
Reproductive biology/metapopulation dynamic studies- data collection	December 31,2008
Site management plans for 6 TYC populations	December 31, 2008
Protective structures and 2009 TYC installation	June 15, 2009
2008 data analysis and annual report	June 30, 2009
Reproductive biology/metapopulation dynamic studies- final reports	June 30, 2009
Classroom projects to protect TYC, understand biology	August 2009
2009 field monitoring, seed collection, and interagency annual survey	September 30, 2009
2009 data analysis and annual report	June 30, 2010
Final Completion Date:	January 2011

COMMENTS:

The Conservation Strategy for the Tahoe Yellow Cress calls for the continuation of the experimental program and monitoring components for at least 8 years, to allow exposure of the reintroduced populations to a full range of environmental variation. The experimental program began in 2003 and will ultimately inform the restoration and mitigation components of the Strategy. This project was funded in Round 5 and Round 6 of the SNPLMA program, and **the funding requested here will allow implementation to move forward through FT 2008 and the first two quarters of FY 2009.**

APPENDIX I

LAKE TAHOE CAPITAL PROJECT PROPOSAL

Project Name: Continued Implementation of the Conservation Strategy for the Tahoe Yellow Cress (*Rorippa subumbellata*)

Capital Focus Area: Watershed Restoration and Habitat Improvement (Objective 2)

EIP #: 10159

Lead Agency: U.S. Forest Service, LTBMU;
U.S. Fish and Wildlife Service

Contact: Jody Fraser, USFS; Steve Caicco, USFWS

Threshold: Vegetation

Phone Number: (530) 543-2842; (775) 861-6300

Threshold Standard: V-3, Sensitive Plants

Email Address: jsfraser@fs.fed.us; steve_caicco@fws.gov

Is this a multi-year Project?
(If "Yes", describe in the Detailed Project Description below number of years or phases and which year the requested funding will cover)
Yes

Total Project Cost: $850,000

Funding Request in this Round: $150,000

Project Summary (maximum 200 words):

This project continues implementation of actions identified in the Conservation Strategy (hereinafter, "Strategy") for Tahoe yellow cress (TYC). The Strategy outlines goals and objectives intended to facilitate recovery of TYC, improve TYC populations, and guide management and conservation activities to secure its survival into the future and to preclude the need to list under the Endangered Species Act. Successful implementation of the Strategy is expected to allow the States of California and Nevada to downlist or delist this species under their respective endangered species regulations, as well as reduce the regulatory burden for projects within the shorezone, by providing appropriate mitigation methods for potential impacts to the species.

The Strategy calls for the continuation of the experimental program and monitoring components for at least 8 years, to allow exposure of the reintroduced populations to a full range of environmental variation. The experimental program began in 2003 and will ultimately inform the restoration and mitigation components of the Strategy. This project was funded in Round 5 and Round 6 of the SNPLMA program, and **the funding requested here will allow implementation to move forward through FT 2008 and the first two quarters of FY 2009.**

Detailed Project Description:

Tahoe yellow cress is a rare plant species endemic to the shores of Lake Tahoe in California and Nevada. It was listed as endangered by the State of California in 1982 (California Fish and Game Code 2050 *et seq.*) and is considered endangered throughout its range by the California Native Plant Society. Tahoe yellow cress is state-listed as critically endangered in Nevada (Nevada Revised Statutes 527.270 *et seq.*), and is considered threatened by the Nevada Native Plant Society (Nevada Natural Heritage Program 2001). It is classified as a candidate species for

listing under the Endangered Species Act of 1973, as amended (64 FR 57533).

The Strategy was developed as a result of declining trends in population numbers and occupied sites during high water conditions and a lack of active management. Evidence suggests TYC is primarily threatened by the following: Alterations in lake level dynamics caused by construction and operation of the Truckee River outlet dam and reservoir; destruction of actual and potentially suitable habitat by the construction of piers, jetties, and other structures; high levels of recreational activity on beaches that support occupied and potentially suitable habitat; disturbance of the sand by public and private property maintenance activities; and possibly random environmental events. Because of the imminent threats facing the species, a task force was formed to develop and implement the Strategy for TYC, which is coupled with an agreement signed by the participating entities that demonstrates the commitment of all involved to the long-term protection of the species.

Successful implementation of the Strategy will provide two main benefits: 1) Identification of appropriate mechanisms to enhance and recover the species and 2) development of appropriate mitigation options that ensure protection for an adequate number of sites around the lake. The availability of these options will reduce the regulatory burden and the need to enforce strict species protections lake-wide, including federally listing the species. Securing the conservation of this species into the future will facilitate economic and conservation progress throughout the basin.

A program that fosters a greater awareness and understanding of TYC biology and conservation among private landowners and lakeshore visitors is a necessary component of implementing the Strategy and reducing the need for federal listing. Since 25 to 50 percent of TYC sites occur on private lakefront parcels, successful reintroduction, enhancement, and mitigation actions will require the use of both public and private lands. This project will provide landowners with information and tools to help them protect TYC on their beaches (fencing and signage as appropriate), as well as encourage them to conduct restoration actions on their property. This project complies with Nevada and California state endangered species laws regulating take of the species and it will specifically encourage public and private beach visitors to avoid TYC plants and respect protective fencing boundaries.

The information gained from this project will enhance our knowledge base regarding the biology and habitat requirements of the species and establish feasible mitigation measures for projects affecting TYC and its habitat. Data obtained from year to year, either through annual survey efforts or results of the studies included in this proposal, will be the basis for future conservation and management decisions and recommendations. As the ecological needs of the species become clear, key management questions (KMQs – identified below), the goals and objectives for conservation, and legal status will be revised appropriately.

<u>Funding Phases:</u>
Round 5 (completed): $100,000 for genetics, continuation of experimental reintroduction component, initiation of pilot translocation study, seed collection for 2006 nursery propagation and outplanting, monitoring, and annual survey effort and report.
Round 6 (being implemented): $350,000 for continuation of experimental reintroduction component, continuation of translocation/mitigation studies, seed collections for 2007 nursery propagation and outplanting, monitoring, and annual survey effort and report.

Round 7: $150,000 for continuation of experimental reintroduction component, continuation of translocation/mitigation studies, seed collections for FY08 nursery propagation and outplanting, monitoring, annual survey effort and report, and planning into the first two quarters of FY09.

Describe the goals and objectives of the project:

For each of the six goals identified below, the Strategy articulates a series of objectives and actions. This project proposal for Round 7 specifically addresses Goals 1 through 6 in part. All goals are interrelated and are designed to sustain TYC populations into the future while accommodating existing and future land uses.

Goal 1: Protect occupied habitat and potentially suitable habitat that does/could support natural populations.

This project includes protective fencing of both natural and experimental populations and will provide the necessary data for determining the habitat parameters that define "potentially suitable habitat".

Goal 2: Improve the size and persistence of TYC populations at core and priority restorations sites.

Reintroduction of propagated plants and/or seeds to appropriate habitats based upon our experimental program will increase the chance of overall project success of maintaining minimum stem counts (greater than 1200 stems for core sites).

Goal 3: Promote conditions that favor a positive metapopulation dynamic.

Monitoring data from experimental and natural populations will enable us to evaluate changes in the colonization/extirpation ratio in operation around the lake over an 8-year period.

Goal 4: Conduct research that directly supports management and restoration.

The ability to manage TYC is currently limited by our understanding of the biology of the species. Reintroduction experiments present the greatest opportunity for increasing our knowledge of TYC. An experimental design will enable us to determine the techniques, habitat conditions, and logistical factors that will optimize restoration efforts.

Goal 5: Revise and continue the monitoring program for TYC.

The project supports continued monitoring efforts and provides an assessment of the accuracy, efficiency, and utility of currently used methods.

Goal 6: Implement an adaptive management framework.

Project implementation is a cooperative effort being carried out under the auspices of the technical advisory group (TAG) with executive committee oversight. The TAG is a multi-agency and private interest task force comprised of biologists, public land managers, and representatives of private property owners and environmental groups. The experimental

approach of the proposed project will generate the demographic and physiological monitoring data to inform the adaptive management process.

In order to organize existing and future research related to TYC, five KMQs were developed. The KMQs that guide conservation and restoration research on TYC are intended to implement the Strategy by focusing research on the restoration of metapopulation dynamics in the context of changing lake levels and continued human activities. Within an adaptive management framework, the KMQs harness the power of a scientific approach while keeping the focus on generating information of immediate value to decision-making. The questions guide research to address specific, applied problems faced by land managers, agency regulators, and restoration biologists. The KMQs are as follows:

KMQ 1: Can TYC populations occupy any site around the lake margin that has sandy beach habitat?

KMQ 2: Are there ecosystem factors that can affect TYC performance within an occupied site or microhabitat?

KMQ 3: Can TYC populations be created or enlarged in order to restore the self-sustaining dynamics of the species?

KMQ 4: Can any TYC genotype perform equally well at any appropriate site?

KMQ 5: Can TYC microhabitats/places be found or created that are less likely to be adversely disturbed despite high visitor use or intense shoreline activity?

Describe the anticipated project accomplishments:

The proposed project includes five major components and the following anticipated accomplishments:

1. TYC reintroduction studies

The greenhouse propagation efforts will produce 4,500 container-grown TYC per year, with a 4-year total of 18,000. Over a 4 to 6 year period, a total of 14,000 second year plants and 4,000 third/fourth/fifth year plants could be transferred to restoration sites. Protective fencing will be installed at all experimental sites and maintained at naturally occurring population sites. Experimental data will inform KMQs and goals and objectives, aid in the development of site-specific management plans for restoration sites and inform the overall adaptive management process.

2. Reproductive biology/metapopulation dynamic studies

Greenhouse and field data on seed germination, viability, dormancy, storage longevity, and stolon longevity will provide important information on the factors that contribute to periodic colonization and extirpation events and will increase our ability to manage and promote the unique metapopulation dynamic of TYC.

3. TYC soils analyses

The experimental design for investigating physical and chemical soil characteristics will provide data for seven hypotheses related to specific KMQs. We will be able to determine if soil characteristics differ among TYC sites, if differences can be detected in the soil between occupied and unoccupied sites, and if gradients in the soil exist within an occupied site. In addition, we will examine if soil characteristics can be correlated to plant performance or proximity to nitrogen-fixing plant species. The final report will strive to provide a more thorough definition of potential TYC habitat.

4. Annual survey report and adaptive management recommendations

The annual reports will include all data from the annual field surveys including methods, results, and a discussion. A description of the year's conservation activities will include detailed research reports of all funded projects and updates on the TYC stewardship efforts. In addition, a detailed summary of all in-kind agency contributions of services, material, and personnel will help establish future fiscal needs.

A central feature of the annual report will be a set of recommended conservation activities for the following year. The TAG will develop recommendations from results of the annual survey and current and past research data that will guide the next year's management of individual sites as necessary. These recommendations will be forwarded to the executive committee for decisions.

5. Private landowner partnerships and visitor awareness

The TAG and the Friends of TYC will gain acceptance and participation of private landowners who recognize the need to protect TYC. In addition, visitors to public beaches will be more cognizant and respectful of protecting TYC from harm when they use the public beaches. Informational signs and protective fencing will be designed specifically for private landowners interested in participating in the program. Activities that landowners may voluntarily participate in include the following: Offering land for experimental efforts, fencing or signing existing plants to protect them, assisting in monitoring and annual survey efforts, or entering into conservation agreements for their property.

Describe the "readiness" of this project to move forward (Environmental documentation, etc.):

Annual survey reports continue to be produced subsequent to each field season. Participation in these efforts greatly increased when development of the Strategy began and remains high. This commitment by the partners ensures that the status of TYC will continue to be monitored and the appropriate conservation and management activities will be performed.

A pilot outplanting project was implemented in 2003 with the installation of 1,400 plants at four sites around Lake Tahoe. This pilot project proved to be a cost-effective way to discover and solve logistical problems associated with propagating, transporting, and reintroducing a rare plant to its historical habitat. Proceeding with a small-scale pilot design provided essential insight into developing protocols for site selection, outplanting, and monitoring, and the ability to obtain high quality data on TYC biology. The installation of fencing effectively reduced human and other impacts and prevented disturbance-induced founder mortality.

Phase I of the experimental reintroduction component was added in 2004 and over 2,700 plants were installed at four sites. Two of the installations were at new sites and two had been planted in 2003, bringing the total number of outplanting sites to six. All six sites were monitored for survivorship and other characteristics. Nearly 100 percent of the individuals in the 2003 cohort that survived through the first season returned in 2004 and survived to September. Phase II will build on the success of Phase I to further increase our understanding of TYC biology and management techniques.

In spring 2005, 3,000 plants were installed at selected sites and a pilot translocation experiment was initiated to test potential mitigation options. In the translocation component of the project, experimental plants from the 2003 and 2004 installation were moved to similar habitat at the same site. Current regulations limit TYC surveys to the window from June 15 to September 15, so translocations will be conducted at 3 times during this period. Habitat factors will also be evaluated in order to develop explicit potential mitigation prescriptions that specify when and how to move a TYC plant with the greatest amount of success. Other experimental variables will include habitat type both within and between sites. Future translocation testing will continue to use experimental plants to test different transplantation techniques and timing. Monitoring will continue through 2008.

Phase II of the experimental reintroduction component will continue with outplanting and monitoring in order to refine our understanding of TYC habitat requirements and increase the number of management strategies that are available for supporting the species. Data from Phase I suggest that both planting time and planting location on the beach influence the survivorship of TYC transplants. Phase II will test TYC performance in both optimal and suboptimal habitats and these data will be used to develop specific restoration prescriptions for TYC that could potentially be used in mitigation scenarios. Under current regulations, no mitigation measures are available and management options are limited. The results of Phase II will inform all five of the key management questions identified by the TAG and support the adaptive management of the species within the dynamic context of Lake Tahoe. This project supports the endangered species statutes of California, Nevada, and the Federal government and is one of the central elements of the TYC conservation strategy.

In addition, a stewardship subcommittee of the TAG continues to meet regularly with TLOA to develop and implement a voluntary program for landowners who wish to participate in conservation and management activities for TYC. Members of the TAG have presented information about the species and survey efforts at the TLOA annual stakeholders meeting for the past 3 years and will continue to participate in this educational program.

Implementation of the Strategy has been ongoing since 2003 and has received SNPLMA funding in Round 5 and Round 6. All necessary environmental compliance documentation has been completed for the early phases of this project where outplanting activities are planned or fencing will be installed. All permits for seed collection have been obtained from the responsible regulatory entity. Finally, coordination with the participating land managers has been conducted and all parties are prepared for the implementation phases. Subsequent site-specific environmental clearances would have to be completed for the restoration phase of the project.

Describe partnerships for this project. (Include documentation):

The following entities participated in the development of the Conservation Strategy for the Tahoe Yellow Cress and signed a Memorandum of Understanding/Conservation Agreement in 2003 demonstrating their commitment to the implementation of the strategy:

- Tahoe Regional Planning Agency
- US Forest Service - Lake Tahoe Basin Management Unit
- US Fish and Wildlife Service
- Nevada Division of State Parks
- Nevada Division of State Lands
- Nevada Division of Forestry
- Nevada Natural Heritage Program
- California Department of Fish and Game
- California Department of Parks and Recreation
- California Tahoe Conservancy
- California State Lands Commission
- League to Save Lake Tahoe
- Tahoe Lakefront Owners' Association

Additionally, BMP Ecosciences has been contracted to design and guide implementation of TYC outplanting, and has been involved in the project since its inception in 2000.

The Strategy is available upon request.

Describe the project monitoring that will be implemented as part of this project, including:

(1) The questions the monitoring program is designed to answer
(2) The monitoring approach
(3) Whether this project monitoring fits in to a larger monitoring or research program?

Monitoring for the experimental component will address lake level, habitat suitability, founder gene pool composition, initial plant vigor, and recreational impacts. The fate of every outplanted individual will be recorded, allowing subsequent calculations of mortality rates, survivorship to reproduction, and estimates of reproductive output. A minimum of five data collections will be conducted at each site, including a final assessment of seed output using previously developed models.

Demographic, physiological, and disturbance monitoring techniques developed for the 2003 pilot project were continued. A datasheet was developed to record the fate of every outplanted individual, allowing subsequent calculations of mortality rates, survivorship to reproduction, and estimates of reproductive output using models previously developed. Three of the land management agencies (USFS, CTC, and NDSP) committed personnel for outplanting and ongoing monitoring efforts throughout the 2004 growing season. Plants were evaluated at two weeks and four weeks after planting and thereafter on a monthly basis through October. Data collection parameters included: Plant position, seed source**,** phenology**,** vigor**,** initial and final plant size**,** and current status. Reproductive output was estimated based on an equation that links canopy size to seed output ($y=3.609x-109.542$, $r = 0.81$).

The water relations monitoring component measured physiological stress levels (i.e., xylem water potentials) of plants established at different hydrotopographic positions with respect to lake level. Water relations monitoring was conducted twice during the 2004 growing season; once in July and again in late September during peak reproduction.

Disturbance monitoring was conducted in conjunction with the demographic monitoring. Additional disturbance monitoring was conducted on July 5th in an attempt to document any impacts from the 4th of July weekend. At five times throughout the season, the monitoring crews made notes about the following possible disturbances in the plots: Footprints/body impressions, animal prints (especially dogs and Canada geese), trash, and any acts of vandalism, especially those affecting Tahoe yellow cress plants or the fence/signs. Photographs were taken of any significant disturbances and maps were generated to mark the areas of disturbance. Plot aisles and perimeters were raked smooth after all monitoring to obliterate any signs of disturbance and discourage people from entering the plots.

The annual surveys will continue to be performed the week following Labor Day each year. These surveys serve as the basis for status and trend analysis and have been conducted since 1979.

Describe how the project results will be communicated and made-available to the public.

Please refer to sections above that discuss stewardship and Friends of TYC. Efforts are also underway to utilize expertise from the University of Nevada, Reno, Cooperative Extension and the Lake Tahoe Environmental Education Coalition to further public involvement and knowledge of the species.

Further, the Interpretive Services staff will conduct public outreach at various locations (e.g., visitor centers, schools, public agencies) and during various events to educate the public concerning the principles, practices, and products of this project; an amount equal to two percent (2%) of the project costs is dedicated to this effort.

Include an 8 ½ X 11 map depicting the project.

The project will occur at specific locations in the shorezone. This map depicts the known locations of TYC in 2003.