INTEGRATED MEADOW RESTORATION AND GRAZING IN SHELL MEADOW

a. Detailed Project Description

Project Summary

High in the Sierra Nevada near Sonora Pass, a tributary to the Middle Fork Stanislaus River flows through Shell Meadow—a high-priority restoration site in the Stanislaus National Forest. The multiple benefits that the meadow provides, including important breeding habitat for the sensitive, endemic Yosemite toad, are at risk because of two headcuts eroding up the stream channel. If no action is taken, these headcuts will advance, the channel will incise, and the meadow's hydrology will be severely compromised. The meadow is within an active grazing allotment, but livestock have been excluded from the site due to the headcuts and the presence of sensitive amphibian habitat.

The project has three main goals. The first is to protect Shell Meadow and its associated high-quality aquatic and terrestrial habitats. The second is to assist the Forest Service in determining how grazing could be compatible with post-restoration management at the site by gathering the information necessary for a site-specific management plan. The third is to develop a project model that demonstrates both how to take preventative action to protect a meadow before full-scale degradation occurs and how to develop appropriate questions and solutions for integrating grazing with meadow management.

Shell Meadow provides an ideal location to address the issues of meadow restoration and grazing. Although many wet meadows in the Sierra are home to sensitive species few have such a wealth of data regarding the relationship between grazing and habitat. A significant three-year study was conducted (Determining the Effects of Livestock Grazing on Yosemite Toads and Their Habitat, Allen-Diaz, McIlroy, Tate, 2010) on the Stanislaus and Sierra National Forests that examined the role livestock grazing in montane meadows may play in the decline of Yosemite toad. In addition, there have been assessments completed on meadows near Shell that can provide critical comparison data to help inform ongoing management of Shell Meadow and similar meadows throughout the Forest. These sites are used for livestock management (grazing and gathering), and half of them have headcuts that threaten to severely degrade their hydrology and damage the Yosemite toad habitat that is present. This project will build on the existing database of information about these meadows to help jumpstart the discussion around how, when, and where to integrate grazing into meadow management. The monitoring effort proposed will build on baseline data and include tracking headcut advancement, forage utilization, and bank stability—all of which are key factors that shape livestock management procedures and are used to determine whether a site can be grazed or not. Absent such data, a discussion about site-specific management, grazing, and restoration can be delayed five to seven years in order to collect and analyze the necessary information.

Expected outcomes of the proposed activities include: 1) final restoration designs completed, 2) permits obtained for on-the-ground meadow restoration, 3) sufficient data collected to determine whether grazing could be compatible with meadow management after restoration, and 4) appropriate questions raised and addressed regarding how,

when, and where grazing could be re-introduced into meadow sites with sensitive habitat.

Final deliverables include: monitoring report with data analysis, complete restoration design, permits, request for bids, and draft contract for restoration implementation.

Project Goal and Outcomes

Offered by a strong partnership of American Rivers and the Stanislaus National Forest, this project is aimed at maintaining Shell Meadow's hydrologic function and the full range of ecosystem services that this high-priority meadow has the potential to lose if the headcuts continue to advance (including natural water storage, flood attenuation, cooling and filtering of water, aquatic and riparian habitat, and recreational values). The primary objectives are three-fold: 1) prevent active headcuts from eroding through Shell Meadow, 2) protect high-quality aquatic and terrestrial habitat, and 3) collect the information necessary for the Forest Service to develop a site-specific management plan and determine whether grazing could be resumed at this site in future. Below we list the anticipated near-term and long-term outcomes.

Near-Term Outcomes:

- Permitting and design complete so site is shovel-ready.
- Data collected to lay the groundwork for a site-specific management plan and determine whether grazing could be compatible with a restored Shell Meadow.
- Forage utilization and headcut advancement data collected on adjacent meadows to inform management decision-making and prioritization on other meadows that have Yosemite toad habitat, headcuts, and are grazed.

Long-Term Outcomes:

- Increased understanding of how, when, and where meadow restoration and grazing can be managed to increase meadow health and provide forage for livestock.
- Increase in meadow restoration projects that consider grazing as a management tool.
- Increased number of meadows restored, resulting in a suite of ecological benefits, including increased habitat and forage, increased water quality, and economic benefits including jobs and output to the regional economy.
- Project model available that demonstrates preventative restoration action and includes consideration of sensitive habitat, headcut advancement, and grazing

Scope of Work

The project is structured to proceed in a stepwise manner with five phases: 1) Assessment and Conceptual Restoration Designs; 2) NEPA Documentation; 3) Final Restoration Design and Pre-Restoration Monitoring; 4) Permitting; and 5) Implementation, Adaptive Management, and Post-Restoration Monitoring. The Forest Service (USFS) completed Phase 1 in summer 2012, and Phase 2 will be completed in winter of 2012/2013. Funding from the Sierra Nevada Conservancy is critical to implementing Phases 3 and 4 (final restoration design, pre-restoration monitoring, and pre-construction permitting) the final steps before on-the-ground restoration (Phase 5) can begin. Once these five phases are complete and restoration has occurred, the Forest Service can convene an interdisciplinary team to develop a site-specific management plan for Shell Meadow. This project will lay the groundwork for the

management plan and help to streamline the Forest Service process in making a grazing determination.

We are requesting $62,000 from SNC and will provide a match of $62,000 for a total project cost of $124,000. We have applied to the National Fish & Wildlife Foundation and Bella Vista Foundation for match funding and have received award notices. The project team is fully capable of all aspects of project management to ensure successful implementation. American Rivers will take the lead in project management and administration and will assist with monitoring. The Stanislaus National Forest will lead permitting, design and will also assist with monitoring.

b. Environmental Setting

Current Land Uses & Proposed Land Use Changes

Shell Meadow is located on a tributary to Niagara Creek, which flows into the Middle Fork Stanislaus River, on the Stanislaus National Forest. Dense forested stands shield the meadow from view from nearby roads, and recreational use is limited. Shell Meadow is three acres and is part of the Eagle Meadow grazing allotment. Although Shell was previously used by livestock, grazing has been excluded on the site for approximately 10 years for two primary reasons: Yosemite toad, a Forest Service sensitive species and a US Fish and Wildlife Service candidate threatened species, has breeding habitat in the meadow, and the headcuts are currently advancing toward that habitat. Ground disturbance associated with cattle grazing along this unstable section of channel has the potential to speed the advancement of the headcut toward the breeding habitat. Land use changes are not proposed at this time. However, stabilization of the headcuts as well as development of a site-specific meadow management plan by a Forest Service interdisciplinary team addressing the concerns of the Yosemite toad habitat would allow the forest to consider allowing grazing in this meadow in the future.

Consistency with Existing Plans

As the project site is located on land managed by the USFS, it does not fall within the jurisdiction of the city or county and thus is not included in any general plans. The project in line with the adopted Stanislaus National Forest Direction Plan and long-term management will be conducted in accordance with that plan.

Meadows, Sensitive Habitat, and Grazing Management

Mountain meadows are hotspots of biodiversity that support many native, rare, and sensitive species, and provide forage and water for grazing animals. Meadows also provide a distinct habitat in contrast with surrounding areas, and although they make up less than 10 percent of the region, their ecological importance is disproportionate to their size. Meadow habitats are especially beneficial for amphibians such as the Yosemite toad *(Bufo canorus).* Across the Sierra Nevada's National Forest lands, where almost half of native amphibian species are considered at risk, permitted livestock grazing is a notably controversial agricultural activity. Cattle-grazing is thought to degrade the quality of meadow breeding habitat for amphibian species of concern such as the endemic Yosemite toad. However, a 2010 study to determine the effects of livestock grazing on Yosemite toads and their habitat (Allen-Diaz, McIlroy, Tate, 2010) did not find a correlation between cattle use and toad occupancy of meadows. Rather, results strongly indicated that toad presence is driven by meadow hydrology. Yosemite

toad occupancy rates of meadows increased with meadow wetness, with wetter meadows providing superior breeding and rearing habitat.

Although the study did not find a correlation between grazing and toad occupancy rates, the presence of Yosemite toad habitat leads to cattle exclusion on a number of USFS meadows, including Shell Meadow. There are currently two USFS Sierra Nevada Forest Plan Amendment Standards (S&G) regarding Yosemite toad habitat that are applicable to Shell Meadow: S&G #53 and #54. S&G #53 requires that livestock be excluded from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads or identified as "essential habitat" in the conservation assessment for the Yosemite toad during the breeding and rearing season (through metamorphosis). S&G #54 states that "Exclusion in standard and guideline #53 above may be waived if an interdisciplinary team has developed a site-specific management plan to minimize impacts to the Yosemite toad and its habitat by managing the movement of stock around wet areas."

In the case of Shell Meadow, once restoration is complete and the headcuts in the meadow are repaired, an interdisciplinary team can be convened under S&G #54 to develop a site-specific management plan. This project will collect necessary data for this management plan and streamline the Forest Service process in making a grazing determination.

Monitoring to Improve Management

Not only will this project advance restoration of Shell Meadow, it will also provide a full picture of the range of management options available to the USFS for grazing on sites with advancing headcuts (like Shell) and generally improve management of similar meadows across the forest. This project includes monitoring on Shell Meadow and nine other meadow sites (Coyote, Bluff, Groundhog, Bloomer Lake, Hammill Canyon, Bull Run, Barn, Toad in the Road, and Wire Corrall). The monitoring on the additional sites will provide critical comparison data to help inform ongoing management of Shell Meadow and similar meadows throughout the Forest. The additional meadow sites were identified through a meadow assessment conducted by the USFS in 2010. These sites are used for livestock management (grazing and gathering), and half of them have headcuts that threaten to severely degrade their hydrology and damage the Yosemite toad habitat that is present. The monitoring effort will include tracking headcut advancement, forage utilization, and bank stability—all of which are key factors that shape livestock management procedures and are used to determine whether the site can be grazed or not.

Consistency with Proposition 84 Goals

This project directly supports the goals of Proposition 84, including contributing to the protection of rivers and streams, their watersheds and associated land and other natural resources. Healthy meadows provide outstanding natural benefits. Meadows store spring floodwaters and release cool flows in late summer, they filter out sediment and pollutants, produce high-quality forage and provide habitat for rare and threatened species. This project will demonstrate and validating restoration practices that will protect water quality, in-stream habitat, and water storage capacity, while retaining the cultural and economic values of a working landscape.

Consistency with SNC Program Goals and Mission
This project clearly aligns with SNC's mission to ensure environmental, economic and social well-being. Environmental benefits will be achieved through meadow restoration, which will maintain water storage capacity, downstream water quality, and productive habitat. Meadow restoration also provides many economic and social benefits, including improvement of water quality that benefits people, fish, and wildlife. The project will help to maintain forest resilience in the face of climate change and protect the carbon stored in Shell Meadow's wet meadow soils. In addition, this project provides substantive benefits across multiple SNC program areas, including: 1) Protect, conserve, and restore the Region's physical and living resources; 2) Protect water quality; and 3) Aid in the preservation of working landscapes.

Contributes to the Economic Viability of Sierra Ranches and Agricultural Lands
Not only is this project directly in line with Proposition 84 goals of watershed protection and restoration of natural resources, it also directly contributes to the Sierra Nevada Conservancy's Ranches and Agricultural Lands focus. Livestock grazing and meadows of the Sierra Nevada have a common history of more than 150 years. Ranching was the first industry in California following the Gold Rush, and ushered in a shift away from mining toward agricultural production. As mining decreased, sheep ranching for wool increased and by 1870, California led the nation in wool production (Ratliff 1985). During this period, grazing of sheep and cattle became the dominant use of meadows, which provided the bulk of the forage for many grazing allotments. In the early 1900s, the Department of Agriculture began to regulate grazing, and from the 1920s to the 1970s, grazing for cattle production generally declined on National Forest land in the Sierra.

Today, revenue from livestock-related agriculture in the Sierra exceeds $90 million per year and the market value of forage exceeds $75 million per year. Ranching remains an important component of the economic picture of rural communities in the Sierra. However, the question of whether to allow or prevent grazing on public meadows is a sensitive topic, with supporters on both sides. Although grazing is much more actively managed now than it was historically, there are many meadows that are severely degraded because of historic over-grazing and impacts from other land uses. Because of this, there is significant tension between environmental groups and those supportive of the ranching community around whether any grazing is compatible with resource management on National Forest and other lands.

Although there has been some research on meadows and grazing in the Sierra to help resolve this issue, including some data suggesting that grazing systems that are well-tailored to a particular meadow can support livestock without causing ecological degradation (SNEP 2006), there have been few attempts to craft win-win conservation strategies that restore both wildlife and livestock to Sierra's working meadows. With this project, we aim to effectively advance the discussion of whether grazing is a sustainable vegetation management practice compatible with restored meadows.

c. Work Plan and Schedule Narrative

Below we describe a detailed work plan that includes specific tasks and subtasks. In addition, we provide information on deliverables for each task, including a schedule of deliverables—details that are critical to ensure that the project will be implemented in a

timely manner. This schedule assumes a May 15, 2013 start date and January 31, 2015 end date. In addition, each task describes the project partners who are responsible for implementing the tasks and the methods that will be used. The project team is fully staffed, has strong working relationships and is ready to proceed once funding is made available. At present, there are no foreseeable factors affecting the project's timeline.

Task 1: Management and Performance Measures

The project team recognizes that project management and administration is a critical aspect of a successful project. Under this task, American Rivers will take the lead in fiscal management, reporting requirements including project performance, finalizing the work plan, developing and managing subgrants, convening project team meetings, developing and disseminating project information, and coordinating with the Sierra Nevada Conservancy.

Subtasks include:

1.1 Convene project team meetings
1.2 Finalize work plan and budget
1.3 Draft and finalize subcontracts/grants
1.4 Finalize and track performance measures
1.5 Manage project budget
1.6 Submit financial and performance reports
1.7 Draft and submit final report
1.8 Outreach and dissemination of project materials and results

Task 1 Deliverables	Responsible Partners	Due Date
Finalized work plan and budget	American Rivers	June 1, 2013
Signed subcontracts/grants with project partners	American Rivers	June 15, 2013
Biannual financial and performance reports	American Rivers with support from partners	December 15, 2013, June 15, 2014
Draft report	American Rivers with support from partners	January 15, 2015
Final report	American Rivers with support from partners	January 31, 2015

Task 2: Pre- and Post-Restoration Monitoring

The purpose of this task is three-fold: 1) to identify the range of data necessary for a USFS inter-disciplinary team to determine whether reintroducing grazing on Shell Meadow would be compatible with post-restoration management on the project site, 2) to gather the necessary data on Shell Meadow along with comparison data on multiple sites, and 3) to analyze and synthesize the collected data. Data will be collected at Shell Meadow and at the nine comparison sites described above (in the Monitoring to Improve Management section). Pre-restoration monitoring equipment has been in place since September 2012 and this task will include installation of additional equipment. Ongoing monitoring on these sites will include calculation of the advancement rate of the headcuts, the distance to Yosemite toad breeding pools, acreage of meadow that

could potentially be lost if the headcuts continue to advance, forage utilization (using exclusion cages) and bank stability.

Subtasks include:
2.1 Develop draft data collection work plan
2.2 Review and revise work plan
2.3 Finalize work plan
2.4 Install monitoring equipment and exclusion cages
2.5 Collect data and conduct surveys
2.6 Analyze data
2.7 Draft and finalize monitoring report
2.8 Disseminate findings

Task 2 Deliverables	Responsible Partners	Due Date
Final data collection work plan	American Rivers and USFS	July 15, 2013
Monitoring data collected	American Rivers and USFS	November 15, 2014
Analyzed data and monitoring report	American Rivers and USFS	January 15, 2015

Task 3: Permitting

The goal of this task is to obtain all permits required for restoration of Shell Meadow. The USFS is in the process of completing NEPA (completion expected in winter 2012/2013). Permits we will seek under this task include a Section 401 Water Quality Certification, a U.S. Army Corps of Engineers 404 Nationwide Permit #27, and a CEQA Categorical Exemption (under Title 14, Chapter 3, Article 19, Section 15333 of the California Code of Regulations, which exempts small habitat restoration projects less than five acres in size).

Subtasks include:
3.1 Draft and submit applications for 401 and 404 permits
3.2 Draft and submit CEQA documentation

Task 3 Deliverables	Responsible Partners	Due Date
Materials/applications required for permits	American Rivers, USFS	February 15, 2014
Completed permits (401 and 404)	American Rivers, USFS	June 30, 2014

Task 4: Final Restoration Design

Under this task, a final restoration design will be developed. This will involve design drawings and plans, a cost-estimate for restoration, contractor requirements, and other elements that will be included in a request for bids that will be announced at the end of the project term. The USFS will lead this task with support from project partners.

Subtasks include:
4.1 Prepare drawings of the preferred restoration design, including written descriptions of the design

4.2 Develop restoration cost-estimate and contractor requirements
4.3 Draft request for bids

Task 4 Deliverables	Responsible Partners	Due Date
Design drawings	USFS	July 15, 2014
Restoration cost-estimate and contractor requirements	USFS	August 15, 2014
Request for bids	USFS	September 1, 2014

d. Restrictions, Technical/Environmental Documents and Agreements

There are no property restrictions or encumbrances that could adversely impact project completion. Shell Meadow is managed by the USFS, who is a partner in this project. A letter of commitment from the USFS providing proof of permission to access land and assist in conducting restoration activities is included. The USFS is currently working to complete NEPA documentation and expects this to be complete by winter 2012/2013. Obtaining additional permits required to implement restoration (401, 404, CEQA) is included as Task 3 in the work plan above.

e. Organizational Capacity

This project is proposed by a strong partnership of American Rivers and the Stanislaus National Forest. American Rivers has a long track record of completing projects on time and within budget. The Stanislaus National Forest has extensive experience managing and implementing projects of the kind proposed.

American Rivers (www.americanrivers.org) is the leading river conservation organization in the United States. Our California staff has been at the forefront of major river restoration and protection efforts including the Sacramento-San Joaquin Bay-Delta Conservation Plan, the historic Klamath River agreement to remove four large dams, and large meadow restoration projects, including past partnerships with the USFS. **Elizabeth Soderstrom, PhD** has significant experience over the last 20 years in managing complex river restoration and management projects, including playing a leadership role in Sierra meadow restoration. She received her B.S and M.S. in biological sciences from Stanford University, and her Ph.D. from UC Berkeley. **Luke Hunt, PhD** has extensive experience in research and monitoring, and received his PhD from Stanford University. Luke is currently managing four meadow restoration projects for American Rivers, one evaluating both restoration and monitoring methods for meadows in the Sierra, and the other a large restoration project at the headwaters of the Mokelumne River. He will serve as project manager.

The Stanislaus National Forest has a long history of meadow restoration, going back to the 1970s. The Forest is committed to restoring high-priority meadows within its district. **Tracy Weddle** has worked on the Stanislaus NF since 2006. Tracy has implemented five meadow restoration projects. She holds a B.S. in environmental studies from U.C. Santa Barbara and M.S. in watershed science from Colorado State University. Tracy will serve as the USFS Project Lead and Hydrologist. **Dawn Coultrap** has worked on the Stanislaus NF since 2012. She is a Range Conservationist and holds a B.S in rangeland resource science and an M.S. in Natural Resources, both from Humboldt State University. She will take the lead on all rangeland utilization monitoring.

f. Cooperation and Community Support

This project was developed through a collaborative process that involved members of the project team—American Rivers and Stanislaus National Forest—as well as discussion and coordination with the ranchers who hold a permit on the grazing allotment where the project site is located. Future phases of the project will include broad outreach and communication regarding meadow restoration movement throughout the Sierra, of which this project is a part. This outreach will be coordinated with partners and other restoration efforts in progress across the Sierra Nevada. We have included a letter of support from the project partner, Stanislaus National Forest.

g. Long-Term Management and Sustainability

American Rivers has been at the forefront of meadow restoration in the Sierra Nevada, and thus has established a plan for funding these activities. Past and current supporters of our meadow restoration work include the National Fish & Wildlife Foundation, Bella Vista Foundation, Swimmer Family Foundation, and the Casey Family Foundation. We intend to develop proposals for restoration implementation of this project and approach these foundations to request support for future project phases. Additionally, a proposal for implementation of restoration on Shell Meadow has been submitted to the Tuolumne-Stanislaus Integrated Regional Water Management Plan (IRWMP) group for possible inclusion in a proposal to the Department of Water Resources.

Long-term management of the project site will be conducted in accordance with the adopted Forest Plan Direction for the Stanislaus National Forest (available for download here http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5154788.pdf and file included on proposal disc).

h. Performance Measures

The following project-specific performance measures will assist us in tracking our progress toward project goals and desired outcomes. Below we provide a list of performance measures we will track, their applicability, and the tracking method we will use.

1. **Number of people reached:** Individuals from all sides of the meadow restoration movement will either be involved in or receive information about the proposed project activities, including the Forest Service, the ranching community, and the environmental/conservation community. We will track the number of people who receive information regarding project details, including data collection outcomes, the effort to advance discussion of grazing on restored meadows, and the effort to assist the Forest Service in developing a site-specific management plan.

2. **Dollar value of resources leveraged for the Sierra Nevada:** The project budget includes funding from the Bella Vista Foundation, National Fish and Wildlife Foundation, and in-kind funding from American Rivers. The current dollar value of resources leveraged for the Sierra Nevada through this project is $70,000. Additionally, implementation of this project will allow us to advance toward restoration of Shell Meadow and further leverage investments in the project. We will track and document all of the project contributions.

3. **Number and type of jobs created:** This project will fund individuals in scientific and professional fields. We will document the number of people employed, length of employment, average number of hours worked per week, and FTE.
4. **Number of new, improved or preserved economic activities:** Grazing on meadow lands is currently limited and is a highly sensitive topic as described above. This project will help to preserve economic activities associated with ranching and grazing of livestock by increasing meadow restoration projects that consider grazing as a management tool and increasing the number of meadows restored, resulting in a suite of benefits, including increased forage, and economic benefits such as jobs and output to the regional economy (achieved through restoration implementation and possible re-introduction of grazing on restored sites). Tracking acreage of meadows with improved forage use, bank stability, and headcut monitoring will provide the basis for reporting on this performance measure.
5. **Number of collaboratively developed plans and assessments:** This project includes collaborative development of three documents: a plan for data collection, a report of results from data collection and analysis, and design plan for restoration of the site. These collaboratively developed documents will not only shape restoration of the site, they will also provide the groundwork for a site-specific management plan that will be created after restoration is complete.
6. **Percent of pre-project and planning efforts resulting in project implementation:** All of the tasks proposed here will assist the project team in advancing toward on-the-ground restoration. Tracking completion of project activities and achievement of deliverables will provide the basis for reporting on this performance measure.

i. Budget

In-Kind Support and Other Sources of Funding. We have been awarded co-funding for this project from the National Fish and Wildlife Foundation ($36,000) and the Bella Vista Foundation ($23,000). In addition, $3,000 of in-kind funding from American Rivers has been pledged for this project. Further, a proposal to obtain funding for the implementation phase of the project is currently under development and will be submitted to the Tuolumne-Stanislaus Integrated Regional Water Management Plan (IRWMP) group this month.

Cost Effectiveness. Compared to other projects, the proposed project is cost effective for several reasons. The project team is experienced in meadow assessment, planning, permitting, restoration and monitoring, so the expertise and most of the equipment necessary to conduct the project is already in-hand or present in the project team. Further, the team is fully staffed and has well-defined working relationships. Although this fact might seem trivial, we have found that the development of working relationships can take time and resources and the cost effectiveness of established project teams should not be underestimated. In addition, this project is highly cost effective as it will provide a model of preventative action and will inform and streamline future determinations and prioritization processes around restoration and grazing throughout the Stanislaus National Forest.