



California Department of Fish & Wildlife
Wetlands Restoration for Greenhouse Gas Reduction Program
Proposals
FY 2014-2015

For more information on projects or proposals, message us at

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Serial No.	Project Title	Applicant	Amount Requested	Amount Approved	Project Summary
1	Developing a Protocol for Net Carbon Sequestration from Restoration of Eastern Sierra Meadows	California Trout, Inc.	\$921,766	\$921,766	<p>Determining the potential contribution of GHG emissions to the overall carbon budget for meadows; Identifying the proximate, mechanistic controls on soil C sequestration and soil GHG fluxes that will be used to build a model to estimate meadow C sequestration and GHG emissions in meadows; Improve hydrologic function, water quality, in-stream habitat, and other co-benefits by plugging meadow gullies, repairing degraded stream, installing a valley grade, and reconnecting the stream to the floodplain of Osa Meadow.</p> <p>Link to applicant's project description</p>
2	Mountain Meadows Restoration Project at Greenville Creek and Upper Goodrich and Effects on GHGs	Plumas Corporation	\$679,566	\$679,566	<p>Project Implementation: Restore hydrologic and ecosystem function to 253 acres of degraded xeric mountain meadow habitat in two locations in the Mountain Meadows watershed of the southern Cascade mountain range: 181 acres on Greenville Creek, and 72 acres on upper Goodrich Creek. Restored function would: 1) increase carbon sequestration by 100%; 2) restore shallow floodplain aquifer volume by 102 ac-ft; 3) improve vegetative productivity by 100%; 4) increase wet meadow vegetative species percent composition by 100%; 5) increase channel flow duration into summer; and 6) improve and create nesting, foraging, and resting habitat for waterfowl with 12.1 acres of ponded water habitat, and increased riparian vegetative vigor over 253 acres.</p> <p>Research: The overall objective of the research component of the project is to quantitatively investigate net greenhouse gas (GHG) emissions and sequestration associated with mountain meadow restoration.</p> <p>Link to applicant's project description</p>
3	Sherman Island Wetland Restoration Project	Reclamation District 341	\$10,386,139	\$10,386,139	<p>Reclamation District 341 (District), in full partnership with the California Department of Water Resources (DWR) and University of California at Berkeley (UCB), proposes to restore approximately 1700 acres of permanent palustrine emergent wetlands on Sherman Island near the Antioch Bridge(Attachment 1 – Boundary Layout). Once the wetlands are mature this site is expected to sequester approximately 11.5 metric tons CO2-eq per acre per year or nearly 20,000 metric tons CO2-eq per year for the entire project. This project also includes a Delta wide monitoring program for CO2, CH4, and N2O, which builds upon data already collected by DWR and UCB. These data sets will be used to further develop and calibrate models allowing for GHG predictions of both baseline and treatment impacts Delta-wide. This project, is also being closely coordinated with other Delta efforts to develop a GHG Protocol for both the voluntary and ultimately regulatory Cap and Trade markets.</p> <p>Additionally, DWR biologists will monitor and assess native plant species annually within these restoration areas and biannual bird surveys will be conducted and compared to preproject conditions. DWR engineers will monitor subsidence reversal rates by utilizing survey techniques.</p> <p>Link to applicant's project description</p>
4	Middle Martis Creek Wetlands Restoration	Truckee River Watershed Council	\$594,176	\$594,176	<p>Greenhouse Gas Reduction Objectives: Increase carbon storage in up to 37 acres of degraded wet meadow and 2 acres of riparian habitat through improving plant vigor; Increase soil organic content in up to 37 acres of degraded wet meadow and 2 acres of riparian habitat through extending the active plant growth season; Participate in Sierra Meadow Restoration Research Partnership (SMRRP), a Sierra-wide research project to assess effectiveness of restoration on GHG reduction.</p> <p>Research Objectives: Determine potential contribution of GHG emissions to the overall carbon budget for project meadow and collectively other meadows included in the SMRRP; Support development of parameters and proxy variables that will be used to build a model to estimate meadow carbon sequestration.</p> <p>Co-benefit Objectives: Restore up to 10 acres of historic wetland and enhance 27 acres of existing wetlands; Restore one mile of historic intermittent channel; Improve fish passage/fish habitat in one mile of existing stream channel and restore associated 2 acres of riparian wetland; Eliminate damaging peak flows, improve late season base flow; Increase water storage in a degraded meadow system; Eliminate in-channel erosion; Improve avian habitat; Ameliorate impacts of climate change through reducing flooding caused by rain on snow events.</p> <p>Link to applicant's project description</p>

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5	A Demonstration of the Carbon Sequestration and Biodiversity Benefits of Beaver and Beaver Dam Analogue Restoration Techniques	Regents of the University of California, Davis	\$539,672	\$539,672	<p>The primary objective of this project is to increase carbon sequestration benefits in a demonstration mountain meadow using cost-effective beaver dam analogue restoration techniques. Specific project objectives include (1) quantify and evaluate changes in above and below ground carbon storage following habitat restoration actions using beaver dam analogues and changes in grazing management in a mountain meadow representative of meadows across northern California, (2) compare the within meadow results to carbon sequestration values in existing restored and unrestored mountain meadows across the Cascade range, and (3) measure the response of hydrogeomorphic conditions (e.g. groundwater, temperature, habitat) and two imperiled species (Cascades Frog and Willow Flycatcher) to restorative actions.</p> <p>Link to applicant's project description</p>
6	North Campus Open Space Wetlands Restoration	Regents of the University of California, Santa Barbara	\$999,989	\$999,989	<p>Project will excavate 250,000 cy from a filled coastal wetland and restore 34 acres of wetland, including 12 acres of salt marsh, sequester 549 metric tons of carbon over 100 years, study and characterize carbon sequestration in intermittently tidal systems and provide long term educational and training benefits to rotating student body of 20,000 UC students at University of California Santa Barbara.</p> <p>Link to applicant's project description</p>
7	Blue Carbon at Elkhorn Slough: Increasing Regional Carbon Sequestration Through Salt Marsh Restoration	Elkhorn Slough Foundation	\$2,996,768	\$2,996,768	<p>The proposed project is designed to restore coastal wetland to reduce GHG and improve important estuarine habitat. This proposal is Phase II of a larger plan to restore at least 110 acres of tidal marshes in Elkhorn Slough and the adjoining 35 acres of existing buffer areas to perennial grassland. Phase I, which is mostly complete, consisted of land acquisition, planning, permitting, and obtaining sediment for the overall restoration work. The funds being requested for Phase II are to begin implementation of restoration and monitoring, and will integrate with other funding sources for the complete restoration project. The overall objective of this phase of the project is to restore 61 acres of tidal salt marsh and 5 acres of a perennial grassland buffer in the southern area of Elkhorn Slough. As funding becomes available the remaining 49 acres of tidal marsh and 30 acres of perennial vegetative buffer will be restored. This proposal requests funds for greenhouse gas research, final engineering, construction and monitoring and is the final step to meeting all the objectives listed below. It is also our opportunity to conduct the first major blue carbon enhancement project in the region, with rigorous post-project monitoring to confirm effectiveness and serve as a model for future such projects.</p> <p>Link to applicant's project description</p>
8	Bean Meadow Restoration Project	Sierra Foothill Conservancy	\$493,542	\$493,543	<p>The Bean Meadow Restoration Project is part of the Sierra Meadow Restoration Research Partnership (SMRRP). The restoration of this meadow will restore hydrologic function, reduce sedimentation, increase water quality and storage capacity and improve wildlife habitat. Along with restoring this meadow, which is currently de-watered, the project will support development of methods for estimating net carbon (CO2-equivalent) sequestration under pre- and post-restoration conditions for mountain meadows, and determine potential contribution of GHG emissions to the overall carbon budget of Bean Meadow. It is anticipated that restoration will result in an increase in net carbon sequestration.</p> <p>Link to applicant's project description</p>
9	Yuba Headwaters Meadow Restoration	South Yuba River Citizens League	\$567,480	\$567,480	<p>Restore and monitor 3 mountain meadows and monitor an additional 2 reference meadows to achieve the following:</p> <p>Project objectives:</p> <p>Help meet the goals of AB 32 by achieving net greenhouse gas emission reductions through the restoration of mountain meadows; Improve the understanding of greenhouse gas emissions from mountain meadows; and Support the development of a predictive model that will allow for the use of proxy variables (e.g., depth and duration of saturation, soil texture and carbon content, plant community type, and length of growing season) to estimate carbon sequestration and GHG emissions in mountain meadows.</p> <p>Co-benefit objectives:</p> <p>Restore and expand habitat for native plants, fish, and wildlife; Restore and enhance the connectivity of associated wetland and riparian communities; Increase late-season flows in meadow streams; Reduce and delay peak flows in meadow streams; Decrease sedimentation downstream of mountain meadows; Improve water quantity and quality for native fish and wildlife; Increase water storage capacity in mountain meadows; and Protect climate refugia in meadows, such as aspen communities and floodplain habitat.</p> <p>Link to applicant's project description</p>

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10	Truckee Meadows Restoration Project	Truckee River Watershed Council	\$1,495,551	\$1,495,551	<ul style="list-style-type: none"> - Offset Greenhouse Gas Emissions through biological carbon sequestration (BCS) into vegetation, soils, woody products, and aquatic environments (meadows) - Improve and reconnect hydrology of meadow - Increase attenuation - Expand meadow and riparian habitat - Reduce erosion and sedimentation - Create recreation and education opportunities <p>Link to applicant's project description</p>
11	Initiation of Thin-layered Sediment Augmentation on the Pacific Coast	U.S. Fish and Wildlife Service	\$1,055,827	\$1,055,827	<ul style="list-style-type: none"> - Demonstrate the effectiveness of thin-layer sediment augmentation in sustaining tidal salt marsh habitat threatened by sea level rise for the purpose of preserving ecosystem services including the conservation of wildlife species, particularly listed and sensitive species, and the long-term carbon storage and sequestration benefits that this habitat provides; - Achieve and maintain a minimum three-inch increase in the marsh plain elevation within the project site two year after sediment augmentation; - Achieve enhanced stem height, stem density, and below ground root growth of Pacific cordgrass within five years of sediment augmentation to increase carbon sequestration levels and protect long-term carbon storage levels, as well as improve habitat quality to support the endangered light-footed Ridgway's rail and other salt marsh dependent species; and - Produce a thin-layer sediment application guidance document describing the procedures, techniques employed, and lessons learned in achieving uniform sediment depths and minimizing movement of sediment offsite in an effort to facilitate future thin-layer sediment augmentation projects along the Pacific Coast where salt marsh habitat is threatened by subsidence and/or sea-level rise. <p>Link to applicant's project description</p>
12	Restoration of the Carbon Storing Ecosystem in Tuolumne Meadows, Yosemite National Park, CA	Yosemite National Park	\$587,996	\$587,996	<p>Yosemite National Park will restore the sedge-dominated plant community that formed and maintained the organic-rich soil in Tuolumne Meadows. This 9 acre restoration will result in the retention and addition in the meadow ecosystem of 4.14 Mg CO₂-C per year. In addition, we expect the restoration will be a co-benefit to native amphibians.</p> <p>Link to applicant's project description</p>
13	Enhancing Carbon Sequestration in Sierra Meadows Through Invasive Plant Management	California Invasive Plant Council (Cal-IPC)	\$840,432	\$0	<ol style="list-style-type: none"> 1. Protect and maintain the carbon sequestration capacity of Sierra meadows by controlling invasive plants that are moving into meadows. 2. Conduct research to quantify the effects of invasive plants on mountain meadow carbon sequestration and greenhouse gases. 3. Improve and protect habitat for native plants and wildlife by removing invasive plants in and near mountain meadows in the Sierra Nevada (co-benefit). <p>Link to applicant's project description</p>
14	Eel River Delta Ecosystem Restoration Project	State Coastal Conservancy	\$4,000,000	\$0	<p>The project seeks to restore functional coastal wetland ecosystems, while at the same time reducing flooding duration and frequency for agricultural producers and residents of the Ferndale Bottoms and achieving a significant net reduction in GHG emissions.</p> <p>Link to applicant's project description</p>

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15	South Bay Salt Pond Restoration Project Phase 2: Alviso Mt. View Ponds	State Coastal Conservancy	\$5,000,000	\$0	Create tidal wetlands to sequester carbon, improve water quality, and provide special status species habitat; protect residents and infrastructure from tidal flooding; create new public recreation and education opportunities. Link to applicant's project description
16	Land-Use Conversion to Managed Wetlands in the Sacramento-San Joaquin Delta Conservancy	Sacramento-San Joaquin Delta Conservancy	\$6,843,721	\$0	We propose to provide up to 1,000 acres of wetland habitat thereby (a) reducing greenhouse gas emissions and sequestering carbon in the soil organic carbon pool (b) restoring wetland habitat (c) reversing the effects of land subsidence, thus reducing levee failure risks and the associated threats to California water supply, and (d) improving water quality. Framework. Another objective of this project is to develop a Delta-wide greenhouse gas accounting framework to account for and enable greenhouse gas reductions and associated co-benefits across the Delta. The project will also address mosquito abatement by determining the mosquito abatement required for carbon sequestration wetlands. Link to applicant's project description
17	Restoration retrofit for wetland enhancement and GHG reduction.	California Department of Transportation	\$87,070	\$0	- Enhance native plant growth in coastal freshwater wetland. - Enhance water quality in relation to roadside run-off in coastal freshwater wetland. - Provide enhanced wetland habitat for vertebrate species. - Provide long term carbon sequestration and reduction of other greenhouse gases in coastal freshwater wetland. Link to applicant's project description
18	Mattole Estuary Wetlands Restoration for Greenhouse Gas Reduction Project	Mattole Salmon Group	\$455,968	\$0	Restore riparian woodlands and wetlands through deep trenched willow and native plantings on open terraces; protect eroding stream banks and prevent riparian woodland loss; create open water off-channel slough habitat; create high and low water endangered salmonid refuges and enhance wildlife and avian habitat as added benefits. Link to applicant's project description
19	Mount Shasta Headwaters Forest (Hancock- River Block)	The Pacific Forest Trust, Inc.	\$3,070,000	\$0	This project will enhance and permanently conserve the 5,344-acre Mount Shasta Headwaters Forest (Hancock River Block) through the acquisition of a conservation easement. The specific terms of the conservation easement will meet the following objectives: - To increase the carbon stores by conserving and restoring the property to older, more complex and biodiverse forest types through development and timber harvest restrictions. - To guide forest management toward the conservation and restoration of rare and/or ecologically significant habitat types to benefit water quality and storage as well as rare and listed species. These habitats include: wet meadows, wetlands, aspen stands, and mountain riparian habitat. - To guide management toward conservation and restoration of the McCloud watershed, and in particular, the improvement of water quality and protection of in-stream flows in the 5 watercourses including the main stem of the McCloud River, which feed into Lake Shasta Reservoir and the California water system. - To promote ecological functionality and resilience at the landscape-level by creating interconnected network of public and private forests in key mountain watersheds that will be managed for carbon sequestration, wildlife habitat and migration corridors, and watershed values, as well as for sustainable timber production. Link to applicant's project description

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20	Mount Shasta Headwaters Forest (Hancock- Town Block)	The Pacific Forest Trust, Inc.	\$2,420,000	\$0	<p>This project will enhance and permanently conserve the 12,805-acre Mount Shasta Headwaters Forest (Town Block) through the acquisition of a conservation easement. The specific terms of the conservation easement will meet the following objectives:</p> <ul style="list-style-type: none"> - To increase the carbon stores by conserving and restoring the property to older, more complex and biodiverse forest types through development and timber harvest restrictions. - To guide forest management toward the conservation and restoration of rare and/or ecologically significant habitat types to benefit water quality and storage as well as rare and listed species. These habitats include: wet meadows, oak woodlands, aspen stands, and mountain riparian habitat. - To guide management toward conservation and restoration of water resources, and in particular, the improvement of water quality and protection of in-stream flows in the 7 streams that are tributaries to Squaw Valley Creek, which flows into Lake Shasta Reservoir and the California water system. - To promote ecological functionality and resilience at the landscape-level by creating interconnected network of public and private forests in key mountain watersheds that will be managed for carbon sequestration, wildlife habitat and migration corridors, and watershed values, as well as for sustainable timber production. <p>Link to applicant's project description</p>
21	Cornerstone Meadows Project	Plumas Corporation	\$964,216	\$0	<p>Implementation Objective: Restore hydrologic and ecosystem function to 64 acres of degraded xeric mountain meadow habitat and 8 acres of aspen habitat in two locations in the central Sierra Nevada mountain range: 27 acres in Foster Meadow on the Middle Fork Cosumnes River, and 45 acres in Mattley Meadow on Mattley Creek, tributary to the North Fork Mokelumne River. Restored function would: 1) increase carbon sequestration by 100%; 2) restore shallow floodplain aquifer volume by 29 ac-ft in Foster Meadow and 97 ac-ft in Mattley Meadow; 3) improve vegetative productivity by 100%; 4) increase wet meadow vegetative species percent composition by 100%; 5) decrease in stream water temperatures in summer; and 6) improve and create nesting, foraging, and resting habitat for meadow and aspen dependent birds, restore aquatic organism passage and increased riparian vegetative vigor over acres.</p> <p>Research Objective: Quantitatively investigate net GHG emissions and sequestration associated with mountain meadow restoration. The framework and methods employed in this project will be aligned with those proposed by other meadow restoration projects that represent a wide range of meadow conditions throughout the Sierra Nevada under the Sierra Meadow Restoration Research Partnership.</p> <p>Link to applicant's project description</p>
22	Lower Deer Creek Meadow Restoration Project	Sierra Streams Institute	\$261,794	\$0	<p>Restore hydrologic and ecological function to a Sierra Nevada meadow to increase greenhouse gas sequestration and restore native plant and aquatic species habitat.</p> <p>Link to applicant's project description</p>
23	Measurement and Assessment of Carbon Sequestration, GHG Emissions, and Wildlife and Fisheries Co-benefit Potential in Response to the Upper Truckee River and Marsh Restoration Project at South Lake Tahoe, CA	Spatial Informatics Group - Natural Assets Laboratory	\$622,958	\$0	<p>There are two sources for project objectives: 1) objectives associated with the Upper Truckee River and Marsh Restoration Project and 2) Objectives associated with this proposal.</p> <p>The primary purpose of the Upper Truckee River and Marsh Restoration Project is to restore natural geomorphic processes and ecological functions along this reach of river while providing for low impact recreation access. Restoration project details can be found at: http://tahoe.ca.gov/ctc_projects/upper-truckee-marsh-69/.</p> <p>The objectives associated with this proposal are to support information needs of the planned Upper Truckee River and Marsh Restoration Project (UTM project) that is sponsored and led by the California Tahoe Conservancy (CTC), US Bureau of Reclamation (BOR) and Tahoe Regional Planning Agency (TRPA). In addition, the data, methods and deliverables from this project will be aligned and shared with those proposed by CalTrout under this CDFW grant solicitation for other meadow restoration projects under the Sierra Meadow Restoration Research Partnership (SMRRP)¹ and will be coordinated with the local Upper Truckee River Watershed Advisory Group (UTRWAG).</p> <p>Link to applicant's project description</p>

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24	Investigation of Greenhouse Gas (GHG) Fluxes and Carbon Sequestration in a Cascade Range Mountain Meadow Restored for Reintroduction of Endangered Shasta Crayfish (<i>Pacifastacus fortis</i>).	Spring Rivers Foundation	\$619,486	\$0	<p>(1) Quantify baseline GHG (carbon dioxide, methane, and nitrous oxide) fluxes and carbon storage in a partially-denuded Cascade Range mountain meadow (Rock Creek Meadow) before the meadow is restored.</p> <p>(2) Evaluate the potential effects of climatic warming on meadow function by studying how soil moisture affects GHG fluxes and carbon storage in six diverse biocommunities (non-native herb/grassland, riparian scrub wetland, riparian wetland, seasonal wetland, spring/seep wetland, and ponderosa pine/mixed oak woodlands) within Rock Creek Meadow.</p> <p>(3) Restore approximately 650 feet of Rock Creek stream channel to pre-disturbance conditions, and improve the efficiency of the water supply for California Department of Fish and Wildlife (CDFW)'s Crystal Lake Hatchery.</p> <p>(4) Compare GHG flux rates and total soil carbon in the restored Rock Creek Meadow to baseline data and determine if the meadow restoration results in a net change in GHG fluxes and/or carbon storage.</p> <p>Co-benefits: The restored stream channel will provide approximately 13,550 square feet (1259 square meters) of habitat for the federally and state-listed endangered Shasta crayfish (<i>Pacifastacus fortis</i>), while maintaining the quality and improving the efficiency of the water supply for CDFW's Crystal Lake Hatchery.</p> <p>Link to applicant's project description</p>
25	Upper San Antonio Creek Restoration Project	The C.R.E.W. aka Concerned Resource & Environmental Workers	\$417,998	\$0	<p>This project seeks to reduce Greenhouse Gases (GHG) and improve the effects of carbon sequestration by mitigating the invasive Tree-of-Heaven, Mexican Fan Palm, Peruvian Pepper and Eucalyptus and planting native trees such as Coastal Oak and Sycamore. As a by-product of this mitigation, this project will improve passage and breeding potential for endangered aquatic species, such as the southern steelhead trout and California red-legged frog, increase water quality and water flow throughout the San Antonio Creek watershed.</p> <p>Link to applicant's project description</p>
26	Quantifying the long-term greenhouse gas and ecosystem benefits of mountain meadow restoration efforts in the Sierras: A case study of the Upper Truckee River Watershed, Lake Tahoe	Regents of the University of California, Berkeley	\$1,726,660	\$0	<ul style="list-style-type: none"> - Determine the long-term net GHG fluxes by measuring seasonal GHG fluxes (CO₂, CH₄, N₂O) and using a biogeochemical model (DAYCENT) to estimate fluxes under current and projected climatic conditions. The model will be used to extrapolate and quantify the net C and GHG fluxes to other comparable mountain meadow restoration sites throughout the Sierra Nevada. - Identify and quantify the effects of mountain meadow restoration on hydrologic variables for meadow function and select vegetation and biological indicators of habitat value. - Create a toolkit to define process, metrics and reporting formats for meadow restoration efforts in the Sierras on project and watershed scales. The toolkit will allow land managers to cost-effectively prioritize projects and predict and verify GHG costs and benefits as a function of restored meadow geomorphology, soil characteristics, climate and other key attributes of ecosystems services. <p>Link to applicant's project description</p>
27	West Struve Slough Enhancement and Habitat Restoration Project	Watsonville Wetlands Watch	\$443,317	\$0	<p>Sequester at least 47.1 tons of carbon over 20 years; sequester at least 2.7 tons of carbon annually; restore 3 acres of native riparian woodland and wet meadow habitat on the Watsonville Sloughs Ecological Reserve; improve native habitats for sensitive fish and wildlife species; enhance water quality and water supply in the Watsonville Slough system</p> <p>Link to applicant's project description</p>