UPPER FEATHER RIVER IRWM

PROJECT INFORMATION FORM

Please submit by 5:00 p.m. on August 3, 2015, to UFR.contact@gmail.com

Please provide information in the tables below:

I. PROJECT PROPONENT INFORMATION

Agency / Organization	Soper Company
Name of Primary Contact	Ryan J. McKillop
Name of Secondary Contact	Paul A. Violett
Mailing Address	19855 Barton Hill Road, Strawberry Valley, CA 95981
E-mail	rmckillop@soperwheeler.com
Phone	530 675-2343
Other Cooperating Agencies / Organizations / Stakeholders	Upper Feather River IRWM Uplands and Forests workgroup members , including the Sierra Institute, W.M. Beaty and Associates, Inc., Collins Pine Company, USFS – Plumas Nat. Forest, IRWM Tribal Advisory Committee Representatives, etc.
Is your agency/organization committed to the project through completion? If not, please explain	At this point in time we are working with other cooperating agencies, organizations and stakeholders to complete Step 2 of the Project Solicitation, for inclusion into the IRWM Plan Update. The size and scope of the project will require a greater level of time and effort than Soper Company can provide, however we are committed to working towards developing the collaboration needed to move forward. A sufficiently staffed group or organization will bring the project forward from Step 2, and facilitate the design, implementation, effectiveness monitoring and maintenance of the project. The Feather River Stewardship Coalition, is developing a charter and governance structure under their CFRLA-RAC grant that will be a basis for the implementation and governance framework for this proposal.

II. GENERAL PROJECT INFORMATION

Project Title	UF-12: UFR Cooperative Regional Thinning
Project Category **Primarily Uplands and Forests but includes strategies and projects important to Tribal, meadow, and floodplain interests.**	☐ **Agricultural Land Stewardship** ☐ **Floodplains/Meadows/Waterbodies** ☐ **Municipal Services** ☐ **Tribal Advisory Committee** ☐ **Uplands/Forest**
Project Description (Briefly describe the project,	The purpose of the project is to: 1.) Reduce catastrophic wildfire in overstocked forests through forest thinning and 2.

in 300 words or less)	Restore the forest hydrograph by reducing the rate of conifer evapotranspiration and 3. Reduce conifer interception of rain and snow and enhance the infiltration of soil moisture by increasing spacing of dominant and codominant overstory trees. Projects that reduce forest densities closer to historic (pre-fire suppression) levels will be accomplished through a collaboratively developed suite of forest health enhancement projects that implement variable density thinning across the forested portions of the UFR region that increase the amount of groundwater available to retained trees and for downstream water needs, both as surface base and pulse flows, and as enhanced groundwater storage through implementing 7 "fire buffer" thinning strategies. Increasing the retention of snow in targeted critical habitat and key re-charge zones, especially at higher altitudes through appropriate thinning of small conifer encroachment into meadows, wetlands, springs, aspen and oak groves and riparian forests. Thinning on ridgetops to mimic historic fire patterns, for example, has especially significant potential to store snowmelt longer into the summer, when the value of water is greatest and forest ecosystem needs for water are highest. (Woods et al 2006, Sun et al 2015). The phased, cooperative project will be designed and implemented at a broad, multi-ownership, landscape level, thus leading healthier ecosystems and processes, and greater fire and climate change related resiliency that is closer to the historic pre-fire suppression forest structure. (RMS#s 10,21,22,23,24,25,26,27,28,30). In addition, this project addresses and initiates monitoring of the relationship between higher forest densities and declining water yields. Decades of fire suppression, together with the lack of economic feasibility of potential pre-commercial and commercial thinning projects, and subsequent markets for such material, plus the inability to incorporate public benefits such as water resources into forest management regimes, have lead to widespread water stressed forest conditions that are prone to catastrophic wildfire. Dense forests transpire more water from the soil and intercept and evaporate more rain and snow than less dense forests. Variable density thinning allows more rain and snow to reach the forest floor, enhancing water availability by increasing groundwater recharge, decreasing loss from evaporation, and extending the life of the snowpack in these areas by days or even weeks. The Project meets the following UFR IRWM Goals: 1. Protect and improve water quality and water supply reliability. 2. Protect and improve the health of the environment including fish, wildlife and the land. Project meets the following UFR IRWM Objectives: 1. Restore natural hydrologic functions. 2. Reduce potential for catastrophic wildland fires in the Region.

	3. Balance the needs of forest health, habitat preservation, fuels reduction, forest fire prevention, and economic activity in the Upper Feather River Region. 4. Build communication and collaboration among water resources stakeholders in the Region. 5. Protect, restore, and enhance the quality of surface and groundwater resources for all beneficial uses, consistent with the Basin Plan. 6. Coordinate management of recharge areas and protect groundwater resources. 7. Improve coordination of land use and water resources planning. 8. Address economic challenges of agricultural (forest products and services) producers.
Project Location Description (e.g., along the south bank of stream/river between river miles or miles from Towns/intersection and/or address):	The Project is located within the Upper Feather River (UFR) Integrated Regional Water Management (IRWM) boundary. The landscape-scale project encompasses some 2.3 million acres of watershed which is a critical headwater source and water supply area for the Sacramento Valley hydrologic basin, which has the capacity to store up to 13.5 million acre feet of water. Of this 2.3 million acre area, approximately 75% or 1.75 million acres are considered forested, and conservatively 50%, or 750,000 to 875,000 acres, could be considered overstocked and thus potentially eligible for active management over the next 10 years under this project proposal.
Latitude:	
Longitude:	The forested portions of UFR Basin is the project area.

III. APPLICABLE IRWM PLAN OBJECTIVES ADDRESSED

For each of the objectives addressed by the project, provide a one to two sentence description of how the project contributes to attaining the objective and how the project outcomes will be quantified. If the project does not address *any* of the IRWM plan objectives, provide a one to two sentence description of how the project relates to a challenge or opportunity of the Region.

Upper Feather River IRWM Objectives:	**Will the project address the objective?**	**Brief explanation of project linkage to selected Objective**	**Quantification** (e.g. acres of streams/wetlands restored or enhanced)
Restore natural hydrologic functions.	☐ Yes ☐ N/A	Within the last 100 years, suppression of fires has become a primary focus of federal, state and private efforts (Fites-Kaufmann et al. 2007). This factor, coupled with historic logging practices and lack of viable markets for biomass material, has led to large areas of Sierra forests that have become	Unable to quantify at this time. If we assumed up to 850,000 acres of treatment, with an average annual precipitation rate of 40", and a savings of 6.4" (16%), that

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		overly dense, thus prone to catastrophic wildfire, drought, and insect attack. Additionally, the increased stocking levels and the shift to more shade-tolerant species has led to increased rates of evapotranspiration compared to historic conditions. Approximately 24% of total precipitation (rain & snow) is intercepted by forest canopy and thus does not infiltrate into the soil (Bohm 2008). Preliminary UFR forest water water budget isotope data suggests that a minimal percent of winter precipitation is evapotranspired from the soil by forest vegetation in the Sierra Nevada compared to estimates by Dept. of Water Resources in 2005 of 70% summer soil evaporation. Overall, initial estimates for the Sierra Nevada are that thinning treatments will increase soil and groundwater infiltration by from a third of an acre-foot to an additional half an acre foot/acre, (Bohm, 2015)and enhance stream water flows from 8% to 10%. In wet years in snow zones, yields can increase by 16% and snow storage can be extended by days to weeks. (TNC & SWEEP, 2011).	translates to a gross gain of 398,400 acre feet of water.
Reduce potential for catastrophic wildland fires in the Region.	☐ Yes ☐ N/A	Conifer thicket thinning and restoration of meadows, riparian and aspen forests and black oak woodland openings in Sierran forests directly impacts severity and rate of spread of a wildfire and protects key forest habitats. Treated areas have greater crown separation, fewer ladder	

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		fuels and reduced ground fuels, resulting in a reduction in fire intensity, flamelength, rate of spread and spotting activity. Often times, treatment of areas can result in a rapidly moving crown fire dropping to the ground, reducing burn severity and enabling direct attack by fire crews.	
Build communication and collaboration among water resources stakeholders in the Region.	☐ Yes ☐ N/A	As a cooperative, region-wide project, collaboration among forest and water managers and stakeholders is a key element for project durability and success. Collaboration for this project will involve not only working together but also a greater level of outreach, education, project evaluation and adaptive learning thereby leading to a more encompassing and effective the project will become. Therefore, the project includes personnel and financial resources for the development of a science-based framework landscape level learning and adaptive project implementation.	Up to 750,000 acres of forestland within the UFR IRWM
Work with DWR to develop strategies and actions for the management, operation, and control of SWP facilities in the Upper Feather River Watershed in order to increase water supply, recreational, and environmental benefits to the Region.	☐ Yes ☐ N/A	Increased reliability of downstream water supplies and timing of water supplies by reducing flood peaks and enhancing pulse and baseflows are primary objectives for this project. Although other valuable forest ecosystem benefits will accrue within the UFR IRWM region. Downstream SWP reservoir storage, hydroelectric – power generation and water based recreational opportunities will also benefit from an improved forest hydrograph.	Unquantifiable at this time For the Sacramento watershed, the value of agricultural and municipal uses is $36 per acre-foot (AF) of water runoff, and an additional $31 per acre-foot (AF) (average) in hydroelectric revenue (Stewart

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		The Upper Feather River IRWM region is the primary water source for the Oroville Reservoir of the State Water Project, one of two key water supply reservoirs in the Sacramento River Hydrologic Region, that in turn provides essential surface water for the Bay-Delta ecosystem and for water exports to Southern and coastal California. The SWP system provides water for 2.3 million Californians and irrigation water for 775,000 acres of farmland.	1996). More recent studies (Workman and Poulos, 2013) value water @ $450-$650/AF. In the 4 year drought, prices have risen to $1000/AF in Southern California and up to $5000/AF in the Reno, NV. Area. Wills- Personal communication, 2015)
Encourage municipal service providers to participate in regional water management actions that improve water supply and water quality.	☐ ☐ N/A		
Continue to actively engage in FERC relicensing of hydroelectric facilities in the Region.	☐ Yes ☐	Focused in the North Fork of the Feather River and one topic for IRWM Plan update discussions with PG&E, DWR, and participants in FERC 1962, 2105, 2107, 619 and 2100 relicensing proceedings.	
Address economic challenges of municipal service providers to serve customers.	☐ ☐ N/A		
Protect, restore, and enhance the quality of surface and groundwater resources for all beneficial uses, consistent with the RWQC Basin Plan.	☐ Yes ☐	The project not only has the direct effect of increasing forest ecosystem resiliency in treatment areas, it also has the potential to mitigate the recent rate of forest loss from fire. Negative impacts to water quality resulting from catastrophic wildfire are well documented, long-lasting, and costly.	Unquantified at this time. The latest analysis of land-cover trends by the U.S. Geological Survey (Raumann and Soulard 2007) estimates a nearly tenfold increase during the last

Upper Feather River IRWM Objectives:	Will the project address the objective?	Brief explanation of project linkage to selected Objective	**Quantification** (e.g. acres of streams/wetlands restored or enhanced)
		Conversion to brushfields reduces soil water moisture (Royce and Barbour, 2001) and (Sahin and Hall, 1995) Increasingly dense forests in a warming climate are predicted to reduce streamflows by 12% (Berghuijs et al., 2014) t0 26% (Goulden et al.,2014)). A key objective of this project to restore the forested watersheds and advance understanding of how this directly contributes to surface and particularly groundwater resources.	decade in the rate at which intact Sierra Nevada forests were converted to an "altered and often unvegetated state" by wildfires.
Address water resources and wastewater needs of DACs and Native Americans.	☐ Yes ☐ N/A	The Upper Feather River Region meets the definition of a "DAC" "region". The project has the potential to address the water needs of both DAC's and Native American groups, through enhancing recharge of groundwater for domestic and community wells serving DAC communities and households. Although no specific projects have been identified, the community (well) recharge area (CRA) fire buffer strategy provides opportunity for integrated projects with the IRWM tribal and municipal workgroups during the upcoming "projects integration workshop".	All of the Upper Feather River (UFR) Region.
Coordinate management of recharge areas and protect groundwater resources.	☐ Yes ☐ N/A	Coordinating a designed, meaningful and lasting management regime of restored forested areas within identified recharge areas and protection and enhancement of groundwater resources within those same areas is a primary goal of this landscape project. Initially coordination is occurring	

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		at the conceptual stage of this project. It is intended that a collaborative management and financing infrastructure be established that will administer its implementation over a 10 year period. There are several examples on which to build: the Feather River Stewardship Coalition is developing a charter that could prove useful. The Sierra Institute helped launch the The Basins CFLR to the north and led the Burney Gardens CFRLA project that drew multiple private landowners together with agencies to advance multi-jurisdictional landscape work (See Kelly and Kusel 2015). The North Cal-Neva RC&D has also been identified as a potential regional administrative entity.	
Improve coordination of land use and water resources planning.	☐ Yes ☐ N/A	The Upper Feather River Region's recently promulgated memorandum of understanding (MOU) greatly expands the breadth of water interests participating in the IRWM process, which will therefore encourage the development and expansion of regional projects and programs such as this. Entities in the region will be encouraged to sign the MOU throughout the UFR IRWM Plan update process.	
Maximize agricultural, environmental and municipal water use efficiency.	☐ Yes ☐	TBD "Community Recharge Area" project specific.	
Effectively address climate change adaptation and/or mitigation in water resources management.	☐ Yes ☐ N/A	Climate change vulnerability assessments (Merriam et al 2013, Kozcot et al 2012, Westerling and Bryant 2008) indicate that forests within the Feather River Region	Up to 750,000 acres of forestland within the UFR IRWM at a 20,000-60,000 acre/yr.

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		may experience a shift in precipitation from snow to rain which will likely affect forest vegetation by increasing the growing season, increasing summer drought conditions, and increasing fire frequency and severity on the landscape. Trends of uncharacteristically large areas of high severity, stand- replacing fire have already been noted on the Plumas National Forest (Collins and Stephens 2012) and these trends have been increasing across the Sierra Nevada mixed conifer forest (Miller et al 2012). Negative impacts to water quality resulting from high severity stand replacing wildfire are well documented, long-lasting, and costly. Conversion of forest land to shrubfields reduces soil water moisture (Royce and Barbour, 2001, Sahin and Hall, 1995) In addition, increasingly dense forests in a warming climate are predicted to reduce stream flows by 12% (Berghuijs et al., 2014) t0 26% (Goulden et al.,2014). One of the few ways that California can address the negative impacts of climate change on water yield and storage in the Sierra Nevada is through forest restoration.. Targeted thinning of overly dense forests results in a healthier, more fire resilient landscape which also mitigates the effects of climate change by restoring forest density to desired historic conditions, in	annual scale of project implementation Over a 10 year period.

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		which the desired residual trees are less subject to moisture stress and thus less prone to mortality (Sun et al 2015). Landscape level treatments also mitigate the recent trend of loss of forest from catastrophic wildfire and declining summer stream flows. (Freeman 2008-2015)	
Improve efficiency and reliability of water supply and other water-related infrastructure.	☐ Yes ☐	Supply efficiency will improve through reductions in evapotranspiration and increased infiltration into the soil. Reliability of water will improve through the timing of water availability that will extend further into the summer. Reducing flood peaks and delaying flood recharged water yields (not sure what flood recharged water yields mean) until the spring and summer enhances downstream reservoir operational flexibility. As the project progresses over time, more and more treated acres will further increase recharge and surface water supply reliability.	Estimates vary considerably regarding flow augmentation from restored forests, with quite limited understanding of groundwater contribution. While there is potentiatl of up to a 16% improvement in supply from treated acres. Potentially more supply from increased ability to accumulate and hold snowpack in targeted areas this project will advance critically needed restoration work along with improving understanding of the relationship between forest restoration and surface and groundwater supplies..
Enhance public awareness and understanding of water	☐ Yes		

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management issues and needs.	☐ N/A		
Address economic challenges of agricultural producers.	☐ Yes ☐ N/A		
Work with counties/ communities/groups to make sure staff capacity exists for actual administration and implementation of grant funding.	☐ Yes ☐ N/A	It is intended that an implementation infrastructure be established and an appropriately scaled and qualified group or entity be identified and/or developed to administer the implementation of this project, including grant funding, over a 10 year period. In the interim, the Sierra Institute, an IRWM MOU entity has agreed to sponsor Step 2 proposal development in partnership with the Uplands and Forests workgroup members.	

If no objectives are addressed, describe how the project relates to a challenge or opportunity for the Region:

IV. PROJECT IMPACTS AND BENEFITS

Please provide a summary of the expected project benefits and impacts in the table below or check N/A if not applicable; **do no leave a blank cell.** Note that DWR encourages multi-benefit projects.

If applicable, describe benefits or impacts of the project with respect to:		
a. Native American Tribal Communities	☐ N/A	The UFR IRWM has allocated a seat on the Steering Committee for a tribal representative to ensure Native American water concerns are incorporated throughout the project implementation planning process. The tribal representative also participates in the Uplands and Forest Workgroup (UFW) as a member of the IRWM Tribal Advisory Committee (TAC). There is substantial opportunity for enhancing benefits to tribes as project integration develops between the UFW and the TAC and mutually beneficial projects are identified.

b. Disadvantaged Communities[1]	☐ N/A	Given the potential scope and life of the project, job creation for DAC communities and households s would be expected. Currently, there is not a sufficient infrastructure in place to handle the potential amount of biomass material that could be generated from a regional project like this, but there is the possibility that collaborative efforts like this could help secure a reliable, long term source of material, and thus creating a market for that material, and needed investment in such infrastructure. Tribal members from the Enterprise Rancheria are developing biomass processing facilities that offer Indirect benefits to DACs. By incentivizing projects in DAC areas, the town of Loyalton, a DAC community , would benefit from the reopening of the Loyalton biomass plant through employment opportunities in both the plant and in nearby forest thinning contracts, and the fuel wood production operation in Delleker, another DAC community., would also benefit from thinning projects undertaken in that area.
c. Environmental Justice[2]	☐ N/A	
d. Drought Preparedness	☐ N/A	
e. Assist the region in adapting to effects of climate change[3]	☐ N/A	The forested areas treated under this project would be better adapted for drier, warmer temperatures, more resilient to fire, and produce more available water. Reducing the density of overstocked forests decreases moisture stress and makes the desirable residual trees less prone to drought and insect caused mortality (McDowell and Allen 2015). Sun et al. 2015 suggests that forest management, specifically thinning, "substantially increase water yield and potentially mitigate the negative drought effects" of future climate change in concert with mitigating fire hazard. Sun et al 2015 discusses "Maintaining low density forest stands through thinning

		and understory control not only helps to produce more water from the soil for groundwater recharge and downstream users, and increase water availability for the remaining trees, but can also have additional benefits to improve wildlife habitats and forest resilience to disturbances (insect and disease and fires) (Grant et al.2013; McNulty et al. 2014)". Region-wide treatments also mitigates the recent trend of loss of forest from catastrophic wildfire. Additionally, forest species composition can be altered or restored, in-line with treatment objectives , to create a more historic species mix, where more shade intolerant and fire adapted species replace the shade tolerant, fire prone, and water guzzling forest thickets that exist in much of the Sierra Nevada today.
f. Generation or reduction of greenhouse gas emissions (e.g. green technology)	☐ N/A	GHG emissions from wildfires are by far, the largest sources of GHG emissions in the UFR IRWM region. In general, thinning of overly dense forests can generate carbon emissions in the short-term, primarily from heavy equipment used in harvesting and the trucking of the material, if it is hauled to another destination. "Carbon neutrality" of electrical power generation from biomass material is still being debated, but replacing fossil carbon use with biomass utilization is a "carbon neutral" green source of electricity particularly in the long-term. When increasing use of biomass for thermal uses are advanced, such as the biomass-powered cogeneration facility that is being constructed for the County's Health and Human Service Building and Feather River College, biomass use contributes to improved GHG benefits. This benefit strengthened when such use reduces open pile burning that increases releases of black carbon, PM 2.5 and other pollutants that compromise human health. Additionally, enhanced hydroelectric generation capacity through increased water produced by forest

		thinning in the NFFR portion of the watershed increases green energy in the UFR region.
g. Other expected impacts or benefits that are not already mentioned elsewhere	☐ N/A	

A Disadvantaged Community is defined as a community with an annual median household (MHI) income that is less than 80 percent of the Statewide annual MHI. DWR's DAC mapping is available on the UFR website (http://featherriver.org/maps/) .

[2] Environmental Justice is defined as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation and enforcement of environmental laws, regulations and policies. An example of environmental justice benefit would be to improve conditions (e.g. water supply, flooding, sanitation) in an area of racial minorities.

[3] Climate change effects are likely to include increased flooding, extended drought, and associated secondary effects such as increased wildfire risk, erosion, and sedimentation.

DWR encourages multiple benefit projects which address one or more of the following elements (PRC §75026(a). Indicate which elements are addressed by your project.

a. Water supply reliability, water conservation, water use efficiency	☐ Yes ☐	g. Drinking water treatment and distribution	☐ ☐ N/A
b. Stormwater capture, storage, clean-up, treatment, management	☐ Yes ☐	h. Watershed protection and management	☐ Yes ☐
c. Removal of invasive non-native species, creation/enhancement of wetlands, acquisition/protection/restoration of open space and watershed lands	☐ Yes ☐	i. Contaminant and salt removal through reclamation/desalting, other treatment technologies and conveyance of recycled water for distribution to users	☐ ☐ N/A
d. Non-point source pollution reduction, management and monitoring	☐ ☐ N/A	j. Planning and implementation of multipurpose flood management programs	☐ Yes ☐
e. Groundwater recharge and management projects	☐ Yes ☐ N/A	k. Ecosystem and fisheries restoration and protection	☐ Yes ☐
f. Water banking, exchange, reclamation, and improvement of water quality	☐ ☐ N/A		

V. RESOURCE MANAGEMENT STRATEGIES

For each resource management strategy (RMS) employed by the project, provide a one to two sentence description in the table below of how the project incorporates the strategy. A description of the RMS can be found in Volume 2 of the 2013 California Water Plan (http://featherriver.org/2013-california-water-plan-update/).

Resource Management Strategy	Will the Project incorporate RMS?	Description of how RMS to be employed, if applicable * anticipated outcomes assume project implementation at a pace and scale above minimum detection thresholds.
Reduce Water Demand		
Agricultural Water Use Efficiency	☐ Yes ☐	The Community Recharge Areas (CRA) strategy will target thinning projects that may enhance groundwater recharge in the uplands surrounding agricultural operations and community settlements. Changing the timing and volume of municipal and agricultural water availability is a locally important outcome of improved forest water use efficiency.
Urban water use efficiency	☐ Yes ☐	Same as above.
Improve Flood Management		
Flood management	☐ Yes ☐	Flood peak attenuation is a predicted outcome of enhancing groundwater recharge.capacity. (Kavvas, 2008)
Improve Operational Efficiency and Transfers		
Conveyance – regional/local	☐ Yes ☐	Enhancing groundwater recharge and storage provides additional "passive" conveyance through natural surface and groundwater pathways.
System reoperation	☐ Yes ☐	Flood peak attenuation in combination with pulse and base flow augmentation from large and strategically located thinning projects can enhance flexibility for downstream reservoir and hydroelectric generation operations. This may become an increasingly important adaptation strategy for a more variable precipitation regime. (TNC, 2015)
Water transfers	☐ Yes ☐	In the headwaters, water transfers occur at the interaction zones between surface and groundwater. The Critical Habitat Strategy targets restoration in and around meadows, riparian forests, springs, wetlands, etc. for protection from catastrophic fire.
Increase Water Supply		
Conjunctive management	☐ Yes ☐	Healthy headwaters function as passive conjunctive areas. Projects that enhance groundwater recharge and storage may facilitate opportunities for conjunctive use

Resource Management Strategy	Will the Project incorporate RMS?	Description of how RMS to be employed, if applicable * anticipated outcomes assume project implementation at a pace and scale above minimum detection thresholds.
		projects downslope and downstream from recharged upland groundwater aquifers.
Precipitation Enhancement	☐ No ☒	
Municipal recycled water	☐ No ☒	
Surface storage – regional/local	☐ Yes ☐	Same as system reoperation above.
Improve Water Quality		
Drinking water treatment and distribution	☐ No ☒	
Groundwater remediation/aquifer remediation	☐ No ☒	
Matching water quality to water use	☐ No ☒	
Pollution prevention	☐ No ☒	
Salt and salinity management	☐ No ☒	
Urban storm water runoff management	☐ No ☒	
Practice Resource Stewardship		
Agricultural land stewardship	☐ No ☒	
Ecosystem restoration	☐ Yes ☐	Effects of thinning overly dense forests include improvement of forest health and forest resiliency to damaging fire and water stress, as treated areas are designed to mimic historic hydrologic and fire disturbance conditions and processes once prevalent throughout the Sierra Nevada. The rate of loss of forests and forest related resources to catastrophic wildfire is slowed. Water stress effects from hotter and drier summers are mitigated. In summary, landscape scale thinning buffers forests from accelerating climate change.
Forest management	☐ Yes ☐	The purpose of this project to increase the pace and scale of ecosystem scale forest management for forest ecosystem health, restoration of hydrologic function, and climate resiliency. Overly dense forests would be thinned to reduce catastrophic wildfire and to restore the pre-fire suppression forest hydrograph.
Land use planning and management	☐ Yes ☐	Overlying forest owners and managers under California's groundwater legislation are now the region's largest groundwater managers. Regional land use planning and management will support forest thinning as an effective water management tool for maintaining forest landscapes and land uses and for regional

Resource Management Strategy	Will the Project incorporate RMS?	Description of how RMS to be employed, if applicable * anticipated outcomes assume project implementation at a pace and scale above minimum detection thresholds.
		water reliability.
Recharge area protection	☐ Yes ☐	Possibly. Project Specific
Sediment management	☐ Yes ☐	Possibly. Project specific. Projects with identified pre-existing point source and non-point source sediment issues can address and mitigate those sources of input.
Watershed management	☐ Yes ☐	Forest management is watershed management when forest restoration improves the forest hydrograph and surface and groundwater connectivity. At a landscape scale, integrated forest and watershed management connects forest ecosystem habitats and buffers precipitation extremes by increasing groundwater recharge and extending surface water base and pulse flow yields beyond yearly precipitation totals.
People and Water		
Economic incentives	☐ Yes ☐	The public benefits of integrating wildfire reduction with forest health and forest hydrograph restoration will be evaluated for credible outcomes which, in turn, become the basis for the project's ongoing public/private and landscape scale investment partnerships
Outreach and engagement	☐ Yes ☐ No	This project will continue to be vetted through the UFR IRWM Plan update and include coordination with the IRWM UF workgroup members' ongoing regional forest project development and funding processes
Water and culture	☐ Yes ☐	The project anticipates piloting the tribal ecological knowledge (TEK) consultation protocol in specific projects through Involvement with tribal affiliates.
Water-dependent recreation	☐ Yes ☐	Enhanced baseflows and pulseflows from treated areas could have measurable benefits for adjacent and downstream water-dependent recreation. By increasing spring, summer, and fall stream flows and inflows to waterbodies; forest thinning projects may enhance the timing and availability of recreationally valuable water.
Wastewater/NPDES	☐ ☒ No	

Other RMS addressed and explanation:

The workgroup reviewed and completed the "Other RMS Strategies" assigned by the RWMG.

The Uplands and Forest Workgroup's 7 Fire & Fuels Management Strategies as of 6/30/2015 are:

1. Ridgeline lightning, roadway, and railroad ignitions,
2. Critical habitat buffers,
3. Snow zone management,
4. Fire liability buffers,
5. Wildland-urban interface (WUI) management,
6. Community recharge area management,
7. Landscape-scale management (containing multiple (#1-#6) fire and fuels management strategies)

VI. PROJECT COST AND FINANCING

Please provide any estimates of project cost, sources of funding, and operation and maintenance costs, as well as the source of the project cost in the table below.

PROJECT BUDGET

Project serves a need of a DAC?: ☐ ☐ Unknown. Project specific
Funding Match Waiver request?: ☐ ☐ Unknown. Project specific

	Category Project expands current forest treated acres/yr from an est. 15,5000 acres/yr to 25,000 to 35,000 acres/yr. assuming additional 30%-50% $ for public benefits	Requested Grant Amount	Cost Share: Non-State Fund Source* (Funding Match)	Cost Share: Other State Fund Source*	Total Cost
a.	**Direct Project Administration @5% (May vary from $0 to >05%)**	$2,520,000.	Project Specific TBD	Project Specific TBD	Project Specific TBD
b.	**Forest treatments @ $1500/acre 18,000 ac./yr. @ $1,500/ac.**	$27,000,000.	Project Specific TBD	Project Specific TBD	Project Specific TBD
c.	**Planning/Design/Engineering / Environmental**	Unknown	Project Specific TBD	Project Specific TBD	Project Specific
d.	**Construction/Implementation**	Unknown	Project Specific	Project Specific	Project
e.	**Environmental Compliance/ Mitigation/Enhancement@$500/ac**	$9,000,000.	Project Specific TBD	Project Specific TBD	Project Specific
f.	**Project partner support @ 05%**	$1,800,000.	Project Specific	Project Specific	Project
g.	**Other Costs: Monitoring and Evaluation @ 10%**	$3,600,000.	Project Specific TBD	Project Specific TBD	Project Specific TBD
h.	**Contingency. Ground burning @ 30 years @ $500/ac.**	$9,000,000.	Project Specific TBD	Project Specific TBD	Project Specific
i.	**Grand Total (Sum rows (a) through (h) for each column) (per year)**	$50,400,000. (w/o a.) to $52,920,000.	Project Specific TBD	Project Specific TBD	Project Specific TBD
j.	**Can the Project be phased?** ☐ **Yes** ☐ Initial projects will include the suite of Step 2 Uplands and				

forest projects, and include Tribal projects and Meadows, floodplains and waterbodies workgroups projects that emerge from the IRWM Project Integration Workshop. Ongoing coordination with regional forest management projects that are CEQA and NEPA ready and which include some of the 7 fire buffer strategies and address issues identified in the Forest Issues and RMS and Forest Issues and Objectives tables will be prioritized for collaborative implementation funding and partnership capacity building. A key component is that this project is by its nature phased but with the important distinction that subsequent phases or actions will be based on lessons learned and adaptive improvement resulting from monitoring and assessment of the previous phases.

	Project Cost	O&M Cost	Description of Phase
Phase 1 (first 2 years)	IRWM Step 2 proposals and currently partially funded or unfunded CEQA and NEPA ready Firesafe Council, RCD, Private Forests, and National Forest Projects	Project Specific TBD	Project Specific TBD
Phase 2 Years 3-5	Scaling up to the appropriate economic and ecological scales. Targets piloting all 7 Fire Buffer Strategies and testing forest hydrograph, forest health and climate resilience metrics	Project Specific TBD	Project Specific TBD
Phase 3 Years 5-7	Includes science review by the science team and includes plans for integration of project monitoring with model development	Project Specific TBD	Project Specific TBD

	Phase 4 Years 7-10	Includes incorporation of prescribed fire as an O&M tool.	Project Specific TBD	Project Specific TBD
k.	**Explain how operation and maintenance costs will be financed for the 20-year planning period for project implementation (not grant funded).**		Project Specific TBD	
l.	**Has a Cost/Benefit analysis been completed?**		☐ ☒ **No TBD. Project specific.**	
m.	**Describe what impact there may be if the project is not funded (300 words or less)**		The scale and severity of forest megafires will increase. Key forest ecosystem habitats will continue to decline. Type conversion is a real threat to long-term forest and species health. Hydrologic function and yield will continue to degrade. Moisture stress and forest species mortality will increase and ecosystem richness and resiliency will continue to decline. Without the buffering effects of fully functioning forest and watershed ecosystems, downstream water supply, hydroelectric generation, and flood control infrastructure will increasingly be subjected to precipitation extremes beyond optimal engineering design and historic operating parameters.	

*List all sources of funding.
Note: See Project Development Manual, Exhibit B, for assistance in completing this table (http://featherriver.org/documents/).

VIII. PROJECT STATUS AND SCHEDULE

Please provide a status of the project, level of completion as well as a description of the activities planned for each project stage. If unknown, enter **TBD**.

Project Stage	Check the Current Project Stage	Completed?	Description of Activities in Each Project Stage	Planned/ Actual Start Date (mm/yr)	Planned/ Actual Completion Date (mm/yr)
a. Assessment and Evaluation	☐	☐ ☐ No ☐	Project Specific TBD	Project Specific TBD	Project Specific TBD
b. Final Design	☐	☐ ☐ No ☐	Project Specific TBD	Project Specific TBD	Project Specific TBD
c. Environmental Documentation (CEQA / NEPA)	☐	☐ ☐ No ☐	Project Specific TBD	Project Specific TBD	Project Specific TBD
d. Permitting	☐	☐ ☐ No	Project Specific TBD	Project Specific TBD	Project Specific TBD

		☐			
e. Construction Contracting	☐	☐ ☐ No ☐	Project Specific TBD	Project Specific TBD	Project Specific TBD
f. Construction Implementation	☐	☐ ☐ No ☐	Project Specific TBD	Project Specific TBD	Project Specific TBD
Provide explanation if more than one project stage is checked as current status			N/A		

IX. PROJECT TECHNICAL FEASIBILITY

Please provide any related documents (date, title, author, and page numbers) that describe and confirm the technical feasibility of the project. See www.featherriver.org/catalog/index.php for documents gathered on the UFR Region.

a. List the adopted planning documents the proposed project is consistent with or supported by (e.g. General Plans, UWMPs, GWMPs, Water Master Plan, Habitat Conservation Plans, TMDLs, Basin Plans, etc.).	Project Specific and including: Forest and Land Management Plans, County General Plans, Timber Harvest Plans, Watershed Assessment and Management plans. Carbon conservation and storage plans, GHG reduction plans, Basin Plans, FERC hydroelectric license plans and conditions, Habitat Conservation Plans, and Non-industrial Timber Management Plans etc.
b. List technical reports and studies supporting the feasibility of this project.	See attachments and including: • Bales et al 2011 Forests and Water in the Sierra Nevada: Sierra Nevada Watershed Ecosystem Enhancement Project (SWEEP Proposal) • Woods et al 2006 Snow accumulation in thinned lodgepole pine stands • Sun et al 2015 Modelling the potential role of forest thinning in maintaining water supplies under a changing climate across the conterminous United States • McDowell and Allen 2015. Darcy's law predicts widespread forest mortality under climate warming

c. Concisely describe the scientific basis (e.g. how much research has been conducted) **of the proposed project in 300 words or less.**	Please see the attached lists of references. There is scientific consensus about the threats of catastrophic wildfires to water quality and forest ecosystem health. There is an emerging body of study on effects of forest thinning on water yields and groundwater recharge and storage. See attached memos for further discussion. (Bohm, 2015)
d. Does the project implement green technology (e.g. alternate forms of energy, recycled materials, LID techniques, etc.).	☐ No ☑ N/A If yes, please describe.
e. Are you an Urban Water Supplier[1]?	☐ No ☑ N/A
f. Are you are an Agricultural Water Supplier[2]?	☐ No ☑ N/A
g. Is the project related to groundwater?	☐ Yes ☐ ☐ If yes, please indicate which groundwater basin. TBD. Potentially, some or all of the UFR groundwater basins identified in DWR Bulletin 118 and as depicted on UFR IRWM maps.

Urban Water Supplier is defined as a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually.

[2] Agricultural Water Supplier is defined as a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding the acreage that receives recycled water.

Attachments:

Bohm memos

Uplands and Forest Workgroup Issues and RMS and Issues and Objectives Tables

Memo on biomass costs

Climate Change – Project Assessment Checklist

This climate change project assessment tool allows project applicants and the planning team to assess project consistency with Proposition 84 plan standards and RWMG plan assessment standards. The tool is a written checklist that asks GHG emissions and adaptation/resiliency questions.

Name of project: UF-12: UFR Cooperative Regional Thinning

Project applicant: Soper Company

GHG Emissions Assessment

Project Construction Emissions

(If you check any of the boxes, please see the attached worksheet)

☒ The project requires nonroad or off-road engines, equipment, or vehicles to complete.

☐ The project requires materials to be transported to the project site.

☒ The project requires workers to commute to the project site.

☐ The project is expected to generate GHG emissions for other reasons.

☐ The project does not have a construction phase and/or is not expected to generate GHG emissions during the construction phase.

Operating Emissions

(If you check any of the boxes, please see the attached worksheet)

☒ The project requires energy to operate.

☐ The project will generate electricity.

☒ The project will proactively manage forests to reduce wildfire risk.

☐ The project will affect wetland acreage.

☐ The project will include new trees.

☒ Project operations are expected to generate or reduce GHG emissions for other reasons.

Adaptation & Resiliency Assessment

Water Supply

Describe how the project makes the watershed (more/less) resilient to one or more of the following high priority water supply vulnerability issues:

- ☐ Not applicable
- ☒ Reduced snowmelt
- ☒ Unmet local water needs (drought)
- ☐ Increased invasive species

More resilient by improving available soil moisture for surrounding trees, and by enhancing recharge to groundwater aquifers.

Water Demand

Describe how the project makes the watershed (more/less) resilient to one or more of the following high priority water demand vulnerability issues:

- ☐ Not applicable
- ☐ Increasing seasonal water use variability
- ☒ Unmet in-stream flow requirements
- ☐ Climate-sensitive crops
- ☒ Groundwater drought resiliency
- ☐ Water curtailment effectiveness

More resilient by creating more availability of groundwater to feed nearby streams and by reducing water stress for water dependent vegetation.

Water Quality

Describe how the project makes the watershed (more/less) resilient to one or more of the following high priority water quality vulnerability issues:

- ☐ Not applicable
- ☒ Increasing catastrophic wildfires
- ☐ Eutrophication (excessive nutrient pollution in a waterbody, often followed by algae blooms and other related water quality issues)
- ☒ Seasonal low flows and limited abilities for waterbodies to assimilate pollution
- ☐ Water treatment facility operations
- ☒ Unmet beneficial uses (municipal and domestic water supply, water contact recreation, cold freshwater habitat, spawning habitat, wildlife habitat, etc.)

More resilient by reductions in catastrophic wildfires and associated reductions in severely burned soils and erosion related impairments to water quality. And more resilient through Increased seasonal low flows to nearby streams and aquifers from reducing fire-prone conifer densities. Reduced forest densities in turn, reduce evapotranspiration competition and water stress levels for retained mature vegetation, including streamside vegetation, during the growing season. And more resilient by making more water available for beneficial uses through enhanced stormwater infiltration and groundwater recharge to forest soils and aquifers during the dormant season. Cold freshwater spawning habitat and wildlife habitat is enhanced by stream cooling in the summer that results from higher inputs of shallow groundwater to nearby streams and through enhanced shading and temperature moderation by well-watered streamside vegetation.

Flooding

Describe how the project makes the watershed (more/less) resilient to one or more of the following high priority flooding vulnerability issues:

- ☐ Not applicable
- ☐ Aging critical flood protection
- ☒ Wildfires
- ☐ Critical infrastructure in a floodplain
- ☐ Insufficient flood control facilities

More resilient through less risk of "fire, flood, and mud" effects to downslope water bodies from large areas of severely burned forest stands and soils.

Ecosystem and Habitat

Describe how the project makes the watershed (more/less) resilient to one or more of the following high priority ecosystem and habitat vulnerability issues:

- ☐ Not applicable
- ☐ Climate-sensitive fauna or flora
- ☐ Recreation and economic activity
- ☐ Quantified environmental flow requirements
- ☒ Erosion and sedimentation
- ☐ Endangered or threatened species
- ☒ Fragmented habitat

More resilient from less erosion and sedimentation caused by severe wildfires. More resilient to habitat fragmentation by wildfire that is so severe and extensive that large acreages of mature forest habitats are converted into non-forest conditions, thereby reducing habitat availability and habitat connectivity for the iconic fish and wildlife species that are dependent on connected mosaics of mature forest habitats.

Hydropower

Describe how the project makes the watershed (more/less) resilient to one or more of the following high priority hydropower vulnerability issues:

- ☒ Not applicable
- ☐ Reduced hydropower output

May be applicable where fuels reduction projects at a landscape scale are effective in enhancing measureable summer flows in hydropower source watersheds (e.g. the North Fork Feather River that drains to Pulga, or in the watersheds draining to Lake Oroville on the Middle Fork of the Feather River below Sierra Valley.

UF-12: UFR Cooperative Regional Thinning

GHG Emissions Analysis

Project Construction Emissions

[X] The project requires non-road or off-road engines, equipment, or vehicles to complete. If yes:

Type of Equipment	Maximum Number Per Day	Total 8-Hour Days in Operation	Total $MTCO_2e$
Rubber Tired Loaders	2	1,960	1,583
Excavators	1	1,960	857
Excavators	1	1,960	857
Other Construction Equipment	1	1,960	158
			0
			0
			0
			0
			0
			0
		Total Emissions	**3,455**

[X] The project requires biomass materials to be transported outside of the UFR watershed. If yes:

Total Number of Round Trips	Average Trip Distance (Miles)	Total $MTCO_2e$
16,100	100	**2,477**

[ ] The project requires workers from outside of the UFR watershed. If yes:

Average Number of Workers	Total Number of Workdays	Average Round Trip Distance Traveled (Miles)	Total $MTCO_2e$
			0

[ ] The project is expected to generate GHG emissions for other reasons. If yes, explain:

[ ] The project does not have a construction phase and/or is not expected to generate GHG emissions during the construction phase.

UF-12: UFR Cooperative Regional Thinning

Project Operating Emissions

☐ The project requires energy to operate. If yes:

Annual Energy Needed	Unit	Total $MTCO_2e$
	kWh (Electricity)	**0**
	Therm (Natural Gas)	**0**

☐ The project will generate electricity. If yes:

Annual kWh Generated	Total $MTCO_2e$
	0

*A negative value indicates GHG reductions

☒ The project will proactively manage forests to reduce wildfire risk. If yes:

Acres Protected from Wildfire	Total $MTCO_2e$
18,000	**-113,400**

*A negative value indicates GHG reductions

☐ The project will affect wetland acreage. If yes:

Acres of Protected Wetlands	Total $MTCO_2e$
1,800	**-7,794**

*A negative value indicates GHG reductions

☐ The project will include new trees. If yes:

Acres of Trees Planted	Total $MTCO_2e$
	0

*A negative value indicates GHG reductions

GHG Emissions Summary

Construction and development will generate approximately:	5,932	$MTCO_2e$
In a given year, operation of the project will result in:	-121,194	$MTCO_2e$