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

Prepared By:	Zeke Lunder – Deer Creek Resources, LLC - submitted for:
Agency / Organization	Plumas County
Name of Primary Contact	Randy Wilson
Technical Contact	Zeke Lunder
Mailing Address	555 Main St. Quincy, CA 95971
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Phone	(530) 283-7011
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, PG&E, Stewardship Council
Is your agency/organization committed to the project through completion? If not, please explain	Deer Creek Resources is committed to seeing this project through to completion. We have long-time ties to the Region, and hope to support restoration and planning work here for as long as possible.

II. GENERAL PROJECT INFORMATION

Project Title	UF-13: UFR Cooperative LiDAR and GIS Support Program
Project Category **Integrated Project -**	**This project will support planning, implementation, and monitoring of any resource management project funded under the IRWM Program.**
Project Description (Briefly describe the project, in 300 words or less)	LiDAR scans the landscape and provides highly accurate information on the terrain and vegetation. The attached examples use LiDAR technology to characterize topography and vegetation for areas around Clio, in Eastern Plumas County. Such data exists for portions of the watershed, but more complete coverage is needed. LiDAR data has been captured for portions of the UFR Region (including the Moonlight and Storrie Fire areas, Meadow Valley and Mohawk Valley). This project will be a collaborative effort between the US Forest Service, Plumas County, and other IRWM signatories to fund acquisition of LiDAR

	topography data for the remainder of the Upper Feather River Watershed. This project will directly support mapping and project-design for a large number of other currently-proposed IRWM projects, and each project could potentially contribute a small portion of their budget to an overall mapping budget for the entire UFR Region.
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 would cover the entire Upper Feather River (UFR) Integrated Regional Water Management (IRWM) boundary, about 2.3 million acres, minus water surfaces on larger reservoirs.
Latitude:	
Longitude:	The entire 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 ☐	LiDAR data will be useful in identifying areas of overstocked forests where thinning will increase groundwater infiltration and reduce the severity of future wildfires.	Unable to quantify at this time.
Reduce potential for catastrophic wildland fires in the Region.	☐ Yes ☐	LiDAR data can be analyzed to map fuel loading and prioritize specific area for hazard reduction thinning.	All WUI areas in the UFR region will be mapped and assessed for wildfire hazard. This project will update the 2004 Plumas County Hazardous Fuels Assessment and Butte County Community Wildfire Protection Plan.

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)
Build communication and collaboration among water resources stakeholders in the Region.	☐ Yes ☐	As a cooperative, region-wide project, collaboration among forest and land managers and stakeholders is a key element for project durability and success.	Training for local resource managers on how to use LiDAR at the project and landscape-scale.
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 ☐	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. Downstream SWP reservoir storage, hydroelectric – power generation and water based recreational opportunities will also benefit from an improved forest hydrograph.	Unquantifiable at this time.
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 ☐	PG&E's vegetation management coordinator for the UFR Region has expressed a verbal commitment to support this project with technical expertise, and potentially, by contributing PG&E's existing LiDAR data for their power transmission corridors.	LiDAR-based maps will be useful in developing ANY resource management activities within the FERC project areas.
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 will support the Soper forest restoration project also proposed under this solicitation. As such, it will be used to develop projects that mitigate the negative impacts to water quality resulting from	Unquantified at this time.

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)
		catastrophic	
Address water resources and wastewater needs of DACs and Native Americans.	☐ Yes ☐	The Tribal Advisory Committee for the UFR effort has identified restoration of spring and wetland areas as being one of the highest priority cultural land management focuses. Data from this project can be interpreted to identify spring areas and areas with topography that supports moist soil conditions.	All of the Upper Feather River (UFR) Region.
Coordinate management of recharge areas and protect groundwater resources.	☐ Yes ☐	Identifying priority watershed enhancement projects requires good, up-to-date information and a collaborative approach. From conceptualization to implementation and monitoring, data from this effort will be useful at all phases of on-the-ground resource management projects in the UFR region.	All of the Upper Feather River (UFR) Region.
Improve coordination of land use and water resources planning.	☐ Yes ☐	This project includes funding to continue to support GIS mapping work done during the UFR IRWM planning process. Maintaining a central GIS database will improve coordination between all parties involved in land and water management.	All of the Upper Feather River (UFR) Region.
Maximize agricultural, environmental and municipal water use efficiency.	☐ Yes ☐	LiDAR can be used to identify areas with the best characteristics for shallow groundwater storage and management.	All of the Upper Feather River (UFR) Region.
Effectively address climate change adaptation and/or mitigation in water resources management.	☐ Yes	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. This project's data will be instrumental in development of	Up to 750,000 acres of forestland within the UFR IRWM at a 20,000-60,000 acre/yr. annual scale of project implementation

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)
		cross-boundary forest restoration projects. 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 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)	Over a 10 year period.
Improve efficiency and reliability of water supply and other water-related infrastructure.	☐ Yes ☐	The LiDAR data is sufficiently detailed to be used in lieu of traditional surveying to conduct meadow, stream, and site surveys necessary to design and implement meadow restoration surface water management infrastructure projects.	
Enhance public awareness and understanding of water management issues and needs.	☐ Yes ☐	LiDAR data is useful in helping the public to visually understand complicated infrastructure and natural resource issues.	
Address economic challenges of agricultural producers.	☐ Yes ☐		
Work with counties/ communities/groups to make sure staff capacity exists for actual administration and implementation of grant funding.	☐ Yes ☐ N/A	This project includes funding to continue to support GIS mapping work done during the UFR IRWM planning process. Maintaining a central GIS database will improve coordination between all parties involved in land and water management.	

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	☐	The Tribal Advisory Committee for the UFR effort has identified restoration of spring and wetland areas as being one of the highest priority cultural land management focuses. Data from this project can be interpreted to identify spring areas and areas with topography that supports moist soil conditions.
b. Disadvantaged Communities[1]	☐	The data from this project will be instrumental in developing public support at the Statewide level for water-related restoration projects that will create jobs while improving public safety for the communities of the Region.
c. Environmental Justice[2]	☐	The Tribal Advisory Committee for the UFR effort has identified restoration of spring and wetland areas as being one of the highest priority cultural land management focuses. Data from this project can be interpreted to identify spring areas and areas with topography that supports moist soil conditions. Tending to the land is at the core of the Maidu way of life. Any project that empowers cultural land management practices increases the environmental justice within the region.
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.

f. Generation or reduction of greenhouse gas emissions (e.g. green technology)	☐ N/A	LiDAR is one of the best available technologies for surveying aboveground biomass at the landscape-scale.
g. Other expected impacts or benefits that are not already mentioned elsewhere	☐ N/A	LiDAR provides highly detailed elevation mapping which can be used for floodplain delineation.

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	☐ Yes ☐	j. Planning and implementation of multipurpose flood management programs	☐ Yes ☐
e. Groundwater recharge and management projects	☐ Yes ☐	k. Ecosystem and fisheries restoration and protection	☐ Yes ☐
f. Water banking, exchange, reclamation, and improvement of water quality	☐ Yes ☐		

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 ☐	This project will support the proposed 'Community Recharge Areas (CRA)' project which targets 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 ☐	LiDAR provides highly detailed elevation mapping which can be used for floodplain delineation.
Improve Operational Efficiency and Transfers		
Conveyance – regional/local	☐ Yes ☐	The LiDAR data is sufficiently detailed to be used in lieu of traditional surveying to conduct meadow, stream, and site surveys necessary to design and implement meadow restoration surface water management infrastructure projects.
System reoperation	☐ ☐ N/A	N/A
Water transfers	☐ ☐ N/A	
Increase Water Supply		
Conjunctive management	☐ ☐ N/A	
Precipitation Enhancement	☐ ☐ No	
Municipal recycled water	☐ ☐ No	
Surface storage – regional/local	☐ ☐ No	
Improve Water Quality		
Drinking water treatment and distribution	☐ ☒ No	
Groundwater remediation/aquifer remediation	☐ ☒ No	

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.
Matching water quality to water use	☐ No ☒	
Pollution prevention	☐ No ☒	
Salt and salinity management	☐ No ☒	
Urban storm water runoff management	☐ Yes ☐	LiDAR can be used to analyze flow patterns in the urbanized landscape and design infiltration projects and implement other stormwater management BMPs
Practice Resource Stewardship		
Agricultural land stewardship	Yes	The LiDAR data is sufficiently detailed to be used in lieu of traditional surveying to conduct meadow, stream, and site surveys necessary to design and implement meadow restoration surface water management infrastructure projects.
Ecosystem restoration	Yes	Same as above
Forest management	Yes	LiDAR data can be used to conduct detailed forest inventories. These can identify overly dense forests for thinning to reduce catastrophic wildfire and to restore the pre-fire suppression forest hydrograph.
Land use planning and management	Yes	This project includes funding to continue to support GIS mapping work done during the UFR IRWM planning process. Maintaining a central GIS database will improve coordination between all parties involved in land and water management.
Recharge area protection	Yes	LiDAR can be interpreted to develop detailed mapping of the surface geology and identify important shallow aquifer areas.
Sediment management	Yes	LiDAR can be delivered as a 'bare-earth' model that shows gullies and landslides caused by forest roads or other historic land management – see attached example map.
Watershed management	Yes	LiDAR is the best available technology for mapping natural resources.
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	LiDAR maps can be used to illustrate any resource management topic or conversation

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 and culture	Yes	The Tribal Advisory Committee for the UFR effort has identified restoration of spring and wetland areas as being one of the highest priority cultural land management focuses. Data from this project can be interpreted to identify spring areas and areas with topography that supports moist soil conditions. Waterfowl hunting and fishing are very important parts of local culture also. LiDAR can be used to assess wildlife habitat conditions and develop projects such as duck nesting islands, stream restoration willow planting, or to locate low-lying areas that are good candidates for wetland restoration
Water-dependent recreation	Yes	See above.
Wastewater/NPDES	No	

Other RMS addressed and explanation:

<u>The workgroup reviewed and completed the "Other RMS Strategies" assigned by the RWMG.</u>
LiDAR can be used to support other projects including the Uplands and Forest Workgroup's 7 Fire & Fuels Management:

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?: YES ☐ Unknown. Project specific
Funding Match Waiver request?: NO ☐ Unknown. Project specific

	Category funding	Requested Grant Amount	Cost Share: Non-State Fund Source* (Funding Match)	Cost Share: Other State Fund Source*	Total Cost
a.	**Direct Project Administration @5%**	$150-200K			$150-200K
b.	**LiDAR Acquisition**	$2M -3M 2 million acres at $1-1.50/acre	50% match from industrial timberland owners, USFS, and potentially Stewardship Council. Donation of existing PG&E and USFS data		$1M-1.5M
c.	**LiDAR Processing and UFR Project Support**	$500K	20% cost share from GIS Contractor		$400K
d.	**Construction/Implementation**	N/A			
e.	**Environmental Compliance/ Mitigation/Enhancement@$500/ac**	N/A			
f.	**Project partner support**				
g.	**Other Costs: Monitoring and Evaluation @ 20%**	N/A			
h.	**GIS Support to integrate LiDAR into UFR Project planning, implementation and monitoring**	$600K	20% cost share from GIS Contractor		$500K
i.	**Grand Total (Sum rows (a) through (h) for each column) (per year for years 1 & 2**	$3M to $4M			$2.05M-$2.55M

j.	**Can the Project be phased? ☐ YES ☐**			
		Project Cost	**O&M Cost**	**Description of Phase**
	Phase 1 (first 2 years)	**LiDAR acquisition and processing**	$2.5-$3.5M	Build LiDAR database and provide data products to UFR project partners
	Phase 2 Years 3-5	**GIS Support to integrate LiDAR into UFR Project planning, implementation and monitoring**	$600K	Project-specific LiDAR analysis – e.g. mapping forest structure, identifying spring areas,
k.	**Explain how operation and maintenance costs will be financed for the 20-year planning period for project implementation (not grant funded).**		Project Specific Future UFR projects will include a data management and mapping line-item in their budgets	
l.	**Has a Cost/Benefit analysis been completed?**		☐ **No** ☐	
m.	**Describe what impact there may be if the project is not funded (300 words or less)**		UFR resource management projects will cost more to implement and be less effective.	

*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.	Pennypacker, C.R., Marek K. Jakubowski, M. Kelly, M. Lampton, C. Schmidt, S. Stephens, R. Tripp, 2013. "FUEGO—Fire Urgency Estimator in Geosynchronous Orbit—A proposed early-warning fire detection system," in Remote Sensing, 5(10):5173-5192. Marek K. Jakubowski, W. Li, Q. Guo, M. Kelly, 2013. "Delineating individual trees from lidar data: A comparison of vector- and raster-based segmentation approaches," in Remote Sensing, 5(9):4163-4186. Marek K. Jakubowski, Q. Guo, M. Kelly, 2013. "Tradeoffs between lidar pulse density and forest measurement accuracy," in Remote Sensing of Environment, 130(15):245–253. Marek K. Jakubowski, Q. Guo, B. Collins, S. Stephens, M. Kelly, 2013. "Predicting surface fuel models and fuel metrics using lidar and CIR imagery in a dense, mountainous forest," in Photogrammetric Engineering & Remote Sensing, 79(1):37–49. Li., W., Q. Guo, Marek K. Jakubowski, M. Kelly, 2012. "A New Method for Segmenting Individual Trees from the Lidar Point Cloud," in Photogrammetric Engineering & Remote Sensing, 78(1):75-84. Blanchard, S.D., Marek K. Jakubowski, M. Kelly, 2011. "Object-Based Image Analysis of Downed Logs in Disturbed Forested Landscapes Using Lidar," in Remote Sensing, 3(11):2420-2439.
c. Concisely describe the scientific basis (e.g. how much research has been conducted) **of the proposed project in 300 words or less.**	The USFS has used LiDAR extensively to characterize forest canopies. Marek Jacubowski, PhD has published peer-reviewed papers specifically on this topic, and he will be a key team member on this project.

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.

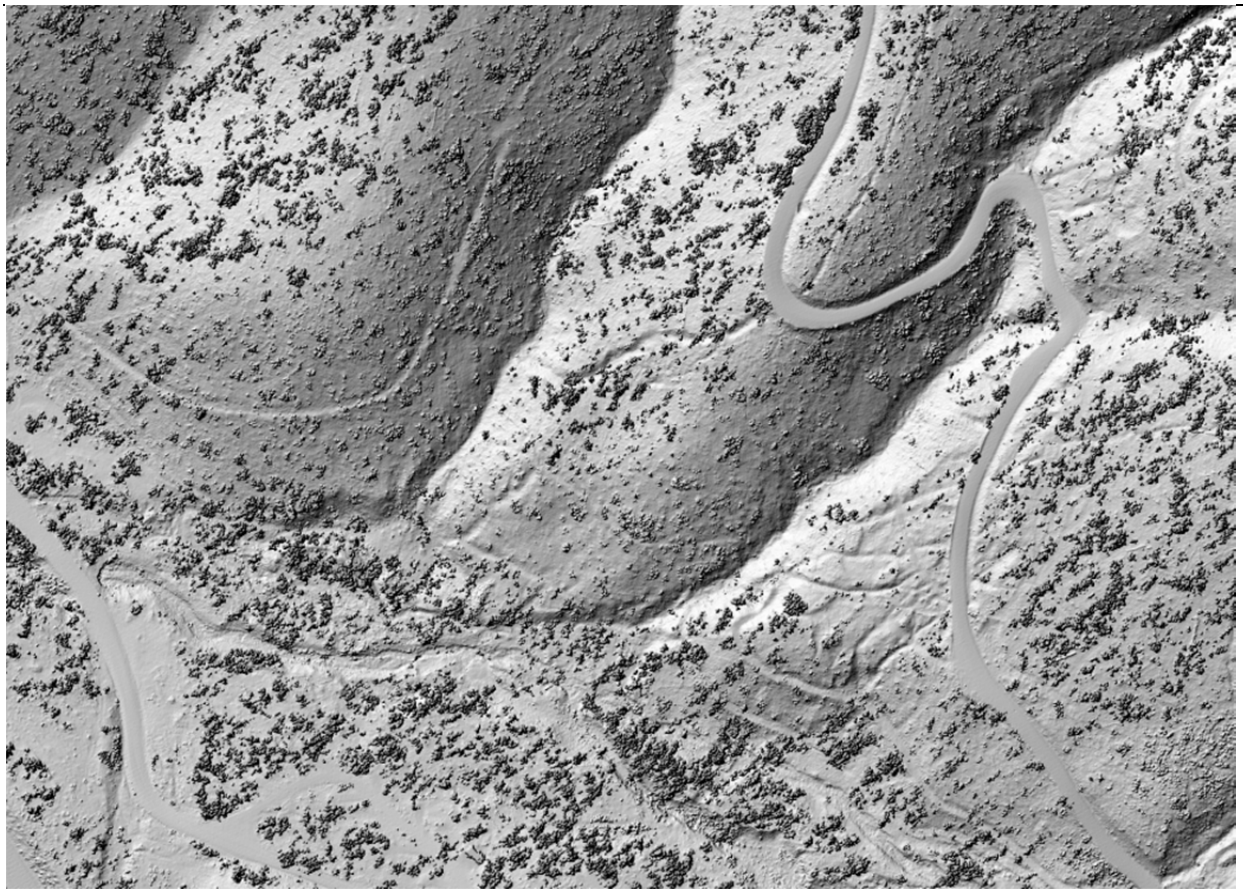
Urban Water Supplier is defined as a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually.

[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:

LiDAR mapping example for Eastern Plumas County

LiDAR Imagery for the Clio Area – shows road fills, gullies, floodplain, channels, potential flood risk.



Example use of LiDAR elevation data to evaluate stream channel areas and map forest road-related erosion.

LiDAR Imagery showing forest density and age classes in same area as bare-earth image, above.