Application Form for 2024 Local Cooperative Solution for Overlying or Adjudicated Groundwater Rights in Scott River and Shasta River Watersheds

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

Please complete this form if you plan to implement a groundwater local cooperative solution (LCS) for the 2024 irrigation season under the Scott River and Shasta River watersheds emergency regulation. A separate application should be submitted for each type of groundwater LCS proposal. **The form and attachments are due by April 15, 2024.**

How to Submit: To submit your application and associated required materials (see Section 2) you can:

- Use the online form
- Email: DWR-ScottShastaDrought@waterboards.ca.gov
- Mail:

  State Water Resources Control Board
  Division of Water Rights - Instream Flows Unit 1
  1001 I Street - 14th Floor
  Sacramento, CA 95814

Section 1: Applicant Information

Name	Dan & Lyn Hayden
Name of Farm, Ranch, or Business	Rocking M Ranch
Phone Number	[redacted]
Email Address	

By typing or signing your name below and submitting this form to the State Water Resources Control Board (State Water Board) you hereby certify that the submitted information is true and correct to the best of your knowledge.

Name: [signature] Date: 4-15-24

Section 9: Percent Reduction Groundwater LCS

The applicable percent reduction in groundwater pumping noted below must be demonstrated for the Percent Reduction Groundwater LCS consistent with section 875(f)(4)(D)(v) of the emergency regulation, and summarized below.

- **Scott River Watershed:** A net groundwater pumping reduction of 30% throughout the irrigation season (April 1 – October 31) and a monthly reduction of 30% between July 1 through October 31.
- **Shasta River Watershed:** A net groundwater pumping reduction of 15% throughout the irrigation season (March 1 – November 1) and a monthly reduction of 15% between June 1 through September 30.
- The relevant water use reduction shall be based on a comparison to a baseline irrigation season (i.e., 2020, 2021, 2022, or 2023).
  - o BUT, if the previous year baseline is higher than the following applied water rates:
    - ➢ 33 inches per year for alfalfa,
    - ➢ 14 inches per year for grain, or
    - ➢ 30 inches per year for pasture
  - ❖ Then the above values shall be used as the baseline UNLESS the applicant provides sufficient additional information supporting an alternative baseline.
- Please provide the total amount of irrigated acreage (with units) under your proposal for a Percent Reduction Groundwater LCS. 515 ac
- If you are proposing a Percent Reduction Groundwater LCS, attach or email the following files to the State Water Board and your Coordinating Entity.
  a. A description of practices that reduces groundwater pumping and how the State Water Board (or Coordinating Entity, if applicable) can verify those actions.

  See Letter

  Upload Attachment

  b. A spreadsheet with monthly pumping volumes for the selected baseline year and current year. Use one row per irrigation method per field.

  Upload Baseline Pumping

  c. Map(s) with each field labelled.

  Upload Map(s)

Maps are the same as 2022.

Section 10: List of Fields, APNs, and Water Rights

List the fields associated with this groundwater LCS application, if each property is owned or leased, and the assessor's parcel number (APN) that contains each field. If a field is on multiple parcels, provide the APN that contains the majority of the field. Alternatively, you may also electronically submit a document or spreadsheet with this information. Each field can only have **one (1)** type of groundwater LCS associated with i

Irrigated Field Name(s) or Number(s)	Is the parcel owned or leased?	Assessor Parcel Number(s)	Water Right(s)	Groundwate Type
		[redacted]		
LAND OWNED AND OPERATED BY ROCKING M RANCH				
	PARCEL NUMBERS AND FIELD BOUNTRIES ARE NOT THE SAME.			

Upload Attachment

Section 5: Groundwater Well Information

Complete the table below or upload an attachment for groundwater wells that are part of the proposed groundwater LCS.

Well Name	Well Coordinates[1]
Ft. Jones South well (lumberyard)	[redacted]
Ft Jones middle well pond	
Ft. Jones Northwell ballpark	
Quartz valley Dangel ranch	
Quartz valley Mulloy	

For assistance in finding well coordinates, you can use Google Maps (www.google.com/maps).

Upload Well Information

Section 6: Metering Information

Please describe the metering for all groundwater wells covered by this groundwater LCS. Fill in the box below, upload an attachment, or email a document or spreadsheet with this information.

a. Describe how you will record daily extractions and report monthly pumping volumes.
Include a description of all water uses associated with each groundwater well that is part of this groundwater LCS.
For example, "the ranch manager will log meter readings at Well 1 and Well 2 and take a picture of the meters each week. They will note what the water is being used for - Well 1 will irrigate 50 acres of grain on fields A and B, 100 acres of pasture on fields E, G, and Z, and Well 2 will irrigate 75 acres of alfalfa on field Y. The manager will send the logs and photos to the Water Board around the first of each month."

Ft. Jones

They will have electronic meters, will download it and forward info.

QV. Mulloy - meter at well. will photograph & report monthly.

QV Dangel well, meter at pivot center - will record & take pics weekly. That pivot is the only water usage on the well. pasture only

b. For groundwater wells that are NOT currently metered, please describe the time schedule and plan to install meters and efforts to obtain a meter before the initiation of groundwater diversions covered by this groundwater LCS. If you want to file for a waiver to the metering requirement please use the box below and include information on why metering of your well(s) should be waived. Be sure to include total irrigated acres, distance of the well(s) from surface water, description of why metering is infeasible, if applicable, and any additional information that supports your waiver request.

We are working with the NRCS on installing the meters. We have been approved for funding on part of the meters and are working on the details. (we pay for the other part)
Planned completion date of 8-1-24

Upload Attachment

Select the type of groundwater LCS you are applying for and complete the corresponding sections of the application.

- [ ] Best Management Practices Groundwater LCS - Complete sections 7 and 10
- [ ] Graduated Groundwater Cessation Schedule LCS - Complete sections 8 and 10
- [x] Percent Reduction Groundwater LCS - Complete sections 9 and 10

[redacted]

April 15, 2024

State Water Resources Control Board
Re: 2024 LCS

To the state water board,
Proposed water plan to get a 30% reduction in water usage, using 2023 baseline.

1. Starting in late April with 1 pass.
2. No irrigation in October.
3. Alfalfa with only 1 pass in September.
4. Proposed 2024 water usage schedule shows a percentage use of 73% in July and August. 67% in September, and 0% in October. 67% for the full year.

Irrigation schedule needs to be flexible during haying schedules and storm activity. We have LESA systems planned for 3 pivots and request an adjustment to our water usesage savings of 18% due to efficiency studies on the LESA system ,as mentioned in the studies and trials in the Pacific Northwest, included is their studies.
We believe that the baselines established were exceptionally low in comparison to the studies done by Steve Orloff University of California Extension Farm advisor, who spent most of his adult life in the fields of Scott and Shasta valleys. He published hundreds of articles reporting on research of pest management, irrigation, harvest management and fertilization. Included are tables that Steve Orloff prepared on the water needs of pasture and alfalfa.
We believe that every crop in Scott Valley should have the same Baseline.

Sincerely yours,
Dan and Lyn Hayden

Table 2 2023 BASELINE

2024 specifications	acre/ft April	acre/ft may	acre/ft June	acre/ft July	acre/ft august	acre/ft september	acre/ft October	Total
Canyon wheel line 6.1gpm 35 noz. 4-10 hr. Sets 3 passes/month grass	4.72	4.72	4.72	4.72	4.72	4.72	1.57	29.89
Ball park wheel line 6.1gpm 12 noz. 8-10 hr sets 3 passes/month alfalfa	2.14	3.23	3.23	3.23	3.23	1.07		16.13
Pond wheel line 6.1gpm 32 noz . 4-10 hr sets 3 passes/month grain	2.86	4.31	4.31	1.43				12.91
Lumber yard wheel line 6.1gpm 11noz. 6-10 hr sets 3 passes/ month grain	1.48	2.22	2.22	0.74				6.66
Hand pipe 6.1gpm 27 noz. 1-10 hr set 3 passes/month grain	0.6	0.91	0.91	0.3				2.72
Lane wheel lines 6.1gpm 58 noz. 5-10 hr sets 3 passes/month grass	6.52	9.77	9.77	9.77	9.77	9.77	3.26	58.63
Pod lines 4gpm 41 noz. 8-10 hr sets 3 passes/month grass	6.04	6.04	6.04	6.04	6.04	6.04		36.24
North pivot 1/3 1.5 inches/pass .5ft/ month 33 acres 4 passes/month alfalfa	8.25	16.5	16.5	16.5	16.5	4.13		78.38
North pivot 2/3 1.25 inch/pass . 42ft/month 66 acres 4 passes/ month grass	13.86	27.72	27.72	27.72	27.72	27.72	6.93	159.39

2023 BASELINE

2024 specifications	acre/ft April	acre/ft may	acre/ft June	acre/ft July	acre/ft august	acre/ft september	acre/ft October	Total
Middle pivot south 1.5 inches/ pass .33ft/ month 23.25 acres 4 passes/month grain	7.67	7.67	7.67	1.92				24.93
Middle pivot north 1.5 inches/pass . 5ft/month 28.38 acres 4 passes/ month alfalfa	7.1	14.19	14.19	14.19	14.19	3.55		67.41
South pivot west 1.25inch/pass . 42ft/month 35.4 acres 3passes/ month grass	7.44	14.86	14.86	14.86	14.86	14.86	3.72	85.46
South pivot east 1.5 inches/pass . 5ft/month 35.4acres 4 passes/month alfalfa	8.86	17.7	17.7	17.7	17.7	4.43		84.09
Dangel pivot 1.25 inch/pass .42ft/ month 75 acres 4 passes/month grass	15.75	31.5	31.5	31.5	31.5	15.75	3.94	161.44
Mulloy pivot south 1 inch/pass .25ft/ month 58.33 acres 3 passes/month	14.58	14.58	14.58	14.58	14.58	14.58		87.48
Mulloy pivot west 1 inch/pass .25ft/ month 43 acres 3 passes/month grass				5.37	10.75	10.75		26.87
Mulloy pivot northeast 1 inch/ pass .08ft/month 40 acres 1 pass/ month grass						3.2		3.2
Total for 2023	107.87	175.92	175.92	170.57	173.56	120.57	19.42	943.83
70% of 2023	75.51	123.14	123.14	119.41	121.49	84.4	13.6	660.68

2024

2024 specifications	acre/ft April	acre/ft may	acre/ft June	acre/ft July	acre/ft august	acre/ft september	acre/ft October	Total
Middle pivot south 1.5 inches/ pass .37ft/ month 23.25 acres 3 passes/month alfalfa	2.87	8.6	8.6	8.6	8.6	2.87		40.14
Middle pivot north 1.5 inches/pass . 37ft/month 28.38 acres 3 passes/ month alfalfa	3.5	10.5	10.5	10.5	10.5	3.5		49
South pivot west 1 inch/pass .25ft/ month 35.4 acres 3passes/month grain	2.87	8.5	8.85	2.95				23.5
South pivot east 1.5 inches/pass . 37ft/month 35.4acres 3 passes/month alfalfa	4.37	13.1	13.1	13.1	13.1	4.37		61.14
Dangel pivot 1 inch/pass .33ft/ month 75 acres 4 passes/month grass	6.19	24.75	24.75	24.75	24.75	12		117.19
Mulloy pivot south 1 inch/pass .25ft/ month 58.33 acres 3 passes/month		14.58	14.58					29.16
Mulloy pivot west 1 inch/pass .25ft/ month 43 acres 3 passes/month grass				5.37	10.75	10.75		26.87
Mulloy pivot northeast 1 inch/ pass .08ft/month 40 acres 1 pass/ month grass								0
Total for 2024	45.63	141.48	141.48	124.39	126.08	77.43		657.19
Total for 2023	107.87	175.92	175.92	170.57	173.56	120.57	19.42	943.83
Percent of 2023	42%	80%	80%	73%	73%	67%	0%	67%

Table 2 2024

2024 specifications	acre/ft April	acre/ft may	acre/ft June	acre/ft July	acre/ft august	acre/ft september	acre/ft October	Total
Canyon wheel line 6.1gpm 35 noz. 4-10 hr. Sets 2.5 passes/month grass	1.6	3.9	3.9	3.9	3.9	3.9		21.1
Ball park wheel line 6.1gpm 12 noz. 8-10 hr sets 2.5 passes/month alfalfa	1.08	2.7	2.7	2.7	2.7			11.88
Pond wheel line 6.1gpm 32 noz . 4-10 hr sets 2.5 passes/month alfalfa	1.44	3.6	3.6	3.6	3.6			15.84
Lumber yard wheel line 6.1gpm 11noz. 6-10 hr sets 2.5 passes/ month grain	0.74	1.85	1.85	0.74				5.88
Hand pipe 6.1gpm 27 noz. 1-10 hr set 2.5 passes/month grain	0.35	0.87	0.87					2.09
Lane wheel lines 6.1gpm 58 noz. 5-10 hr sets 2.5 passes/month grass	3.25	8.15	8.15	8.15	8.15	8.15		44.01
Pod lines 4gpm 41 noz. 8-10 hr sets 2.5 passes/month grass	2.42	6.04	6.04	6.04	6.04	6.04		32.62
North pivot 1/3 1.5 inches/pass .37ft/ month 33 acres 3 passes/month alfalfa	4.07	12.21	12.21	12.21	12.21	4.07		56.98
North pivot 2/3 1 inch/pass .33ft/ month 66 acres 4 passes/month grass	10.89	21.78	21.78	21.78	21.78	21.78		119.79

Scott River Water Trust

P.O. Box 591 ~ Etna, CA 96027
530-643-2395 scottwatertrust@gmail.com

Month, Day, Year
4-13-24

APPLICATION TO SCOTT RIVER WATER TRUST AS COORDINATING ENTITY for the SCOTT VALLEY GROUNDWATER REDUCTION LOCAL COOPERATIVE SOLUTION

The following request is being submitted pursuant to Section 875.5, , subdivision (a)(1)(A)(ix) [Scott River] of the Scott-Shasta Drought Emergency Regulation of the State Water Resources Control Board (SWB). The purpose of this Local Cooperative Solution (LCS) is to document the applicant's proposed reduction in use of overlying or adjudicated groundwater use by a certain amount over the entire irrigation season.

Applicant's Name: Rocking M Ranch
Address: [redacted]
Phone: [redacted] E-mail: [redacted]
Owner of property (if different): Dan and Lyn Hayden
Leaseholder of property (if different):
Other Contact Info:
Identify Specific Parcels served by overlying or adjudicated groundwater for irrigation, as identified in relevant curtailment order (SO# or SG#). Include irrigated acreage and number of wells.

Total irrigated acres to be included in this agreement: 515 ac 5 wells

▶ Attach curtailment plan and map of properties to be included in plan
I agree to pay SRWT for its time to help prepare my water reduction plan at the rate of $75/hr. When your LCS plan is complete, a Binding Agreement will need to be signed with the SRWT as your designated Coordinating Entity. SRWT will need to verify that the plan's actions are being met.

▶ Lyn Hayden
Lyn Hayden (Apr 13, 2024 14:06 PDT)
▶ Applicant signature

Date: 4-13-24

Christopher Voigt
Scott River Water Trust signature

Date: 4/3/2024

Low Energy Precision Application (LEPA) and Low Elevation Spray Application (LESA) Trials in the Pacific Northwest

Troy Peters, Howard Neibling, Richard Stroh, Behnaz Molaei, and Hani Mehanna

Abstract
LEPA and LESA are alterations on a center pivot where the sprinklers are moved much closer to the ground, the spacing between sprinklers is reduced (more sprinklers), and water is emitted at very low pressures. It saves water (18%), it saves energy (less water pumped and pumped at a lower pressure), and it helps growers get better yields especially in areas where water is limiting. However, it has an increased propensity for runoff, and the sprinklers operating below the top of the canopy can require some management changes. In many cases energy savings alone can pay for the increased costs of the additional sprinklers and drop hose. However, the largest profit potential lies in the ability to get improved yields in areas that are water short or have large water losses to wind drift and evaporation.

Background
Fresh water is limited and it will become a much more limiting resource in the future. This increased shortage will be driven by the municipal and industrial water needs for a growing population, the irrigation water requirements to grow food for these people, the irrigation water demands to grow biofuel crops, and the increased irrigation water requirement caused by a warmer environment due to climate change. Irrigation accounts for 80-90% of the consumptive use of water in the arid areas of the Pacific Northwest where water shortages are felt the keenest. Center pivots and linear-move irrigation systems account for well over half of the total irrigated acres in the Pacific Northwest, or 3.9 million irrigated acres (NASS Farm and Ranch Irrigation Survey, 2013). Because of this, even small changes in the efficiency of these systems will have a huge impact on total water conservation. Figures 1, 2, and 3 show the progression over time of sprinklers on center pivots from high-pressure impact sprinklers situated on the top of pivots to middle elevation sprinklers to low elevation spray application (LESA).

Calculating Baseline Irrigation Application Amounts for Scott Valley Irrigated Pasture

Scott Valley Agriculture Water Alliance

4/13/24

Sources:

1. *California Water Exchange Center. Department of Water Resources. Monthly average precipitation at Fort Jones, CA.* Dam Profile for (ca.gov)
2. *Orloff, S. et al. UC Cooperative Extension Siskiyou County and LAWR UC Davis.* *Alfalfa Water Use in the Scott Valley: Resolving the Discrepancy Between Theory and Practice.*
3. *University of California Agriculture and Natural Resources.* *Drought Tip: Field Irrigation Water Management in a Nutshell. September 2019.*
4. *Zaccaria, Daniele, PhD. Agriculture Water Management Specialist, UC Davis. Personal communication, 4/12/24.*

Overview: Approximate irrigation baselines for Scott Valley irrigated pasture can be determined based on three factors:

1. The evapotranspiration (ET) of pasture (how much water the plants use) during growing season.
2. Irrigation application efficiency rates for different irrigation systems.
3. Rainfall occurring during the growing season (and resulting infiltrated rainfall into the crop root zone).

Approximate baseline for water application can be determined by dividing crop ET by the application efficiency rate, then subtracting 75 percent of the total rain that occurred during the growing season (Zaccaria, personal communication).

Establishing Pasture evapotranspiration (ET): Pasture ET was determined in 8 fields across 4 years in the Scott and Shasta valleys by Orloff et al. (2007-2010). See Figure 1 below. Because "Reference ET" (far right column) is a determination of well-watered, unstressed, irrigated grass pasture, it can be used synonymously with "pasture ET." The average cumulative pasture ET for Scott and Shasta was on average 40 inches for the growing season over the course of the study period. This is the amount of water the irrigated grass pasture used during the growing season under well-watered, non-stressed conditions.

Region	Site	Year	Age of Alfalfa	Seasonal ET (inches)	Reference ET (inches)
Scott Valley/Shasta Valley	EN	2007	2	39.6	44
	EN	2008	3	32.8	42.6
	EN	2009	4	33.8	40.4
	FI	2009	5	36.1	37.4
	SH	2009	4	38.8	40.4
	AP	2010	5	37.3	37.4
	FI	2010	2	34.7	37.4
	FA	2010	6	38.8	41.1
				Ave: 36.5	Ave. 40.1

Figure 1. Orloff et al recordings of Alfalfa ET and Reference grass ET (ETo) for Scott and Shasta valleys at 8 sites between 2007-2010.

Establishing application efficiency: The UC Davis Drought Tips Fact Sheet titled "Irrigation water management in a nutshell" outlines application efficiency rates for various irrigation systems. See Figure 2 below. Efficiencies range from 90 percent (LEPA pivot systems) to 45 percent (furrow irrigation). "Side-roll" refers to "wheel line" systems.

Box 1 – Application Efficiency

Some extra water must be added to the soil in addition to the amount needed to adequately replenish water used by the crop since the last irrigation or rainfall. Such extra water is required to compensate for losses from the irrigation systems that occur through deep percolation, surface runoff, evaporation, wind-drift, and nonuniform water application. Because of losses occuring during irrigation application, application efficiency is always less than 100 percent.

Application efficiency is defined as the ratio of ***water beneficially used by the crop to the total water applied***, where "beneficial use" includes water used for crop evapotranspiration, frost protection, salt leaching, canopy cooling, etc. Application efficiency provides an indication of how well an irrigation system performs its objective of applying water in adequate amounts and uniformily throughout the field, and allowing it to be stored in the crop root zone to meet the crop water requirements. No irrigation system can achieve 100% application efficiency, but adequate system design, regular maintenance, and careful irrigation management can minimize water losses, thus increasing the relative portion of applied water that is beneficially used by plants. Some irrigation methods perform relatively better than others in terms of the water application rate matching the soil intake rate and for the evenness with which water is distributed throughout the field (distribution uniformity). Table 3 shows potential values of application efficiency for properly-designed and well-managed irrigation systems.

Table 3. **Ranges of potential application efficiency (Eff_A) of well-designed and well-managed irrigation systems**

Irrigation method/system	Potential Eff_A (%)
Sprinkler	
LEPA	80–90
linear move	75–85
center pivot	75–90
traveling gun	65–75
side-roll	65–85
hand-move	65–85
solid-set	70–85
Surface	
furrow (conventional)	45–65
furrow (surge)	55–75
furrow (with tailwater reuse)	60–80
basin	60–75
precision level basin	65–80
Microirrigation	
bubbler (low head)	80–90
microspray	85–90
micropoint source	85–90
microline source	85–90
surface drip	85–95
subsurface drip	90–95

Source: Adapted from Howell 2003.

Figure 2. Application efficiency rates as found in UC-ANR Drought Tips Fact Sheet published in 2019.

Establishing total water needs of pasture: The equation for calculating total water needs during the growing season is: pasture ET / application efficiency, minus 75 percent of total rainfall (not all rain will percolate into the soil; some will run off. This is referred to as "Effective Rainfall") (Zaccaria, personal communication, 4/12/24).

Establishing effective rainfall for Scott Valley during growing season: According to California Data Exchange Center, average rainfall occurring during the growing season is 5.33 inches. Effective Rainfall is generally calculated as 75% of total rainfall. Thus: 5.33 x .75 = 4 inches.

Calculating applied water needs for pasture: ET / application efficiency rate, minus Effective Rainfall).

Scenario 1: pasture irrigated by wheel line sprinkler system.

Crop ET: 40 inches
Application efficiency rate: 75%
Total water need for growing season: 53.5 inches (40/0.75)
Effective Rainfall to subtract: 4 inches
<u>Total irrigation water needed for growing season: 53.5 – 4 = 49.5 inches</u>

Scenario 2: pasture irrigated by center pivot sprinkler system.

Crop ET: 40 inches
Application efficiency rate: 80%
Total water need for growing season: 50 inches (40/0.80)
Effective Rainfall to subtract: 4 inches
<u>Total irrigation water needed for growing season: 50 – 4 = 46 inches</u>

Scenario 3: pasture irrigated by flood irrigation (basin irrigation)*

Crop ET: 40 inches
Application efficiency rate: 55 %
Total water need for growing season: 73 inches (40/0.55)
Effective Rainfall to subtract: 4 inches
<u>Total irrigation water needed for growing season: 73 – 4 = 69 inches</u>

*Note that flood irrigation often applies more water, but has no wind drift and can have low evaporation loss. If runoff rates are low, then a high percentage of water unused as ET will percolate back into the water table.

Scenario 4: pasture corners irrigated by K-line or traveling gun.

Crop ET: 40 inches
Application efficiency rate: 75%
Total water need for growing season: 53.5 inches (40/0.75)
Effective Rainfall to subtract: 4 inches
<u>Total irrigation water needed for growing season: 53.5 – 4 = 49.5 inches</u>