Tailwater Revealed: Uncovering how Agricultural Run-off Impacts Water Quality in the Shasta Valley

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What is Tailwater?

- Surface water is diverted out of the Shasta River or it's tributaries
- Sometimes travels miles in irrigation ditches or pipes to the "point of use"
- Turned out onto fields to run across the land being used by plants, evaporating, percolating or running off as TAILWATER

Tailwater Neighborhood

- Tailwater runs off either back to the river or onto another property
- Due to TMDL's we needed to ask…

Who's water is it?

and

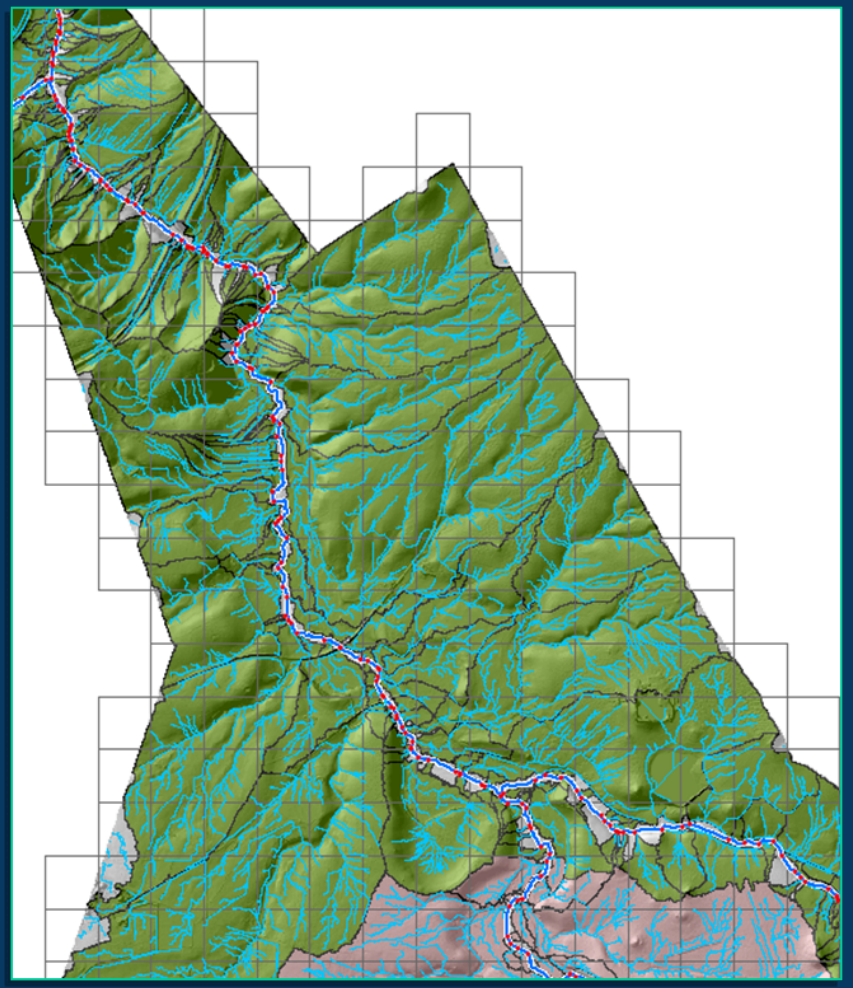
Who is responsible for it?

Grant Funding

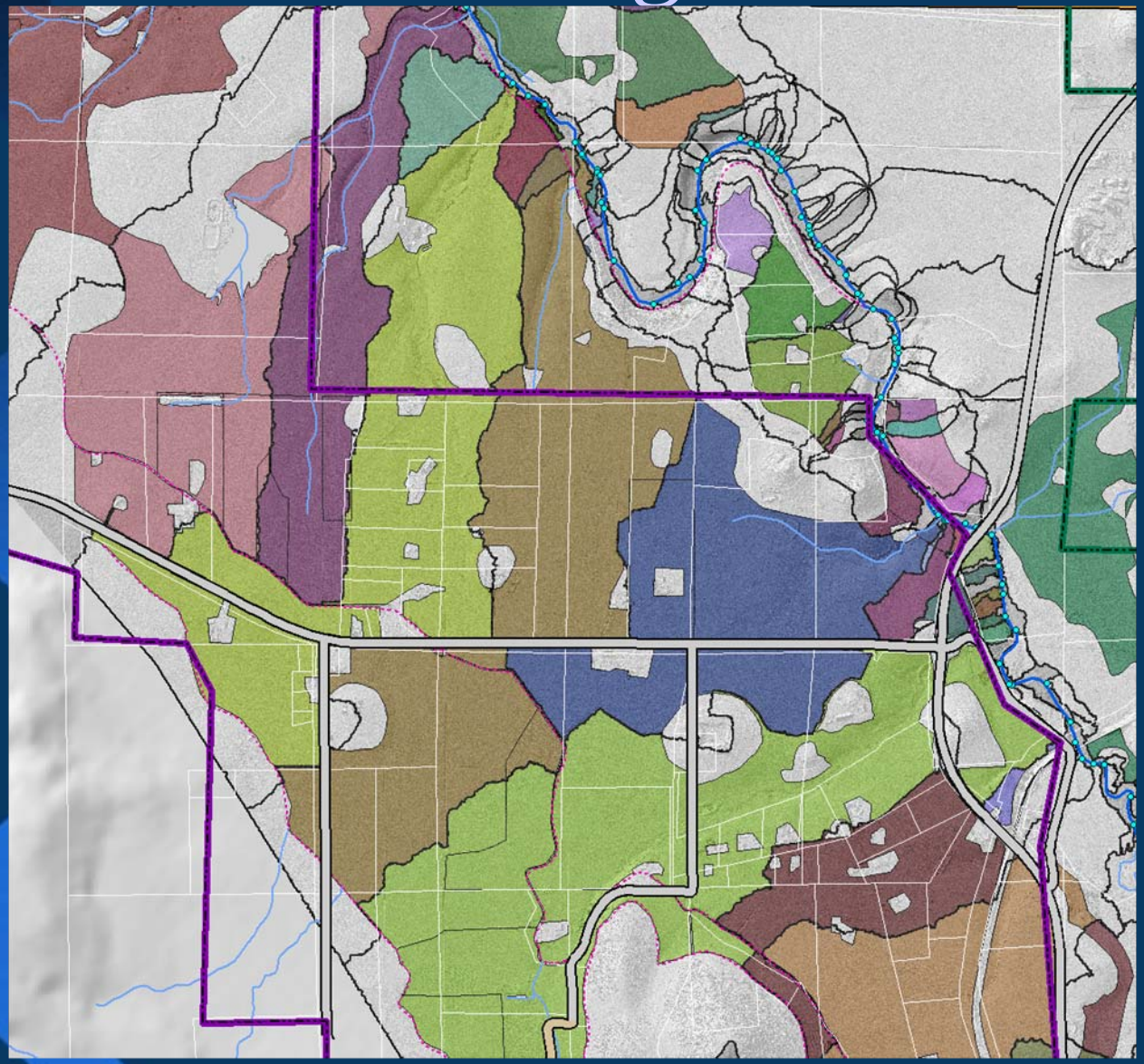
- Under Prop 40/50 Agricultural Water Quality money the SVRCD received funding from State Water Resources Control Board
- Project Goal: Keep warm water out of river and cold water in the river
    - Identify neighborhoods valley-wide
    - Prioritize the neighborhoods for impacts to WQ
    - Implement 4-7 high priority tailwater reduction projects
    - Monitor pre and post for project success

Neighborhood Identification

- LiDAR Flight
- NRG utilized GIS to perform flow accumulation model
  - Obtain Drainage lines
  - Pour points
  - Drainage areas



Tailwater Neighborhoods



Prioritizing Neighborhoods

- Tailwater Advisory Committee
- Neighborhood Criteria
  - Location of return related to identified salmon rearing areas
  - Quantity of tailwater re-entering waterway
  - Degree tailwater affects river temperature
  - Tailwater monitoring data available

Tailwater Quantity

Funded by California Department of Fish & Game (during bond freeze)

- Irrigation Water Applied
  - Using standard NRCS application rates for crop need (Pasture or Crop)
  - Irrigation efficiency rates (Flood or Sprinkle)
- Run-off Coefficient
  - Calculate runoff class (Low – Very High) for each FIELD UNIT based on slope, infiltration rates (Ksat), crop cover type
- Results calibrated against 16 monitoring locations
  - Short & long-term
  - Flow, Temperature (river & tailwater), nutrients

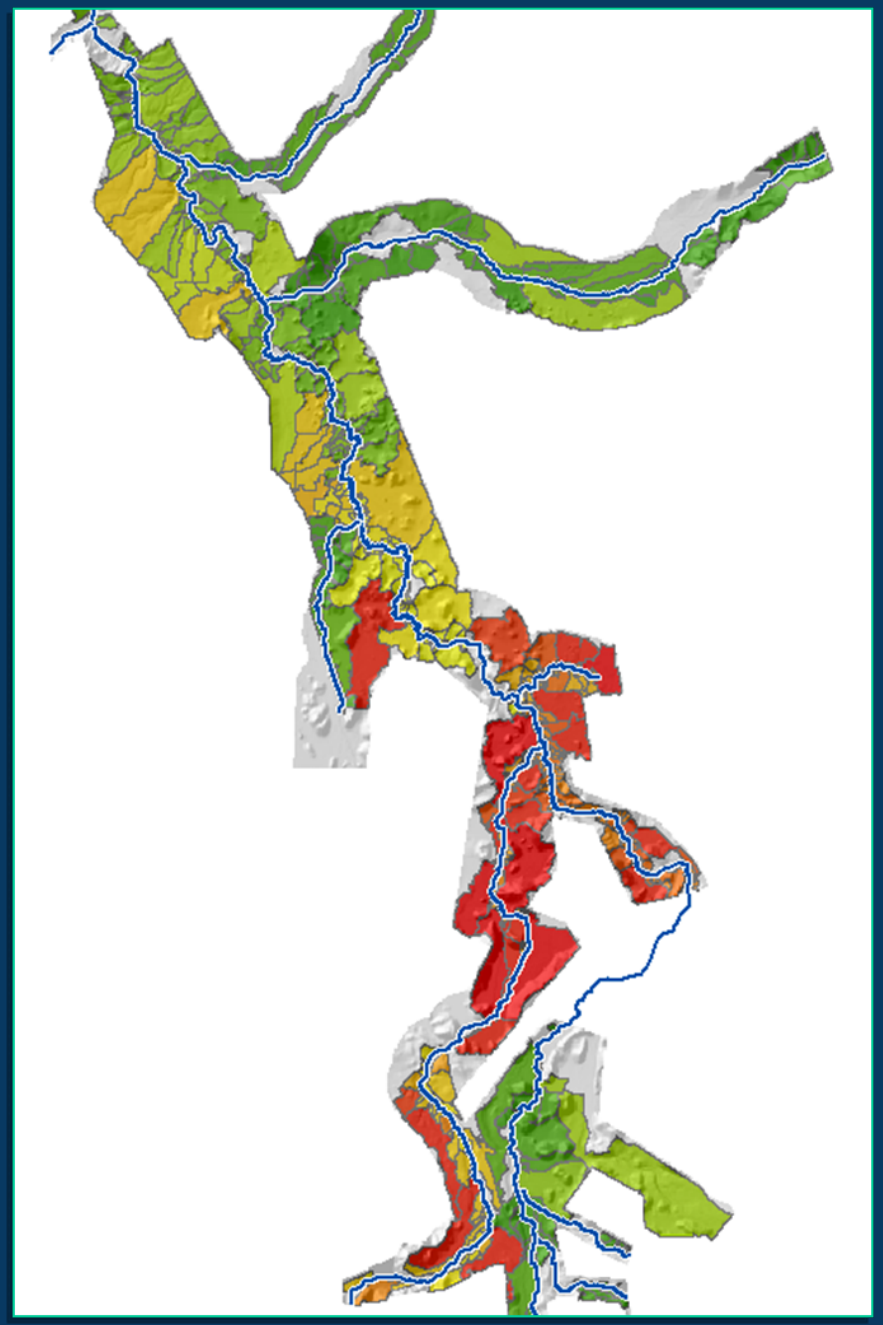
River Temperature Impacts

- To obtain river temperatures after tailwater returns the following estimates/data was used in the standard mixing equation for each pour point:
  - "Average Daily Flow" for the season before return
  - "Average Daily Temperature" for river before return
  - Modeled/monitored tailwater quantity for "Average Daily Max"
  - Monitored tailwater temperature "Average Daily Max"

Model Conclusions

- Accumulated impacts: May need projects to reduce returns on many neighborhoods at once.
- Tailwater has greater impact on upper watershed
- Big returns: Many returns are too big to attempt to fix at the bottom end, must outreach to neighborhoods to increase efficiency first and capture/reuse/treat remainder

Neighborhood Prioritization



Next Steps

- Outreach to landowners in high priority neighborhoods for project implementation
  - Ideally increase efficiencies for entire neighborhoods and implement projects at pour points to cool/treat whatever still returns
- RCD has received additional grant for Tailwater II
  - Will use LiDAR to refine hydrography and map key agricultural conveyance
  - DWR Water Rights adjudication data will be integrated into data model - will be used to more accurately model water use at field level
  - Expand monitoring to upper watershed to refine model coefficients
  - Explore time series computation model for determining where tailwater has greatest impacts when fish are present

Project Contributors:

State Water Resources Control Board

California Department of Fish and Game

The Nature Conservancy

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