Current and Future Water Demand and Use and the Potential for Water Markets

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Water Demand (consumption/use)

Factors influencing demand

- Population
- Climate change
- Technology
- Instream flow requirements
- Changes in crop mix

Measurement of use across categories of use

- Residential Use
- Agricultural Use
- Marijuana Use

Measurement of use across categories of supplies

- Surface water
- Ground water

Resolution of data gaps

Value of Improved Use Data and Numerical Model

Economic incentives/mechanisms to improve efficiency; i.e.; make "better" allocation decisions

- Subsidies
- Water markets/leases

Impediments to use of economic incentives

Municipal Water Use

Among water use categories, municipal use by cities for residential and industrial use within the city boundary is the easiest to quantify. The SCWA reports deliveries to a number of cities. As expected, summer demand is the greatest. Other cities have their own wells and diversions

Groundwater

- Groundwater use is the most problematic agricultural use category, given that current well use does not involve a water right and there is no reporting of groundwater diversions.
- Lack of such data on groundwater use is a challenge in terms of water management options, such as the use of conjunctive management to address seasonal disparities in surface water availability.
- The complexity of surface and groundwater interactions in the Russian River basin makes it difficult to quantify the impact of these different types of water use (i.e., surface vs. groundwater) on stream flows.
- Sustainable Groundwater Management Act should improve groundwater measurement

Rural Residential Water Use

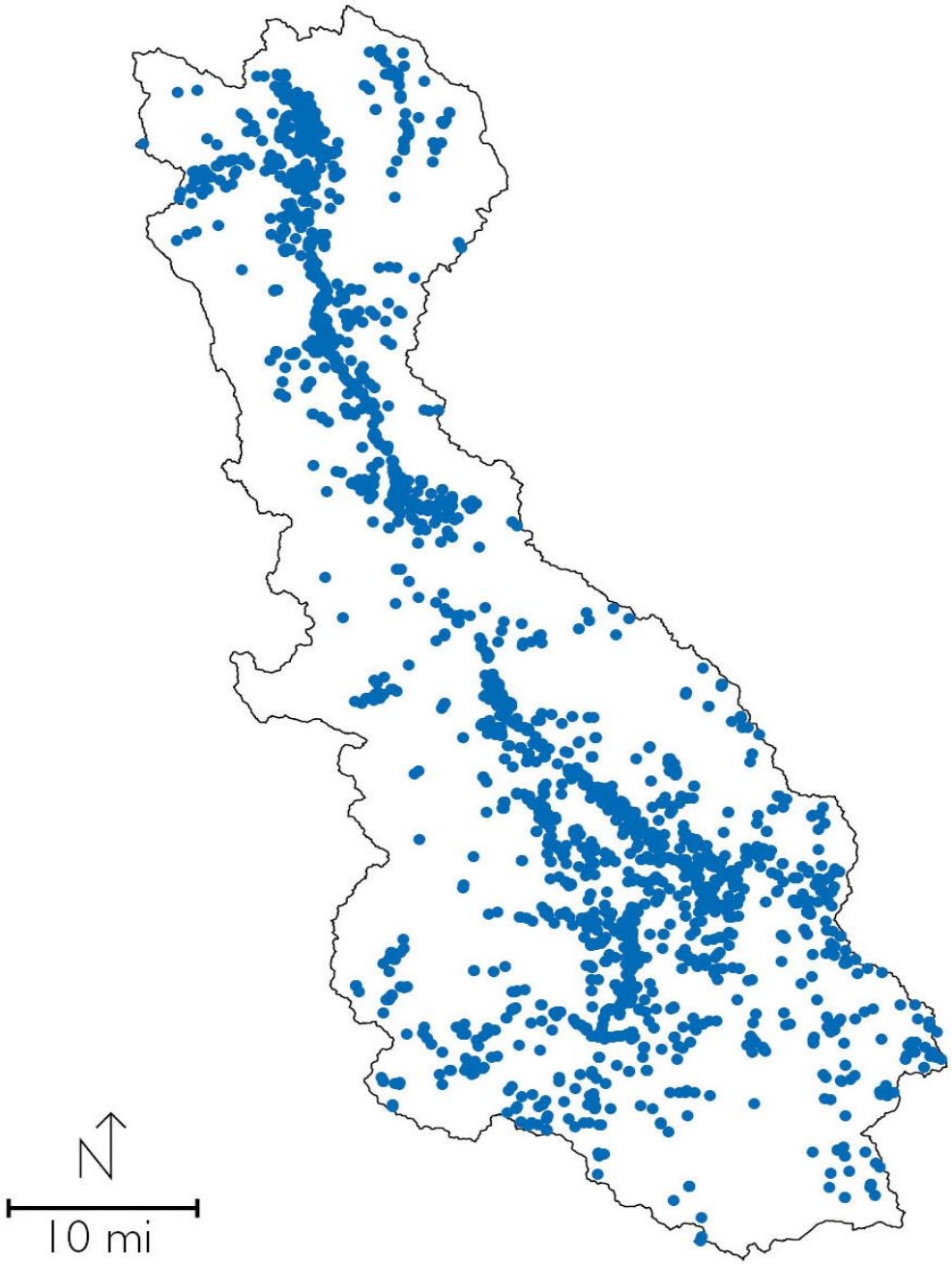
Rural residential use is largely unknown, since such use is typically from unmonitored, individual residential wells and surface water diversions.

Several recent studies estimated water demand for rural residences. For example, on the Santa Rosa Plain the USGS estimated that rural non-municipal use of groundwater makes up 82% of total groundwater extraction with 32% going to agriculture and 50% going to rural residential uses.
These studies point to rural residential water use as a significant in reducing dry season flow in tributaries..

Water Rights Data		Amount directly diverted or collected to storage (AF) 2014	Amount Used (AF) 2014	Amount directly diverted or collected to storage (AF) 2013	Amount Used (AF) 2013	Amount directly diverted or collected to storage (AF) 2012	Amount Used (AF) 2012	Amount directly diverted or collected to storage (AF) 2011	Amount Used (AF) 2011	Amount directly diverted or collected to storage (AF) 2010	Amount Used (AF) 2010	Amount directly diverted or collected to storage (AF) 2009	Amount Used (AF) 2009
All Water Rights (195 Total)	Number Reported	102	102	116	116	147	147	150	150	148	148	88	88
	% Reported	**52%**	**52%**	**59%**	**59%**	**75%**	**75%**	**77%**	**77%**	**76%**	**76%**	**45%**	**45%**
	Sum (Acre-Ft)	4733.2	4643.2	7378.1	9530.7	8309.3	8249.5	8013.9	8018.1	8519.7	8508.4	6199.1	6175.4
Riparian (95 Total)	Number Reported	24	24	36	36	69	69	70	70	67	67	31	31
	% Reported	25%	25%	38%	38%	73%	73%	74%	74%	71%	71%	33%	33%
	Sum (Acre-Ft)	1110.7	1093.3	1771.1	1780.8	3132.0	3109.5	2903.9	2906.9	3226.3	3220.0	798.4	**784.4**
Appropriative (100 Total)	Number Reported	78	78	80	80	78	78	80	80	81	81	57	57
	% Reported	78%	78%	80%	80%	78%	78%	80%	80%	81%	81%	57%	57%
	Sum (Acre-Ft)	3622.5	3549.9	5607.0	7749.9	5177.3	5140.0	5109.9	5111.2	5293.4	5288.4	5400.7	**5391.1**

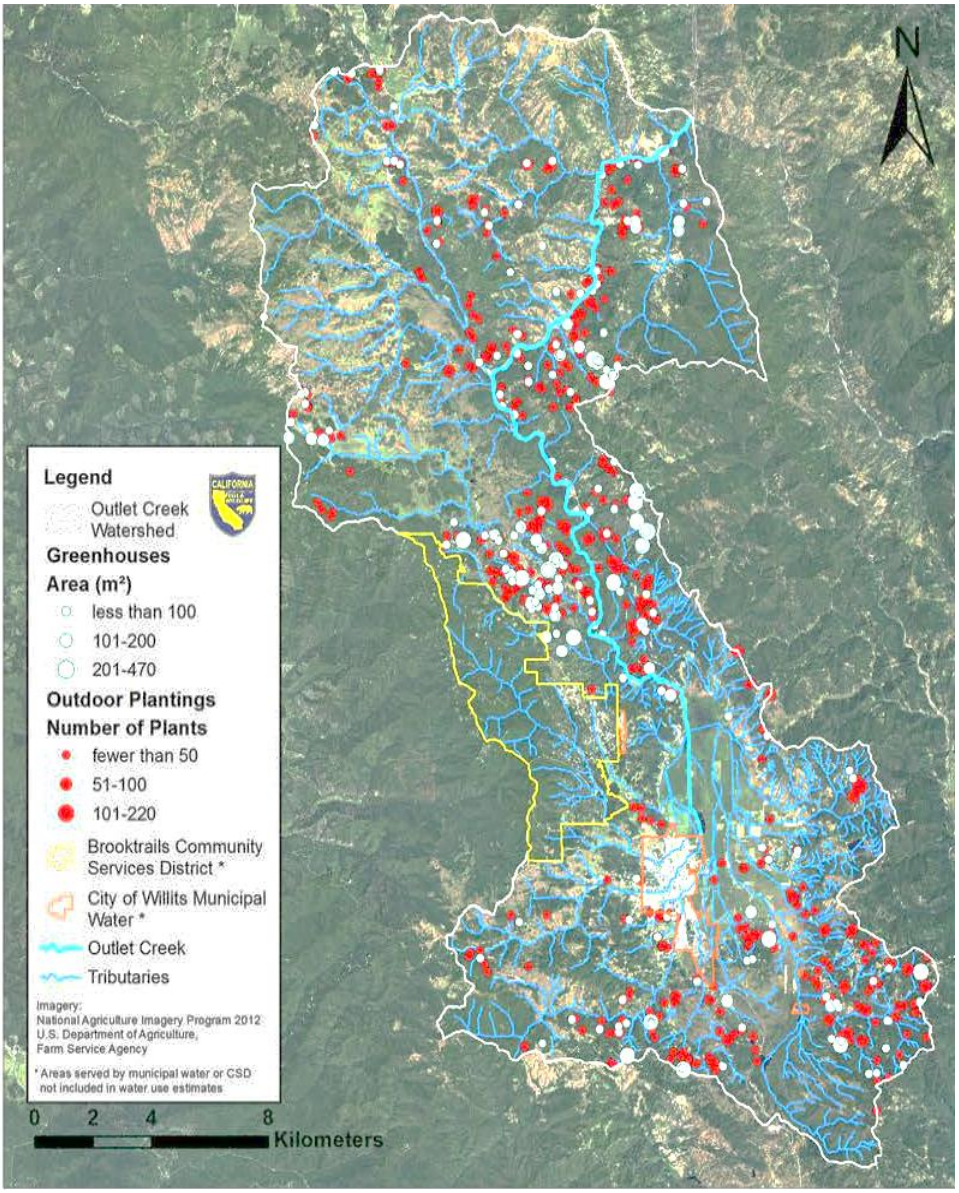
The State Water Resources Control Board regulates and keeps records of surface water rights and some groundwater diversions. The amount of water used is the volume put to a beneficial use and is reported annually. The Table shows reporting data for the Ukiah Valley subarea. Data is missing for many rights with 2011 having the highest reporting rate at 77% of water right holders submitting use reports. Other subareas had equally low reporting rates. Beginning in January 2017, all diverters of 10 AF or more per year have to install and maintain a device that monitors the rate and quantity of diverted water.

Agricultural Water Use



Blue dots indicate locations of small water projects with permits or pending permits as documented in the State Water Resources Control Board database. Most of these are for agricultural crops not including marijuana.

Marijuana Water Use



- The driest period (June-October) of the year coincides with the highest irrigation demand for marijuana.
- Marijuana grows tend to be located in the upper mountainous areas of tributary watersheds where most bedrock channels are located and are the primary rearing habitats for steelhead
- There are no estimates of the acreage in the Russian River. Figure illustrates the density of marijuana grows in the Outlet Creek drainage just north of the Russian River watershed.

Water Use Data Gaps and Uncertainties

- Water use records need to be kept by all water users.
- Lack of complete water use reporting under state appropriative and riparian water rights is a data gap.
- Lack of reporting for rural residential water use is a major data gap.
- Lack of groundwater use data is a major data gap.
- Water diversions for marijuana cultivation need to be quantified and locations identified.
- How will water demand change quantitatively and spatially with various climate change scenarios?
- Projections indicate that population will increase 20 to 25 percent by 2045. How will this affect future water demand?

Economic Incentives

- Management of water issues within the basin will inevitably involve tradeoffs.
- Economic information can provide guidance on the nature and efficacy of tradeoffs by identifying least cost alternatives to meet a given goal or objective.
- Changing water user behavior can be enhanced through use of economic incentives
- Within the Russian River basin subsidies may be effective in some settings, such as construction of off-stream water storage facilities for use in frost protection or to fund in-stream flow and riparian habitat improvements in the tributaries.
- An economic mechanism that is aimed at improving the efficiency of water use is the creation of a water market. Water markets have been used widely to facilitate alternative water allocations in the arid west.
- Water markets have the advantage of being voluntarily exchanges between sellers of water and potential buyers, usually a public agency.

Water Markets

- It is likely that the necessary conditions exist in some tributaries for testing of water markets. If additional water is needed in a tributary stream for fishery benefits, there may be a diverter who would voluntarily sell/supply the needed water from ponds or a well. The water must be sufficiently cold for salmonids, so groundwater wells could be the best source. Currently there is no system for trading/selling water within the Russian River basin.
- A variant on water markets is creation of temporary water markets that encourage wider participation because a seller does not permanently lose the water right. Under certain conditions, these temporary water markets have been effective in obtaining water for instream flows during critical drought periods. Such temporary markets have been created in the California Delta, the Klamath Basin, the Deschutes River and John Day River.
- A numerical model of seasonal water flows in the Russian River basin is needed to test the feasibility of water markets in the tributaries. Use of these and other incentive-based mechanisms should be encouraged.