Multi-scale report cards

NWQMC 2010: Science-based environmental report cards and indicators from the watershed to the national scale

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Acknowledgments

Sacramento River Watershed Project:

UC Davis Crew, Carrie Monohan (Sierra Fund), Carol Murray, Darcy Pickard, Marc Porter, David Waetjen, & Katherine Wieckowski (ESSA Technologies Ltd.), Mary Lee Knecht (Sacramento River Watershed Project

Napa River Watershed Project:

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UC Davis Crew:

Emil Aalto, Jennifer Hemmert, Allan Hollander,
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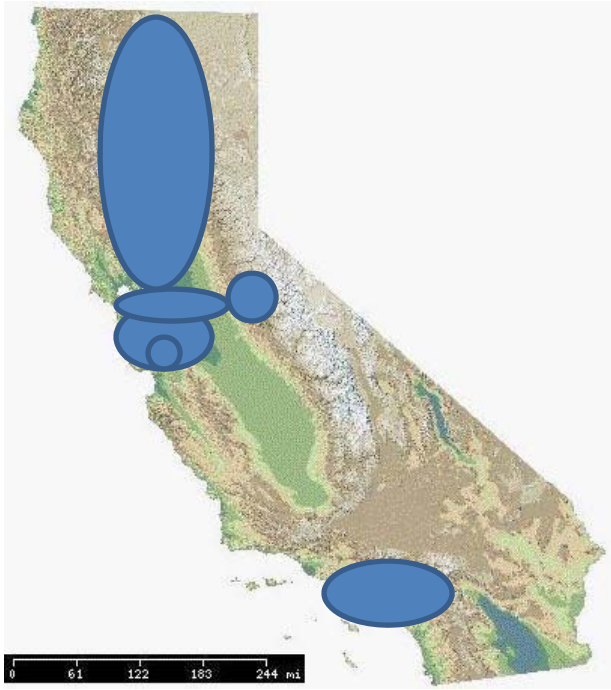


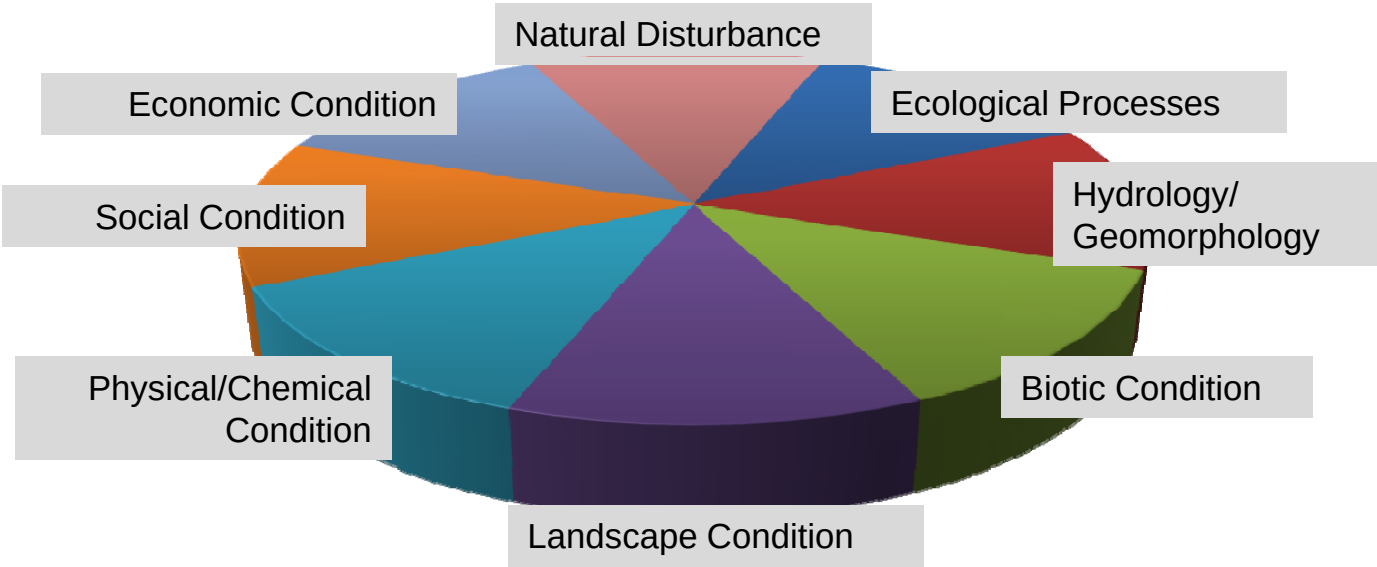
Assumptions and objectives

Reporting status and trends according to social goals

Science is the basis of report cards

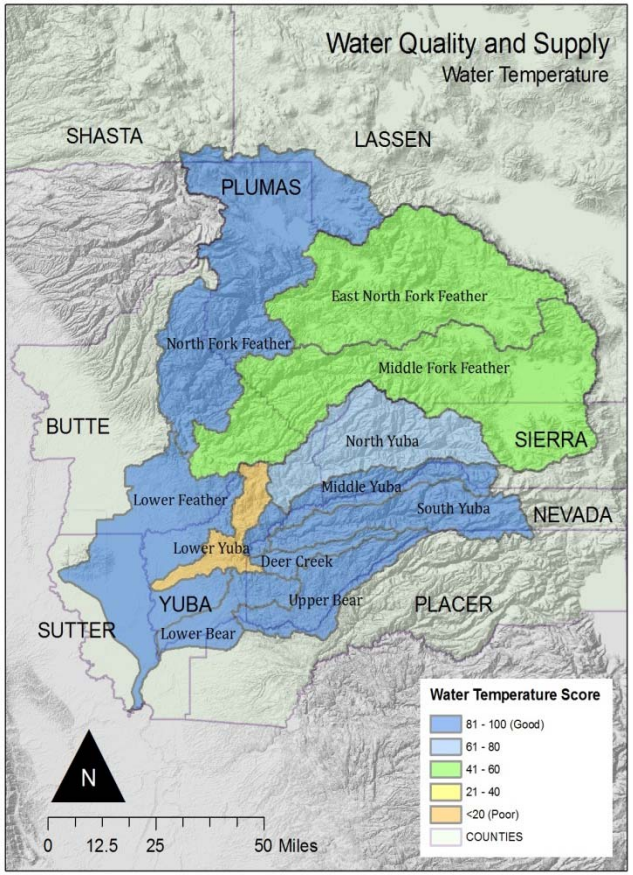
Measuring system performance relative to targets

Scores can be aggregated in multiple dimensions



California Watershed Assessment Framework, based on USEPA SAB Framework

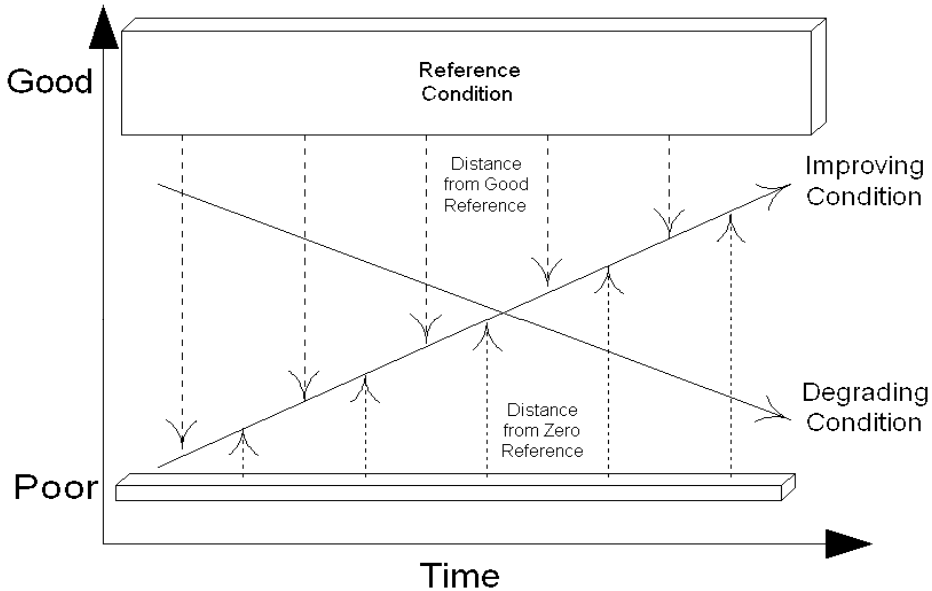
Nested analytical and reporting scales

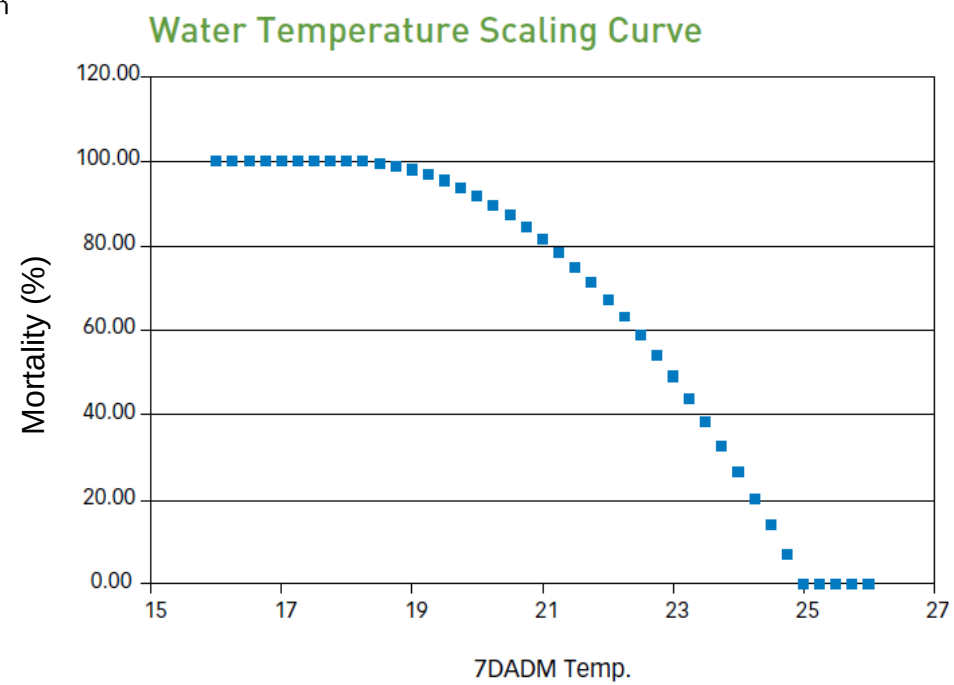


Disparate indicators (examples)

Los Angeles	Napa River/North Bay	Sacramento River
Goal Meet human needs and enhance the quality of life by improving the conditions of watersheds and their ecosystems.	***Goal*** Conserve, protect and improve native plant, wildlife and fish habitats and their communities	***Goal*** Maintain and restore natural disturbance
Indicators **Equitable Access to Open Space**	***Indicator*** **Fish, bird, BMI metrics**	***Indicator*** **Natural fire regimes**
Goal Sustainably manage local waters supplies for human and natural communities	***Goal*** Reduce greenhouse gas emissions and adaptively manage watershed resources to address climate change	***Goal*** Improve social and economic conditions & benefits from healthy watersheds
Indicator **Proportions native to imported to recycled water used for spreading**	***Indicator*** **Carbon storage and sequestration**	***Indicator*** **Free school lunch enrollment**

Distance to target (allows aggregation)



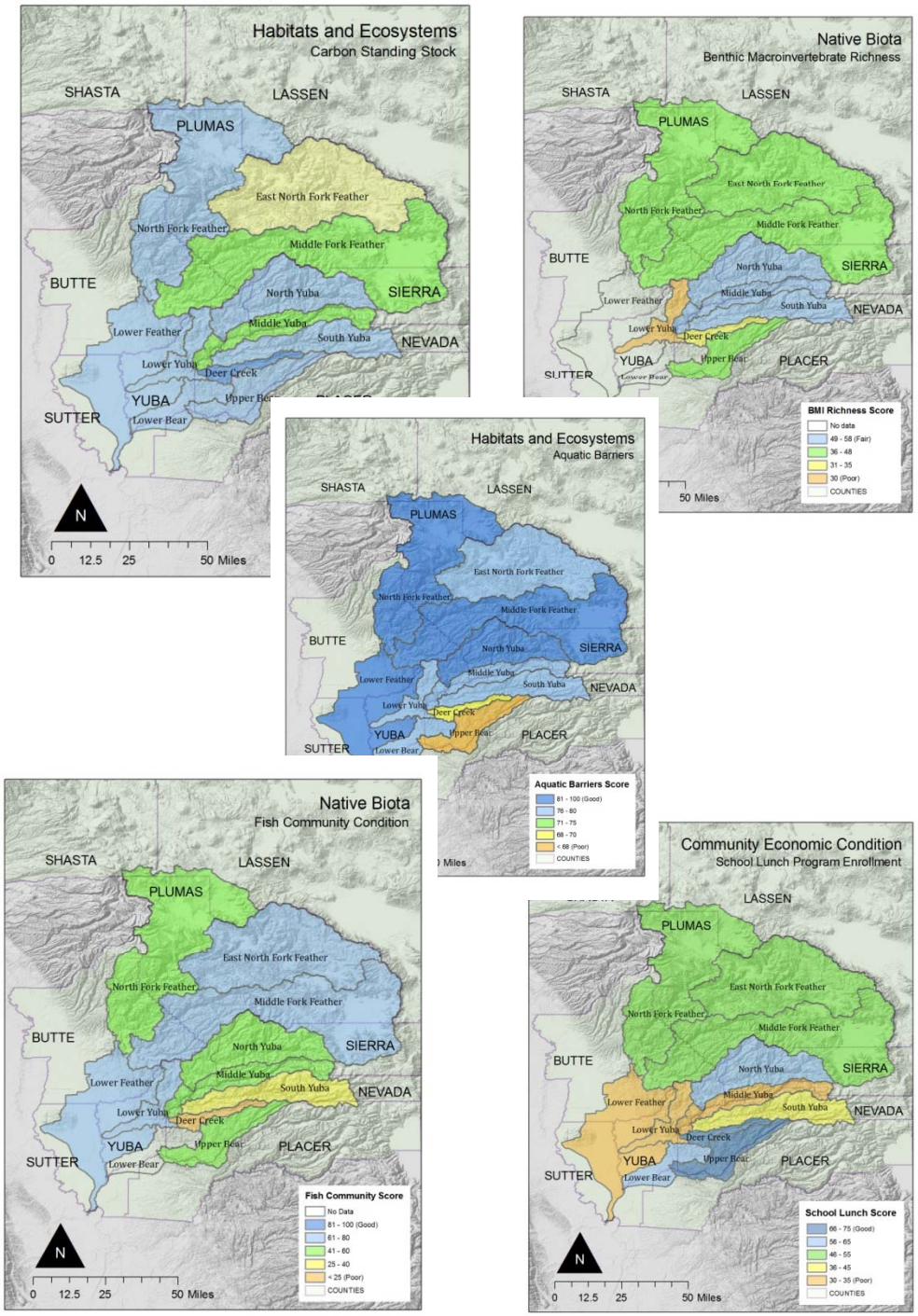


Trends analysis primarily using Mann-Kendall, Seasonal Kendall, Regional Kendal. Sen slope estimation

Whole system reporting

Table E.1 — How well are we meeting goals and objectives for the Feather River watershed?

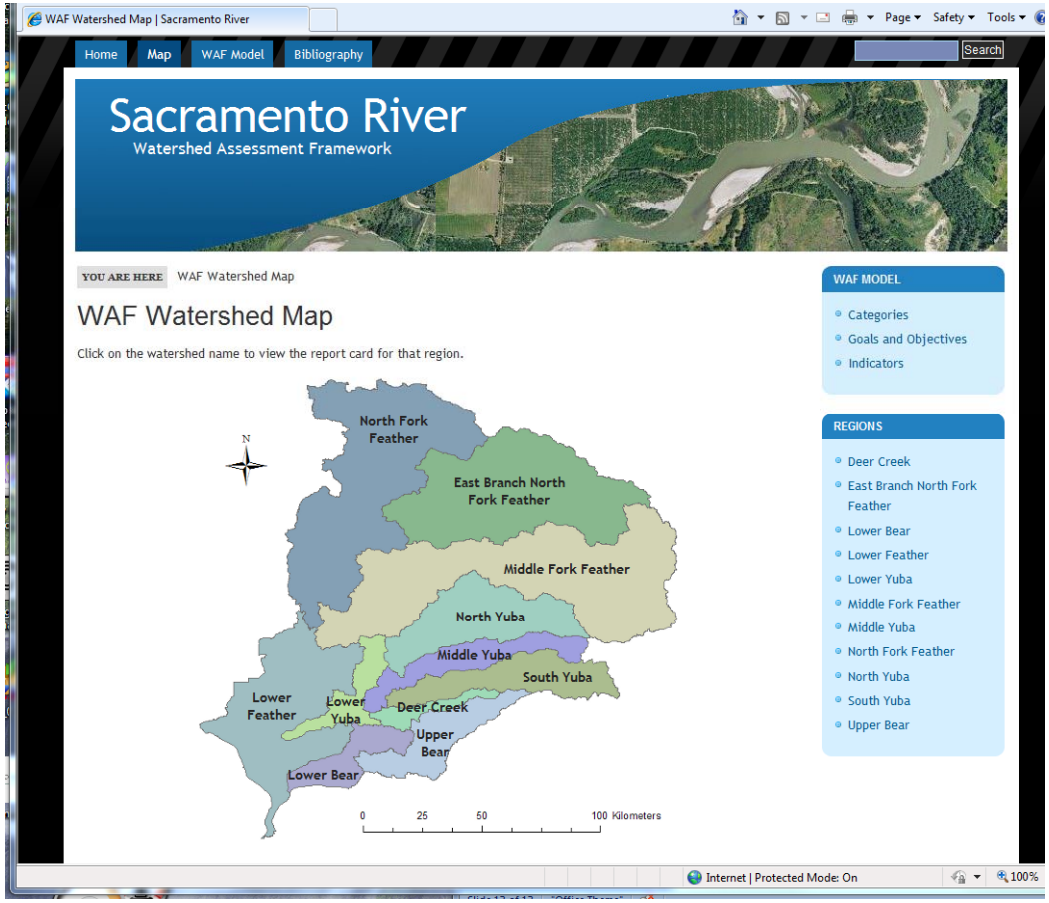
Goals	Measurable Objective	Condition	Trend	Confidence
Water quality and supply for natural and human communities	Water quality for aquatic health	51	↔	Medium-high
	Maintain natural stream flows	55	n/a	Medium
Protect and restore native animals and plants	Native birds	100	↔	Medium
	Native invertebrates	46	↔	High
	Native fish	49	↔	High
	Agricultural/urban development	90	n/a	Medium
Protect and enhance habitats, ecosystems, and watersheds	Protect aquatic connections	77	n/a	Medium-high
	Protect landscape connections	33	n/a	High
	Maintain natural production and nutrient cycles	82	↓	Medium
Maintain and restore natural disturbance	Restore natural fire regimes	9	↔	Medium
	Encourage natural flooding, while protecting people	50	n/a	Low
Improve social and economic conditions & benefits from healthy watersheds	Enhance wildlife-friendly agriculture	83	↑	Medium-high
	Improve community economic status	51	↓	High



Web reporting

Table E.1 — How well are we meeting goals and objectives for the Feather River watershed?

Goals	Measurable Objective	Condition	Trend	Confidence
Water quality and supply for natural and human communities	Water quality for aquatic health	51	↔	Medium-high
	Maintain natural stream flows	55	n/a	Medium
Protect and restore native animals and plants	Native birds	100	↔	Medium
	Native invertebrates	46	↔	High
	Native fish	49	↔	High
	Agricultural/urban development	90	n/a	Medium
Protect and enhance habitats, ecosystems, and watersheds	Protect aquatic connections	77	n/a	Medium-high
	Protect landscape connections	33	n/a	High
	Maintain natural production and nutrient cycles	82	↓	Medium
Maintain and restore natural disturbance	Restore natural fire regimes	9	↔	Medium
	Encourage natural flooding, while protecting people	50	n/a	Low
Improve social and economic conditions & benefits from healthy watersheds	Enhance wildlife-friendly agriculture	83	↑	Medium-high
	Improve community economic status	51	↓	High



Trend Analysis

There was a statistically significant upward trend in school lunch program enrollment over the 22-year period ($p < 0.001$), with a 1.0% increase per year. This significant increase in enrollment was true of both Napa County and Solano County schools. In Napa, the increase in enrollment was 0.6% per year and in Solano, 1.6% per year. **Forty-two of the watershed's 87 schools individually increased in enrollment ($p < 0.05$), with 41 showing no statistically-significant change, and 4 Napa County schools showing a decrease in enrollment.**

Contact

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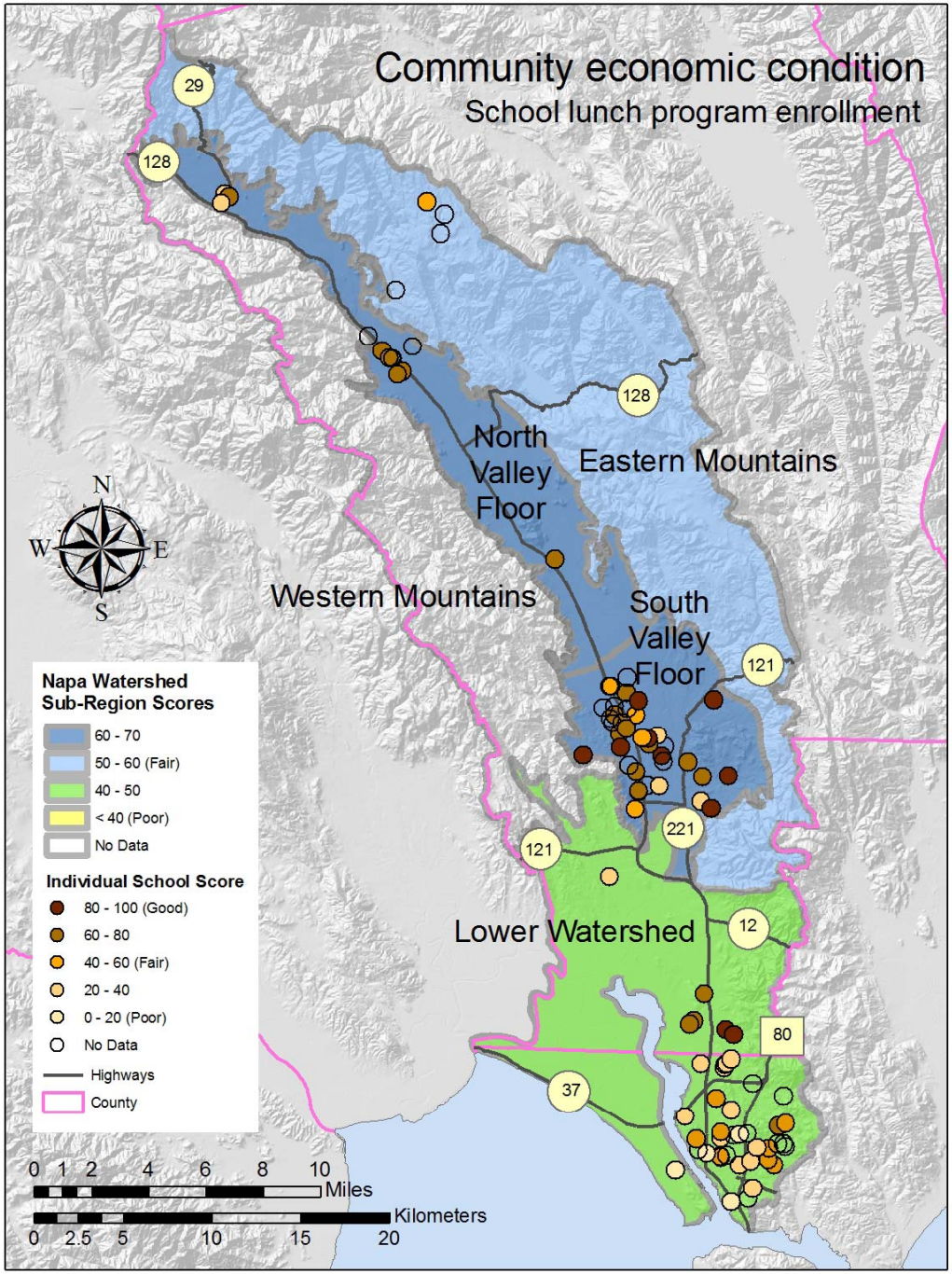
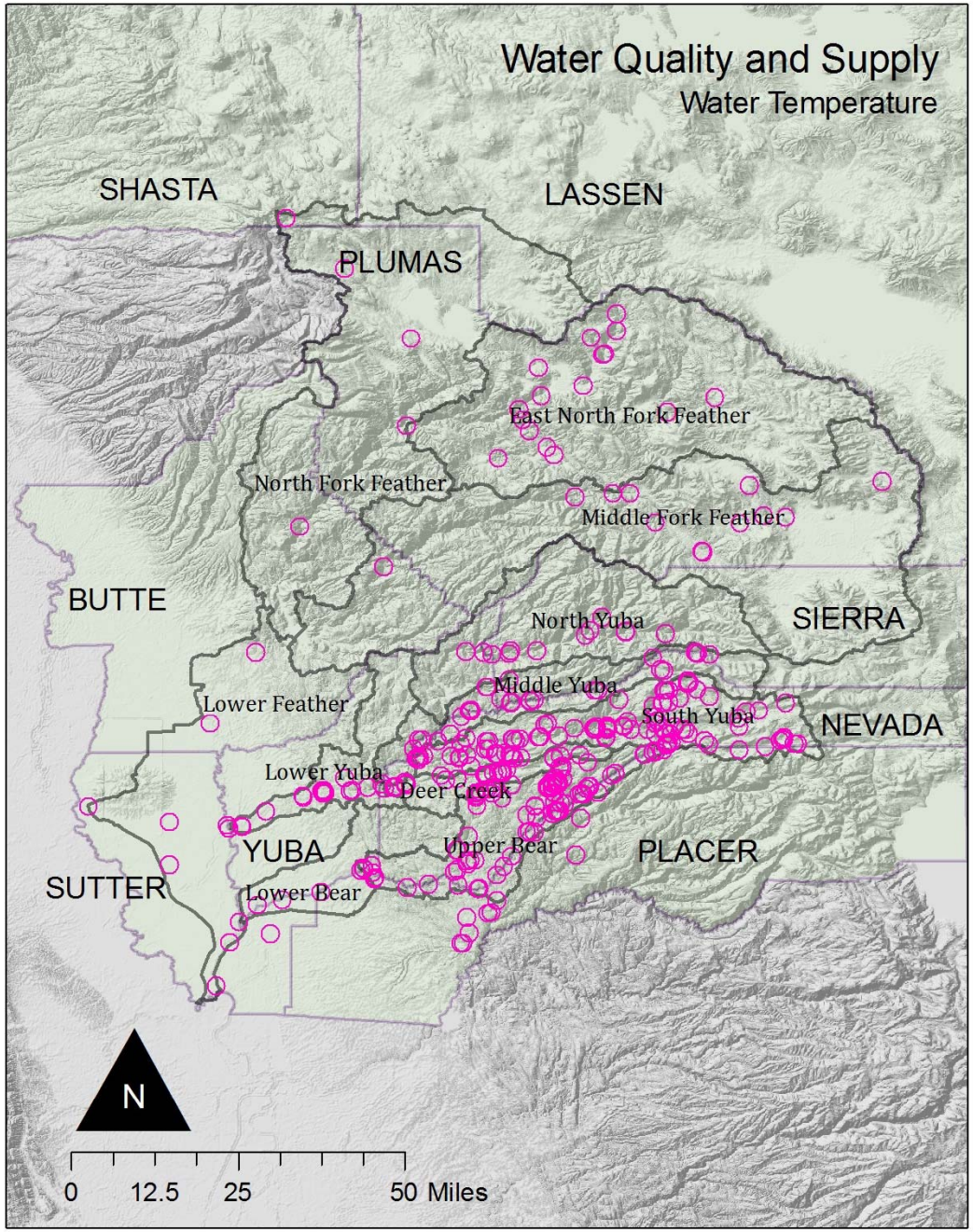
Sub-watershed report card

Goals	Measurable Objective	Indicators	Sub-Watershed Condition Score (0 – 100)											Trend	Confidence
			ENFF	NFF	MFF	LF	NY	MY	SY	DC	LY	UB	LB		
Water quality and supply for natural and human communities	Water quality for aquatic health	Water temperature, algae, mercury in fish	73	75	38	50	53	47	39	35	13	40	61		medium-high
	Maintain natural stream flows	Current flow vs. historical flow	69	n/a	n/a	54	n/a	n/a	n/a	63	40	60	41	n/a	medium
Protect and restore native animals and plants	Native birds	Bird species richness	100	n/a	100	100	100	100	100	n/a	100	100	100		medium
	Protect native aquatic communities	Land disturbance, aquatic insects, fish	69	64	69	61	66	69	62	47	55	61	82		high
Protect and enhance habitats, ecosystems, and watersheds	Protect aquatic connections	Barriers to aquatic organism movement	77	82	76	82	82	76	79	69	77	67	79	n/a	medium-high
	Protect landscape connections	Barriers to wildlife movement	23	81	44	5	54	27	100	5	11	14	2	n/a	high
	Maintain natural production and nutrient cycles	Carbon storage and sequestration, nitrogen loads	88	93	63	94	93	89	93	48	96	91	96		medium
Maintain and restore natural disturbance	Restore natural fire regimes	Fire frequencies compared to expected frequency	2	9	14	39	2	3	4	12	15	0	4		medium
	Encourage natural flooding, while protecting people	Floodplain access	n/a	n/a	n/a	43	n/a	n/a	n/a	n/a	70	n/a	38	n/a	low
Improve social and economic conditions & benefits from healthy watersheds	Enhance wildlife-friendly agriculture	Pesticide use and organic agriculture	100	99	100	51	n/a	98	100	100	17	100	62		medium-high
	Improve community economic status	Poverty measure	49	52	54	34	64	32	40	73	35	70	61		high

Nested analytical and reporting scales



Water Temperature

- ~500,000 records
- 162 sites