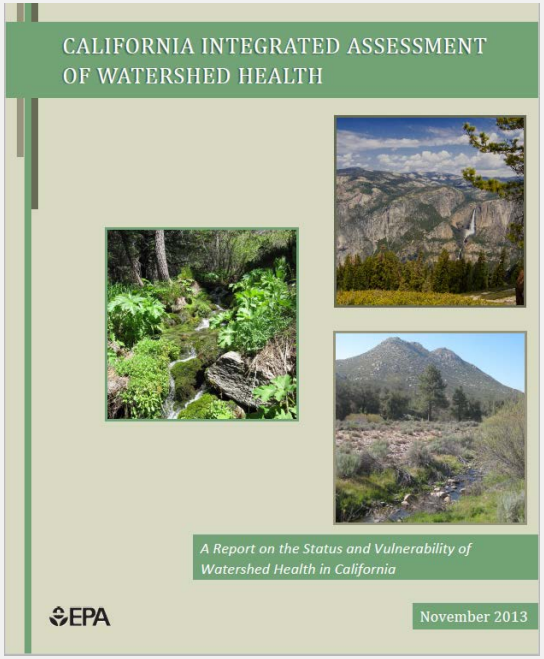
WEB-BASED ASSESSMENT TOOL WORKPLAN

May 8, 2019

BACKGROUND

- 2018 Triennial Review of the North Coast Basin Plan priority projects
- Identified "landscape assessment tool" for addressing projected climate change impacts, among other uses
- Outstanding National Resource Water (ONRW) criteria and designation process
  - Tier 3 waters from federal antidegradation policy
  - ONRW designation can be viewed as a mechanism to address climate change impacts (i.e. give **resilient** and **vulnerable** systems more protection)
- "Landscape assessment tool" = what does that mean?

BACKGROUND



- Report published in 2013 only takes a "snapshot" of relative watershed health
- Spearheaded by Healthy Watersheds Partnership (HWP)

WATERSHED HEALTH ASSESSMENT

Landscape Condition
Patterns of natural land cover, natural disturbance regimes, lateral and longitudinal connectivity of the aquatic environment, and continuity of landscape processes.

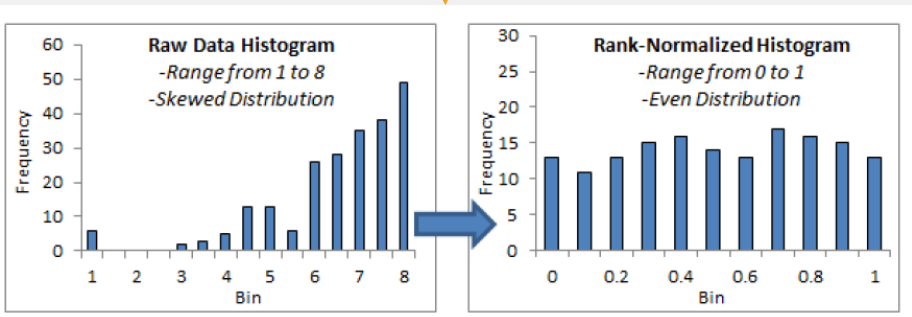
Geomorphology
Stream channels with natural geomorphic dynamics.

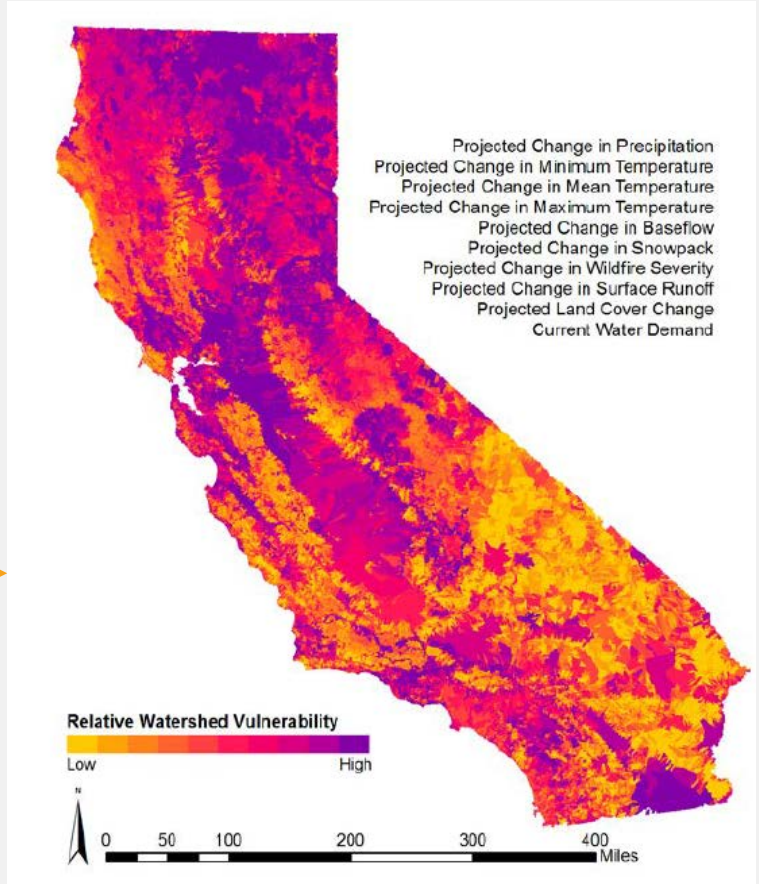
Habitat
Aquatic, wetland, riparian, floodplain, lake, and shoreline habitat. Hydrologic connectivity.

Water Quality
Chemical and physical characteristics of water.

Hydrology
Hydrologic regime: Quantity and timing of flow or water level fluctuation. Highly dependent on the natural flow (disturbance) regime and hydrologic connectivity, including surface-ground water interactions.

Biological Condition
Biological community diversity, composition, relative abundance, trophic structure, condition, and sensitive species.





ADAPTATION INTO WEB APP

- Methodology relatively simple and straightforwardly coded into a web application:
  - https://lancele.shinyapps.io/HWI_test/
- "Landscape assessment tool" = web-based application or dashboard of tools?
  - More dynamic as users can perform assessments in real-time
  - Data management less labor intensive through use of APIs or application programming interfaces
  - Increased transparency as code and methodologies are publicly accessible

Healthy Watersheds Initiative

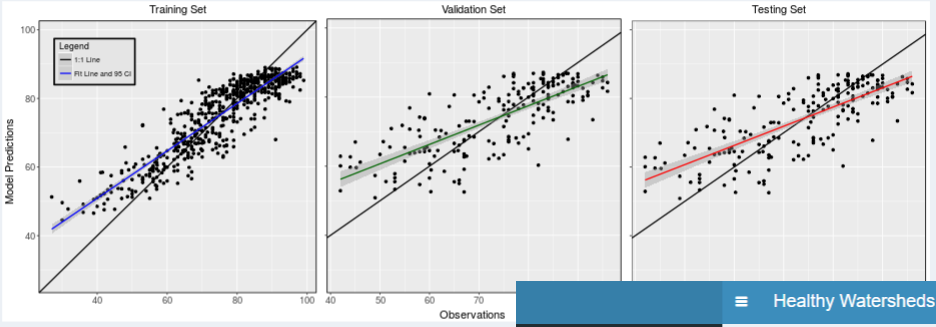
- Introduction
- Select Data
- Data Imputation
  - Data Preprocessing
  - Model Fitting
  - Diagnostics
- Watershed Metrics
- Explore Results
- View Data

Diagnostics

This step checks the fitted models and provides tools to the user to perform diagnostics.

Select response variable:

CRAM Overall Score



Goodness of Fit Statistics

	Statistic	Symbol	Min	Max	Training	Validation	Test
1	Mean Error	ME	$-\infty$	∞	0.03	0.12	−0.12
3	Mean Squared Error	MSE	0	∞	41.08	74.01	74.01
6	Percent Bias (%)	PBIAS	$-\infty$%	∞%	0.00	0.20	−0.20
8	Ratio of Standard Deviations	σ_r	$-\infty$	∞	0.77	0.73	1.37
9	Nash – Sutcliffe Efficiency	NSE	$-\infty$	1	0.80	0.59	0.22
12	Index of Agreement	d	0	1	0.93	0.85	0.85
15	Persistence Index	PI	0	1	0.84	0.72	0.18
16	Pearson Correlation	r	−1	1	0.90	0.77	0.77
17	Coefficient of Determination	R^2	0	1	0.81	0.59	0.59
21	Spearman Correlation	ρ	−1	1	0.88	0.76	0.76

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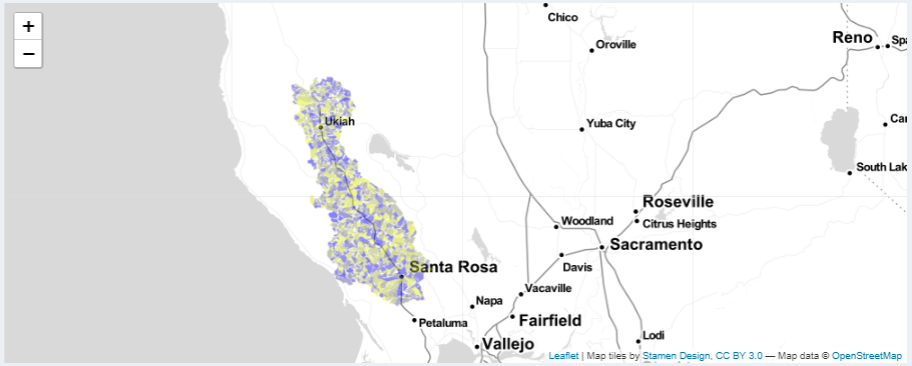
Explore Results

Choose output to map:

Watershed Condition

Choose colors for display:

Low = 0	High = 1	Transparency %
#0D00FF	#EEFF00	50



	Value	Reach Code	Highlight catchments on map
Minimum	0.000	18010109000255	
Median	0.500	18010110000650	
Maximum	1.000	18010108001307	
Std. Dev.	0.289	Not Applicable	

NEXUS

- Need to define climate **resilience** and **vulnerability** for Triennial Review projects
- HWP and others concerned with defining water body **health**
  - Resilience and vulnerability can be a function of health
- But: concepts are fluid and rely on assumptions that are *numerous* and sometimes *subjective*
- Everyone, including general public, should be able to weigh in on these concepts
- Updating assessments can be more rapid with a web tool
- Web-based application "dashboard" is one outcome that can satisfy goals of both HWP and North Coast Water Board

NEXUS

- Healthy Watersheds Partnership (HWP) seeking to update and improve the Assessment work from 2013
- Water Boards Office of Info. Mgt. & Analysis (OIMA) interested in building internal capacity for data science projects
- North Coast Water Board needs an advisory committee to review scientific and technical support

PROJECT OVERVIEW

- 2-year timeline to completion
- 2 Phases, each completed at year's end
- Phase 1: public-facing R Shiny application with tools for:
  - Assessing water body health (absolute and relative)
  - Determining ONRW eligibility
  - Data visualization and mapping

PROJECT OVERVIEW

- Phase 2: Add to Shiny application:
  - Ability to create user profile so users may save work and have outputs from different tools feed into each other
  - Option to upload individual datasets
  - Data imputation tools for sparse datasets
    - Availability of relevant datasets vary geographically, need to fill in missing gaps
  - Other tools as recommended by an advisory committee

DISCUSSION

- Alternatives to this workplan:
  - Existing or similar tools?
  - Existing or similar platforms that can we build additional capacity into?
  - Do we really need to pursue a web-application product at all? Why not just publish another report as in 2013?
- Suggestions and other comments