Open Data to Open Indicators

EPA Exchange Network Project
UC Davis, Southern California Tribal Chairmen’s Association, Round Valley Indian Tribes, California Department of Water Resources

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SWRCB, CWQMC, RTOC participant tribes
Partnership

• Indicator development among partners
• Tribe involvement in defining needs that the system should meet and indicator selection
• Indicator selection informed by CDWR current indicator palette for California Water Plan 2018
Indicators

System is based on indicators, selected in open process

Indicators correspond to social objectives for valued attributes

Indicators are quantitative measures of how well we are meeting objectives

Thus, they require data and a clear evaluation protocol
## Indicators

<table>
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<tr>
<th>California Tribes and Water Plan Goals</th>
<th>Indicators</th>
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<tr>
<td><strong>Reliable Drinking Water Supply</strong></td>
<td>Groundwater use</td>
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<tr>
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<td>Surface water use/supply</td>
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<td></td>
<td>Change in depth to groundwater</td>
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<td>Waterway threatened by climate change</td>
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<tr>
<td><strong>Reliable Drinking Water Quality</strong></td>
<td>Groundwater quality</td>
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<tr>
<td></td>
<td>Surface water quality</td>
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<td></td>
<td>Pathogenic organisms</td>
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<td>Ag/wastewater pollutants</td>
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<td>Industrial pollutants</td>
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<td><strong>Environmental Quality</strong></td>
<td>Mercury in edible fish</td>
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<td>Flows relative to goals</td>
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<td>Water temperature</td>
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<td>Waterway fragmentation</td>
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<td>Invasive species by basin</td>
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<tr>
<td><strong>Maintenance of Traditional Activities</strong></td>
<td>Tribal cultural use</td>
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</table>
Process

Met with reps from Southern California Tribal Chairmen’s Association, Round Valley Indian Tribe, RTOC-participating tribes

Discussed possible indicators important to tribes and that tribes thought were regionally important

Met with DWR staff and reviewed draft CWP 2018 documents

Participated in CWQMC meetings and workgroups

Developed sets of indicators
Indicator Score Conversion

Data for environmental conditions are converted to a score using rules specific to the indicator and data.

Salmon egg – juvenile well-being and water temperature (San Joaquin River)
Open Data

Water Quality Portal (USGS/USEPA)

State/AB1755 Resources
“Grab” Corresponding Data

Three primary mechanisms:

1) Local database query:
   Periodically access data and query locally

2) APIs:
   Query data that are online (e.g., WQP) using URL
   Query data using agency interface

3) “Scrape” data only available as online tables

Visualization

Maps
Visualization

Maps – select indicator in legend to right, zoom into points
Visualization

Regions
Chinook salmon growth curve (Brett et al. 1982). Growth rates at different temperatures for three feeding levels (R=0.6, 0.8, and 1.0). Rmax (R=1.0) represents satiation feeding, with R=0.6 closer to natural feeding levels.

Water temperature scaling curve, converts 7-day average daily maximum temperature to a 0 to 100 score. The formula is 100 – r(x-K)², where r = 2.041 and K = 18°C.

Or instantaneous equation Y= 1-1/(1+e-(12-.56T)) (chinook salmon juvenile, Delta smelt; Bennett (2005); Nobriga et al. (2008); Moyle (2002))
Visualization

Maps – select indicator in legend to right, zoom into points
Surface and ground water
Example: N (Ammonium, Nitrate)

Score based on Dugdale et al., 2007, ammonium suppression of nitrate uptake.

Formula: $\ln(Y) = -1.28 \ln(X) - 4.26$

Suppression begins at 1 micromolar = score of 100. Score of 1 at 36 micromolar (no true 0)

Score based on Drinking water quality

Water Supply Wells Nitrate Score
- 0 - 29
- 30 - 49
- 50 - 69
- 70 - 89
- 90 - 100

Monitoring Location & Date

Score

Equivalent Score

Total nitrate (mg/L)
Next Steps

• Finalizing indicator data collection and score calculation
• Associating sites with each other
• Communicate with stakeholders
• Finishing 9/2018
Automated Features: Trends Analysis

![Graph showing trends over time with different parameters and statistical significance levels.](image)

- Parameter values over time with trend lines indicating significant changes.
- Statistical significance marked with asterisks: * indicates significant change.
- Nonsignificant changes are indicated as n.s.
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