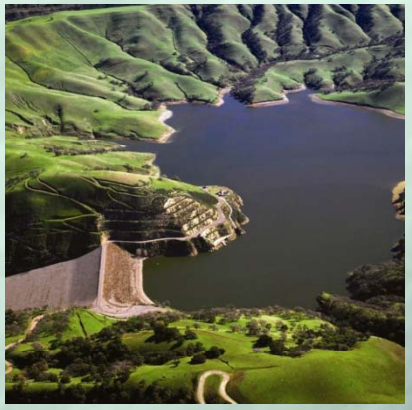

Sustainability Indicators and Web-based Reporting for the California Water Plan

Rich Juricich,
California Department of Water Resources

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Acknowledgements

- UC Davis: Fraser Shilling, Iara Lacher, Susana Cardenas, David Waetjen, & Caitlin Cornwall
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- US EPA: Vance Fong & Don Hodge
- Pacific Institute: Julian Fulton & Heather Cooley

Presentation Overview

- Sustainability & the California Water Plan
- Water sustainability indicators framework
- Testing the framework through pilot studies
- Decision Support Tool
- Water Footprint

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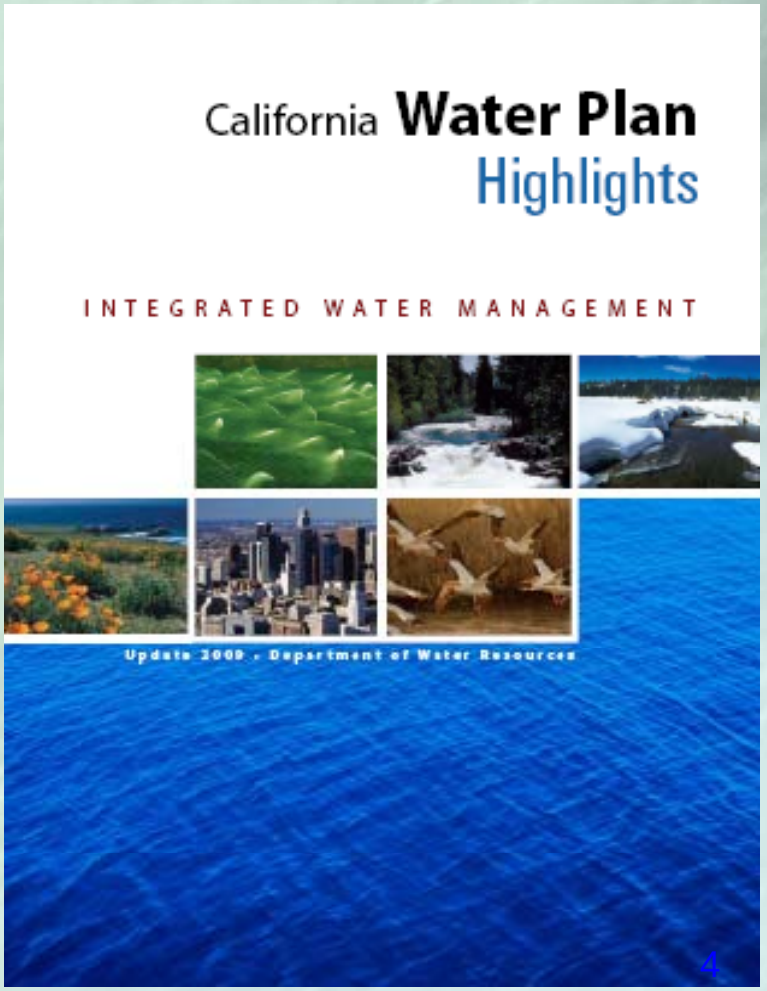
The California Water Plan Est. 1957

- First published in 1957
- Updated 9 times; last one in 2009
- DWR required by law (Water Code) to update the Water Plan every 5 years; next one in 2013
- Growing interest by Legislature and stakeholders
- Not a mandate & No appropriation



California Water Plan
State's Blueprint for Integrated Water Management & Sustainability

VISION

- Public Health, Safety, Quality of LIfe
- Vitality, Productivity, Economic Growth
- Healthy Ecosystem, Cultural Heritage

Foundational Actions for SUSTAINABLE WATER USES

- Use Water Efficiently
- Protect Water Quality
- Expand Environmental Stewardship

Initiatives for RELIABLE WATER SUPPLIES

- Expand Integrated Regional Water Managment
- Improve Statewide Water and Flood Management Systems

Imperative to Act to Keep Pace w/ Changes

- Population growth & movement
- Shift to permanent crops
- Increasing flood risk
- Declining Delta & watersheds
- Impaired water bodies
- Climate Change profoundly impacting water systems
- Aging water & flood systems challenged by legal remedies & regulatory protections
- Growing economic & societal consequences of declining water reliability and degraded quality of surface & groundwater supplies

Imperative to Act

The *Entire* System –

water & flood facilities, watersheds & ecosystems

– has lost resilience and is changing in undesirable ways.

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Water Plan Update 2013
CA Water Sustainability Indicators
Purpose

Quantitatively monitor progress to meeting water sustainability objectives through the development and application of an analytical framework.

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Defining Water Sustainability

- *A system that is sustainable, should meet today's needs without compromising the ability of future generations to meet their own needs" (Brundtland Commission, 1983)*

- *Water sustainability is the dynamic state of water use and supply that meets today's needs without compromising the long-term capacity of the natural and human aspects of the water system to meet the needs of future generations.*

Sustaining California's Water Needs

- Who and What is being Sustained?
  - The people of the State, the ecosystems on which their water supply, and water quality depend, as well as appropriate levels of water reliability, water infrastructure, flood protection and the associated supporting institutions.
  - Public Safety, Environmental Stewardship, and Economic Stability

Managing for Water Sustainability in an Uncertain Future

Fraser Shilling, Iara Lacher, Susana Cardenas, & David Waetjen (UC Davis)

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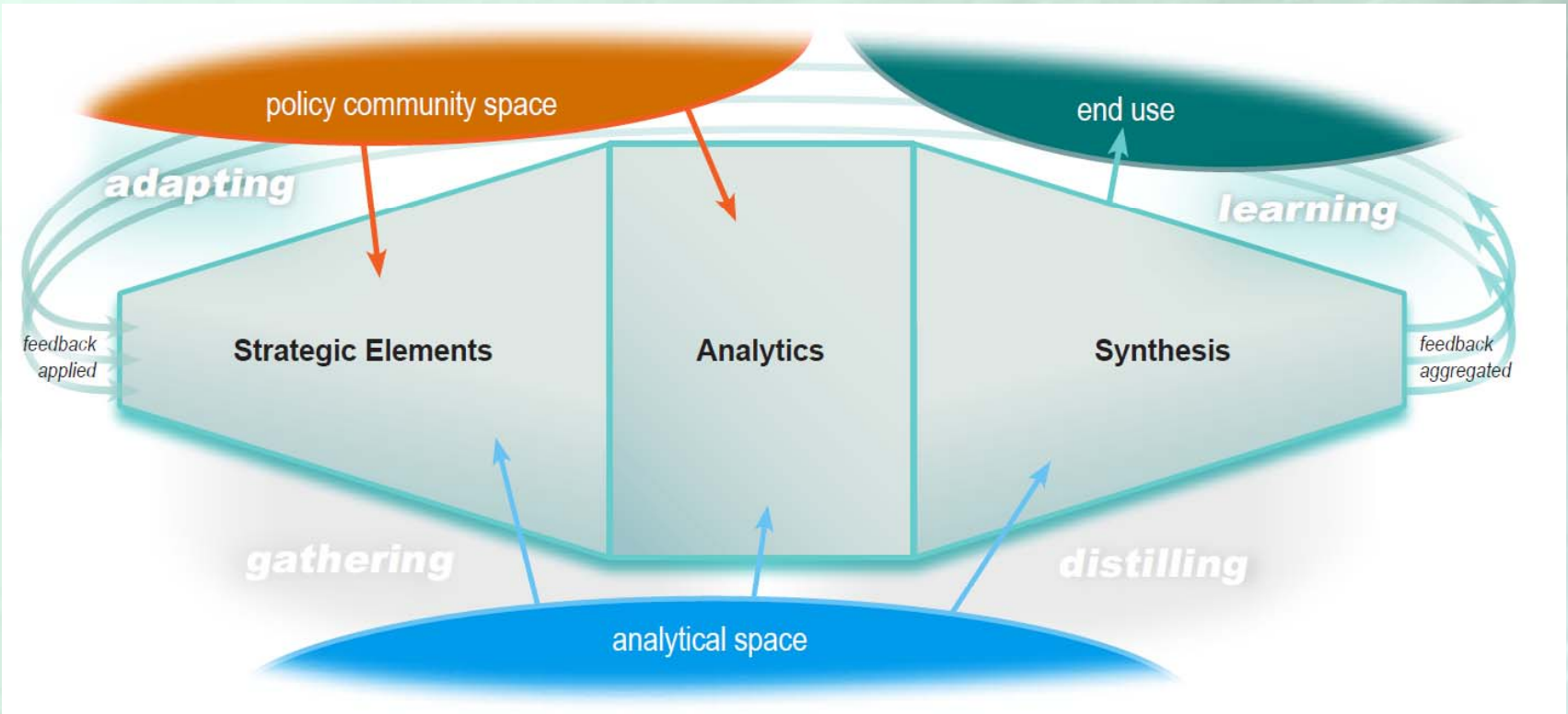
indicators.ucdavis.edu

Indicator Framework Ties Strategic Planning to Indicators and Reporting



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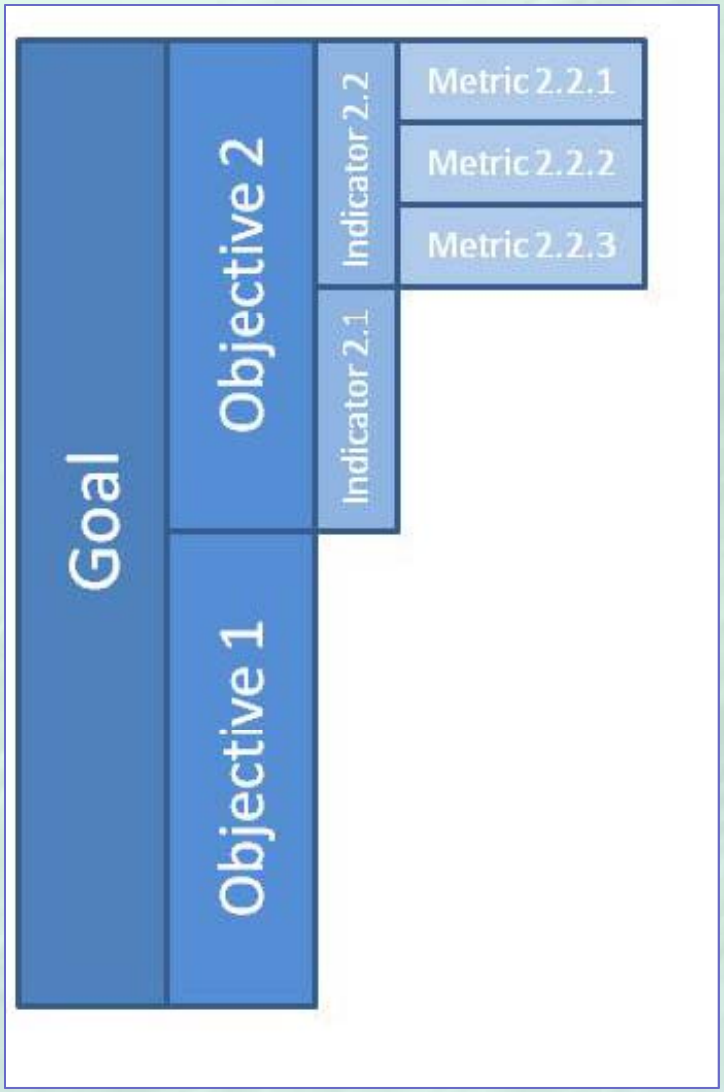
Glossary of Terms

Term	Definition
Goal	A goal is a broad statement describing where a community or society would like to end up.
Objective	Objectives are more specific and measurable aspects of a broader goal.
Indicator	Indicators are qualitative or quantitative parameters that are metrics from monitoring programs (e.g., groundwater level, streamflow). Indicators are the ways to measure achievement of objectives and progress toward goals
Index	An index is an aggregation of indicators that may convey a story about a system, or part of a system.
Theme/domain	Themes and domains are types of category (i.e., collection of like attributes) and are terms of art referring to large parts of natural or social systems (e.g., landscape condition).

Organizing indicators



- Water Supply Reliability
- Water Quality
- Ecosystem Health
- Social Benefits & Equity
- Adaptive & Sustainable Management

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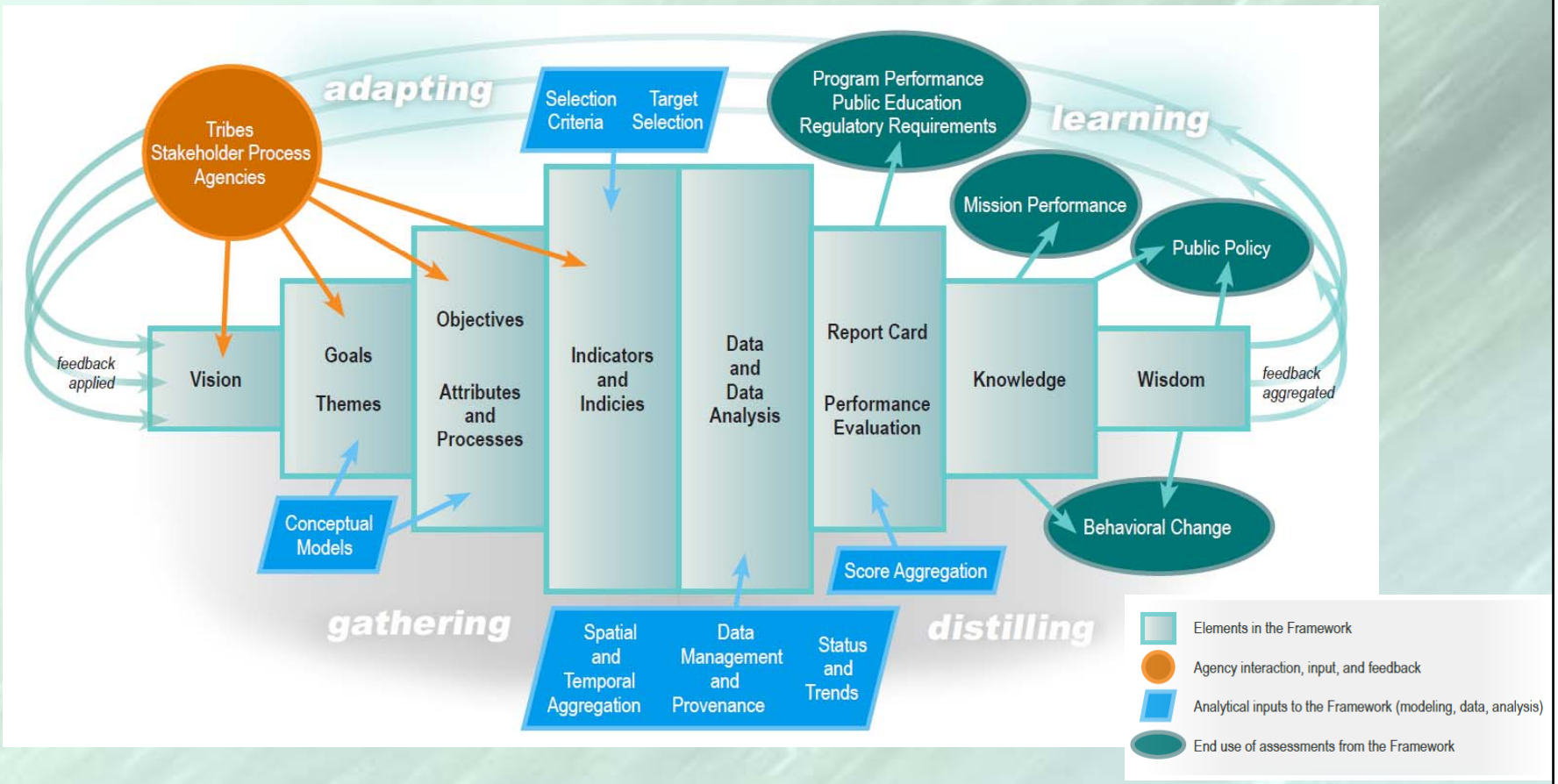
Selecting Indicators: Criteria

- Availability of high-quality data
- Data affordability
- System representation
- Ability to detect change over time
- Independence of indicators from one another
- Supports management decisions and actions
- Can be reported & understood in public arenas

There are Many Inter-related Steps in Developing Indicators



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Water Sustainability Goals

Water Plan Update 2013

Goal 1. Manage and make decisions about water in a way that integrates water availability, environmental conditions, and community well-being for future generations.

Goal 2. Improve water supply reliability to meet human needs, reduce energy demand, and restore and maintain aquatic ecosystems and processes.

Goal 3. Improve beneficial uses and reduce impacts associated with water management.

Goal 4. Improve quality of drinking water, irrigation water, and in-stream flows to protect human and environmental health.

Goal 5. Protect and enhance environmental conditions by improving watershed, floodplain, and aquatic condition and processes.

Goal 6. Integrate flood risk management with other water and land management and restoration activities.

Goal 7. Employ adaptive decision-making, especially in light of uncertainties, that support integrated regional water management and flood management systems.

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SAWPA One Water One Watershed 2.0

Goal 1: Maintain reliable and resilient water supplies and reduce dependency on imported water

Goal 2: Manage at the watershed scale for preservation and enhancement of the natural hydrology to benefit human and natural communities

Goal 3: Preserve and enhance the ecosystem services provided by open space and habitat within the watershed

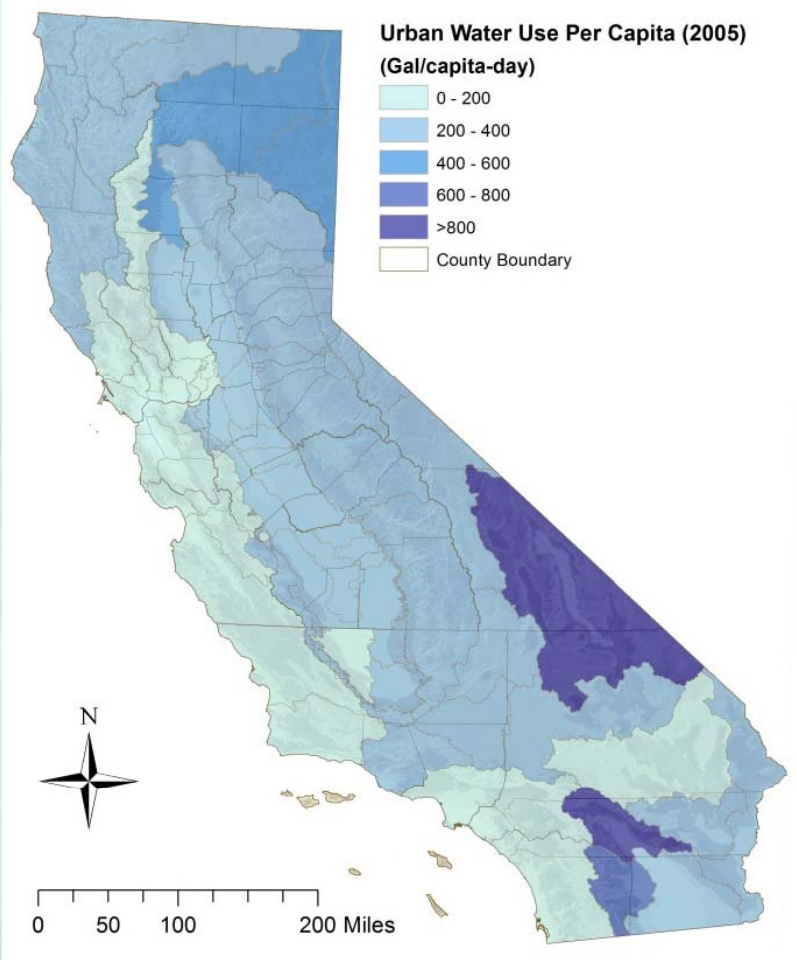
Goal 4: Protect beneficial uses to ensure high quality water for human and natural communities

Goal 5: Accomplish effective, equitable and collaborative integrated watershed management in a cost-effective manner

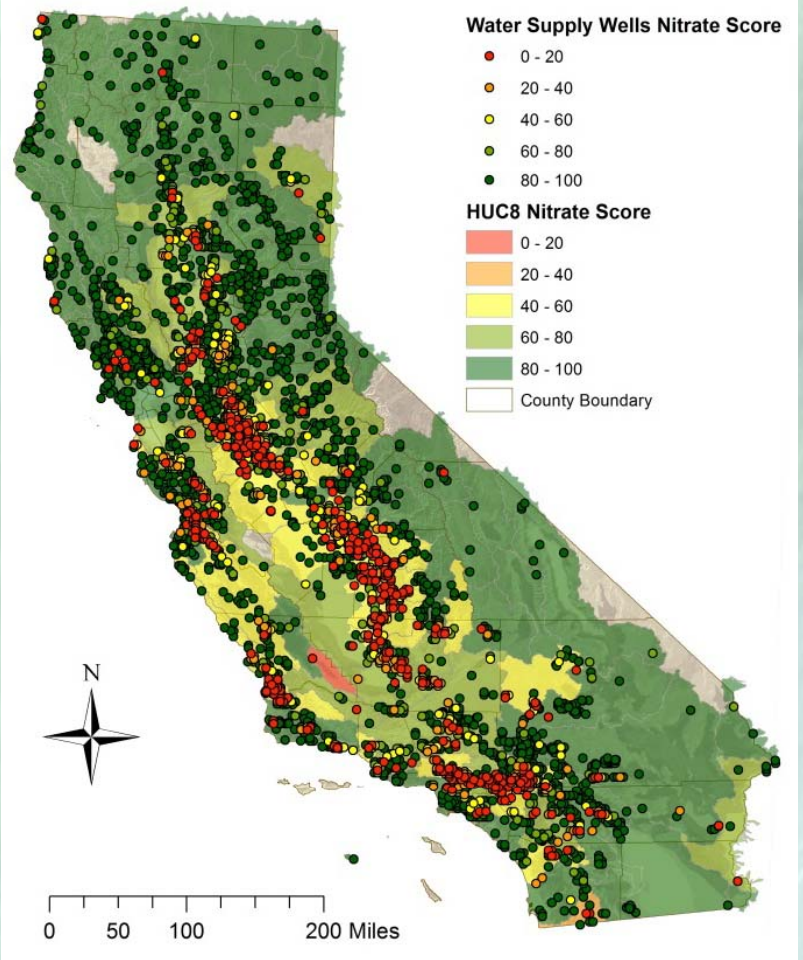
Pilot Studies - Proof of Concept

- State/Hydrological Region
  - Select sub-set of indicators for whole state/HR, status and trends analysis, and reporting. Incorporate water footprint analyses into analysis.
- Regional Pilot
  - Select region within California to test-implement the framework, including selection of goals & indicators, status and trends analysis, and reporting. Incorporate “water footprint” into analysis.

Sample Findings: California

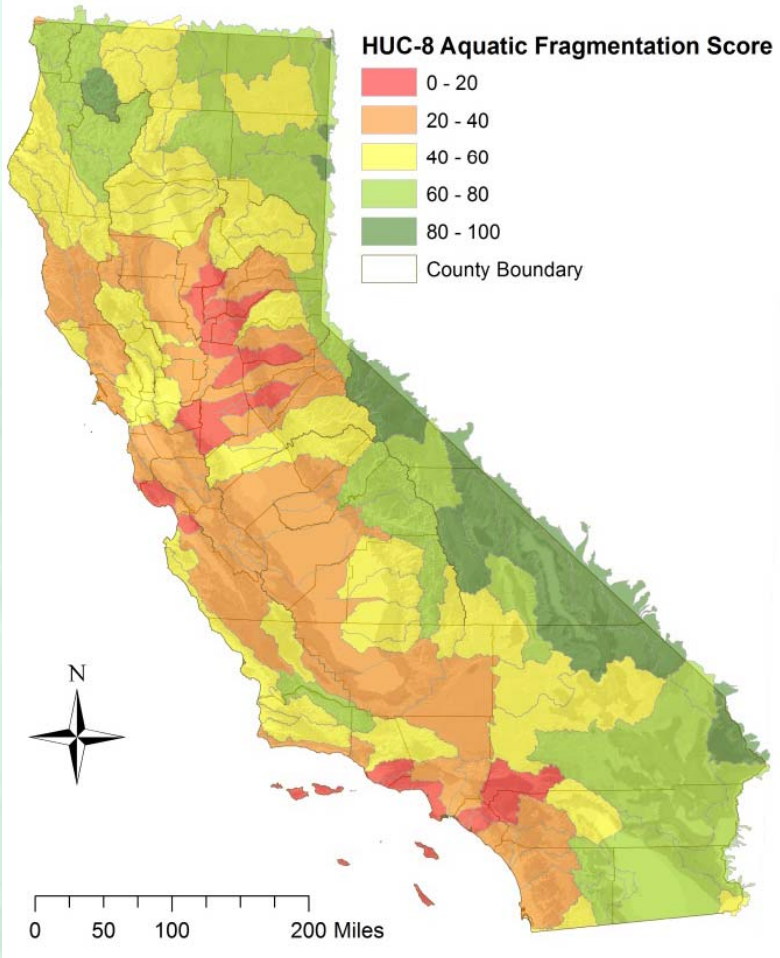


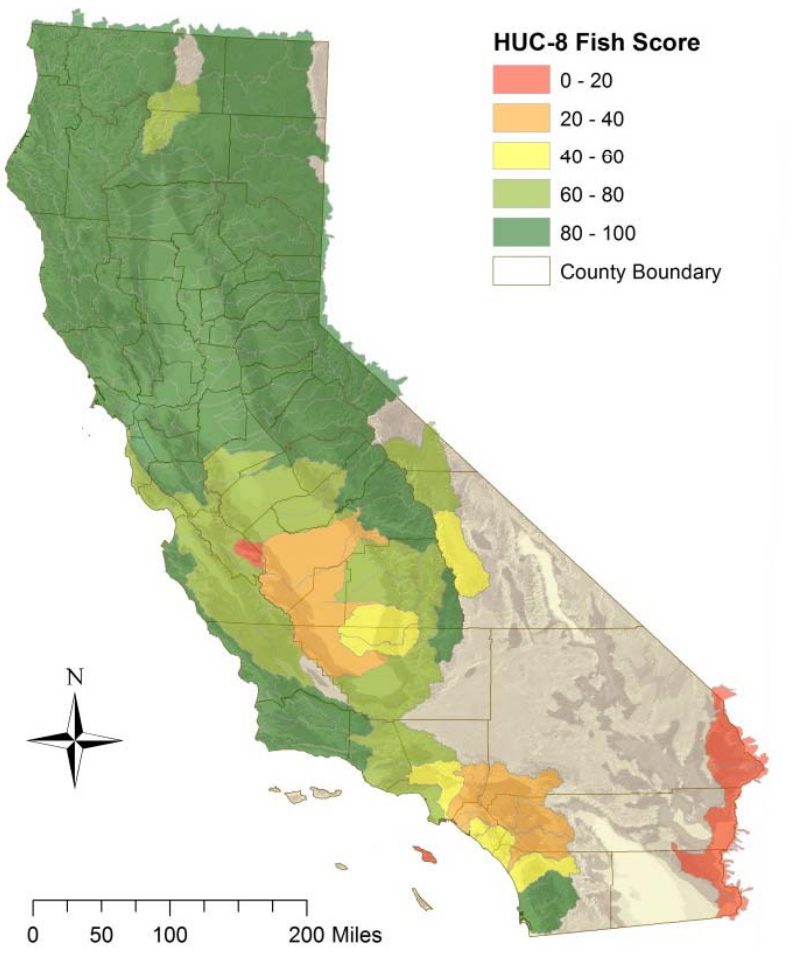
Water use by DWR planning area



Water supply wells affected by nitrate contamination

Sample Findings: California





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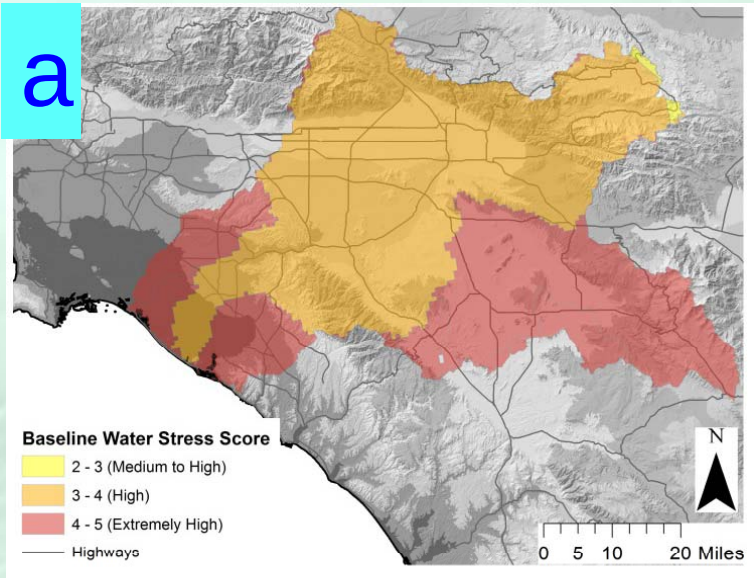
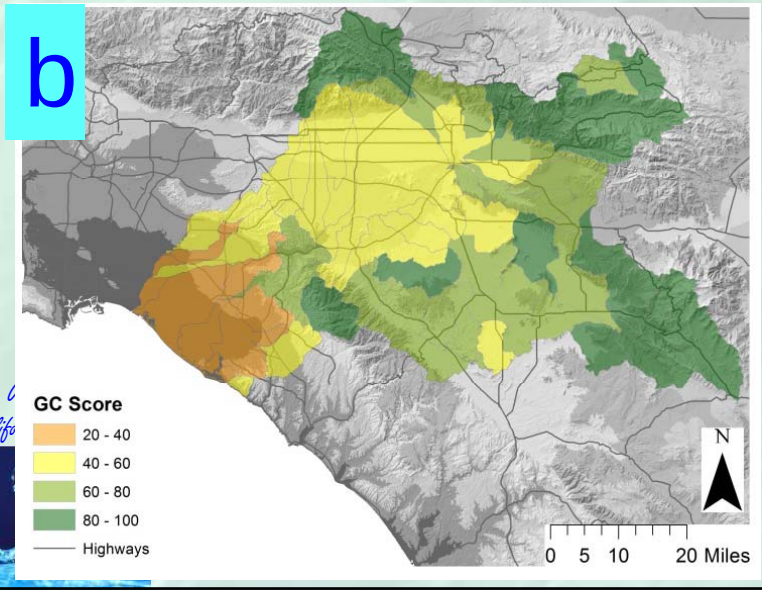
Aquatic fragmentation from road-stream crossings

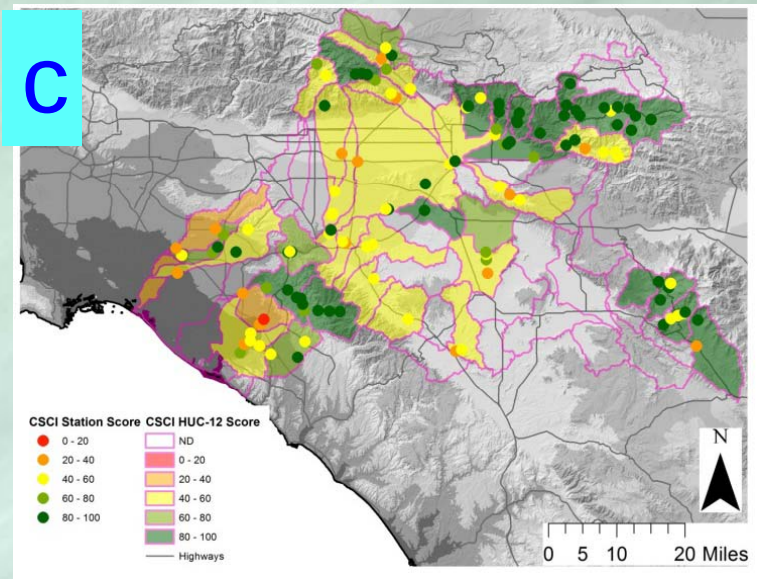
Current presence of native fish species relative to historic presence.

Sample Findings: SAWPA



Evaluation of (a) “baseline water stress”, (b) geomorphic condition (GC), and (c) California Stream Condition Index indicators at the SAWPA scale.





Web-Based Decision Support Tool

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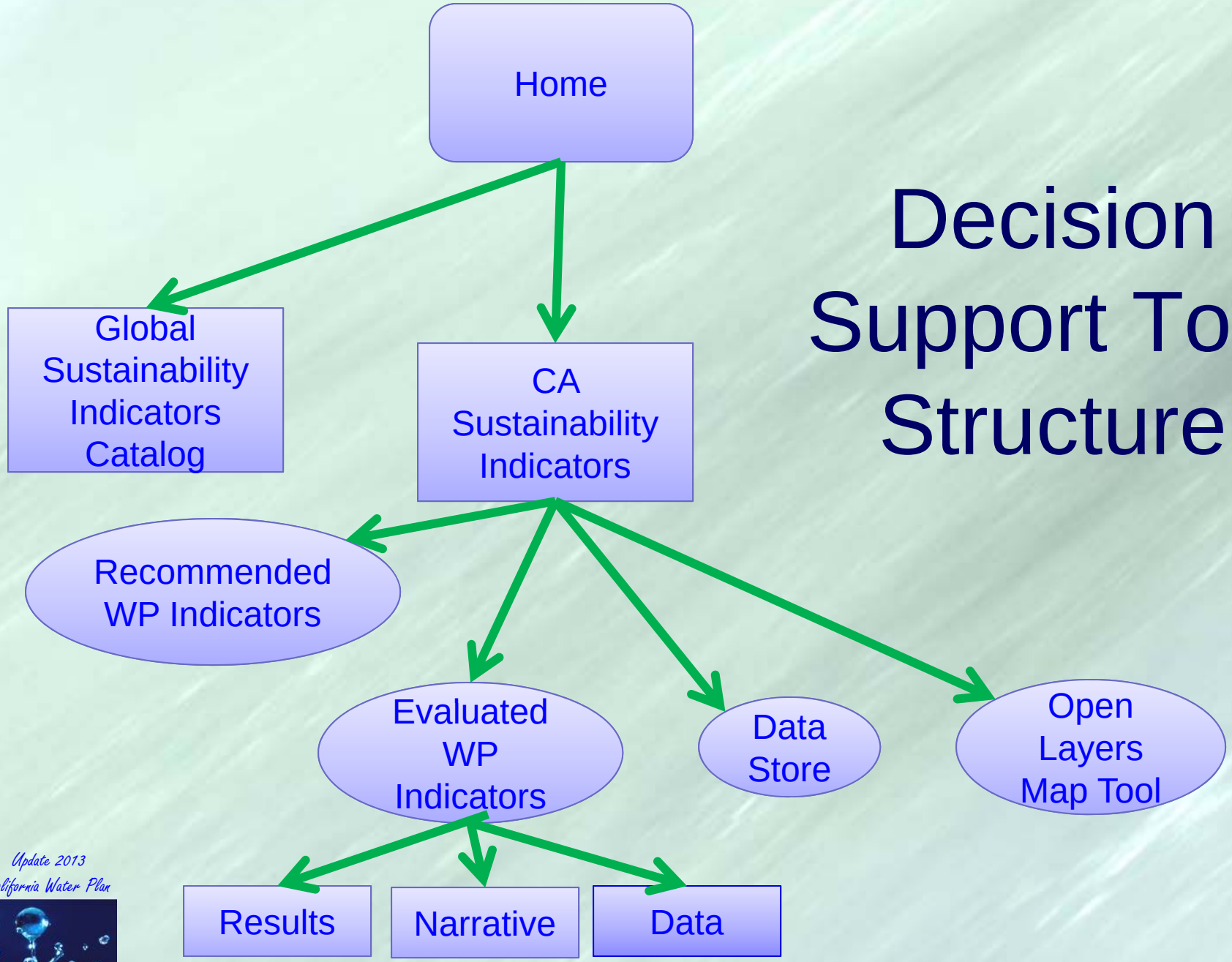
http://indicators.ucdavis.edu

Decision Support Tool Structure



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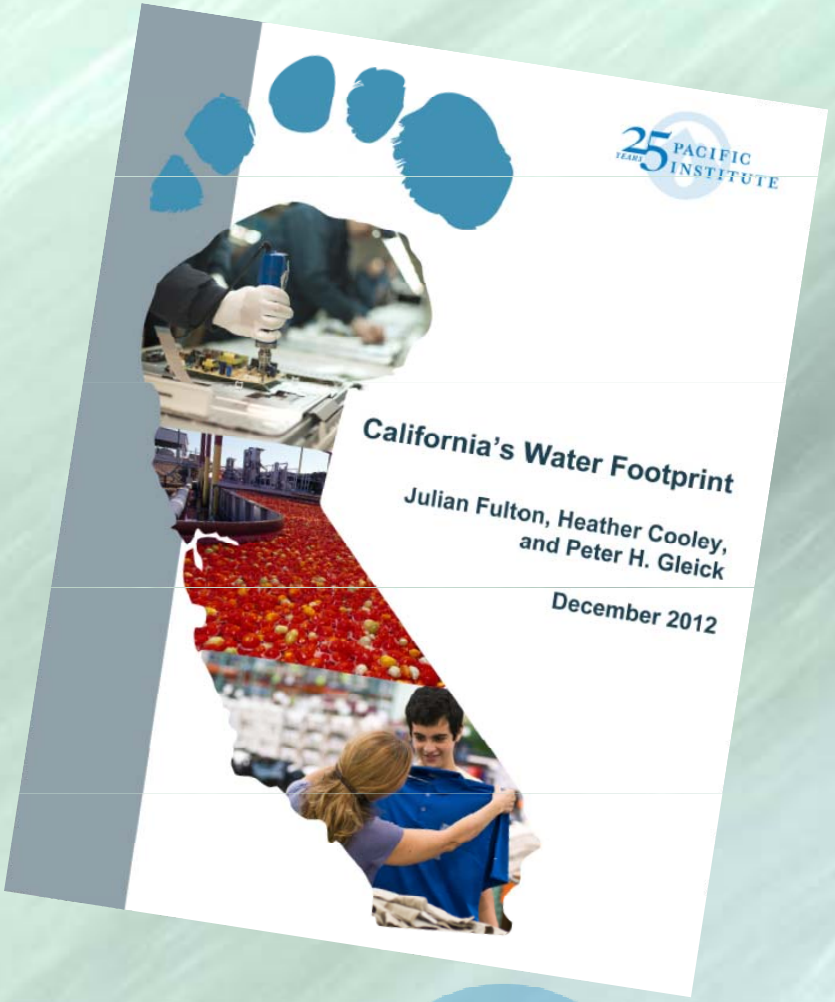
California's Water Footprint:
Major Findings and Discussion



Heather Cooley and Julian Fulton
Pacific Institute, UC Berkeley
http://www.pacinst.org/

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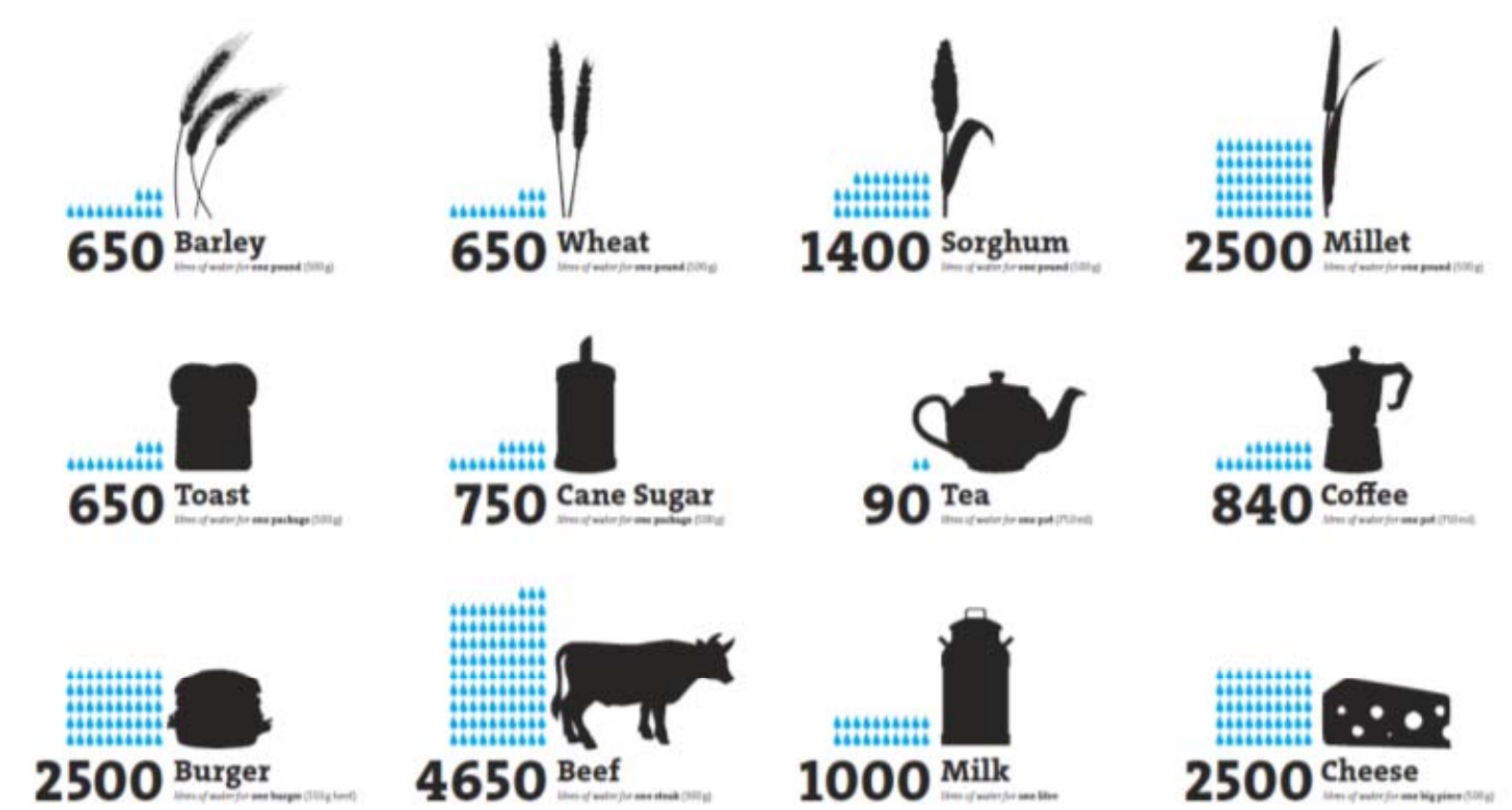
Water Footprint Definitions

- Blue, green, and grey
  - Water consumption
    - Internal and external

Examples



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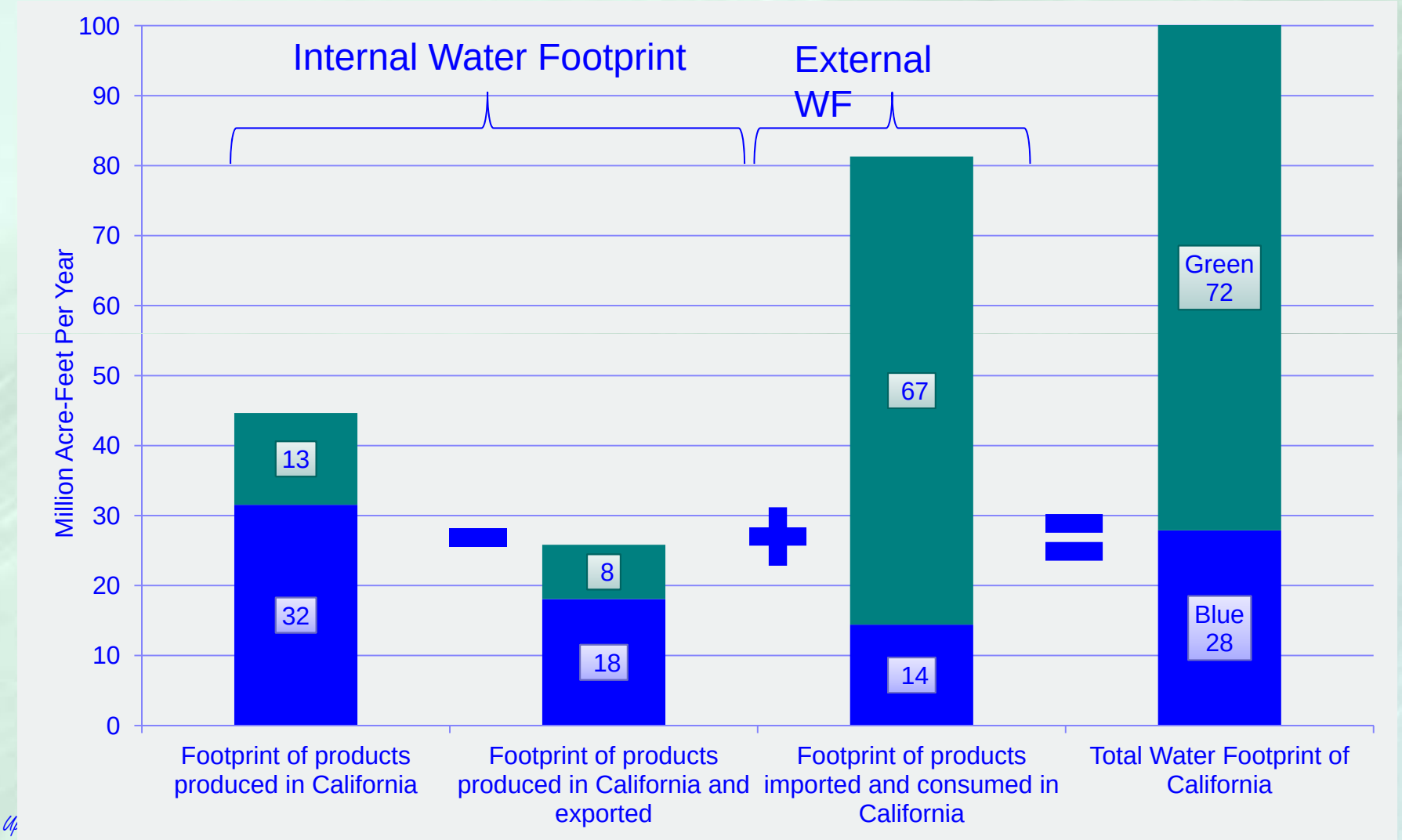
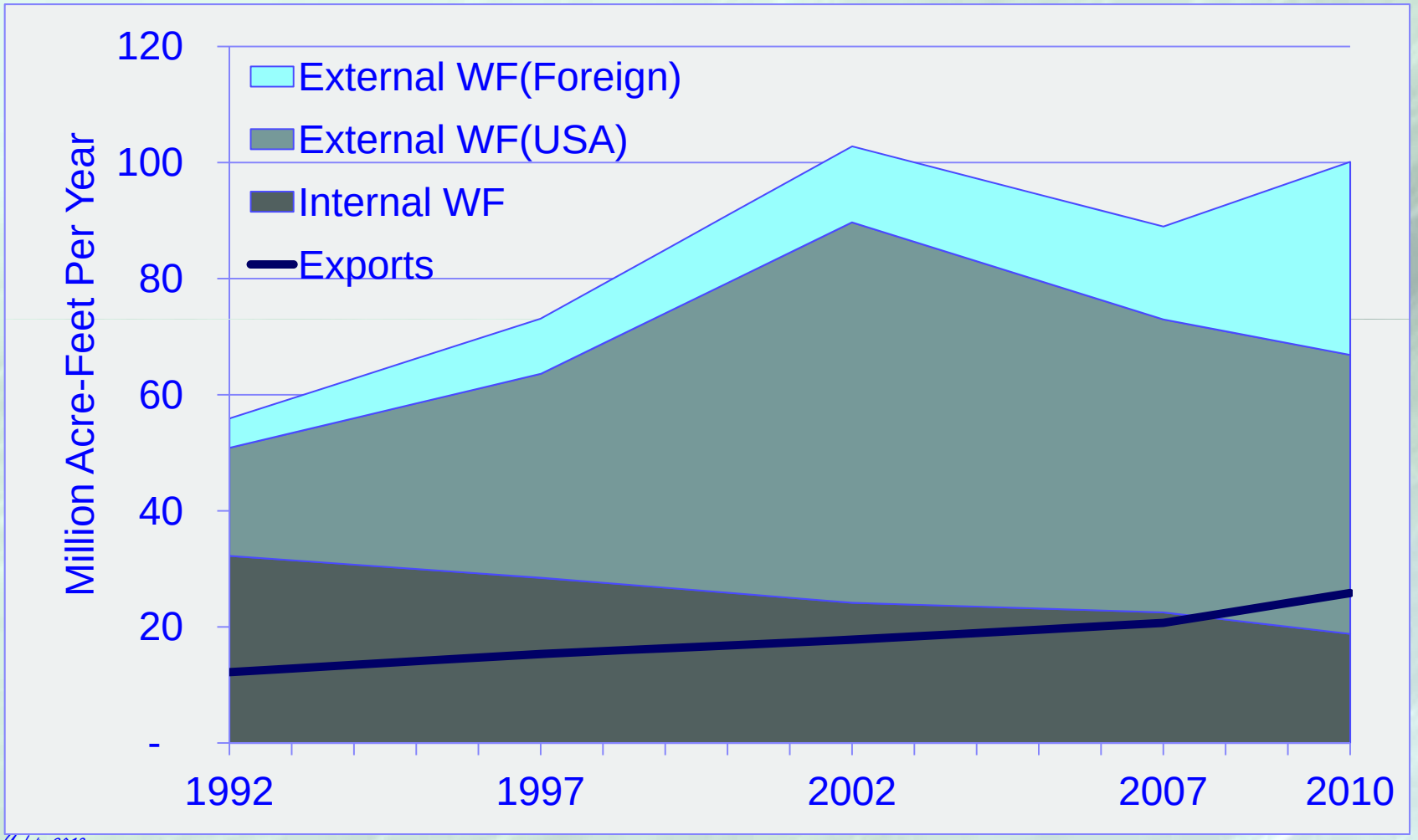
Source: http://virtualwater.eu/

California's Water Footprint in 2010



California's Water Footprint, 1992- 2010



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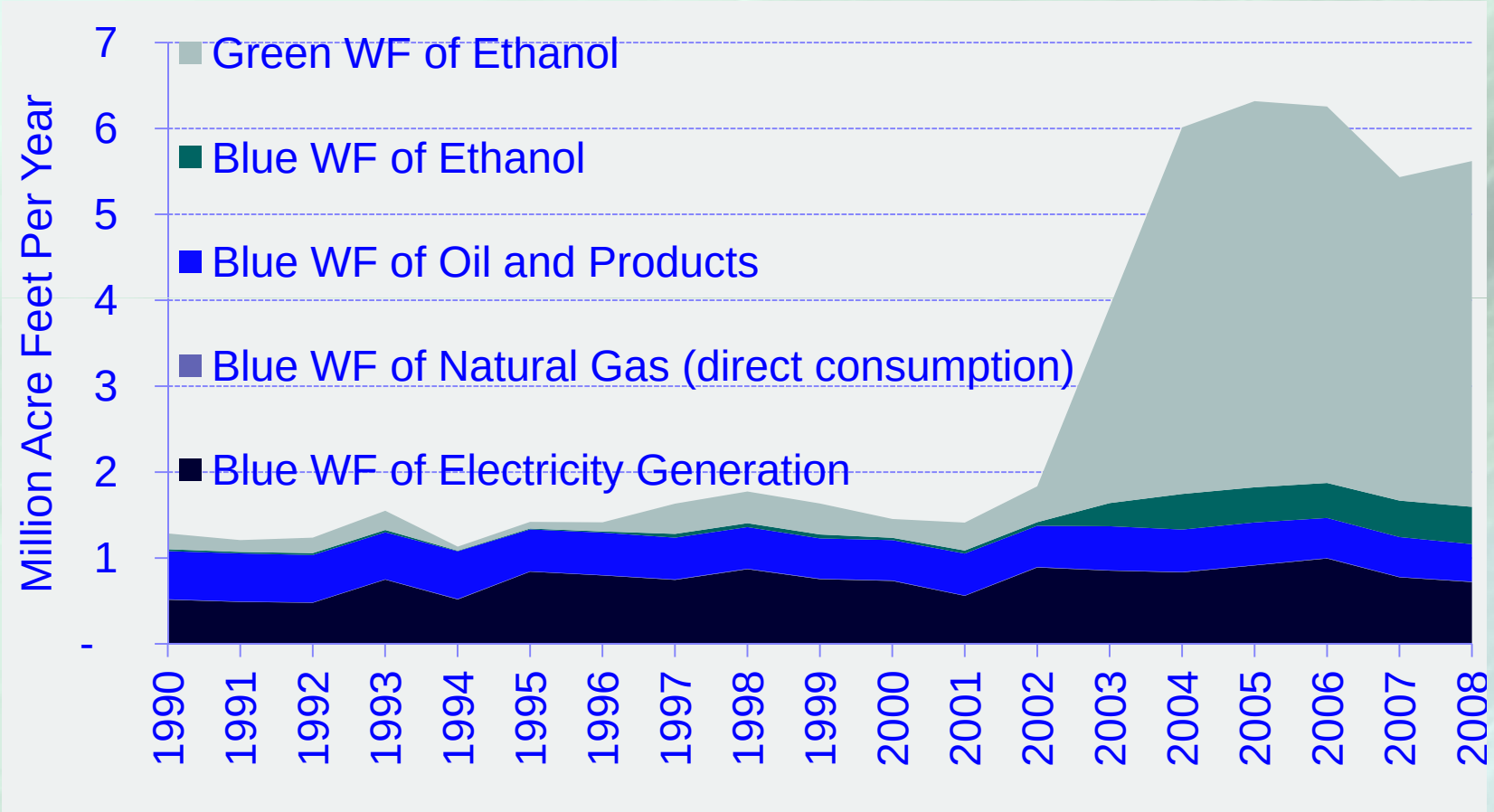
PACIFIC INSTITUTE 25 YEARS

Water Footprint of Energy



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Closing Thoughts

- Sustainability's Answers Require:
  - Systems' Thinking
  - Holistic Approach
  - Awareness of Time Horizons, Scales, Trajectories
  - Managing Risk & Uncertainty
  - New Tools
  - Discovering Common Ground for Solutions
  - Continuous Education

Contact Information

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Decision Support Website
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