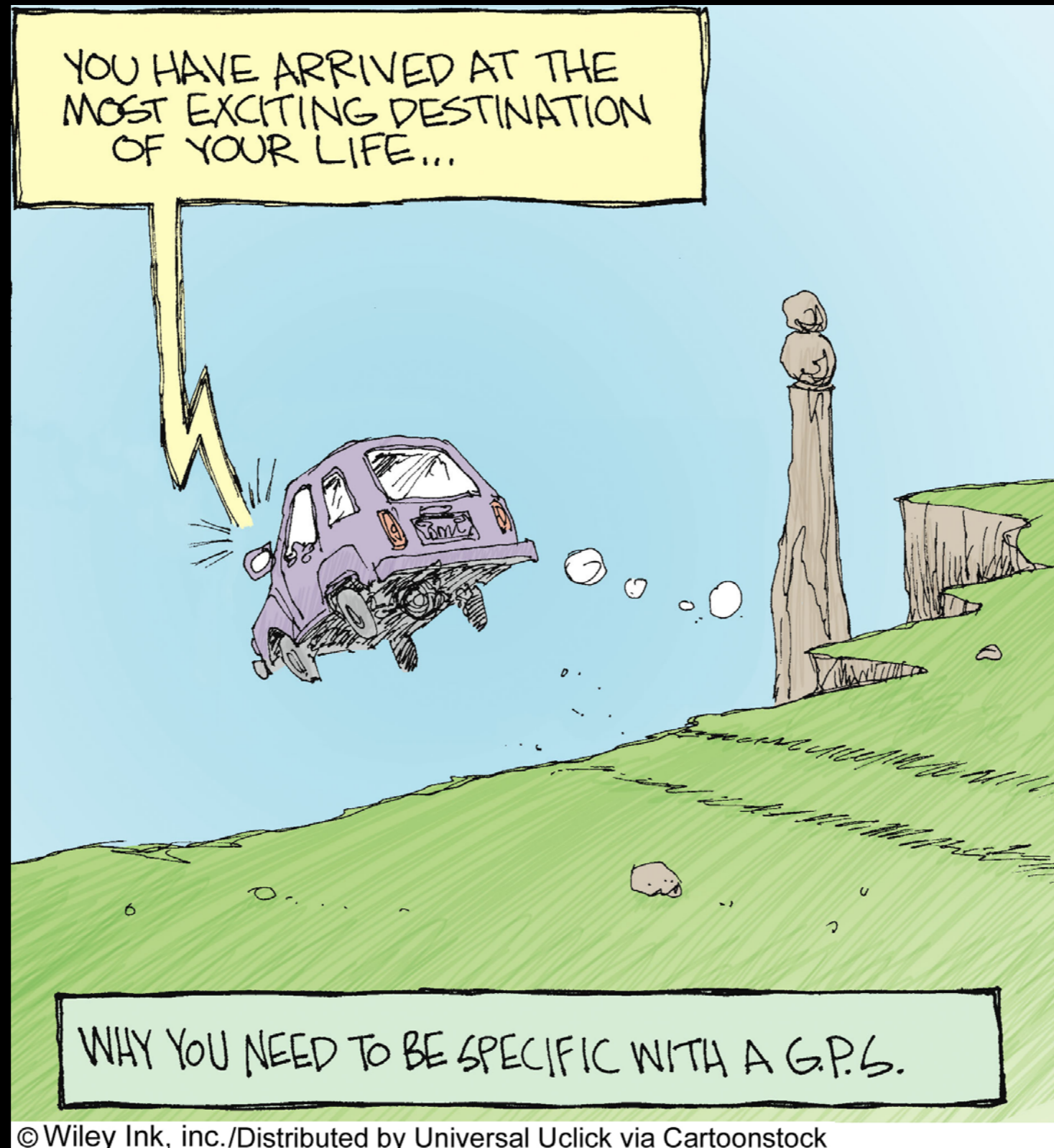


Measuring What Matters

*The Sustainable Groundwater Management Act:
Measurable Objectives*

Dr. Juliet Christian-Smith
Climate Scientist
Union of Concerned Scientists

What's new?



Measuring What Matters

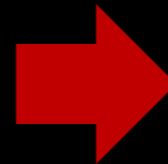
Setting Measurable Objectives to Achieve Sustainable Groundwater Management in California



New goals

Past Plan Requirements

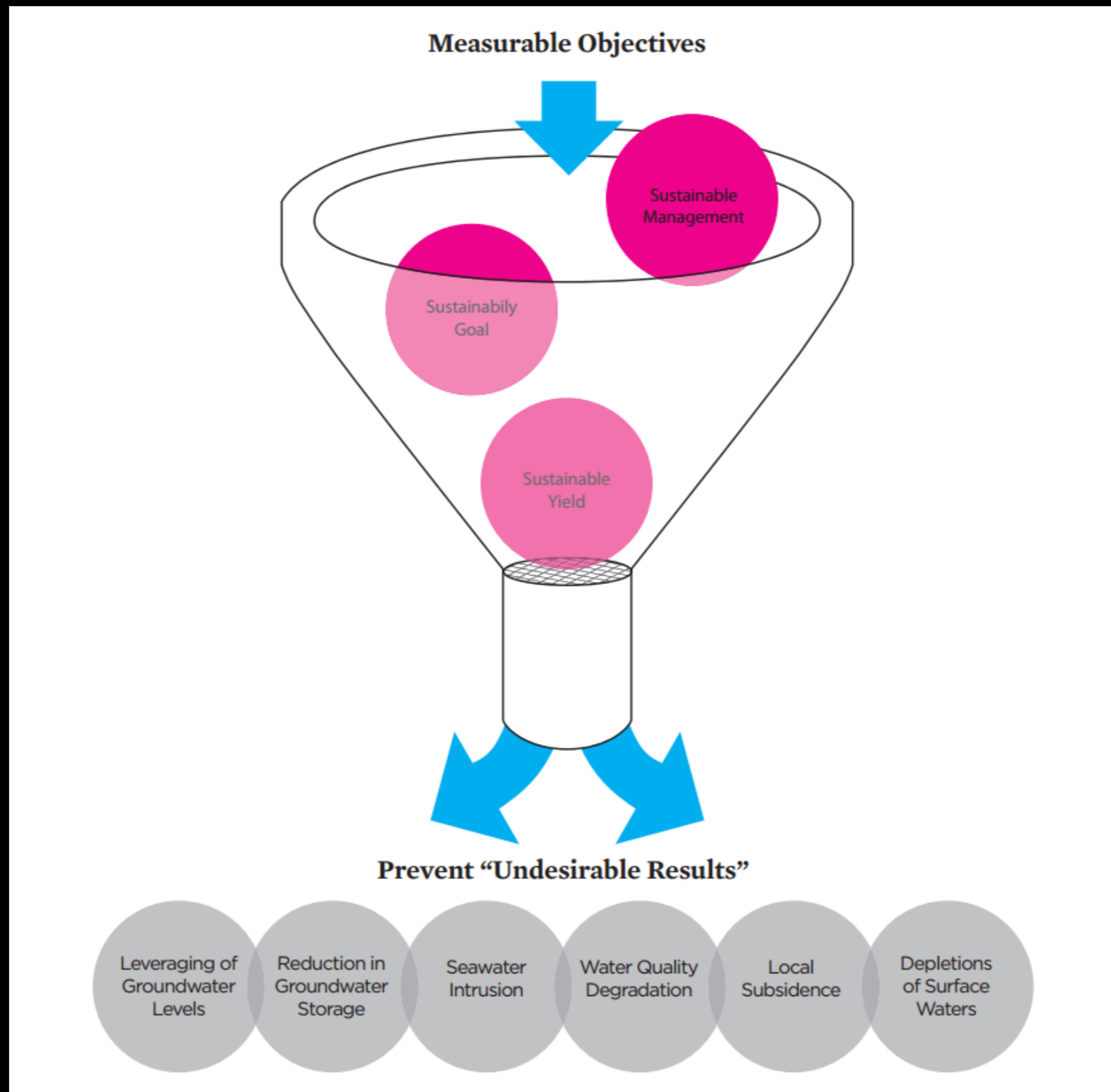
- Maps and hydrology
- **Basin Management Objectives (BMOs)**
- Monitoring of groundwater
- Plan to involve other agencies
- Documentation of public involvement



New Plan Requirements

- Physical description of the basin (water level, quality etc.)
- **Measurable Objectives and Interim Milestones**
- Description of how these will be achieved
- Monitoring and management provisions
- How the plan will affect other county/city general plans

Measurable Objectives



Effective Measurable Objectives

- Define clear baselines
- Set quantitative thresholds
- Develop protective triggers
- Incorporate regular measurement and monitoring
- Account for uncertainty
- Adapt to changing conditions and new information

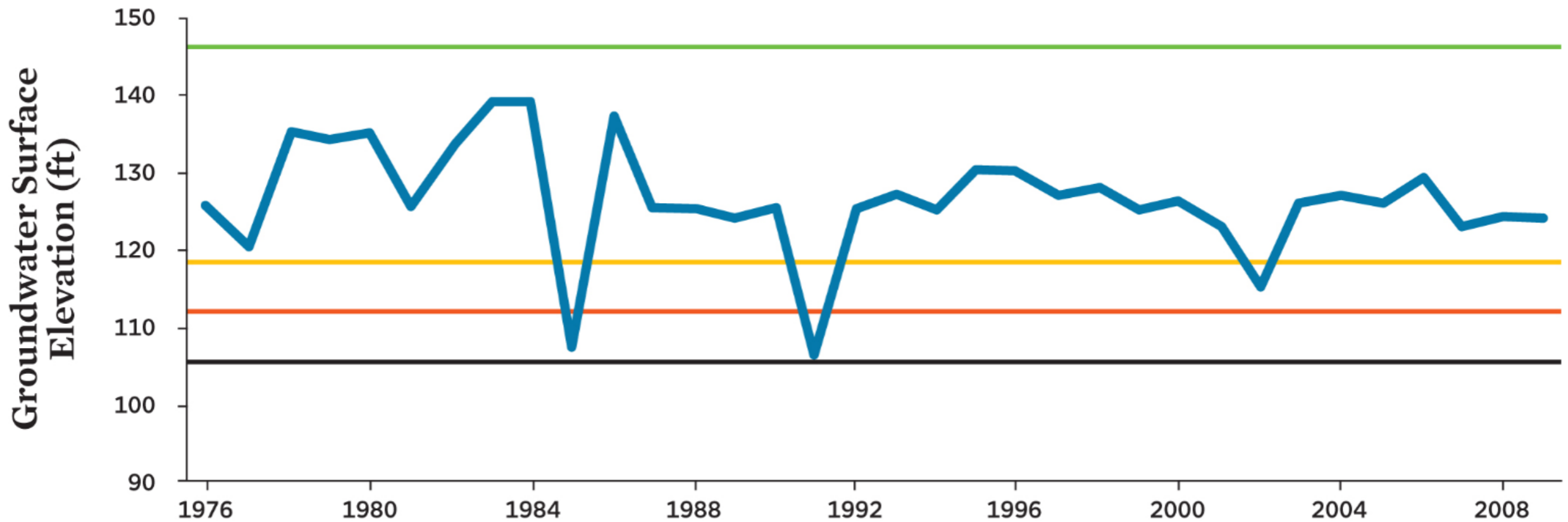
Set Quantitative Thresholds

TABLE 1. Examples of Measurable Objectives and Corresponding Thresholds in Groundwater Management

Measurable Objective	Document	Threshold Example
Groundwater Levels		
Limit groundwater extraction.	Central Sacramento County Groundwater Management Plan	The long-term average groundwater extraction rate should not exceed 273,000 acre-feet (AF)/year.
	Orange County Water District (OCWD) Groundwater Management Plan	OCWD does not have a "hard cap" on groundwater extractions, but uses economic disincentives to encourage groundwater producers to limit production to the amount established by OCWD.
	Madera Regional Groundwater Management Plan	Reduce groundwater extractions by 150,000 AF/year.
Limit the decline in groundwater elevation to provide for sustainable yield.	Groundwater Management Area 1: Desired Future Conditions (Dockum Aquifer)	Average decline in groundwater levels must not exceed 30 feet over the next 50 years.
Groundwater Storage		
Achieve a target storage volume in the future.	Monterey Peninsula Water Management District	27,360 AF of usable storage required.
	Groundwater Management Area 1: Desired Future Conditions (Blaine Aquifer)	50% of the volume in storage will remain in 50 years.
	Orange County Water District Groundwater Management Plan	Managed groundwater basin within a 500,000 AF volume with triggers when storage levels reach various points, including reducing pumping.

Develop Protective Triggers

FIGURE 2. Fixed Thresholds and Triggers for Groundwater Management

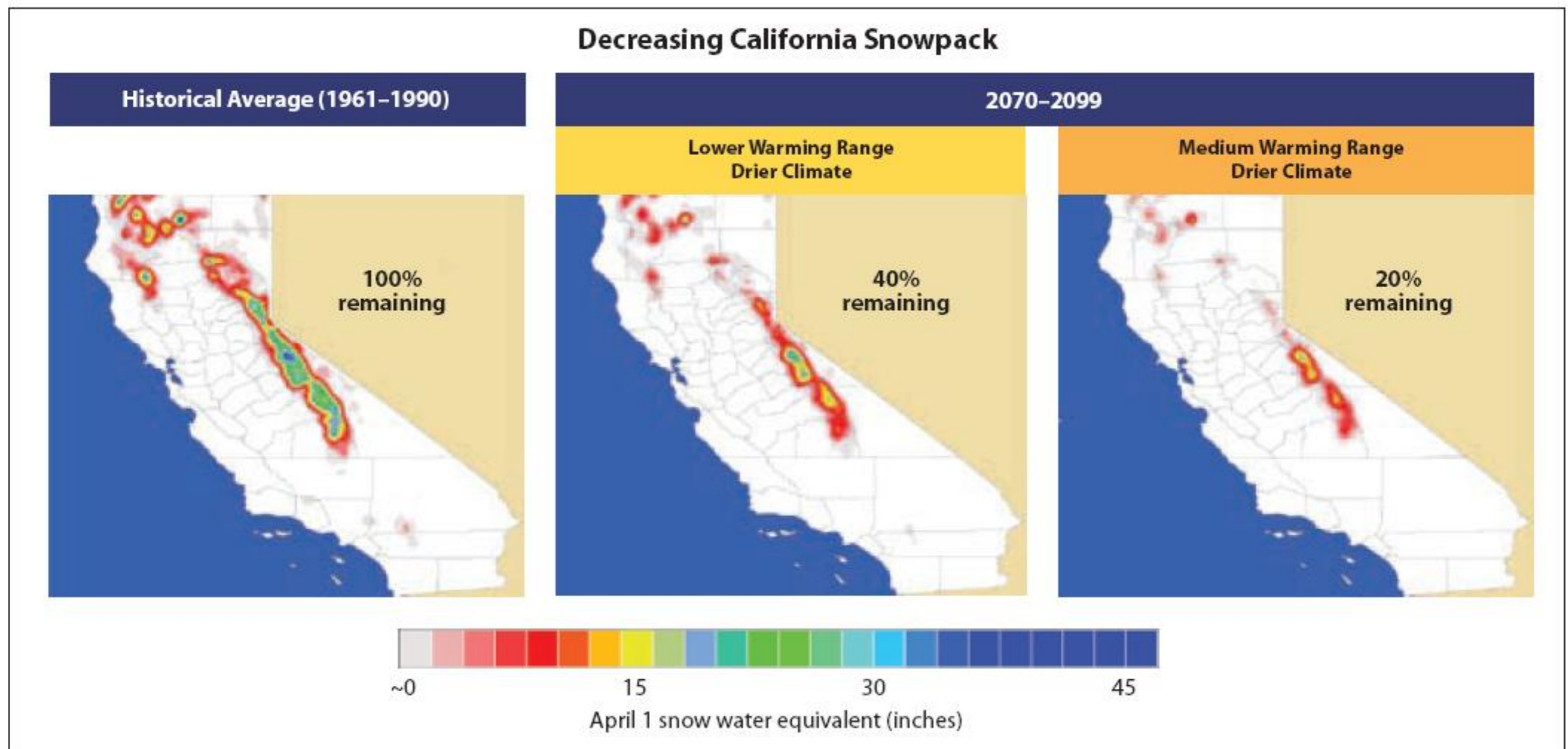


In this example, the threshold for chronic lowering of groundwater levels is the lowest groundwater elevation recorded (black line). Fixed triggers have been set at one standard deviation (yellow-light trigger) and two standard deviations (red-light trigger) below the average groundwater elevation (black).

Measurement & Monitoring



Account for Uncertainty



Adapt to Change



Shared resources, lacking direction



Shared resources, with direction



Common Framework

- Does the threshold exceed an existing standard?
- Does the threshold conflict with thresholds for other undesirable results?
- Was the threshold developed through a transparent public process?
- Are there potential negative impacts associated with the threshold?
- Does the threshold violate the threshold of neighboring basins?
- Are there high levels of uncertainty regarding proposed actions?

Common Framework

- Does the threshold exceed an existing standard?
- Does the threshold conflict with thresholds for other undesirable results?
- Was the threshold developed through a transparent public process?
- Are there potential negative impacts associated with the threshold?
- Does the threshold violate the threshold of neighboring basins?
- Are there high levels of uncertainty regarding proposed actions?

Common Framework

- Does the threshold exceed an existing standard?
- Does the threshold conflict with thresholds for other undesirable results?
- Was the threshold developed through a transparent public process?
- Are there potential negative impacts associated with the threshold?
- Does the threshold violate the threshold of neighboring basins?
- Are there high levels of uncertainty regarding proposed actions?

Common Framework

- Does the threshold exceed an existing standard?
- Does the threshold conflict with thresholds for other undesirable results?
- Was the threshold developed through a transparent public process?
- Are there potential negative impacts associated with the threshold?
- Does the threshold violate the threshold of neighboring basins?
- Are there high levels of uncertainty regarding proposed actions?

Measuring What Matters

Setting Measurable Objectives to Achieve Sustainable Groundwater Management in California



For more information

www.ucsusa.org/measuringwhatmatters

www.ucsusa.org/sustainablegroundwater

Contact me: Juliet Christian-Smith

jchristiansmith@ucsusa.org