

California Water Plan Update 2009

Future Scenarios Sacramento River HR

2009 Regional Workshops

California **Water Plan** Update **2009**

INTEGRATED WATER MANAGEMENT



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Public Review Draft

January 2009

Water Plan Scenarios Used To Consider Future Uncertainty

- Three plausible yet very different conditions during 2050 planning horizon
- Explore key uncertainties facing water community
- Factors water community has little control over
- Not predictions ---- used to evaluate water management responses

Quantifying Future Scenarios for Update 2009

- Using WEAP analytical tool to quantify water demand and supplies for future scenarios and water management responses
- WEAP Hydrologic Region analysis being done for all regions --- high level, coarse representation
- WEAP Planning Area analysis for Sacramento and San Joaquin regions --- more physically based
- Each scenario evaluated with 12 climate sequences (climate change, multiple year droughts, wet years)

WEAP Model

- Water Evaluation And Planning Model
- High level screening tool with graphical interface
- Demand & Supply in a single tool
- Demand driven water supply allocation model
- Steps through time to simulate future conditions
- Very suitable to build and study future water scenarios as affected by population, socio_economic factors and climate change
- Explore management strategies (demand reduction, supply augmentation)
- Recent successful WEAP application for Inland Empire Utilities Agency

Hydrologic Region Analysis

- Monthly, climate-driven demands to 2050
 - reflect global climate change projections
- Inventory current supplies by source
- Coarse representation of response packages

All 10 Hydrologic Regions



Planning Area Analysis

Sacramento and San Joaquin River Regions

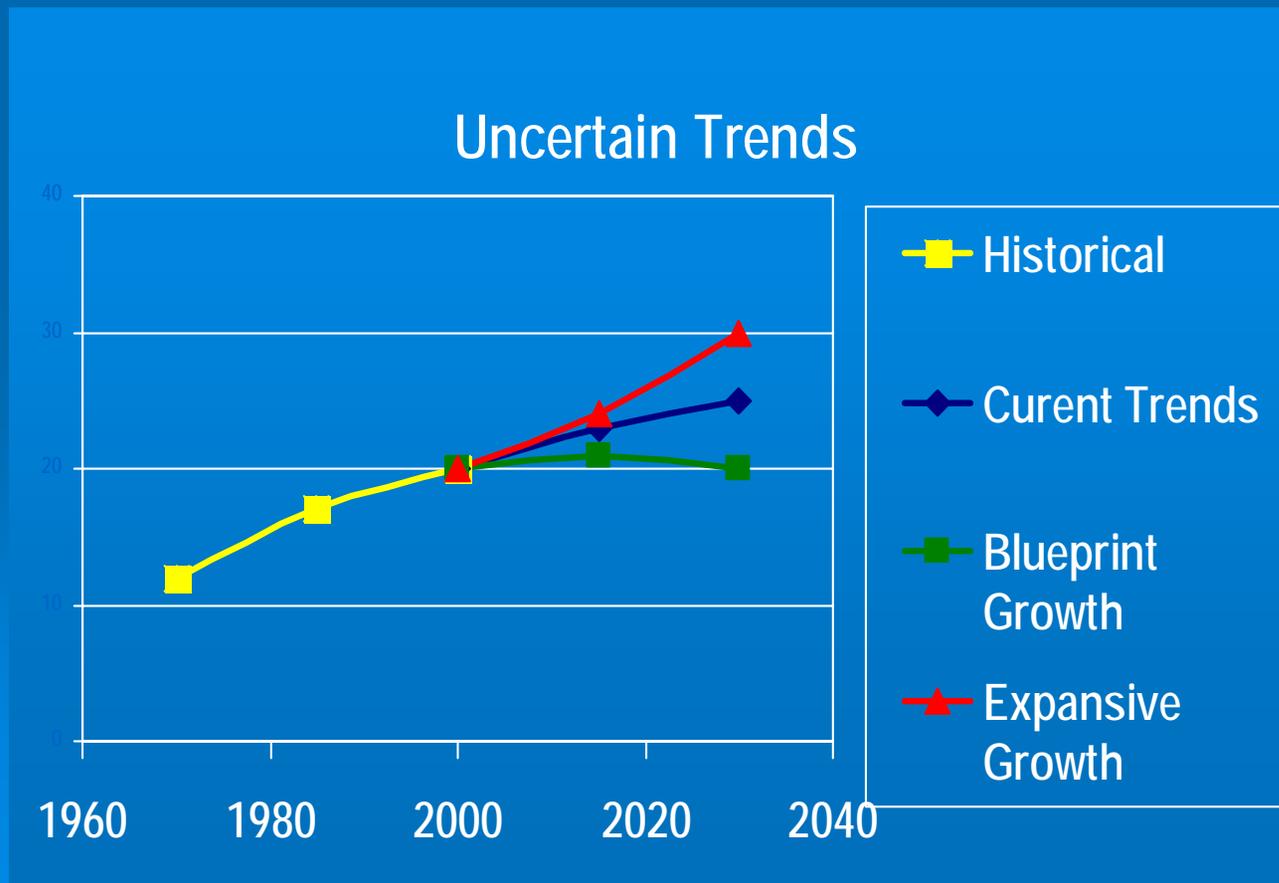
- Hydrologically-based water system simulation by month to 2050
 - reflect global climate change projections
- Estimate environmental flows, system operations, deliveries, and reliability
- More direct representation of response packages

Sacramento River & San Joaquin River Hydrologic Regions



Scenario Overview

- Scenario concepts
- 3 scenario narratives
- Quantifying important factors
- Evaluation framework

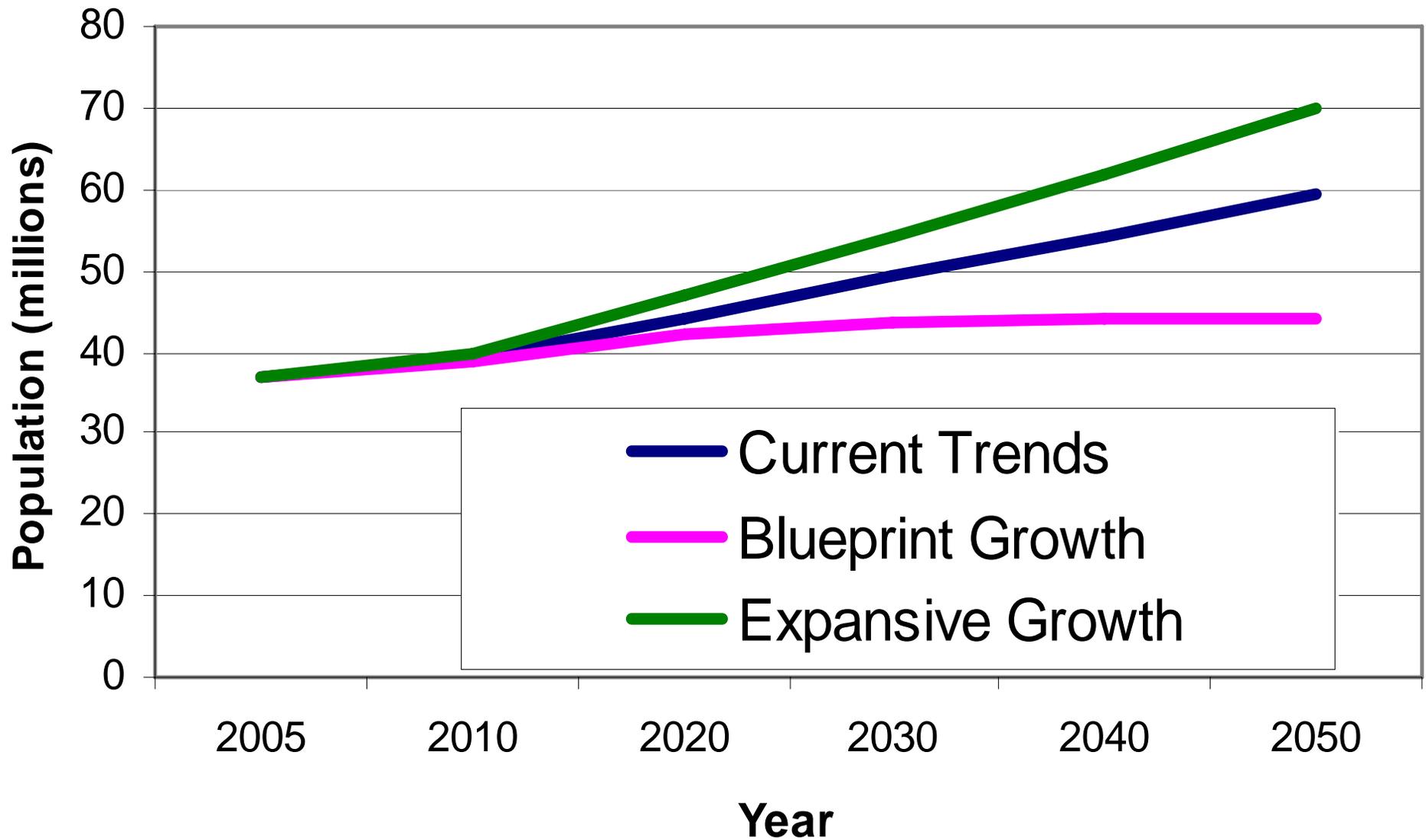


Demographic Factors

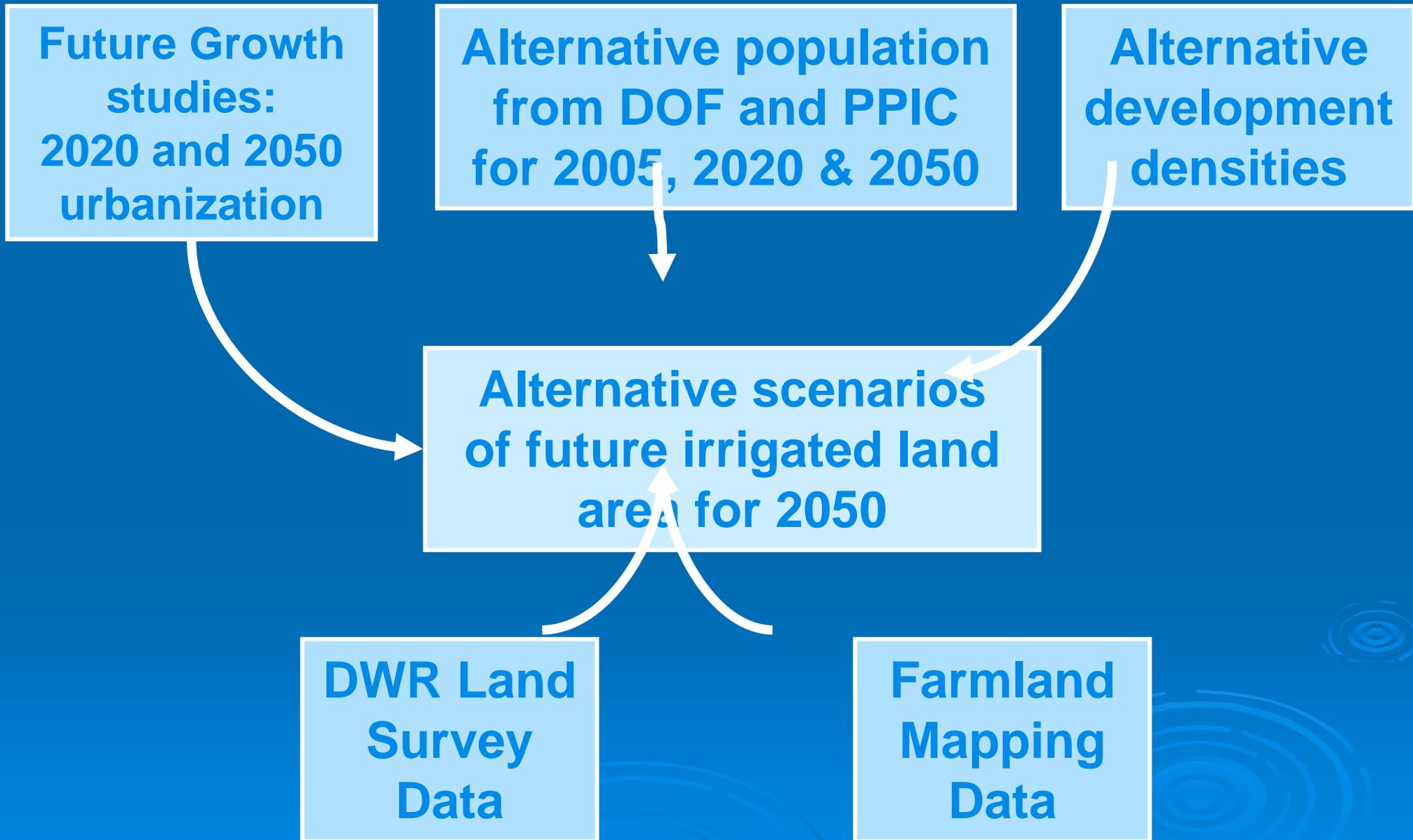
- Population, Employment, Housing, Income
- Used to determine indoor urban demands
- Population used to estimate outdoor urban landscape area, future urbanization of agricultural lands



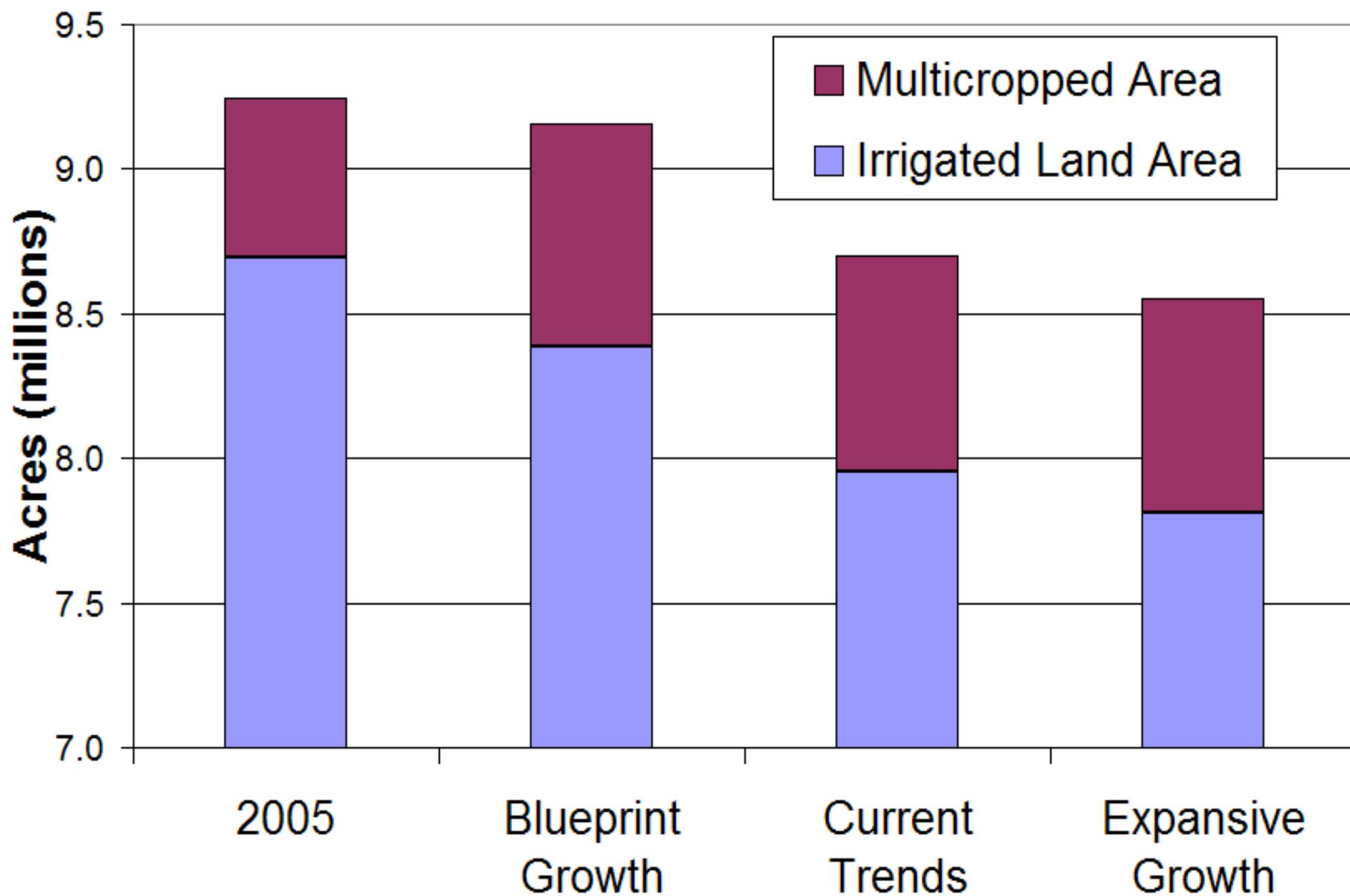
California Population by Scenario



Irrigated Agricultural Area



2050 California Irrigated Crop Area by Scenario



Environmental Demand Estimates

- Developed for Instream Flows, Wildlife Refuges, Wild & Scenic Rivers, and Delta Outflow Requirements.
- Based on recent years current environmental water requirements.
- Using future hydrologic sequences with climate change to generate environmental needs for three scenarios.

Climate Factors

- Model estimates of future precipitation, temperature, wind speed, and relative humidity
- Used in calculation of applied agricultural and outdoor M&I water uses
- Developed using World Climate Research Programs downscaled climate projections – CMIP3 dataset
 - http://gdo-dcp.ucllnl.org/downscaled_cmip3_projections/

3 Baseline Scenarios for 2050

Plausible Yet Different Futures

➤ **Current Trends**

- ✓ Recent trends continue into the future for population, agricultural production, environmental water, and background water conservation

➤ **Blueprint Growth**

- ✓ More coordinated planning & infill
- ✓ Lower population growth
- ✓ More agricultural prod. -- 2000 level
- ✓ New environment water -- High
- ✓ More background water conservation

➤ **Expansive Growth**

- ✓ Less coordinated planning & sprawl
- ✓ Higher population growth
- ✓ More agricultural prod. -- 2000 level
- ✓ New environment water -- Low
- ✓ Less background water conservation

Scenario Assumptions for Key Factors

Sacramento River Hydrologic Region

Scenario Factors Affecting Water Demand	Year 2005 Observed	2050 Current Trends	2050 Blueprint Growth	2050 Expansive Growth
Population (millions)	2.9	5.3	4.0	5.9
Irrigated Crop Area (thousand acre)	1920	1840	1900	1800
Environmental Water Instream flows & refuges (Thousand acre-feet)	2005 Level	+562	+715	+390
Background Water Conservation (% Incr.)	----	10%	15%	5%

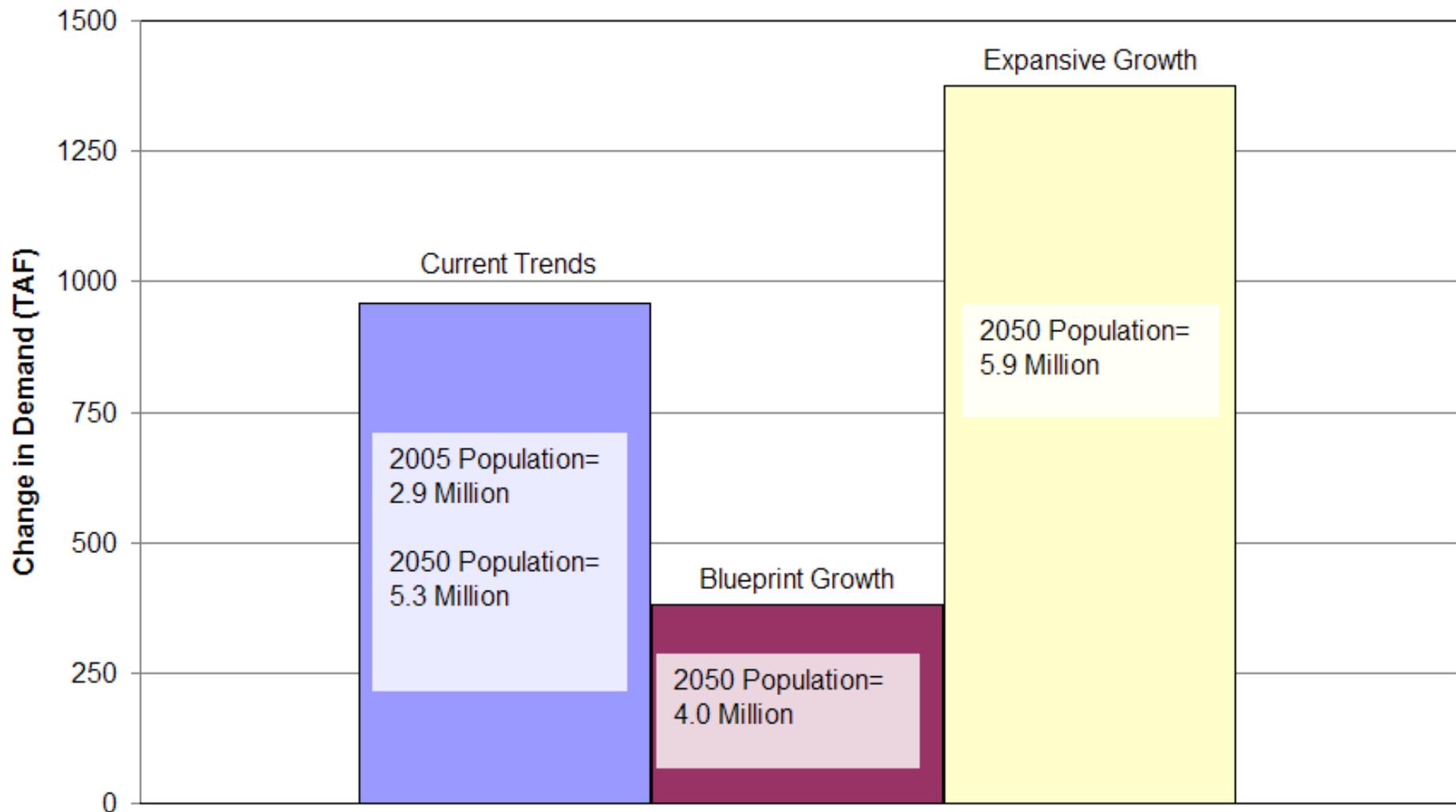
Scenario Water Demand Changes

HR Results for 1 Climate Sequence

- Change in urban water demand
- Change in irrigated agriculture water demand
- Change in environmental water
- Net Change in regional water demand

Urban Water Demand Changes – 2005 to 2050 Sacramento River HR

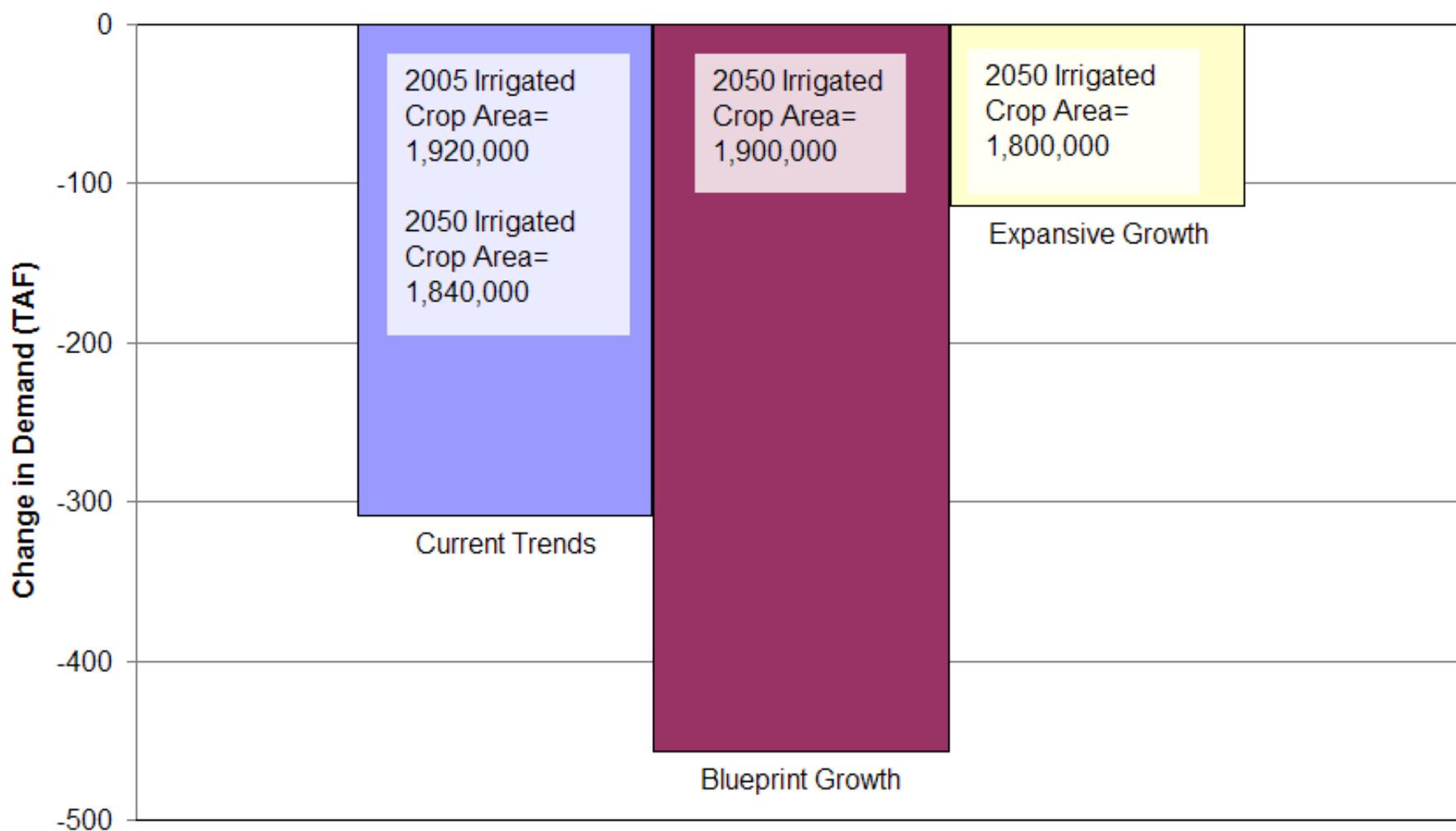
**Change in 2041-2050 Average Applied Urban Water Demand
from 1998-2002 Historical Average by Scenario
Sacramento River Region, Climate Sequence 1**



Farm Water Demand Changes – 2005 to 2050

Sacramento River HR

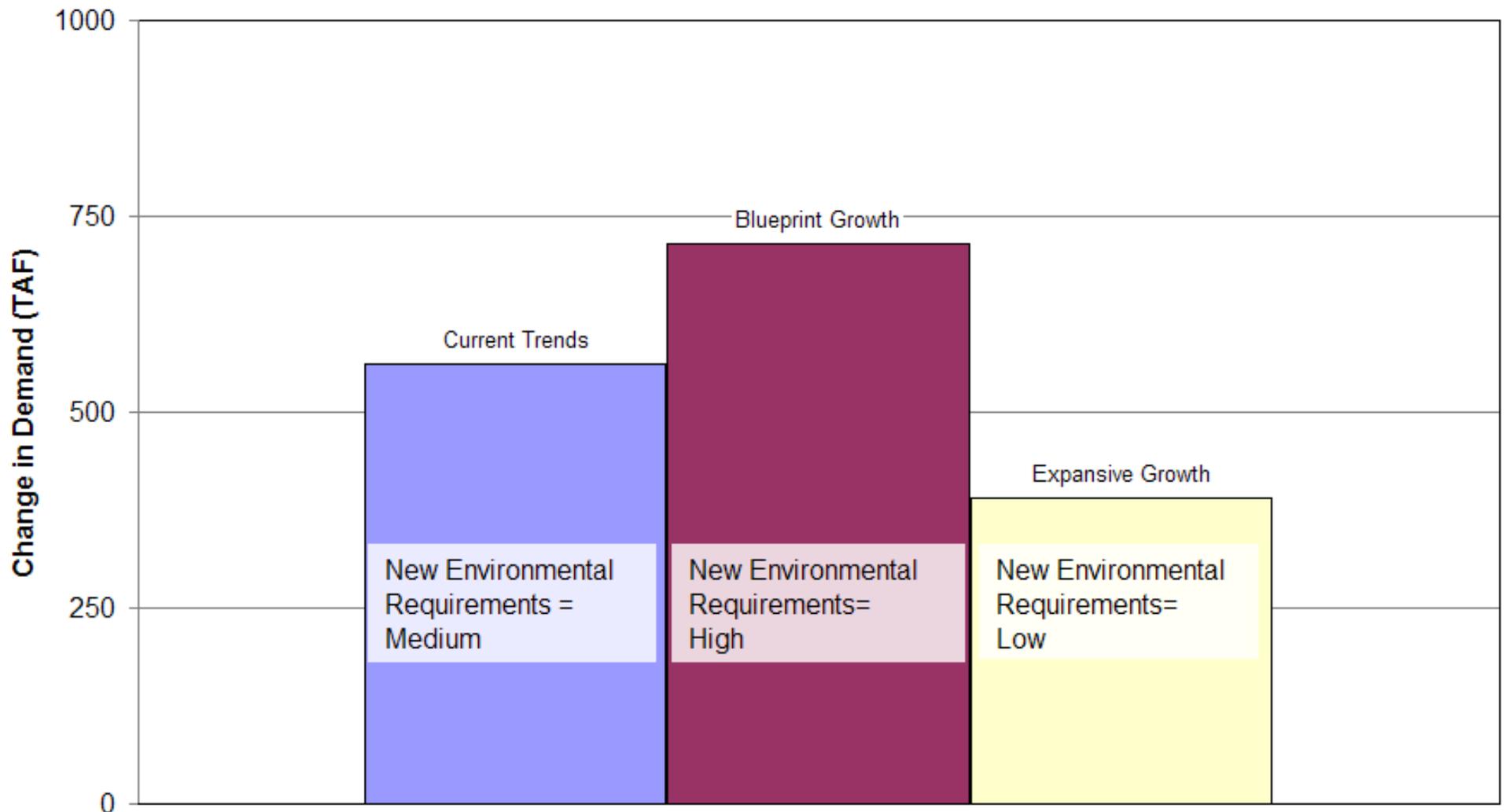
Change in 2041-2050 Average on-Farm Applied Water Demand from 1998-2002 Historical Average by Scenario Sacramento River Region, Climate Sequence 1



Environment Water Demand Changes – 2005 to 2050

Sacramento River HR

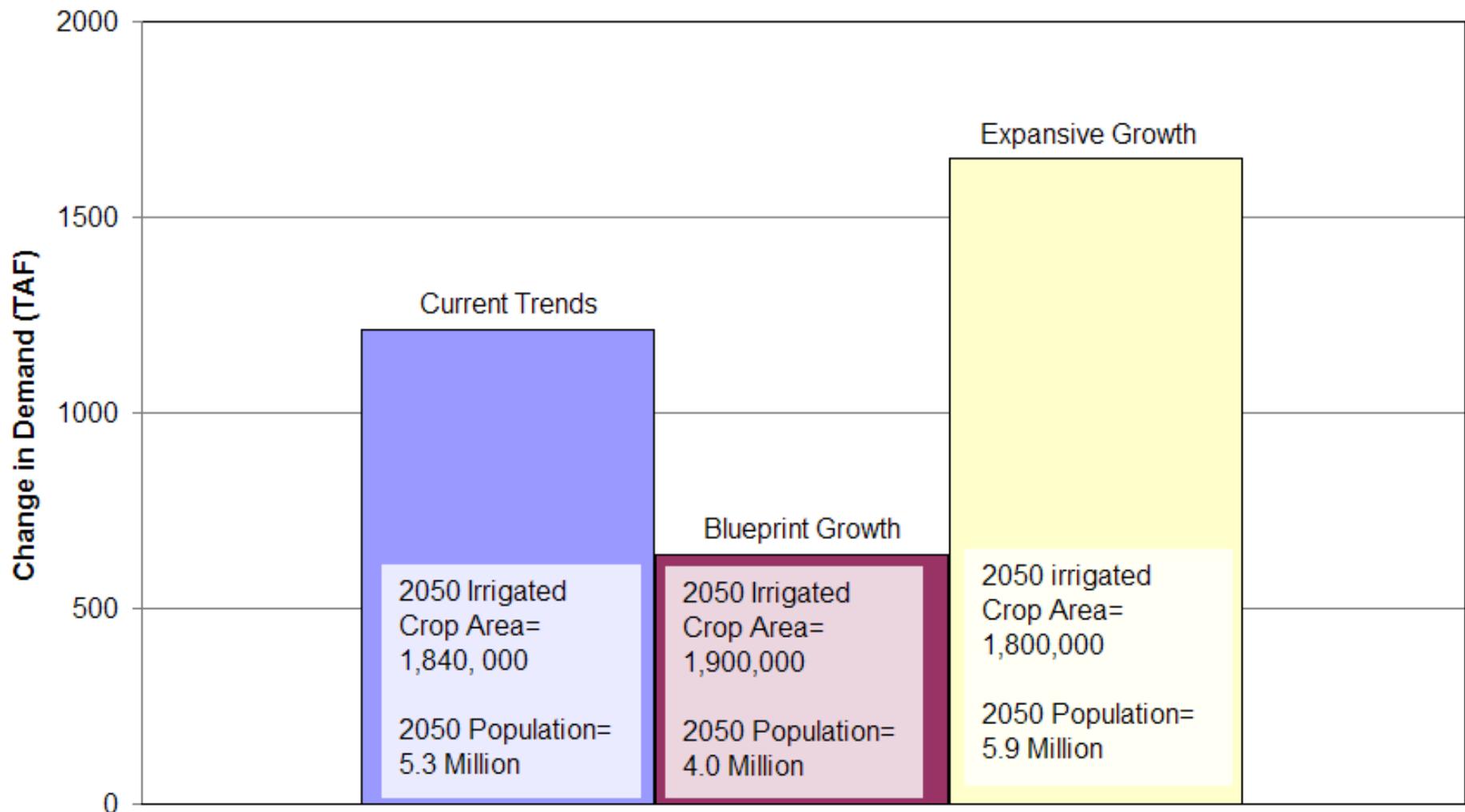
**Change in 2041-2050 Average Environmental Water Demand
from Current Conditions by Scenario
Sacramento River Region, Climate Sequence 1**



Net Water Demand Changes – 2005 to 2050

Sacramento River HR

**Change in 2041-2050 Average Applied Water Demand
from 1998-2002 Historical Average by Scenario
Sacramento River Region, Climate Sequence 1**



Technical Outreach for Scenario Work

- December 2007 – Scenario proposal
- April 2008 – Shared Vision Planning
- June 2008 – Refinement of scenario proposal
 - Climate change
 - Environmental water
 - Flood management
 - Water quality
- February 2009 – Review of preliminary demands

Steps for Scenario Work

- December 2008 – February 2009
 - Develop scenario water demands
- February – May 2009
 - Develop scenario water supplies
 - Test future water management responses
- June 16, 2009
 - Workshop on Regional and Planning Area results in Sacramento

Reference Information

- DWR Scenario Team Lead – Rich Juricich
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- Statewide Water Analysis Network (SWAN)
website: <http://www.waterplan.water.ca.gov/swan>