

Source: California Department of Fish & Wildlife 2013

Upper Feather River

Integrated Regional Water Management Plan

October 23, 2015 – RWMG Meeting – Climate Change



Meeting Objectives

- Provide context, background, and overview of climate change chapter and related items
- Discuss how climate change will be incorporated into the IRWMP



Agenda

- Climate Change Overview
- Climate Change Deliverables
 - Climate Change Chapter
 - Vulnerability Assessment
 - Data Collection Improvement
 - Project Assessment Tool
- Next Steps
- Questions and Comments



Source: Sacramento River Watershed Program 2010

Introduction



Climate Change Team

- Michael Baker International
 - Chris Read

- ECORP Consulting, Inc.
 - Michael Preszler



ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS



Why are we talking about climate change?

- Regulatory framework
 - Proposition 84 Guidelines
 - DWR Climate Change Handbook for Regional Water Planning
- Recent conditions underscore the need to plan for more variability

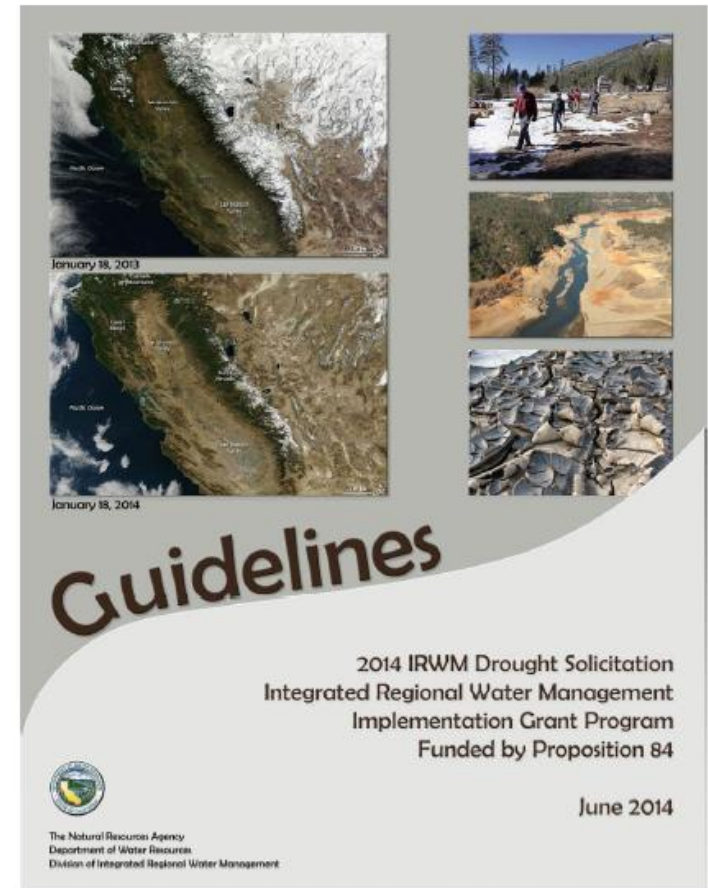


Wildland 2001



Proposition 84 Guidelines (IV.A.16)

“The IRWM Plan must address both the adaptation to the effects of climate change and the mitigation of GHG emissions.”

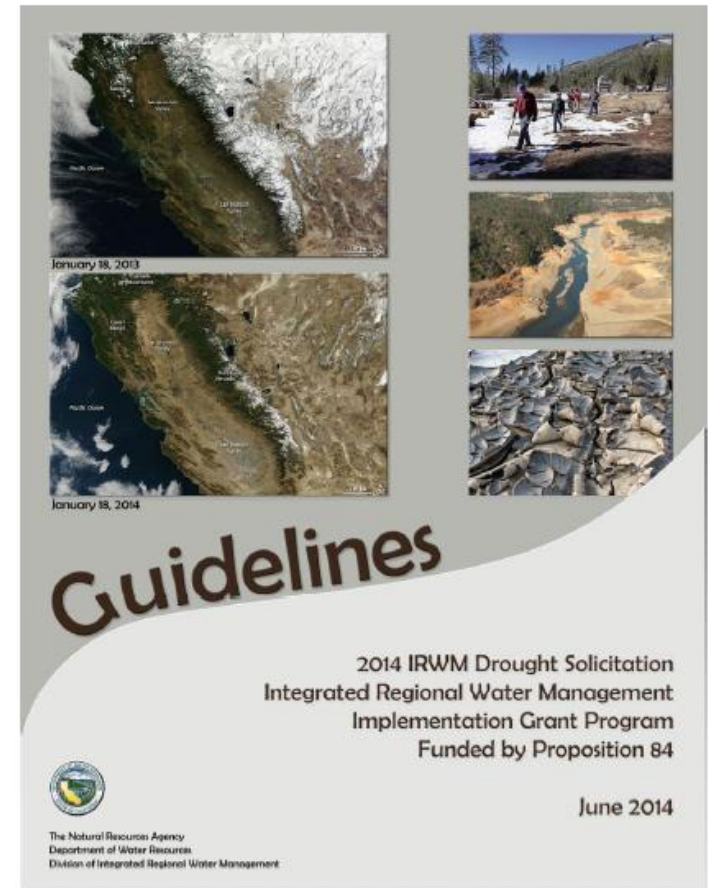




Proposition 84 Guidelines (IV.A.16)

This includes:

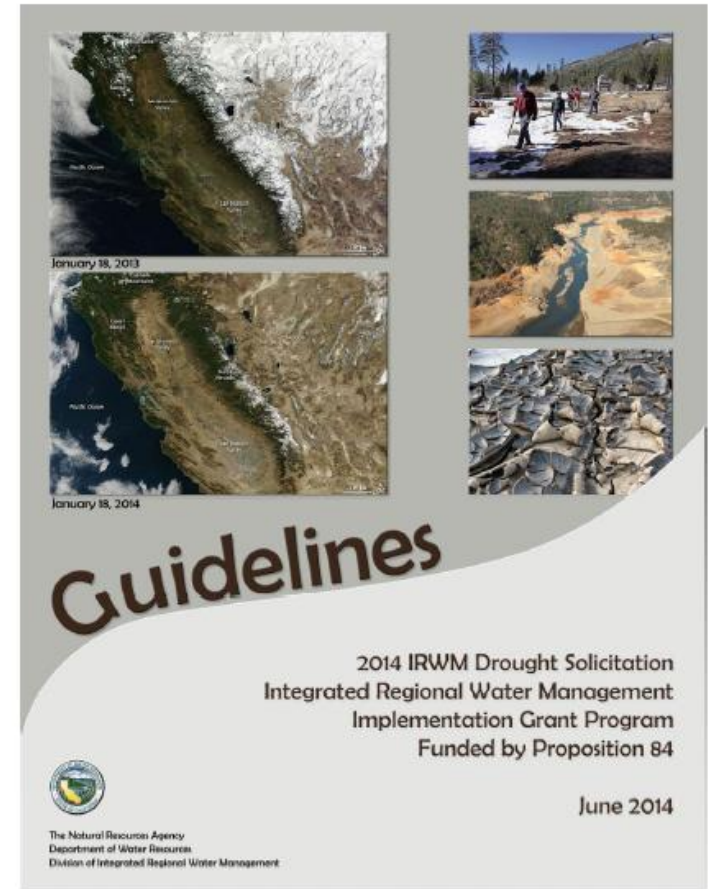
- A discussion of potential effects of climate change on the region and potential adaptation responses to those vulnerabilities
- A process that considers GHG emissions in selecting project alternatives
- A list of prioritized vulnerabilities
- A plan, program, or method for further monitoring prioritized vulnerabilities





Proposition 84 Guidelines (IV.A.16)

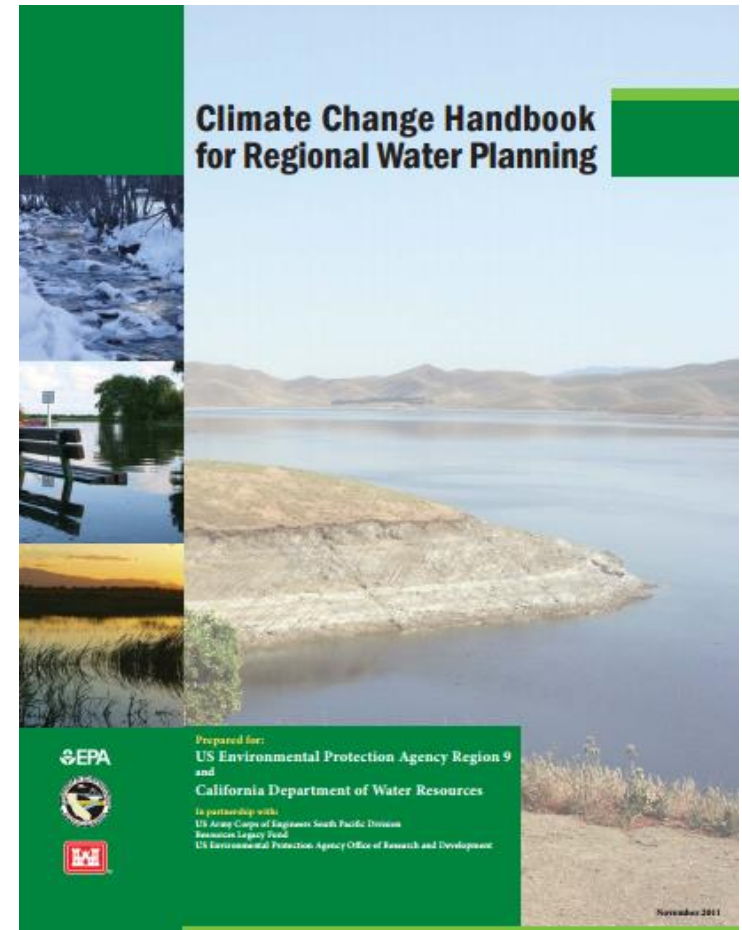
Evaluation must be equivalent to the vulnerability assessment in the Climate Change Handbook for Regional Water Planning





DWR Climate Change Handbook

- Provides direction for incorporating climate change analysis and methodologies into DWR planning efforts
- The climate change work completed for the UFR IRWMP follows the suggested guidelines laid out in the handbook
- Appendix B of the handbook provides a detailed checklist





Climate Change Chapter



Chapter Outline

- Introduction
- Region Characterization
- Climate Change Trends
- Regional Climate Change Vulnerabilities
- Prioritizing Vulnerabilities
- Further Data Gathering and Analysis
- GHG Emissions and UFR Project Development and Selection

Source: Hank Hansen 2013



Introduction

- Regulatory Framework
 - Provides brief description of Prop 84 Guidelines and DWR guidance
- Description of Chapter Sources

Source: Hank Hansen 2013



Region Characterization

- Describes region in terms of climate change-related characteristics
- For consistency, this section will be completed after overall region characterization is drafted



Source: Zeke Lunder 2011



Climate Change Trends

- Climate Change Overview
 - observed and projected global changes
- Local observed and projected changes
 - Wildfire
 - Water Supply
 - Water Demand
 - Water Quality
 - Flooding
 - Ecosystem Habitat



Source: Zeke Lunder 2011



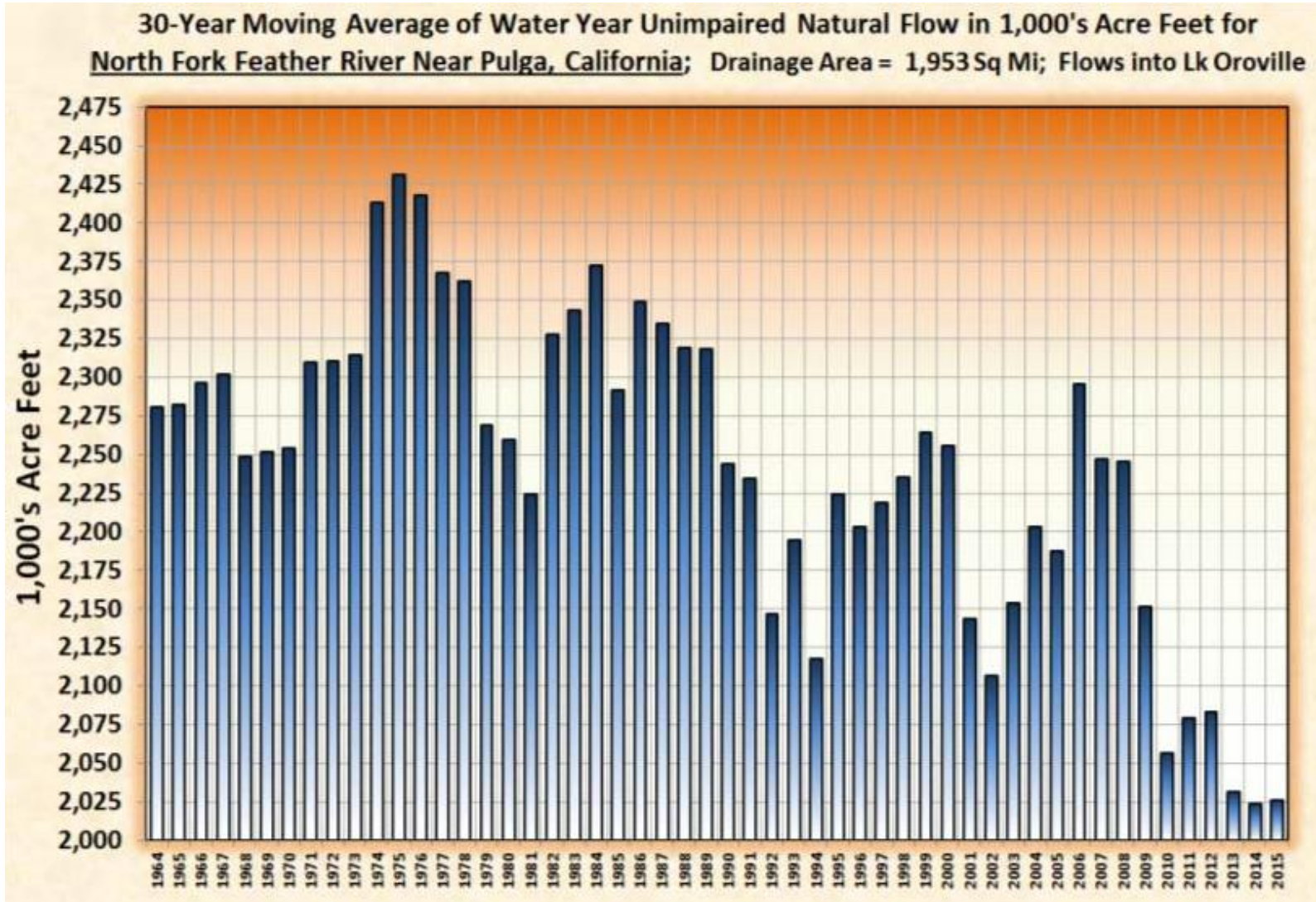
Regional Climate Change Vulnerabilities & Prioritization



How do we assess our vulnerability?

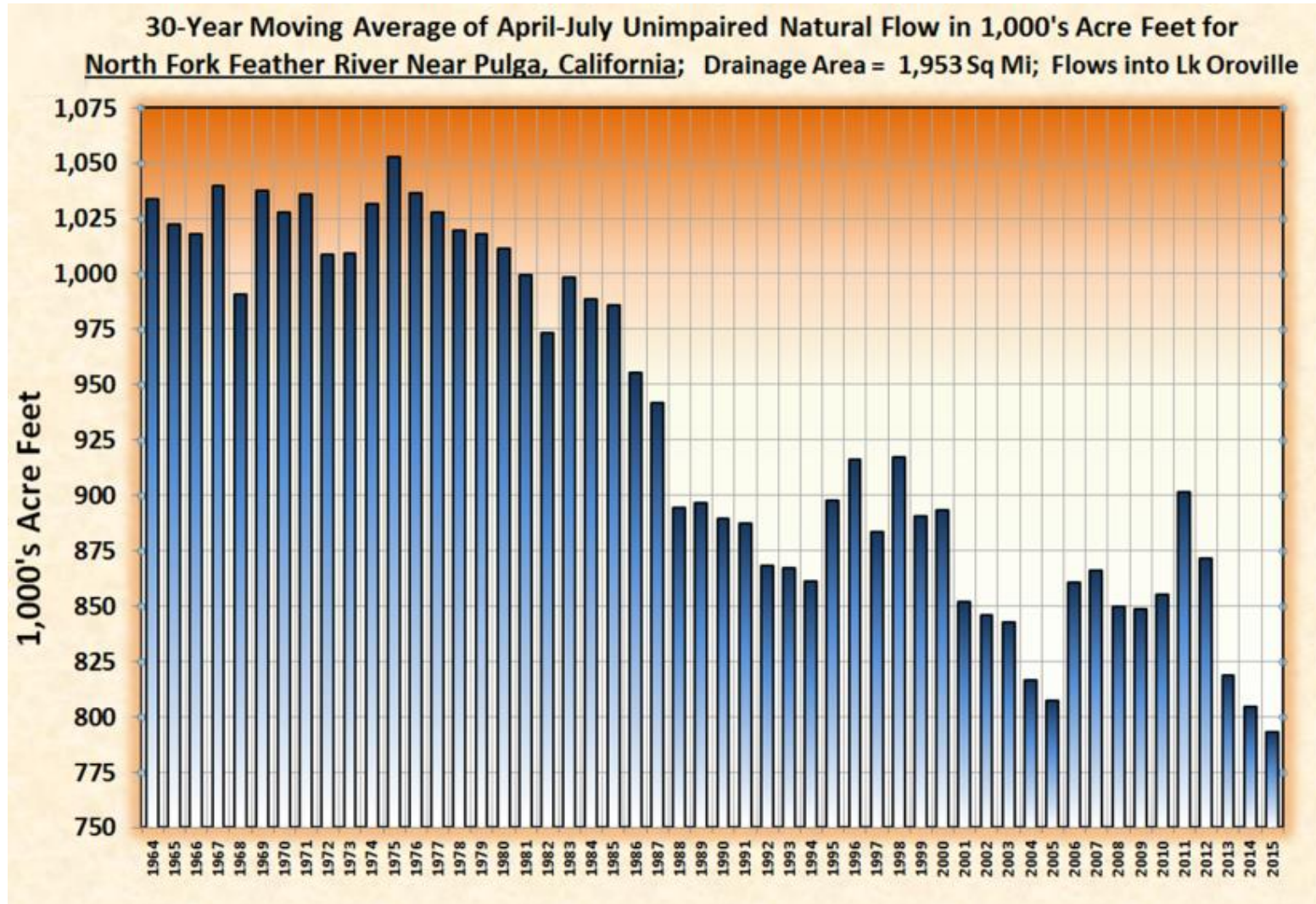
- Review observed and predicted changes
- Review how important assets have responded to similar impacts in the past and consider how they might respond if those impacts increase
 - DWR Climate Change Handbook for Regional Water Planning – Appendix B

Observed and Projected Changes



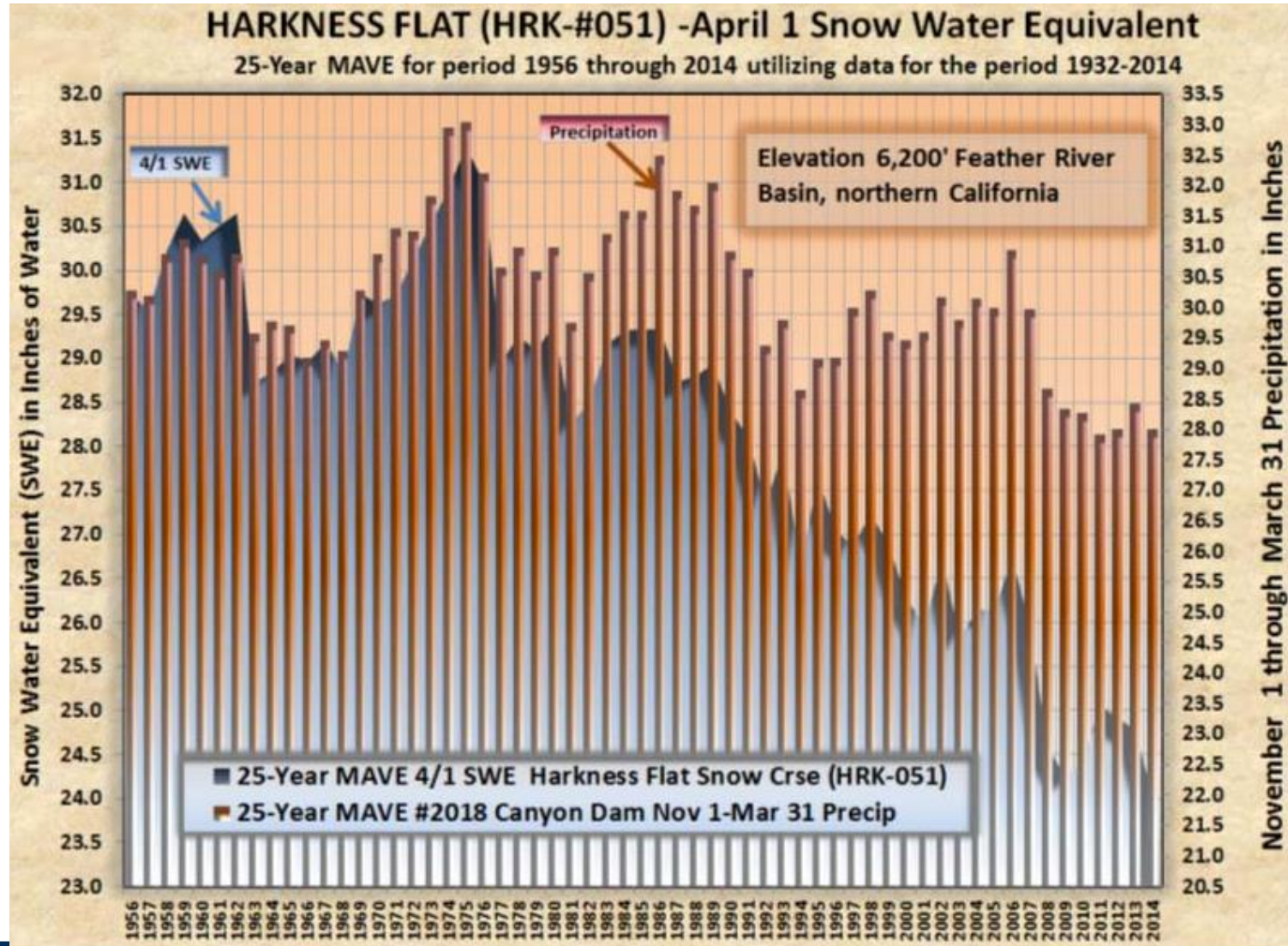


Observed and Projected Changes





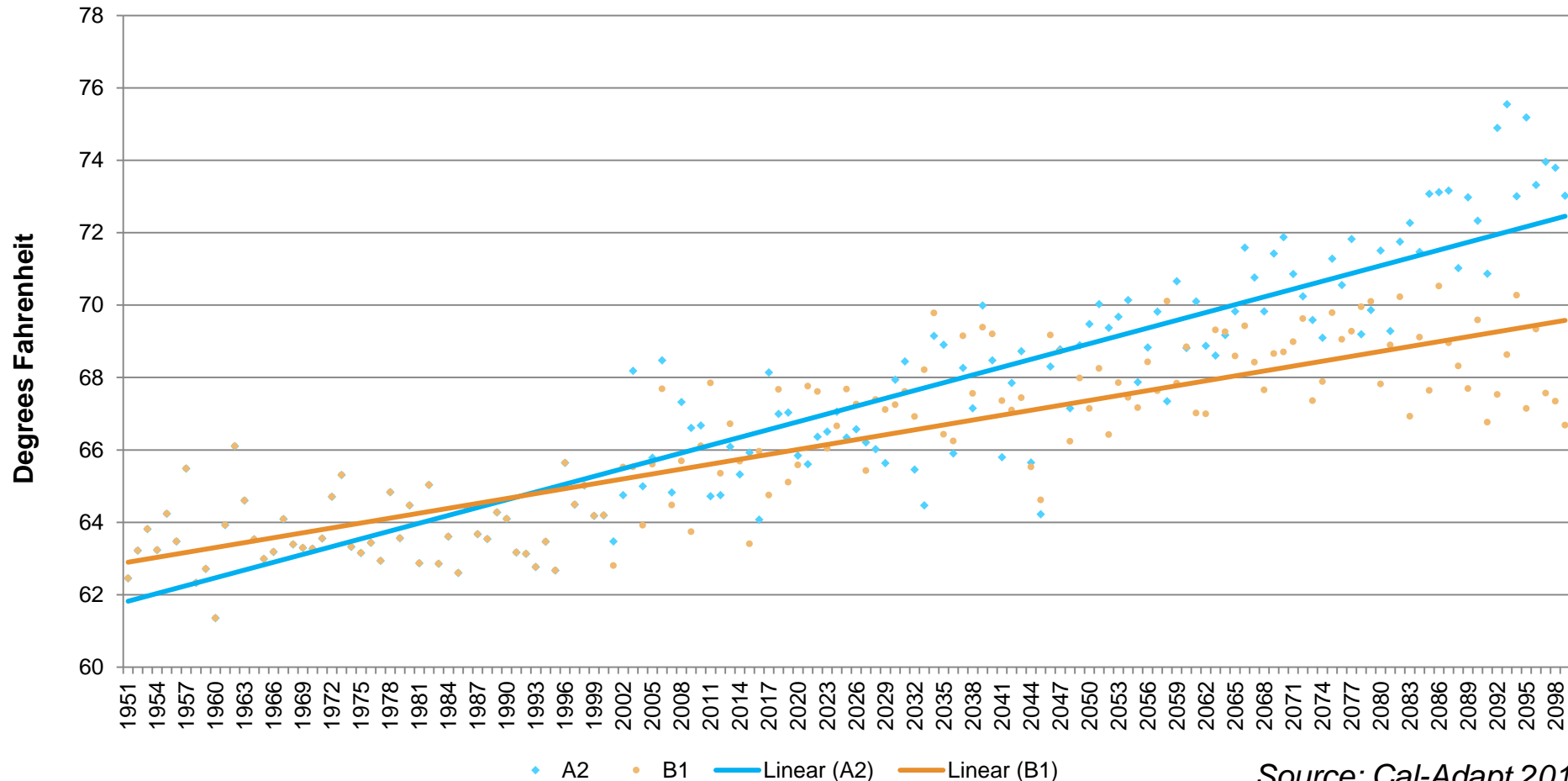
Observed and Projected Changes





Observed and Projected Changes

Mean Annual High Temperature (Fahrenheit)



Source: Cal-Adapt 2015



How do we assess our vulnerability?

- Review observed and predicted changes
- Review how important assets have responded to similar impacts in the past and consider how they might respond if those impacts increase
 - DWR Climate Change Handbook for Regional Water Planning – Appendix B



Climate Change Handbook – Appendix B

Appendix B Vulnerability Assessment Checklist

I. Water Demand

- ☐ Are there major industries that require cooling/process water in your planning region?
 - As average temperatures increase, cooling water needs may also increase.
 - Identify major industrial water users in your region and assess their current and projected needs for cooling and process water.
- ☐ Does water use vary by more than 50% seasonally in parts of your region?
 - Seasonal water use, which is primarily outdoor water use, is expected to increase as average temperatures increase and droughts become more frequent.
 - Where water use records are available, look at total monthly water uses averaged over the last five years (if available). If maximum and minimum monthly water uses vary by more than 25%, then the answer to this question is "yes".
 - Where no water use records exist, is crop irrigation responsible for a significant (say >50%) percentage of water demand in parts of your region?
- ☐ Are crops grown in your region climate-sensitive? Would shifts in daily heat patterns, such as how long heat lingers before night-time cooling, be prohibitive for some crops?
 - Fruit and nut crops are climate-sensitive and may require additional water as the climate warms.
- ☐ Do groundwater supplies in your region lack resiliency after drought events?
 - Droughts are expected to become more frequent and more severe in the future. Areas with a more hardened demand may be particularly vulnerable to droughts and may become more dependent on groundwater pumping.
- ☐ Are water use curtailment measures effective in your region?
 - Droughts are expected to become more frequent and more severe in the future. Areas with a more hardened demand may be particularly vulnerable to droughts.
- ☐ Are some instream flow requirements in your region either currently insufficient to support aquatic life, or occasionally unmet?
 - Changes in snowmelt patterns in the future may make it difficult to balance water demands. Vulnerabilities for ecosystems and municipal/agricultural water needs may be exacerbated by instream flow requirements that are:
 1. not quantified,
 2. not accurate for ecosystem needs under multiple environmental conditions including droughts, and
 3. not met by regional water managers.

II. Water Supply

- ☐ Does a portion of the water supply in your region come from snowmelt?
 - Snowmelt is expected to decrease as the climate warms. Water systems supplied by snowmelt are therefore potentially vulnerable to climate change.
 - Where watershed planning documents are available, refer to these in identifying parts of your region that rely on surface water for supplies; if your region contains surface water supplies originating in watersheds where snowpack accumulates, the answer to this question is "yes."

Appendix B • Vulnerability Assessment Checklist

V. Flooding

- ☐ Does critical infrastructure in your region lie within the 200-year floodplain? DWR's best available floodplain maps are available at: http://www.water.ca.gov/floodmgmt/ra/fma/fmb/fes/best_available_maps/.
 - While it is unclear how average precipitation will change with temperature, it is generally agreed that storm severity will probably increase. More intense, severe storms may lead to higher peak flows and more severe floods.
 - Refer to FEMA floodplain maps and any recent FEMA, US Army Corps of Engineers, or DWR studies that might help identify specific local vulnerabilities for your region. Other follow-up questions that might help answer this question:
 1. What public safety issues could be affected by increased flooding events or intensity? For example, evacuation routes, emergency personnel access, hospitals, water treatment and wastewater treatment plants, power generation plants and fire stations should be considered.
 2. Could key regional or economic functions be impacted from more frequent and/or intense flooding?
- ☐ Does part of your region lie within the Sacramento-San Joaquin Drainage District?
 - The SJD contains lands that are susceptible to overflows from the Sacramento and San Joaquin Rivers, and are a key focus of the Central Valley Flood Protection Plan. (<http://www.water.ca.gov/cvfmpp/program.cfm>).
- ☐ Does aging critical flood protection infrastructure exist in your region?
 - Levees and other flood protection facilities across the state of California are aging and in need of repair. Due to their overall lowered resiliency, these facilities may be particularly vulnerable to climate change impacts.
 - DWR is evaluating more than 300 miles of levees in the San Joaquin and Sacramento Rivers Valleys and the Delta (<http://www.water.ca.gov/levees/>).
- ☐ Have flood control facilities (such as impoundment structures) been insufficient in the past?
 - Reservoirs and other facilities with impoundment capacity may be insufficient for severe storms in the future. Facilities that have been insufficient in the past may be particularly vulnerable.
- ☐ Are wildfires a concern in parts of your region?
 - Wildfires alter the landscape and soil conditions, increasing the risk of flooding within the burn and downstream areas. Some areas are expected to become more vulnerable to wildfires over time. To identify whether this is the case for parts of your region, the California Public Interest Energy Research Program (PIER) has posted wildfire susceptibility projections as a Google Earth application at: <http://cal-alert.org/fwa/>. These projections are the results of only a single study and are not intended for analysis, but can aid in qualitatively answering this question. Read the application's disclaimers carefully to be aware of its limitations.

VI. Ecosystem and Habitat Vulnerability

- ☐ Does your region include inland or coastal aquatic habitats vulnerable to erosion and sedimentation issues?
 - Erosion is expected to increase with climate change, and sedimentation is expected to shift. Habitats sensitive to these events may be particularly vulnerable to climate change.
- ☐ Does your region include estuarine habitats which rely on seasonal freshwater flow patterns?
 - Seasonal high and low flows, especially those originating from snowmelt, are already shifting in many locations.



DWR Vulnerability Assessment Checklist*

1. Water Demand
2. Water Supply
3. Water Quality
4. Flooding
5. Ecosystem and Habitat Vulnerability
6. Hydropower

*Sea level rise not included



Resources Consulted

- Scholarly articles
- Cal-Adapt
- Local feedback and expertise
 - Questionnaire
 - One-on-one calls
 - Climate change workshop
- State agency guidance and data



Source: Zeke Lunder 2015



Sample Section

1. Water Demand

1.1 Are there major industries that require cooling/process water in your planning region ?

Yes	No	Perhaps/Uncertain
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Agriculture, logging, energy production, and tourism are the main economic activities in the planning region. Some of these activities in the UFR region require cooling water. Collins Pine Company operates a wood products manufacturing and co-generation electricity generating facility in Chester. Sierra Pacific Industries, in Quincy, also uses a cooling tower for a co-generation plant. These facilities are critical for handling biomass during wildfire prevention and response activities. Additionally, some timber mills in the region require cooling water for log decks to avoid wood drying and staining.



Prioritizing Vulnerabilities

	Category	Topic	Urgency	Risk
1	Water Demand	Seasonal water use variability	High	High
1	Water Supply	Snowmelt	High	High
1	Water Supply	Unmet local water demands (drought)	High	High
1	Water Supply	Invasive species	High	High
1	Water Quality	Water quality (wildfires)	High	High
1	Water Quality	Eutrophication water quality issues	High	High
1	Water Quality	Seasonal low flows and assimilative capacity	High	High
1	Water Quality	Treatment facility operations	High	High
1	Flooding	Aging critical flood protection	High	High
1	Flooding	Wildfires	High	High
1	Ecosystem and Habitat Vulnerability	Climate-sensitive fauna or flora	High	High
1	Ecosystem and Habitat Vulnerability	Recreation and economic activity	High	High
1	Ecosystem and Habitat Vulnerability	Quantified environmental flow requirements	High	High
1	Ecosystem and Habitat Vulnerability	Top habitat vulnerable to climate change	High	High
2	Water Demand	Unmet in-stream flow requirements	Medium	High

Note: Urgency and risk are rated on a scale that includes High (H), Medium (M), and Low (L). Urgency is how soon a vulnerability may be impacted. Risk is the likelihood and severity of the impact.



Prioritization (continued)

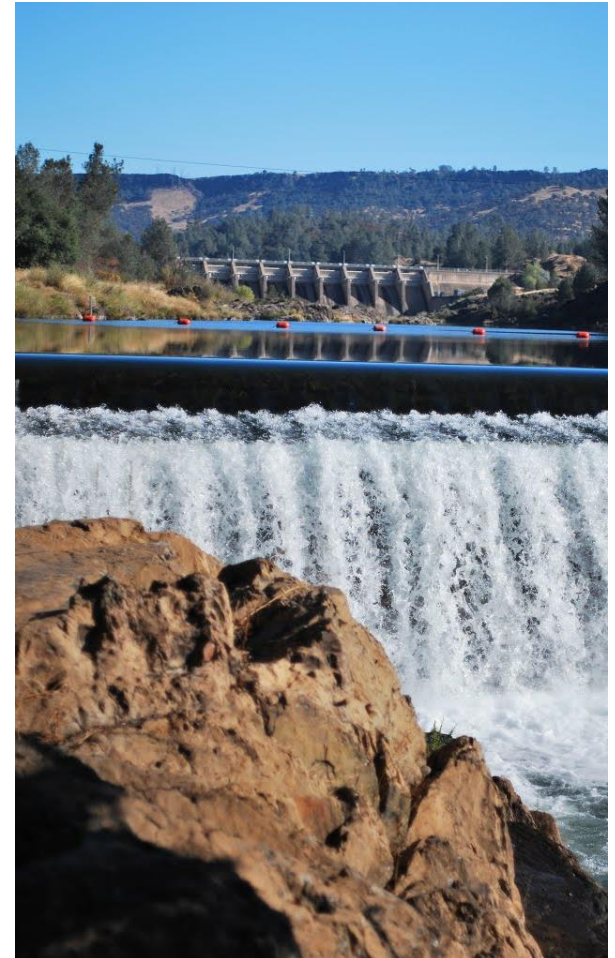
Priority	Category	Topic	Urgency	Risk
3	Water Demand	Climate-sensitive crops	Medium	Medium
3	Water Demand	Groundwater drought resiliency	Medium	Medium
3	Water Demand	Water curtailment effectiveness	Medium	Medium
3	Water Quality	Unmet beneficial uses	Medium	Medium
3	Flooding	Critical infrastructure in a floodplain	Medium	Medium
3	Flooding	Insufficient flood control facilities	Medium	Medium
3	Ecosystem and Habitat Vulnerability	Erosion and sedimentation	Medium	Medium
3	Ecosystem and Habitat Vulnerability	Endangered or threatened species	Medium	Medium
3	Ecosystem and Habitat Vulnerability	Fragmented habitat	Medium	Medium
3	Hydropower	Electricity source	Medium	Medium
4	Water Supply	Supply surplus carryover	Low	Medium
5	Water Demand	Cooling/process water for industry	Low	Low
5	Water Supply	Climate-sensitive water supply	Low	Low
5	Hydropower	Growing energy needs	Low	Low

Note: Urgency and risk are rated on a scale that includes High (H), Medium (M), and Low (L). Urgency is how soon a vulnerability may be impacted. Risk is the likelihood and severity of the impact.



Remaining Sections

- Further Data Gathering and Analysis
 - Cross-references data gathering program
- GHG Emissions and UFR Project Development and Selection
 - Describes project assessment tool
 - Includes a cross-reference placeholder for the RMS chapter



Source: Hank Hansen 2013



Data Collection Improvement



Data Collection Improvement Recommendations

- Approach and Process
 - Review and understand available data to inform the IRWM Plan
 - Identify data gaps where sufficient information is lacking
 - Beneficial to develop information for future IRWM Plan updates
 - New projects to address data gaps
 - Data gaps identified by review of existing documents and during stakeholder meetings

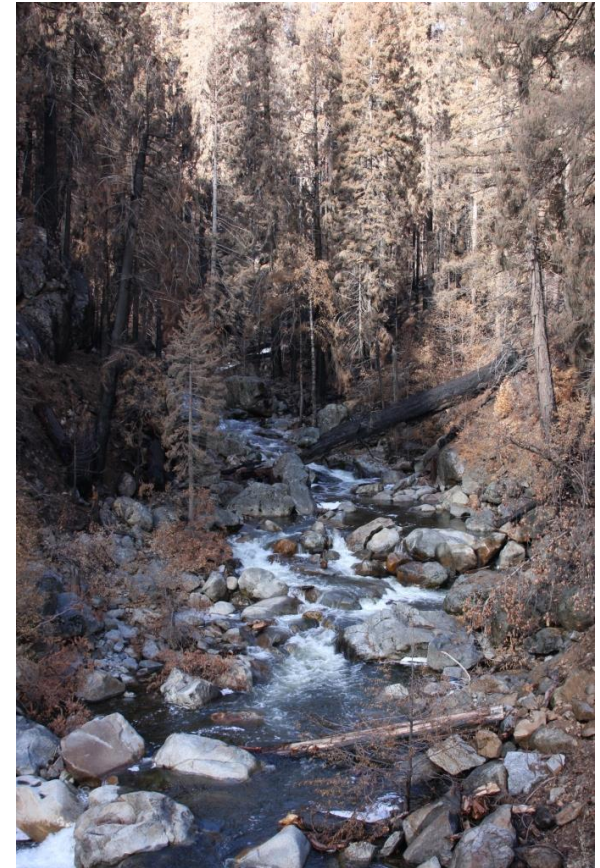


Source: Sacramento River Watershed Program



Data Collection Improvement Recommendations

- Identified Data Gaps
 - Climatic Effects on Catastrophic Fire
 - 200-Year Floodplain Mapping for the UFR Region
 - Increased Understanding of Snowpack
 - Local Greenhouse Gas (GHG) Emissions



Source: Sierra Nevada Conservancy 2014



Project Assessment Tool



Project Assessment Tool

- Did you consider climate change?
 - Does the project generate GHGs, reduce GHGs, or have no effect on GHGs (construction and operations emissions)?
 - Does the project make the city more resilient, less resilient, or have no effect on resilience (based on vulnerability prioritization exercise)?
- Draft tool has been shared with the RWMG

Upper Feather River Integrated Regional Water Management Plan
Climate Change- Project Assessment Checklist

Climate Change – Project Assessment Checklist
This climate change project assessment tool allows project applicants and the planning team to assess project consistency with Proposition 84 plan standards and RWMG plan assessment standards. The tool is a written checklist that asks GHG emissions and adaptation/resiliency questions.

Name of project: _____
Project applicant: _____

GHG Emissions Assessment

Project Construction Emissions
(If you check any of the boxes, please see the attached worksheet)

- ☐ The project requires nonroad or off-road engines, equipment, or vehicles to complete.
- ☐ The project requires materials to be transported from outside of the UFR watershed.
- ☐ The project requires workers from outside of the UFR watershed.
- ☐ The project is expected to generate GHG emissions for other reasons.
- ☐ The project does not have a construction phase and/or is not expected to generate GHG emissions during the construction phase.

Operating Emissions
(If you check any of the boxes, please see the attached worksheet)

- ☐ The project requires energy to operate.
- ☐ The project will generate electricity.
- ☐ The project will proactively manage forests to reduce wildfire risk.
- ☐ The project will affect wetland acreage.
- ☐ The project will include new trees.



GHG Calculator

- If you answer “yes” to any of the GHG questions, the calculator provides an estimate of GHG additions or reductions
- Estimate is intended to satisfy DWR requirements and do not fulfill CEQA requirements.
- “Virtual Office House” to answer any specific questions related to the tool on **[DATE] [TIME]**.

Upper Feather River IRWMP
Project Assessment - GHG Emissions Analysis

GHG Emissions Analysis
Project Construction Emissions

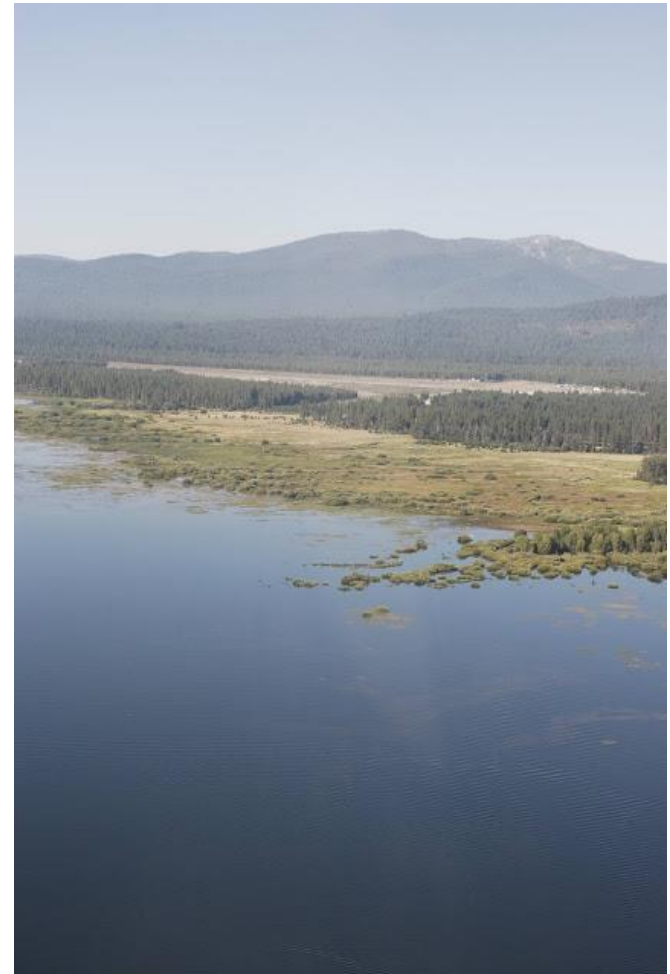
☒ The project requires non-road or off-road engines, equipment, or vehicles to complete. If yes:

Type of Equipment	Maximum Number Per Day	Total 8-Hour Days in Operation	Total MTCO ₂ e
Signal Boards	4	14	3
Off-Highway Tractors	1	15	12
			0
			0
			0
			0
			0
			0
			0
			0
Total Emissions			15



Next Steps

- Incorporate comments into climate change chapter
- Assess projects using the project assessment tool
- Integrate climate change into RMS (November/December)



Zeke Lunder 2011



Questions and Comments?

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