

Upper Feather River Integrated Regional Water Management Plan August 21, 2015 – Climate Change Workshop

Michael Baker

Meeting Objectives

- Discuss IRWMP climate change requirements and project scope
- Share and discuss vulnerability assessment findings
- Prioritize vulnerabilities
- Discuss how climate change will be incorporated into the IRWMP
 - Project selection
 - RMS development

Michael Baker

Agenda

- Introduction
 - Regulatory framework
 - Climate change requirements
- Vulnerability Assessment
 - DWR checklist
 - Review of draft responses
 - Prioritization of vulnerabilities
- Next Steps
- Questions and Comments



Introduction



ael Baker

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



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. "



Michael Baker

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



Michael Baker

Proposition 84 Guidelines (IV.A.16)

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



Michael Baker

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 will follow the suggested guidelines laid out in the handbook
- Appendix B of the handbook provides a detailed checklist



Michael Baker

Example Climate Change Sections

- Upper Sacramento, McCloud, and Lower Pit IRWMP (http://uppersacirwm.org/upload/pl ansections/USR_IRWM_Plan_Chapt er9_ClimateChange.pdf)
- Northern Sacramento Valley IRWMP (http://nsvwaterplan.org/mdocsposts/final-nsv-irwmp-chapter-4/)





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







chael Baker

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

mate Change Handbook	– Appendi
Agenda B Vulnerzability Assessment Checkfast	
Appendix B Vulnerability Assessment Checklist U: Rooding D are new planetere by	ant Owder
Appendix & Appendix A	ent Oncident
Vulnerability Assessment Checklist V. Rooling	
D deer ontool informations in yo	
evaluation for the second s	nar anglon lie within the 200 year floodplain? (WWYs best withdhe at: Samanhatina fina Nachez, availatin, angen.)
1. Water Demand	produktion will change with temperature, it is generally agreed that man. Mare interne, servere alarms may lead to higher peak flows and
Are there index index that the regular cooling/brooses weber in your plenning region? Are there index index and an antibility of the second	and any search FDMA, ULArray Cargo of Englishers, or Delitoteches Soul exteendelline. for ever region, Other Milwevez questions that
I Sharpah processes.	s lower work? In affected by increased flooding rooms or intensity? wellow reactes, emergency personnel access, hospitals, water
Instant state us, skild hydradly syllaterate us, hengeded is formers as average Section of the syllaterate state use of design because any began, Were used as a state of the syllaterate state of the syllaterateraterateraterateraterateraterater	nizerado finalment plent, poer providen plent and the define mail I or economic functions in impacted from more frequent and/or
rears IF methods. A mean-town and indicates methody water asso sary by more thes 2000, then the meaner to this quarteria. The year's and the second term of term o	In the Sacramento-San Juaguin Snahage Clainis? In sacraphile to revefues then the Sacraments and SacJauguin a Castof Athen Read Protector Pan.
Ave cope proces in your region climate-annotant ¹ . Would adply in data heat politions, such as how lang heat lappen lighter might fairs caulting. In prochables of the came annual? To full or cope on climate caulting. In proceedings of the came annual? To full or cope on climate caulting in the climate cause.	automanen.eta) Kon informituetuen nuket in paur region? en facilities annas des stats of California are aging and in nami of
Do groundwater applies in your region task nationary offer drought events? Do groundwater applies in your region task nationary offer drought events? Do groundwater applies in your region task nationary offer drought events? Do groundwater applies in your region task nationary offer an applies in the Mains, New offer some Do groundwater applies in your region task nationary offer an applies in the Mains, New offer some Do groundwater applies in your region task nationary offer an applies in the Mains, New offer some Do groundwater applies in your region task nationary offer applies in the Mains, New offer some Do groundwater applies in your region task nationary offer applies in the Mains, New offer some Do groundwater applies in task nationary offer applies in the Mains, New offer some Do groundwater applies in task nationary offer applies in the Mains, New offer some Do groundwater applies in task nationary offer applies Do groundwater applies in task nationary offer applies Do groundwater applies Do	and webersy, these facilities may be perforded to when don'to 21 index of Tenses in the last Joseph and Jackenenic River, Valley, 21.12 (Schward)
provident provides provident provides provident provides provident provides provident provides provident p	It as impoundment structures) been insufficient in the part? Its impoundment oppole may be truckland for seven deriva in the insufficient in the part may be periodely unimedia.
Indexed General rate (a predictable indexed) in despite. Are sense instructor of the regulational indexed in the Section of the Context of the Section of t	of your region? In call condition, burnaring the fak of faceling ability the burn and are expected to become non-subwritin to with two over time. To
Courges to reconstruct animates for the future material database material databases. In the future of the fut	the parts of your region, that definents bable inserted Stange Season's The association projections as a Google faith apphasitor at: a projections are the results of only a visigle region with an end with publicationly answering this question. Tead the apphasizer's
tet accurate for assignment and under multiple environmental conditions including discussions dis	e of th Bestadora,
W. Ecception and Habitat V	Falnerability
IL Water Supply	for south/aquetic habitate subwedde to another and
La sole a parter et les entre suppor aux report contracteurs de la sole a sole	with-Omate change, and sedimentation to expected to shift. Habitato a perfocularly universitie to simular change.
More subscription planning documents are available, where to document in address of planning in the series of plannin	ine habitats which rab on sectional Attributer flow pedde these organizing here sectored, we should diffing to new
wearship when compart accordance, the access to this positive is "Pars"	







1. Water Demand

1.1 Are there major industries that require cooling/process water in your planning region ? No

Perhaps/Uncertain

No major industries are known to require cooling or process water.

COMP Consolium hos

Participation Guide

- Is the answer correct?
- Is the answer missing anything?
- How important is this?
 - Rate the urgency (high, medium, low). Urgency is how soon an asset may be impacted.
 - Rate the risk (high, medium, low). Risk is the likelihood and severity of the impact.
 - Follows the Upper Sacramento, McCloud, and Lower Pit IRWMP sample.

(Provide answers as we go; there will be time to change answers at the end.)

CONTRACT Care

Yes

1. Water Demand

1.2 Does water use vary by more than 50% seasonally in parts of your region?

Crop irrigation and increased population create seasonal water use patterns that are regionally higher in summer months and lower in winter months.

No Perhaps/Uncertain

Perhaps/Uncertain

Michael Baker

Yes

BOUDP Countries, Ins.

Yes

1. Water Demand

1.3 Are crops grown in your region climatesensitive? Would shifts in daily heat patterns, such as how long heat lingers before nighttime cooling, be prohibitive for some crops?

No

Perhaps/Uncertain

Perhaps/Uncertain

Some of the region's crops, mostly fruits and nuts, would be directly vulnerable to changes in daily heat patterns. Others, such as alfalfa, depend on pollinators that may be negatively impacted by increasing temperatures.



Ves

1. Water Demand

1.4 Do groundwater supplies in your region lack resiliency after drought events? No

The Sierra Valley Aquifer took nearly 20 years to rebound from extreme drought conditions when paired with increased withdrawal conditions. In the last 10 years, all SVGMD monitored water levels in the Sierra Valley have dropped.

1. Water Demand

1.5 Are water use curtailment measures effective in your region?

Existing curtailments from the SWRCB have been met. indicating effectiveness. If drought conditions persist or worsen, it is unclear how additional curtailments can be achieved in communities with rapidly diminishing water supplies.

BOOKP Convolting, Inc

1. Water Demand

1.6 Are some instream flow requirements in your region either currently insufficient to support aquatic life or occasionally unmet? Perhans/IIncertain

Although environmental water laws protect required flows for aquatic life, reduced flow magnitudes can significantly reduce biological integrity of aquatic communities.

23 STORP Granding, Inc.

2. Water Supply

2.1 Does a portion of the water supply in your region come from snowmelt?

Perhaps/Uncertain No

A majority of water in the region originates as surface flows from the Sierra Nevada.

2. Water Supply

2.2 Does part of your region rely on water diverted from the Delta, imported from the Colorado River, or imported from other climatesensitive systems outside your region? No Perhans/Uncertain

This region relies only on groundwater and surface water from the Upper Feather River.

2. Water Supply

2.3 Does part of your region rely on coastal aguifers? Has salt intrusion been a problem in the past?

The region is not located near the coast. Salt intrusion is not an issue for the region.

No

Perhaps/Uncertain

Perhaps/Uncertain

2. Water Supply

2.4 Would your region have difficulty in storing carryover supply surpluses from year to year? No

Perhaps/Uncertain

Reservoirs in the UFR historically spill frequently during the spring when inflow exceeds both the available usable capacity of the seasonal reservoirs and the capacity of releasing inflow through outlets.

2. Water Supply

2.5 Has your region faced a drought in the past during which it failed to meet local water demands?

No

The project team would still like to know more about past droughts. Current curtailments aside, how has the watershed recovered from droughts in the past? Were local water demands left unmet?

BOOKP Convolting, Inc

2. Water Supply

2.6 Does your region have invasive species management issues at your facilities, along conveyance structures, or in habitat areas? Yes No Perhaps/Uncertain

Several invasive and noxious weeds have been introduced to the UFR watershed. Certain invasive species are expected to increase in number as a result of warming and drying conditions.

Yes

3. Water Quality

3.1 Are increased wildfires a threat in your region? If so, does your region include reservoirs with fire-susceptible vegetation nearby which could pose a water quality concern from increased erosion? No Yes Perhaps/Uncertain

The region is at a high risk for uncharacteristically large and damaging wildfires. Reservoir water quality could be adversely affected by increased post-fire erosion.

3. Water Quality

3.2 Does part of your region rely on surface waterbodies with current or recurrent water quality issues related to eutrophication, such as low dissolved oxygen or algal blooms?

Yes No Perhaps/Uncertain generally considered to be good; however, there are general concerns including temperature, dissolved oxygen, sediment, and bacteria. Several waterbodies are listed on the Clean Water Act's 303(d) list of impaired waters for mercury, copper, temperature, and toxicity.

Michael Baker

Yes

3. Water Quality

3.3 Are seasonal low flows decreasing for some waterbodies in your region? If so, are the reduced low flows limiting the waterbodies' assimilative capacity?

No

Perhaps/Uncertain

Analysis over a moving 30-year average shows reductions in flow on tributaries to the Feather River watershed at about 4.5%. This suggests that overall seasonal low flows are decreasing in the UFR watershed.

Michael Baker

3. Water Quality

3.4 Are there beneficial uses designated for some waterbodies in your region that cannot always be met due to water quality issues?

Beneficial uses in the UFR watershed include municipal and domestic water supply, hydropower generation, water contact recreation, water non-contact recreation, cold freshwater habitat, spawning habitat, and wildlife habitat.

aael Baker

3. Water Quality

3.5 Does part of your region currently observe water quality shifts during rain events that impact treatment facility operation?

Overflows due to excessive inflow (from rainfall) have been observed at regional wastewater treatment plants. As storm intensity increases, these events may also become more common. Stronger storms also increase erosion, leading to higher turbidity in rivers and streams.

Michael Baker

Do we need a break? Reconvene in 10 minutes

ATTONAL

4. Flooding

4.1 Does critical infrastructure in your region lie within the 200-year floodplain?

No Perhaps/Uncertain

No known critical infrastructure lies within the 200-year floodplain.

CONF Councili

4. Flooding

4.2 Does part of your region lie within the Sacramento-San Joaquin Drainage District? No

Perhaps/Uncertain

The UFR watershed is north of the Sacramento-San Joaquin Drainage District.







Michael Baker

5. Ecosystem and Habitat Vulnerability

5.1 Does your region include inland or coastal aquatic habitats vulnerable to erosion and sedimentation issues? Yes No Perhaps/Uncertair

The region's complex topography, multiple waterways, and highly erodible granitic and sedimentary soils are susceptible to erosion and sedimentation issues. Grazing, timber production, and wildfires decrease vegetation and increase the amount of sediment running off into the watershed.

ichael Baker

5. Ecosystem and Habitat Vulnerability

5.2 Does your region include estuarine habitats which rely on seasonal freshwater flow patterns? Perhaps/Uncertain

The region does not include any estuarine habitats.

5. Ecosystem and Habitat Vulnerability

5.3 Do climate-sensitive fauna or flora populations live in your region?

The interconnectedness of the region's climate with all of the species means that shifts in normal temperature and precipitation closely impact many of the native species.

No

Perhaps/Uncertain

Michael Baker

5. Ecosystem and Habitat Vulnerability

5.4 Do endangered or threatened species exist in your region? Are changes in species distribution already being observed in parts of your region?

Perhaps/Uncertai

Perhaps/Uncertain

Perhaps/Uncerta

A number of habitats and species of special concern exist in the watershed. Upslope migration into higher elevations of the Sierra Nevada and climate-driven changes in fire activity have already been observed.

Michael Baker

5. Ecosystem and Habitat Vulnerability

5.5 Does the region rely on aquatic or waterdependent habitats for recreation or other economic activities? Perhans/Uncertain

Fishing, boating, kayaking, swimming, waterfowl hunting, bird-watching, and agriculture are all integral parts of the economic prosperity of the UFR watershed. Cross-country skiing, snowmobiling, and snowshoeing are winter attractions that may be negatively impacted by a reduction in snowpack.

Michael Baker

Yes

5. Ecosystem and Habitat Vulnerability

5.6 Are there rivers in your region with quantified environmental flow requirements or known water quality/quantity stressors to aquatic life?

No

Hydropower and drought-related flow reduction can diminish both the quality and the quantity of habitat for aquatic species.

Michael Baker

Yes

5. Ecosystem and Habitat Vulnerability

5.7 Do estuaries, coastal dunes, wetlands, marshes, or exposed beaches exist in your region? If so, are coastal storms possible/frequent in your region? Perhaps/Uncertain

There are no estuaries, coastal dunes, wetlands, marshes, or exposed beaches in the region. Coastal storms are not a concern.

No

chael Baker

5. Ecosystem and Habitat Vulnerability

5.8 Does your region include one or more of the habitats described in the Endangered Species Coalition's Top 10 habitats vulnerable to climate change?

The Upper Feather River is in California's Sierra Nevada range, identified by the Endangered Species Coalition as one of the top 10 most vulnerable habitats to climate change.

No

5. Ecosystem and Habitat Vulnerability

5.9 Are there areas of fragmented estuarine, aquatic, or wetland wildlife habitat within your region? Are there movement corridors for species to naturally migrate?

Yes No Perhaps/Uncertain The chain of dams in the Upper Feather River region fragments aquatic habitat and prevents movement of fish and other aquatic wildlife to varying degrees. Additionally, extensive road systems and historic mining have damaged the watershed and disrupted natural movement corridors. Michael Baker

6. Hydropower

6.1 Is hydropower a source of electricity in your region?

PSREC generated 0.5% of its grid-wide energy from small hydroelectric and 33.2% from large hydroelectric. In 2012, PG&E procured 2% of its total electricity from small hydroelectric and 11% from large hydroelectric. This hydropower production may become vulnerable to decreased production capacity if flow volume decreases. The dams on the Upper Feather River produce 9%–30% of California's power.

Michael Baker

BOORP Committee

6. Hydropower

6.2 Are energy needs in your region expected to increase in the future? If so, are there future plans for hydropower generation facilities or conditions for hydropower generation in your region?

Population growth and rising temperatures have the potential to increase demand for energy in the UFR region.

15-Minute Prioritization Activity

Example Prioritization

BOUR Consolving, hos

	Vulnerability	Urgency	Risk	Priority
Water Demand	Seasonal demand variability	н	M	2
Water Demand	Climate-sensitive crops	н	L	3
Water Demand	Drought-sensitive groundwater supplies	M	M	4
Water Demand	Instream flow requirements	н	н	1
Water Demand	Water curtailments	м	M	4
Water Supply	Reduced snowpack and water availability	м	M	4
Water Quality	Water temperature and turbidity	L	L	6
Flooding	Wildfire	н	н	1
Ecosystem and Habitat	Erosion and sedimentation	н	н	1
Ecosystem and Habitat	Climate-sensitive fauna or flora	M	м	4
Ecosystem and Habitat	Endangered or threatened species	м	M	4
Ecosystem and Habitat	Aquatic habitats used for economic activities	н	н	1
Ecosystem and Habitat	Quantified environmental flow requirements	м	н	2
Ecosystem and Habitat	Climate-sensitive habitats	M	н	2
Hydropower	Hydropower facilities	н	н	1
	Regional energy needs	M	L	5



Project Selection Process

- Did you consider climate change?
 - Does the project generate GHGs, reduce GHGs, or have no effect on GHGs?
 - Does the project make the watershed more resilient, less resilient, or have no effect on resilience?
- Developing draft tool to complete for project review



Resource Management Strategies

- Add relevant RMS at the end of each climate change vulnerability section (Upper Sacramento sample does this)
- Develop materials for September work group meetings to consider climate change in the RMS



Michael Baker

Questions and Comments?

Chris Read: <u>cread@mbakerintl.com</u> Chris Stabenfeldt: <u>cstabenfeldt@ecorpconsulting.com</u> Michael Preszler: <u>mpreszler@ecorpconsulting.com</u>