Portfolio Development Exercise

WSAC March Meeting

Exercise Objectives:

- Work collaboratively to develop Portfolios
- Develop an understanding of:
  - the plausible range of demand-supply gaps you may need to plan for
  - how Actions work together – not always linear
  - the kinds of situations where specific Actions are useful
- Provide guidance to Tech Team on next round of scenarios to use in next meeting
- It is **NOT** an objective to reach agreement to use these scenarios

Exercise Process

1. We will describe the scenarios you will work with today, and why they were developed
2. We will provide some background and instructions
3. Answer clarifying questions
4. You will break out into 3 groups and begin the Portfolio development process

Next Steps

- **Tomorrow:**
  - Tech Team is available to support additional Portfolio construction and Report Out presentation
- **Friday:**
  - Share *Portfolios*
  - Share ideas on next steps in *Scenario* development
  - Task the Tech Team
- **Next Month**
  - Tech Team analyzes Portfolios
  - Tech Team develops additional information about Actions
  - Tech Team builds demand-supply gaps and interest based narratives for next round of Scenarios.

Next Steps

- **Next meeting:**
  - WSAC builds Portfolios for next round scenarios
  - WSAC begin Identification of the set of actions that will be included in every portfolio and set of elements to broaden range of scenarios
- **Future meetings**
  - **Focused discussion on:**
    - **drought to plan for**
    - **climate to plan for**
    - **scenarios to select**
    - **Overall strategies**
    - **Many other focused discussions!**

The Three Draft Sample Scenarios

- **RISKS** to a rainfall dependent system –
  - Drought
  - Climate change
  - Regulations (fish flows, groundwater protection limits)
- Included interest based narrative to so you can examine how these are constructed and operate

Draft/Sample Scenario #1: Planning for Extended Drought

Climate variability suggests that the next big drought that Santa Cruz experiences may not look like the worst drought on record (the 1976–1977 drought) or the second-worst drought on record (the 1987–1992 drought). In this scenario, Santa Cruz prepares for a plausible extended drought event that looks like both the 1976–1977 and 1987–1992 droughts occurring back to back.

Table 1. Extended drought peak-season shortage statistics

	Millions of gallons the city does not deliver each year due to shortage	Percent of peak-season demand (2.0 bg) the city cannot meet each year
Year 1	929	46%
Year 2	1,330	67%
Year 3	376	19%
Year 4	725	36%
Year 5	479	24%
Year 6	564	28%
Year 7	582	30%
Year 8	123	6%
Total	**5,108**	
Average	**639**	**32%**
Maximum	**1,330**	**67%**
Minimum	**123**	**6%**

Extended Drought

- This may not be the plausible extended drought you will decide to prepare for.
- We will provide other ideas and additional background information

Any clarifying questions about the draft/sample Extended Drought Scenario?

Draft/Sample Scenario # 2: The Climate Changes

This scenario represents a future with higher temperatures and changes in precipitation patterns due to climate change. For this scenario the lower bound of fish flows rules, the city proposal, is assumed. This scenario is guided by the City's interest-based objective to be sustainable and environmentally friendly.

Mission Statements

Your Charter:

to **deliver a safe, adequate, reliable and environmentally sustainable water supply;** *and develop strategy recommendations for City Council consideration.*

The Water Department Mission Statement:

Our mission is to **ensure public health and safety by providing a clean, safe, reliable supply of water**. We strive to serve the community in a courteous, efficient, cost effective and **environmentally sustainable** manner.

Others, Sustainability, etc..

Sustainability

- TBL based – social, environmental and financial
- Your water supply can now be certified sustainable
- Above and beyond what designed to do – not instead

Table 2. Peak-season shortage guide for climate change and city flows

% of years a shortage is likely	Number of years during the next 50 a shortage is likely to occur	Millions of gallons the city cannot deliver (shortage)	Percent of peak-season demand (2.0 bg) the city cannot deliver (shortage)
75%	38	0	0%
5%	3	Up to 60	Less than 3%
5%	3	60–140	3% to 7%
3%	2	140–300	7% to 15%
7%	4	300–500	15% to 25%
5%	2	500	More than 25%
Maximum		**520**	**26%**

Draft/Sample Scenario # 3: The Climate Changes

This scenario represents a future with higher temperatures and changes in precipitation patterns due to climate change. For this scenario the higher bound of fish flows rules, DFG 5, is assumed.

Table 3. Peak-season shortage guide for climate change and DFG 5 Fish Flows

% of years a shortage is likely	Number of years during the next 50 a shortage is likely to occur	Millions of gallons the city cannot deliver (shortage)	Percent of peak-season demand (2.0 bg) the city cannot deliver (shortage) (%)
35%	18	0	0%
8%	4	Up to 300	Less than 15%
5%	3	300–500	15% to 25%
30%	15	500–800	25% to 40%
10%	5	800–940	40% to 47%
4%	2	940–1,000	47% to 50%
8%	4	> 1,000	More than 50%
Maximum		**1,150**	**57%**

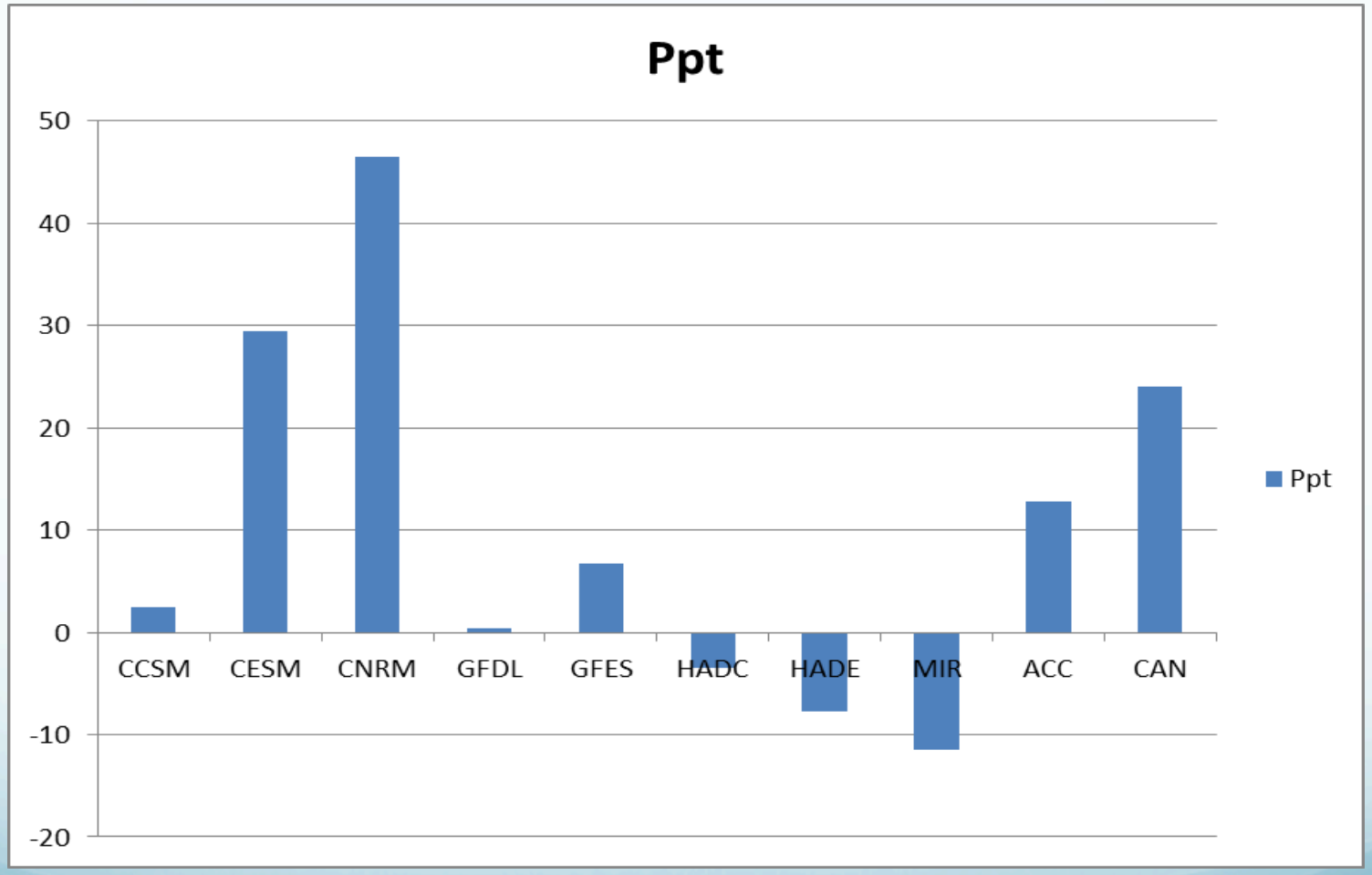
Applying GCMs (Top Down Approach)

1. Select GCM and emissions forecast (CalAdapt provides CA-approved list)
2. Downscale GCM results to local level (BCSD approach, results available from CalAdapt)
3. Interpret BCDS data
   a. Calculate change between hindcast and forecast
   b. Apply “deltas” to historical data
4. Run forecast precip and temps through hydrology
5. Run CC-impacted streamflows thru *Confluence*

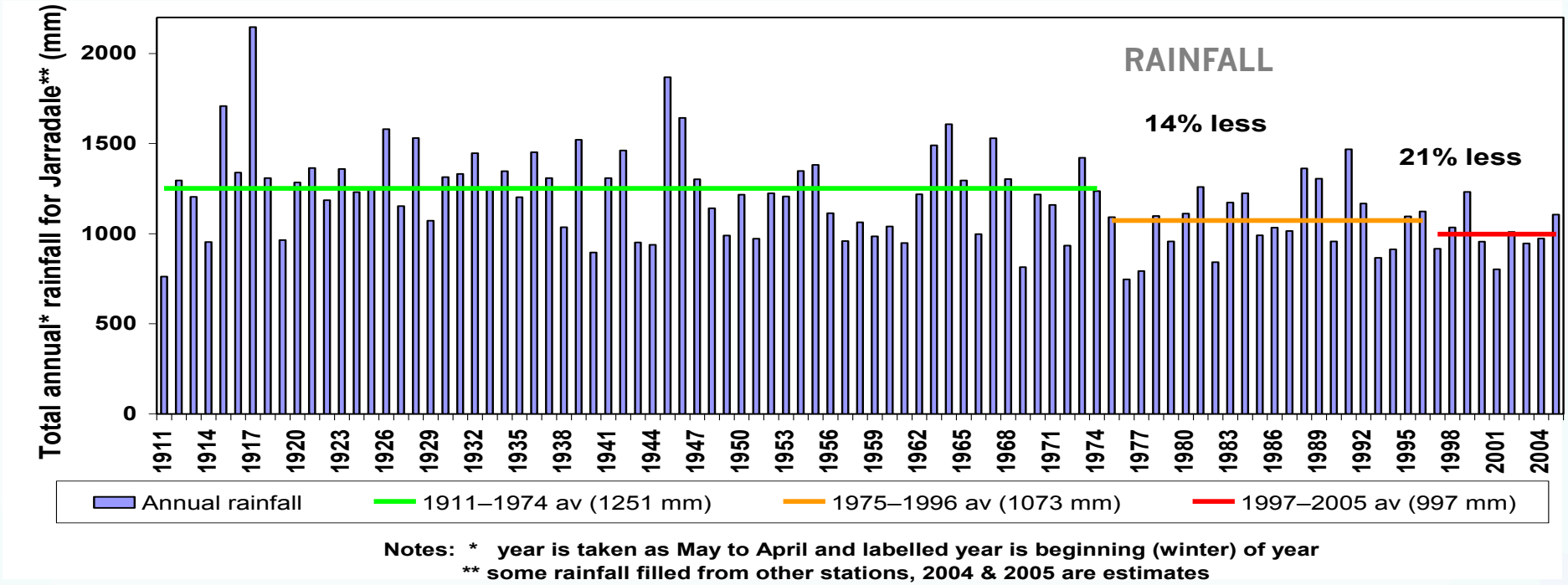
Flint and Flint (USGS, 2012)

- Reduced early and late wet season runoff => extended dry season
- Longer and drier summers regardless of precip. trends (i.e., even wetter is drier)
- Higher ET, and climatic water deficit (CWD) increasing up to 30% => up to 200 mm added water needed to maintain soil moisture
- Potential for extended drought and unprecedented precipitation events

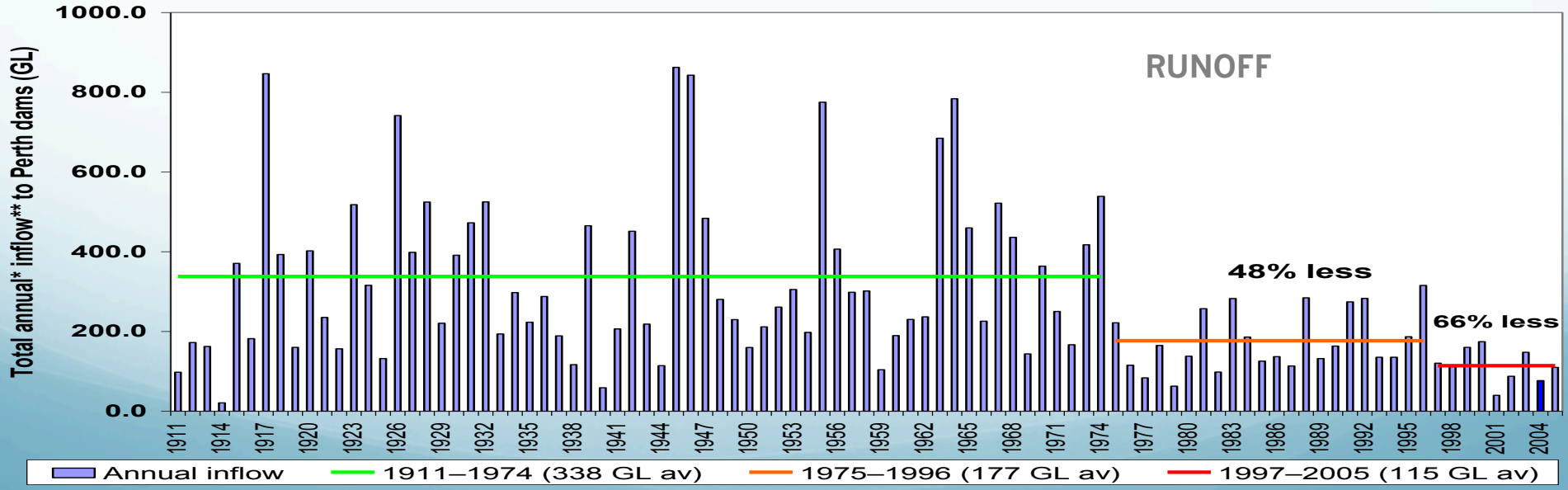
Range of GCM Results: precip in SC (10 CMIP5 models recommended for CA)



Perth's Watersheds – Climate (Rainfall) and Reliability (Runoff)



Notes: * year is taken as May to April and labelled year is beginning (winter) of year
** some rainfall filled from other stations, 2004 & 2005 are estimates



Notes: * year is taken as May to April and labelled year is beginning (winter) of year
** inflow is simulated based on Perth dams (excluding Stirling & Samson)

Climate Change

Don't' worry!!!! We will have the many more discussions about CC before you identify the plausible range of CC you want to plan for!

- **Enrichment Opportunity**
- **More background materials**
- **Focused discussion**

Any clarifying questions about the draft/sample Climate Change Scenario?

Using Probabilities
What do they mean?

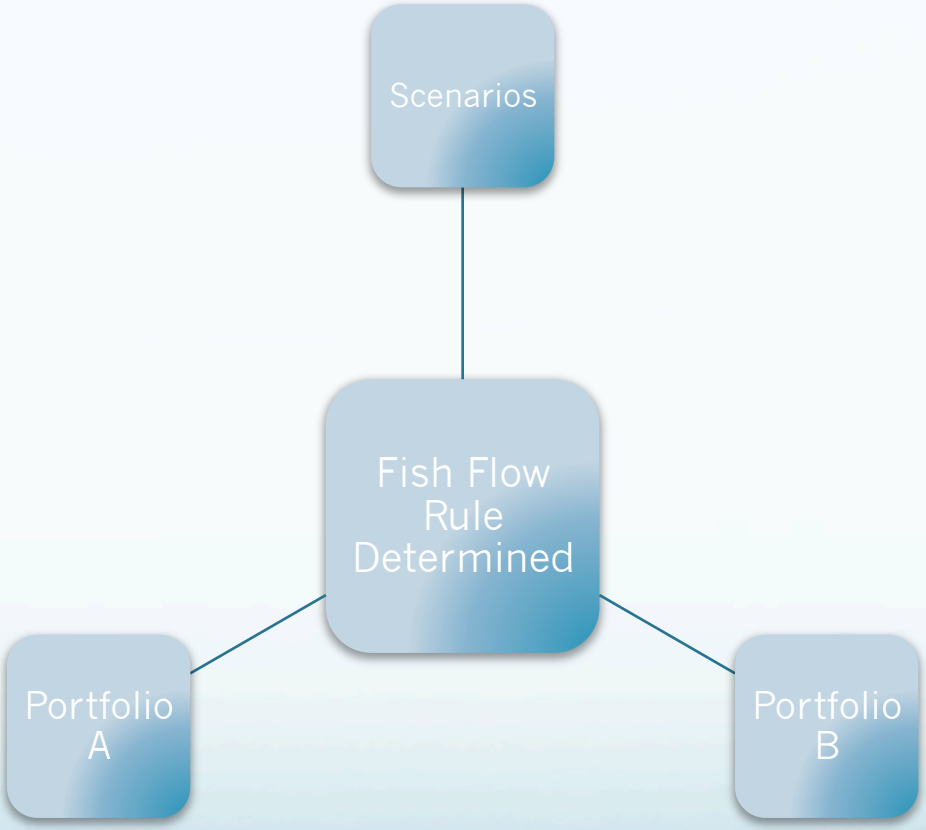
- Increases the likelihood of a shortage of any size to 20% every year
- A shortage is likely to occur once every five years
- A shortage greater than 15% is expected to occur about once every eight years
- The probability of a shortage greater than 15% (the current policy regarding maximum curtailments) is about 12% in any given year (i.e., a shortage greater than 15% is expected to occur about once every eight years).
- Other questions about how we use probability data?

Going beyond the Portfolio

Considerations for developing the strategy:

Decision Points:

If then statements



Preserve Options

Another kind of *if then* statement

- Are there actions you want to ensure are available in the future; i.e. that you want to do something to preserve for the future.

Example: buy land now for new reservoir – don't build unless trends show precipitation patterns are getting worse than expected.

Additional Assumptions for this round

- **Rule:** Solve for curtailments less than 15% and not too frequent – current policy
  - Efficiencies versus shortage actions
- Tech Team will provide additional info for next meeting
- WSAC will discuss in more detail at future meetings

Portfolio Instructions

- Summary Sheet for Report Out
- Worksheet for each Action

Worksheet for Individual Action Selection

- Complete one, as needed, for each action selected for inclusion in the portfolio
- Blue action identifies criteria designed for individual actions – others for Portfolios
- Add other ideas!!
- Have on stick so you can complete electronically

Worksheet: Summary of Portfolio designed for Draft Scenario….

- Use for Consistent Report Out
- Share ideas on improving Report Out
- Set Tech Team priorities!

Other considerations:

- What changes would you make to the criteria?
- What criteria did you aim to satisfy
- Which were the easy Actions to select? Why?
- Which were the difficult Actions to select? Why? How did you reach agreement on these?
- Your Aha! Moments. What did you learn that you hadn't expected?

Scenario Considerations: **Elements you want to provide insurance for in the future** **Group Members:**
Demands to examine – Think outside the box!
Why?
Hydrology to examine – modifications to fish flows, drought, CC, any other conditions to consider?
Why?
Interests to include as narratives – What are the important drivers?
Why?
Other elements to consider adding to future scenarios:
Why?

MCDS Evaluation Criteria Summary Table			
Criterion	**Question**	**Alternative Criteria**	**Portfolio Criteria**
1. Technical Feasibility	How feasible is this approach technically?		
2. Legal Feasibility	Within the required timeframe for this approach are necessary rights currently held in the form needed or feasible to acquire or modify as needed?		
3. Regulatory Feasibility	How easy or difficult would the regulatory approval process for this approach be?		
4. Political Feasibility	What level of political support is this approach likely to have?		
5. Implementability	How easy or difficult would this portfolio be to implement?		
6. Groundwater Resources	How would this approach affect groundwater resources?		
7. Marine Ecosystem Health	How would this approach affect the health of marine ecosystems?		
8. Freshwater and Riparian Ecosystem Health	How would this approach affect the health of freshwater and riparian ecosystems?		
9. Terrestrial Ecosystem Health	How would this approach affect the health of terrestrial ecosystems?		
10. Environmental Profile	How acceptable is the environmental profile of this portfolio?		
11. Operational Flexibility	To what extent does this approach increase operating flexibility?		
12. Addresses Peak Season Demand	To what extent does this approach help address peak season demand?		
13. Yield (Informational Only – Not Rated)	How much water will this approach save or produce?		
14. Energy	How much Energy will this approach/portfolio require per million gallons of water/how much greenhouse gas will the approach/portfolio produce per million gallons of water?		
15. Scalability (becomes Adaptive Flexibility)	How adaptable or flexible is this approach/portfolio to changing conditions?		