Austin WATER | WATER FORWARD
INTEGRATED WATER RESOURCE PLAN

Austin Integrated Water Resource Planning Community Task Force

Packet Index

January 22, 2018

Austin Integrated Water Resource Planning Community Task Force
January 22, 2018 – 6:00 p.m.
Waller Creek Center, Room 104
625 East 10th Street
Austin, Texas 78701

For more information go to:
Austin Integrated Water Resource Planning Community Task Force

AGENDA

Voting Members:

Sharlene Leurig - Chair	Marianne Dwight	Sarah Richards
Jennifer Walker – Vice Chair	Diane Kennedy	Lauren Ross
Todd Bartee	Perry Lorenz	Robert Mace
Clint Dawson	Bill Moriarty	

Ex Officio Non-Voting Members:
Austin Water: Greg Meszaros
Austin Energy: Kathleen Garrett
Austin Resource Recovery: Sam Angoori
Neighborhood Housing and Community Development: Rebecca Giello
Office of Innovation: Kerry O'Connor
Office of Sustainability: Lucia Athens
Parks and Recreation: Sara Hensley
Watershed Protection: Mike Personett

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1. **CALL TO ORDER – January 22, 2018, 6:00 p.m.**

2. **CITIZEN COMMUNICATION**

   The first 10 speakers signed up prior to the meeting being called to order will each be allowed a three-minute allotment to address their concerns regarding items not posted on the agenda.

3. **APPROVAL OF MEETING MINUTES**
   a. Approval of the meeting minutes from the December 5, 2017 Task Force meeting (5 minutes)

4. STAFF BRIEFINGS, PRESENTATIONS, AND OR REPORTS

a. Presentation on Draft Hybrid Portfolio Composition- City Staff (20 minutes)
    i. Task Force Discussion and Input (approximately 1.5 hours)

5. SUBCOMMITTEE REPORTS

6. VOTING ITEMS FROM TASK FORCE

a. Discuss and consider approval of proposed meeting schedule for March 2018 (10 minutes)

7. FUTURE AGENDA ITEMS

8. ADJOURN

Note: Agenda item sequence and time durations noted above are subject to change.

The City of Austin is committed to compliance with the American with Disabilities Act. Reasonable modifications and equal access to communications will be provided upon request. Meeting locations are planned with wheelchair access. If requiring Sign Language Interpreters or alternative formats, please give notice at least 2 days (48 hours) before the meeting date. Please call Austin Integrated Water Resource Planning Community Task Force, at 512-972-0194, for additional information; TTY users route through Relay Texas at 711.

For more information on the Austin Integrated Water Resource Planning Community Task Force, please contact Marisa Flores Gonzalez at 512-972-0194.

MINUTES

Austin Integrated Water Resource Planning Community Task Force **REGULAR MEETING**
December 05, 2017

The *Austin Integrated Water Resource Planning Community Task Force* convened in a Regular Meeting on December 05, 2017 at Waller Creek Center, Conference Rm 104, 625 E 10th Street, in Austin, Texas.

Members in Attendance:

Sharlene Leurig - Chair	Robert Mace	Todd Bartee
Jennifer Walker – Vice Chair	Sarah Richards	Perry Lorenz
William Moriarty	Lauren Ross	
Diane Kennedy	Clint Dawson	

Ex-Officio Members in Attendance:
Lucia Athens, Chris Herrington

Staff in Attendance:
Greg Meszaros, Kevin Critendon, Daryl Slusher, Teresa Lutes, Marisa Flores Gonzalez, Joe Smith, Mark Jordan, Prachi Patel, Helen Gerlach, Gabriella Ybarra, Jeff Fox, Drema Gross, Geneva Guerrero,

Additional Attendees:
Dan Rodrigo, Tina Petersen, Richard Hoffpauir, Jerry Roane, Brent Lyle, John Burke, Stefan Schuster, Ron Anderson

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1. **CALL TO ORDER**
   Sharlene Leurig, Chair, called the meeting to order at 4:13 p.m.

2. **CITIZEN COMMUNICATION: GENERAL**
   None

3. **APPROVAL OF MEETING MINUTES**
   The meeting minutes from the November 07, 2017 Austin Integrated Water Resource Planning Community Task Force regular meeting were approved on Member Kennedy's motion and Member Lorenz's second on an 9-0-1-2 vote with Member Bartee abstaining and Member Walker and Member Dwight absent.

4. **STAFF BRIEFINGS, PRESENTATIONS, AND/OR REPORTS**
   a. Presentation on Draft Initial Portfolio Scoring was provided by Dan Rodrigo, CDM Smith. This presentation was followed by Task Force discussion and input, followed by questions and answers.

5. **SUBCOMMITTEE REPORTS**
   None

6. **VOTING ITEMS FROM TASK FORCE**
   Proposed Task Force Meeting Dates Through Plan Development

7. **FUTURE AGENDA ITEMS**
   None

Chair Leurig adjourned the meeting at 7:16 pm.

PRESENTATION

Austin WATER

WATER FORWARD
INTEGRATED WATER RESOURCE PLAN

Water Forward Task Force Meeting

January 22, 2018

Agenda

- Presentation of Draft Hybrid Portfolio Composition
  - Task Force Questions, Discussion, and Input
- Discuss and consider approval of proposed meeting schedule for March 2018
- Next Steps

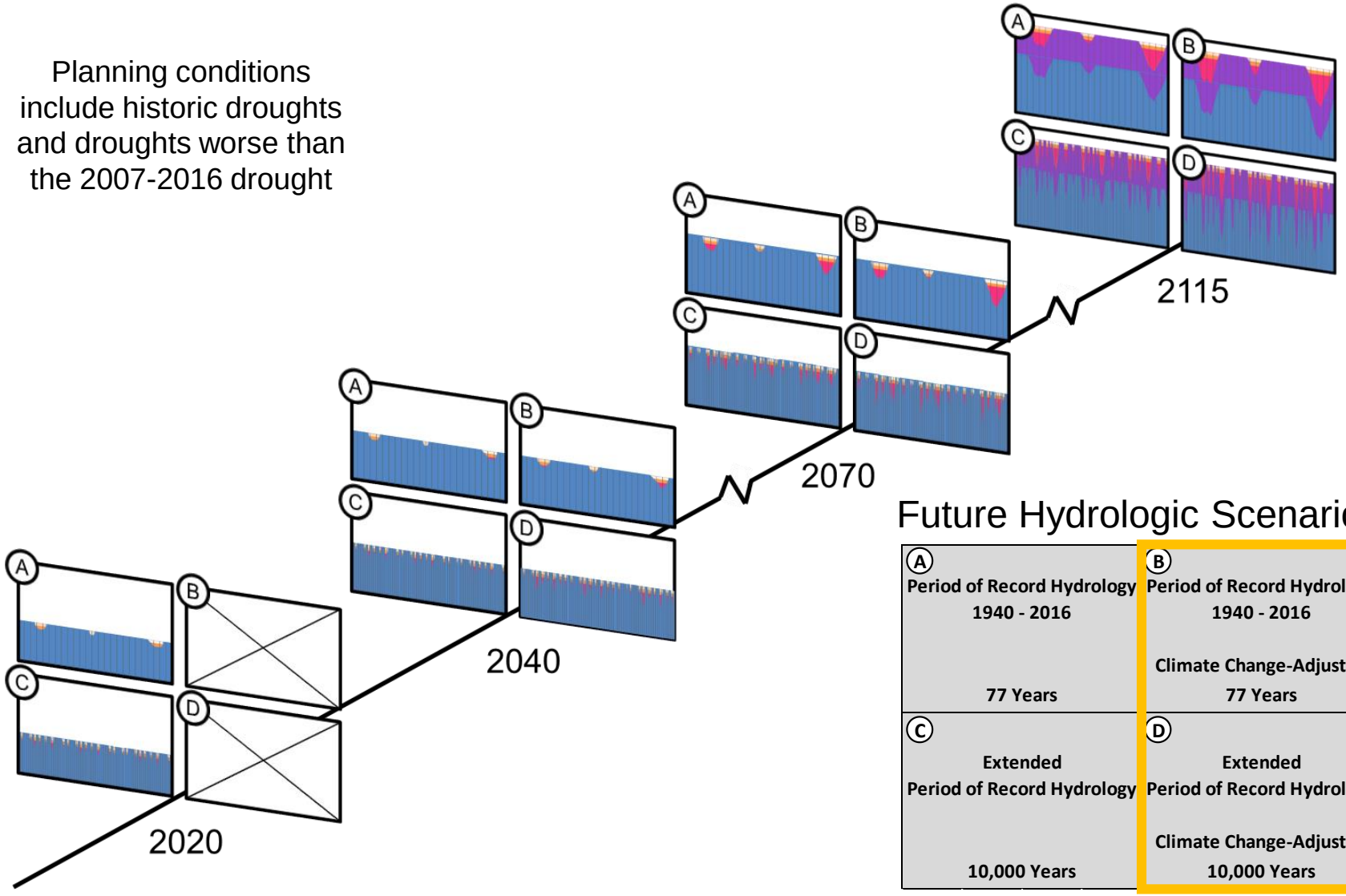
Draft Hybrid Portfolio Composition

Meeting Goals

- Presentation on first iteration of hybrid portfolio compositions (20 min)
  - Please limit questions to clarifying questions
- Task Force Discussion (1.5 hours)
  - Input on draft hybrid composition
  - Consensus on reliability goals for hybrids
  - Buy-in on approach to evaluating risk
- Parking lot for other/future items

Planning For Change and Uncertainties

Planning conditions include historic droughts and droughts worse than the 2007-2016 drought

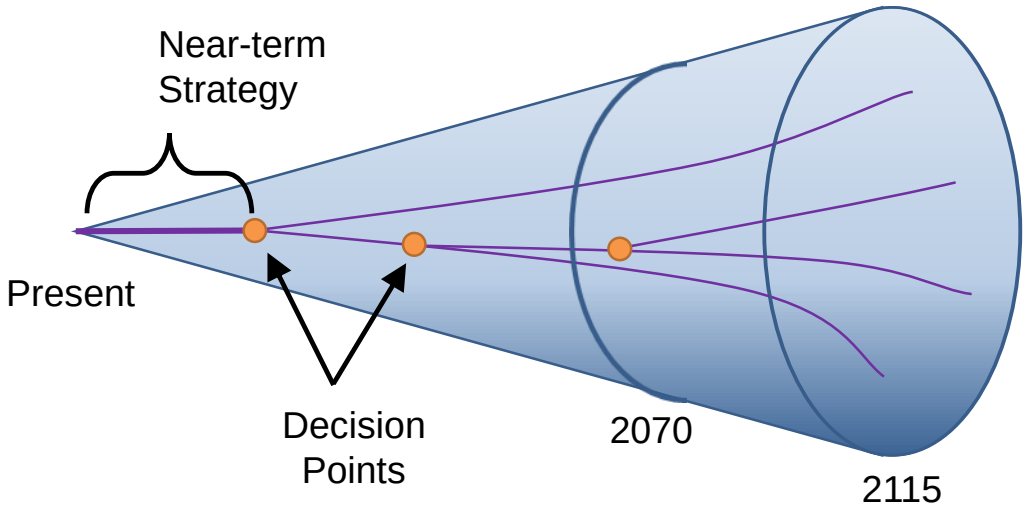


Future Hydrologic Scenarios

(A) Period of Record Hydrology 1940 - 2016 77 Years	(B) Period of Record Hydrology 1940 - 2016 Climate Change-Adjusted 77 Years
(C) Extended Period of Record Hydrology 10,000 Years	(D) Extended Period of Record Hydrology Climate Change-Adjusted 10,000 Years

Key Points on Water Forward's Adaptive Management Plan

- This process is about incremental changes we can make to get closer to our desired future
- Out of the gate will focus on near term strategies while keeping an eye on longer term strategies
- The plan is anticipated to be updated on a five year cycle



First Iteration Hybrid #1 Composition – Conservation Based

Conservation Options	
D1	AMI
D2	Water Loss Control
D3	CII Ordinances
D4	Benchmarking
D5	Landscape Ordinance
D6	Landscape Incentive
D7	Irrigation Incentive
D8	Lot Scale Stormwater Harvesting
D9	Lot Scale Rainwater Harvesting
D10	Gray Water Harvesting
D11	Building Scale Wastewater Reuse
D12	AC Condensate Reuse
S10	Sewer Mining
S11	Community Stormwater
Reclaimed Water Options	
S3	Direct Non-Potable Reuse (Purple Pipe System Expansion)
S9	Distributed WW Reuse
Potable Supply Options	
S1	Aquifer Storage and Recovery
S2	Brackish Groundwater Desal
S5	Indirect Potable Reuse
S7	Off Channel Reservoir

	Options Not Included
S4	Direct Potable Reuse
S6	LCRA Additional Supply
S8	Imported Option – includes two variations: Seawater Desalination and Conventional Groundwater
S12	Community-Scale Rainwater Harvesting

First Iteration Hybrid #2 Composition– Local Control or Low Cost Based

Conservation Options	
D1	AMI
D2	Water Loss Control
D3	CII Ordinances
D4	Benchmarking
D5	Landscape Ordinance
D9	Lot Scale Rainwater Harvesting
D10	Gray Water Harvesting
D12	AC Condensate Reuse
S10	Sewer Mining
S11	Community Stormwater
S12	Community Rainwater
Reclaimed Water Options	
S3	Direct Non-Potable Reuse (Purple Pipe System Expansion)
S9	Distributed WW Reuse
Potable Supply Options	
S1	Aquifer Storage and Recovery
S2	Brackish Groundwater Desal
S5	Indirect Potable Reuse
S7	Off Channel Reservoir

	Options Not Included
D6	Landscape Incentive
D7	Irrigation Incentive
D8	Lot Scale Stormwater Harvesting
D11	Building Scale Wastewater Reuse
S4	Direct Potable Reuse
S6	LCRA Additional Supply
S8	Imported Option – includes two variations: Seawater Desalination and Conventional Groundwater

Refined Risk Evaluation Approach

Risks that impact initial implementation

Risks that impact operations/reliability once project is implemented

	Supply and Demand-Side Options	Institutional Challenge	Public/Developer Opposition	Scalability Issue After Initial Const.	Geographic/Distribution Limitations	Permitting/Regulatory Difficulty	Infrastructure Failure	Supply/Savings Un-Certainty	O&M Challenges	Siting/Land Acquistion	Emerging Technology/	Total Risk Score
S8a	Imported Option Category - Seawater Desalination	1	0	1	0	1	1	0	1	1	1	7
S8b	Imported Option Category - Conventional Groundwater	1	1	0	0	1	1	1	1	1	0	7
S4	Direct Potable Reuse	1	1	0	0	1	0	0	1	1	1	6
D11	Building Scale Wastewater Reuse	0	1	0	1	1	0	0	1	0	1	5
S12	Community Rainwater Harvesting	1	1	0	1	0	0	1	1	0	0	5
S2	Brackish Groundwater Desalination	1	0	0	0	1	0	0	1	1	0	4
S5	Indirect Potable Reuse	0	1	0	0	1	0	0	0	1	1	4
S11	Community Stormwater Harvesting	1	0	0	1	0	0	1	1	0	0	4
S10	Wastewater Scalping (Sewer Mining)	0	0	0	1	1	0	0	1	0	1	4
D4	Development-Focused Water Use Benchmarking/Budgeting	1	0	0	0	0	0	1	0	0	1	3
D8	Stormwater Harvesting (Lot)	0	1	0	0	0	0	1	1	0	0	3
D9	Rainwater Harvesting (Lot)	0	1	0	0	0	0	1	1	0	0	3
D10	Graywater Harvesting (Lot)	0	1	0	1	0	0	0	1	0	0	3
S1	Aquifer Storage and Recovery	0	0	0	0	0	0	0	1	1	1	3
S6	Additional Supply from LCRA	1	0	1	0	0	0	1	0	0	0	3
S7	Off-Channel Reservoir w/ Lake Evaporation Suppression	0	0	1	0	1	0	0	0	1	0	3
S9	Distributed Wastewater Reuse	0	0	0	1	1	0	0	1	0	0	3
D1	Advanced Metering Infrastructure	0	0	0	0	0	0	0	1	0	1	2
D2	Water Loss Control Utility Side	0	0	0	0	0	0	0	1	0	1	2
D5	Landscape Transformation Ordinance	0	1	0	0	0	0	1	0	0	0	2
S3	Direct Non-potable Reuse (including deluxe option)	0	1	0	1	0	0	0	0	0	0	2
D6	Landscape Transformation Incentives	0	0	0	0	0	0	1	0	0	0	1
D7	Irrigation Efficiency Incentives	0	0	0	0	0	0	1	0	0	0	1
D12	AC Condensate Reuse	0	0	0	0	0	0	0	1	0	0	1
D3	CII Ordinance for Cooling Towers and Steam Boilers	0	0	0	0	0	0	0	0	0	0	0

Changes to Objectives/Sub-Objectives

- **Water Supply Benefits** – Make this objective more focused on reliability benefits and show more distinction between portfolios
  - Only has two sub-objectives: **Vulnerability** (what percent of demand are the type shortages during the worst 12-months of drought) and **Reliability** (how many months in period of simulation that have zero shortages)
- **Implementation Benefits** – Make this objective be solely focused on issues of risk and local control
  - Only has two sub-objectives: **Risk** (a new sub-objective that measures major aspects of risk/uncertainties) and **Local Control** (now measured by assessing both AW's control over operations of resource and whether resource resides within the local area)

Water Supply Benefits Objective Draft Changes

Original Objective / Sub-Objectives

Primary Objective	Objective Weight	Sub-Objective	Performance Measure	Sub-Objective Weight
Water Supply Benefits	35%	Maximize Water Reliability	Percent of time a shortage occurs and the cumulative shortage for a design drought based on WAM modeling results	20%
		Maximize Local Control	Proportion of total supply yield from locally controlled sources	7.5%
		Maximize Supply Diversification	# of supply/demand-side management sources (above minimum yield threshold)	7.5%

Revised Objective / Sub-Objectives

Primary Objective	Objective Weight	Sub-Objective	Performance Measure	Sub-Objective Weight
Water Supply Benefits	35%	Minimize Water Supply Vulnerability	Percent of shortage compared to demand during drought based on WAM modeling results	28%
		Maximize Water Supply Reliability	Percent of time a shortage occurs based on WAM modeling results	7%

Implementation Benefits Objective Draft Changes

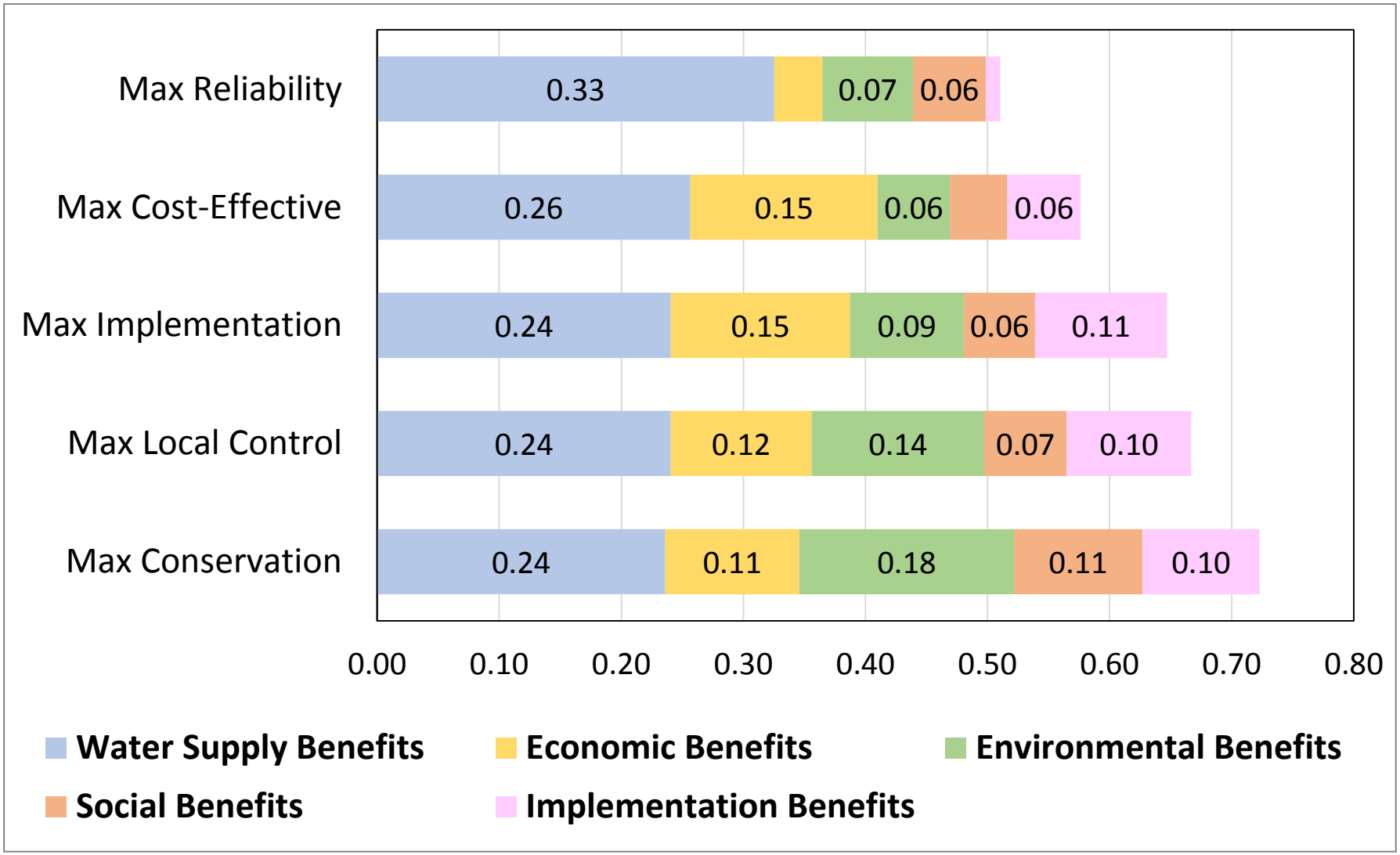
Original Objective / Sub-Objectives

Primary Objective	Objective Weight	Sub-Objective	Performance Measure	Sub-Objective Weight
Implementation Impacts	12%	Minimize Implementation Challenges	Implementation Uncertainty Score (1-5), where 1 = high combined challenges and 5 = low combined challenges	4%
		Maximize Scalability	Scalability Score (1-5), where 1 = small incremental sizing potential and 5 = high incremental sizing potential	4%
		Minimize Technical Feasibility Challenges	Technical Feasibility (1-5), where 1 = high reliance on emerging or unproven technologies and 5 = low reliance on emerging or unproven technologies	4%

Revised Objective / Sub-Objectives

Primary Objective	Objective Weight	Sub-Objective	Performance Measure	Sub-Objective Weight
Implementation Impacts	12%	Minimize Risk	Risk Score (1-5), where 1 = high combined risks and uncertainties and 5 = low combined risks and uncertainties	7%
		Maximize Local Control	Measured by assessing both AW's control over operations of resource and whether resource resides within the local area	5%

Revised Portfolio Ranking



Discussion Goals

- Input on draft hybrid composition
  - What should we add? What should we get rid of?
- Consensus on reliability goals for hybrid portfolios
  - Goals for different planning horizons and hydrologic scenarios
- Buy-in on approach to evaluating risk

- Parking lot for items not on discussion list
- Focus on 2115 for this meeting, will discuss phasing in of options at a future meeting
- Will discuss implementation strategy at a future meeting

Backup Materials

Questions and Discussion

Proposed March 2018 Meeting Schedule

Proposed March 2018 Meeting Schedule

- March 20th Task Force meeting
  - Waller Creek Center, Room 104, 4:00 pm

Next Steps

Next Steps

- February 2018 Task Force Meeting
  - Presentation of draft Hybrid Portfolio scoring
- March 2018 Task Force Meeting
  - Presentation of draft plan recommendations
- March 2018 Public Workshop
  - Public input on of draft plan recommendations

BACKUP MATERIALS

Draft Hybrid Composition:

Draft Hybrid #1 – start with Maximize Conservation and Environmental Stewardship Initial Portfolio (IP)

Base components:

- Core Colorado River Supply (LCRA Firm Water Supply Agreement)
- City of Austin Reclaimed Water Program (existing Purple Pipe System)
- City of Austin Drought Contingency Plan

2115 Time Horizon

Conservation Options			
D1	AMI		9,371
D2	Water Loss Control		13,064
D3	CII Ordinances		1,063
D4	Benchmarking		25,228
D5	Landscape Ordinance		15,050
D6	Landscape Incentive		929
D7	Irrigation Incentive		394
D8	Lot Scale Stormwater Harvesting		2,275
D9	Lot Scale Rainwater Harvesting		9,251
D10	Gray Water Harvesting		12,667
D11	Building Scale Wastewater Reuse		7,875
D12	AC Condensate Reuse		5,150
S10	Sewer Mining		5,284
S11	Community Stormwater		504
		Total	108,103
Reclaimed Water Options			
S3	Direct Non-Potable Reuse (Purple Pipe System Expansion)		44,000
S9	Distributed WW Reuse		30,049
		Total	74,049
Potable Supply Options			
S1	Aquifer Storage and Recovery	Increase storage capacity for hybrid	60,000
S2	Brackish Groundwater Desal	Increase amount for hybrid (from 10k AF)	20,000
S5	Indirect Potable Reuse	Add for hybrid	20,000
S7	Off Channel Reservoir		25,857
		Total	125,857

Options Not Included

S4	Direct Potable Reuse
S6	LCRA Additional Supply
S8	Imported Option – includes two variations: Seawater Desalination and Conventional Groundwater
S12	Community-Scale Rainwater Harvesting

2115 Total of Conservation and Non-Potable Reuse Options: 182,154 AF

2115 Total of Estimated Savings with DCP Stages 3 in effect: 61,359 AF

2115 Key Demand and Other Reference Figure Summary Table:

2115 Condition	AF
Average Weather Baseline demand – Stationary Climate	467,392
Conservation Stage Demand Level with Conservation options 1-12 applied and S10 and S11 plus addition of 6% demand multiplier factor for climate change effects – Climate Change Adjusted Demand	380,846
Potable system demand – DCP Conservation Stage - Above figure with non-potable reuse options S3 and S9 subtracted - Climate Change Adjusted Demand	306,797
Potable system demand – Drought Conditions - Above figure with DCP Stage 3 in effect - Climate Change Adjusted Demand	245,438

Draft Hybrid Composition:

Draft Hybrid #2 – start with Maximize Local Control Initial Portfolio (IP)

Base components:

- Core Colorado River Supply (LCRA Firm Water Supply Agreement)
- City of Austin Reclaimed Water Program (existing Purple Pipe System)
- City of Austin Drought Contingency Plan

2115 Time Horizon

Conservation Options			
D1	AMI		9,371
D2	Water Loss Control		13,064
D3	CII Ordinances		1,063
D4	Benchmarking		25,228
D5	Landscape Ordinance		15,050
D9	Lot Scale Rainwater Harvesting		4,819
D10	Gray Water Harvesting		4,508
D12	AC Condensate Reuse		5,150
S10	Sewer Mining		6,357
S11	Community Stormwater		874
S12	Community Rainwater		24
		Total	85,508
Reclaimed Water Options			
S3	Direct Non-Potable Reuse (Purple Pipe System Expansion)		59,600
S9	Distributed WW Reuse		31,602
		Total	91,202
Potable Supply Options			
S1	Aquifer Storage and Recovery	Increase storage capacity for hybrid	60,000
S2	Brackish Groundwater Desal	Increase amount for hybrid (from 10k AF)	20,000
S5	Indirect Potable Reuse	Add for hybrid	20,000
S7	Off Channel Reservoir		25,857
		Total	125,857

Options Not Included

D6	Landscape Incentive
D7	Irrigation Incentive
D8	Lot Scale Stormwater Harvesting
D11	Building Scale Wastewater Reuse
S4	Direct Potable Reuse
S6	LCRA Additional Supply
S8	Imported Option – includes two variations: Seawater Desalination and Conventional Groundwater

2115 Total of Conservation and Non-Potable Reuse Options: 176,710 AF

2115 Total of Estimated Savings with DCP Stages 3 in effect: 62,719 AF

2115 Key Demand and Other Reference Figure Summary Table:

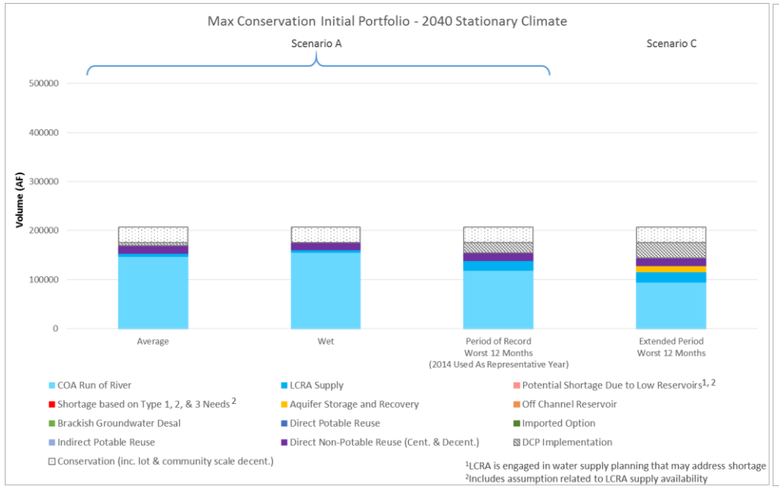
2115 Condition	AF
Average Weather Baseline demand – Stationary Climate	467,392
Conservation Stage Demand Level with Conservation options 1-12 applied and S10 and S11 plus addition of 6% demand multiplier factor for climate change effects – Climate Change Adjusted Demand	404,798
Potable system demand – DCP Conservation Stage - Above figure with non-potable reuse options S3 and S9 subtracted - Climate Change Adjusted Demand	313,595
Potable system demand – Drought Conditions - Above figure with DCP Stage 3 in effect - Climate Change Adjusted Demand	250,876

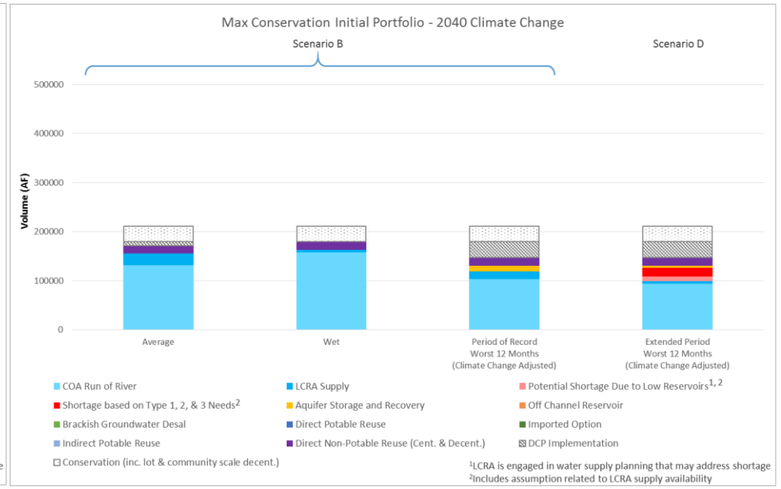
Water Forward: Integrated Water Resources Plan Objectives – Prior Version – used in prior Initial Portfolio scoring (December 2017)

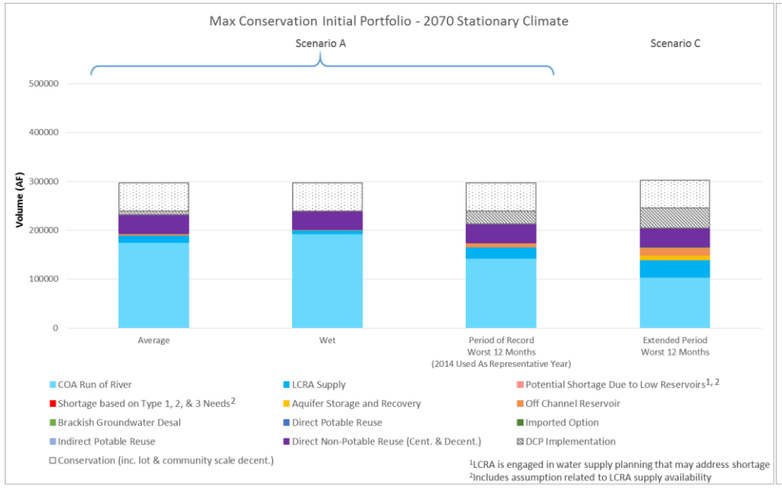
Primary Objective	Objective Weight	Sub-Objective	Defining Question	Performance Measure	Sub-Objective Weight
Water Supply Benefits	35%	Maximize Water Reliability	How does the portfolio perform in terms of how often is there a shortage and how large is the shortage under various hydrologic conditions, including climate change scenarios?	Percent of time a shortage occurs and the cumulative shortage for a design drought based on WAM modeling results	20%
		Maximize Local Control	To what extent does AW have control over the quantity and storage of water and operation of options (especially during drought periods) included in the portfolio?	Proportion of total supply yield from locally controlled sources	7.5%
		Maximize Supply Diversification	How many independent water supply and demand-side management options above a minimum yield threshold are included in the portfolio?	# of supply/demand-side management sources (above minimum yield threshold)	7.5%
Economic Impacts	20%	Maximize Cost-Effectiveness	What is the total capital (construction) and operations/maintenance costs of all projects/programs in the portfolio over the lifecycle, divided by the sum of all water yield produced by the portfolio?	Unit cost ($/AF) expressed as a present value sum of all costs over the lifecycle, including utility and customer costs.	15%
		Maximize Advantageous External Funding	Does the portfolio have an opportunity for advantageous external funding from Federal, State, local, and private sources?	External Funding Score (1-5), where 1 = low potential and 5 = high potential	5%
Environmental Impacts	20%	Minimize Ecosystem Impacts	To what extent does the portfolio positively or negatively impact receiving water quality (e.g., streams, river, lakes), terrestrial and aquatic habitats throughout Austin, and net streamflow effects both upstream and downstream from Austin?	Ecosystem Impact Score (1-5), where 1 = high combined negative impacts and 5 = high combined positive impacts	8%
		Minimize Net Energy Use	What is the net energy requirement of the portfolio, considering energy generation?	Incremental net change in kWh	6%
		Maximize Water Use Efficiency	What is the reduction in potable water use from water conservation, reuse and rainwater capture for the portfolio?	Potable per capita water use (gallon/person/day)	6%
Social Impacts	13%	Maximize Multi-Benefit Infrastructure/Programs	To what extent does the portfolio provide secondary benefits such as enhanced community livability/beautification, increased water ethic, ecosystem services, or others?	Multiple Benefits Score (1-5), where 1 = low benefits and 5 = high benefits	5%
		Maximize Net Benefits to Local Economy	To what extent does the supply reliability and water investments of the portfolio protect and improve local economic vitality, including permanent job creation?	Local Economy Score (1-5), where 1 = high negative impact and 5 = high positive impact	4%
		Maximize Social Equity and Environmental Justice	To what extent does the portfolio support social equity and environmental justice, with emphasis on underserved communities? (see accompanying reference slide)	Social Equity and Environmental Justice Score (1-5), where 1 = significant support and 5 = minimal support	4%
Implementation Impacts	12%	Minimize Implementation Challenges	What implementation challenges will the portfolio face in terms of public acceptance, regulatory approval, and legal/institutional barriers?	Implementation Uncertainty Score (1-5), where 1 = high combined challenges and 5 = low combined challenges	4%
		Maximize Scalability	To what extent can the portfolio be incrementally sized over time in terms of supply capacity and demand management?	Scalability Score (1-5), where 1 = small incremental sizing potential and 5 = high incremental sizing potential	4%
		Minimize Technical Feasibility Challenges	To what extent does the portfolio rely on emerging and/or unproven technologies?	Technical Feasibility (1-5), where 1 = high reliance on emerging or unproven technologies and 5 = low reliance on emerging or unproven technologies	4%

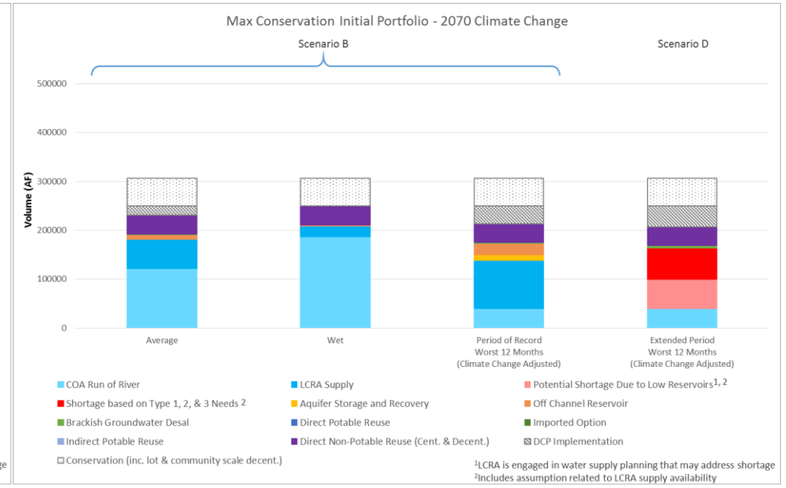
Water Forward: Integrated Water Resources Plan Objectives – Draft Revised Version – used in revised Initial Portfolio scoring (January 2018)

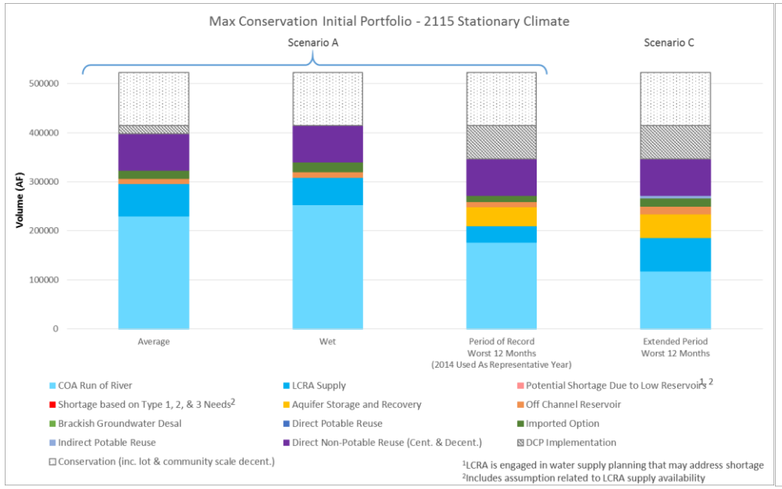
Primary Objective	Objective Weight	Sub-Objective	Defining Question	Performance Measure	Sub-Objective Weight
Water Supply Benefits	35%	Minimize Water Supply Vulnerability	How does the portfolio perform in terms of how large are shortages under various hydrologic conditions, including climate change scenarios?	Percent of shortage compared to demand during drought based on WAM modeling results	28%
		Maximize Water Supply Reliability	How does the portfolio perform in terms of how often is there a shortage under various hydrologic conditions, including climate change scenarios?	Percent of time a shortage occurs based on WAM modeling results	7%
Economic Impacts	20%	Maximize Cost-Effectiveness	What is the total capital (construction) and operations/maintenance costs of all projects/programs in the portfolio over the lifecycle, divided by the sum of all water yield produced by the portfolio?	Unit cost ($/AF) expressed as a present value sum of all costs over the lifecycle, including utility and customer costs.	15%
		Maximize Advantageous External Funding	Does the portfolio have an opportunity for advantageous external funding from Federal, State, local, and private sources?	External Funding Score (1-5), where 1 = low potential and 5 = high potential	5%
Environmental Impacts	20%	Minimize Ecosystem Impacts	To what extent does the portfolio positively or negatively impact receiving water quality (e.g., streams, river, lakes), terrestrial and aquatic habitats throughout Austin, and net streamflow effects both upstream and downstream from Austin?	Ecosystem Impact Score (1-5), where 1 = high combined negative impacts and 5 = high combined positive impacts	8%
		Minimize Net Energy Use	What is the net energy requirement of the portfolio, considering energy generation?	Incremental net change in kWh	6%
		Maximize Water Use Efficiency	What is the reduction in potable water use from water conservation, reuse and rainwater capture for the portfolio?	Potable per capita water use (gallon/person/day)	6%
Social Impacts	13%	Maximize Multi-Benefit Infrastructure/Programs	To what extent does the portfolio provide secondary benefits such as enhanced community livability/beautification, increased water ethic, ecosystem services, or others?	Multiple Benefits Score (1-5), where 1 = low benefits and 5 = high benefits	5%
		Maximize Net Benefits to Local Economy	To what extent does the supply reliability and water investments of the portfolio protect and improve local economic vitality, including permanent job creation?	Local Economy Score (1-5), where 1 = high negative impact and 5 = high positive impact	4%
		Maximize Social Equity and Environmental Justice	To what extent does the portfolio support social equity and environmental justice, with emphasis on underserved communities? (see accompanying reference slide)	Social Equity and Environmental Justice Score (1-5), where 1 = significant support and 5 = minimal support	4%
Implementation Impacts	12%	Minimize Risk	What major implementation and operational risks and uncertainties will the portfolio face?	Risk Score (1-5), where 1 = high combined risks and uncertainties and 5 = low combined risks and uncertainties	7%
		Maximize Local Control	To what extent does AW have control over the quantity and storage of water and operation of options (especially during drought periods) included in the portfolio?	Measured by assessing both AW's control over operations of resource and whether resource resides within the local area	5%

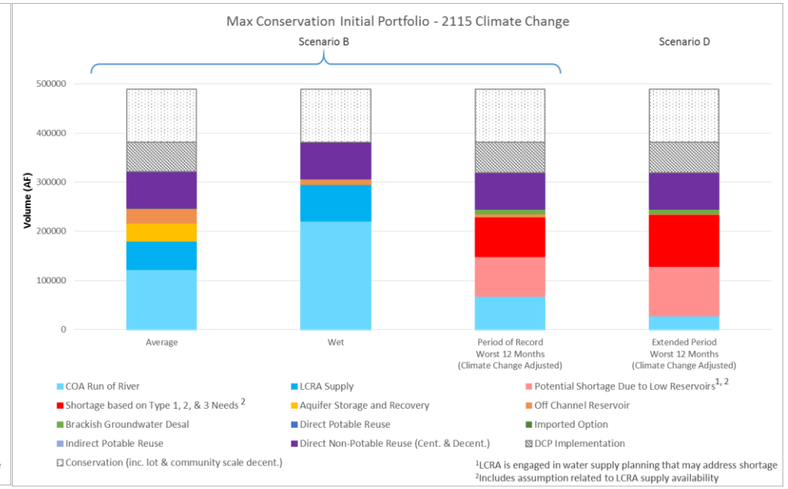




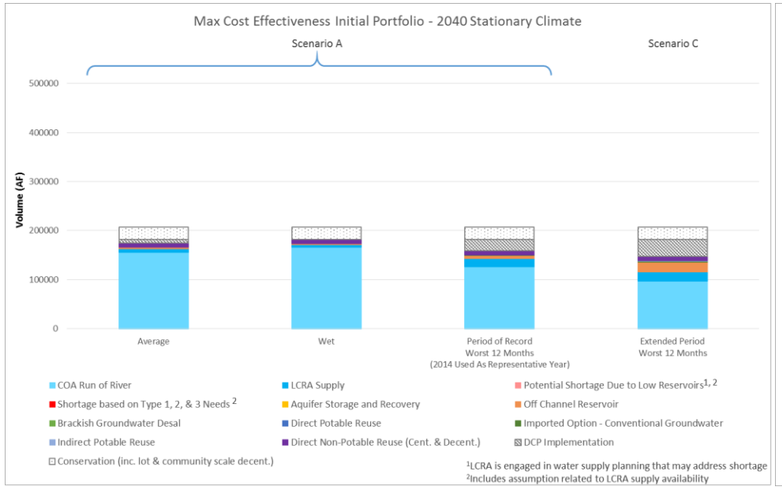


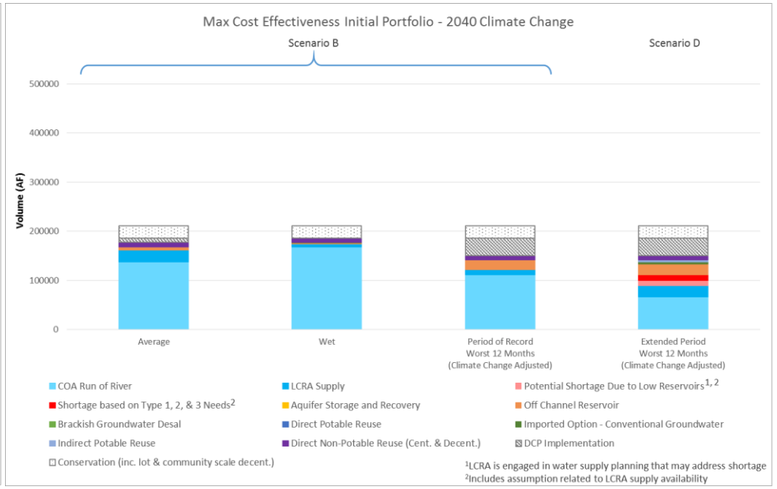


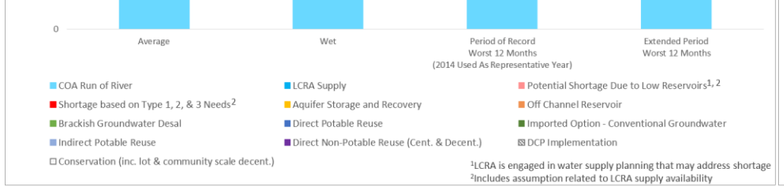


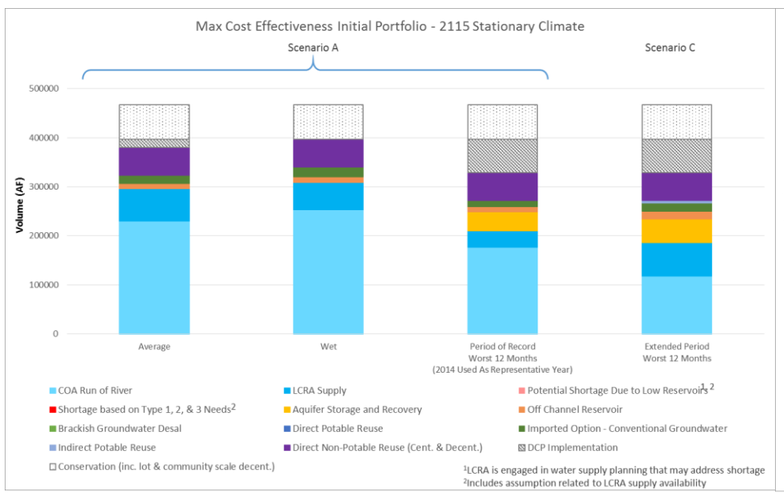


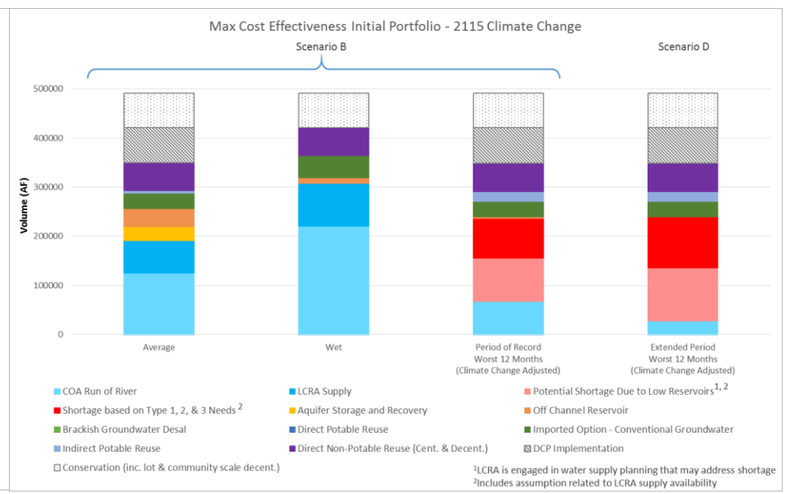
Portfolio Makeup		Avg/Droug	2040 Target Yield	2070 Target Yield	2115 Target Yield
D1	AMI	Both	3,882	5,766	9,371
D2	Water Loss Control	Both	9,326	10,918	13,064
D3	CII Ordinances	Both	1,063	1,063	1,063
D4	Benchmarking	Both	5,953	11,670	25,228
D5	Landscape Ordinance	Both	3,038	7,428	15,050
D6	Landscape Incentive	Both	321	633	929
D7	Irrigation Incentive	Both	205	427	394
D8	Lot Scale Stormwater Harvesting	Both	329	869	2,275
D9	Lot Scale Rainwater Harvesting	Both	1,550	4,032	9,251
D10	Gray Water Harvesting	Both	2,126	5,617	12,667
D11	Building Scale Wastewater Reuse	Both	1,323	3,672	7,875
D12	AC Condensate Reuse	Both	1,084	2,711	5,150
S1	Aquifer Storage and Recovery	Drought	30,000	30,000	60,000
S2	Brackish Groundwater Desal	Both	-	5,000	10,000
S3	Direct Non-Potable Reuse	Both	12,000	24,000	44,000
S4	Direct Potable Reuse	Drought	-	-	-
S5	Indirect Potable Reuse	Drought	-	-	-
S6	LCRA Additional Supply	Both	-	-	-
S7	Off Channel Reservoir	Both	-	25,827	25,827
S8	Imported Option	Both	-	-	-
S9	Distributed WW Reuse	Both	3,154	14,467	30,049
S10	Sewer Mining	Both	1,000	2,211	5,284
S11	Community Stormwater	Both	158	236	504
S12	Community Rainwater	Both	-	-	-



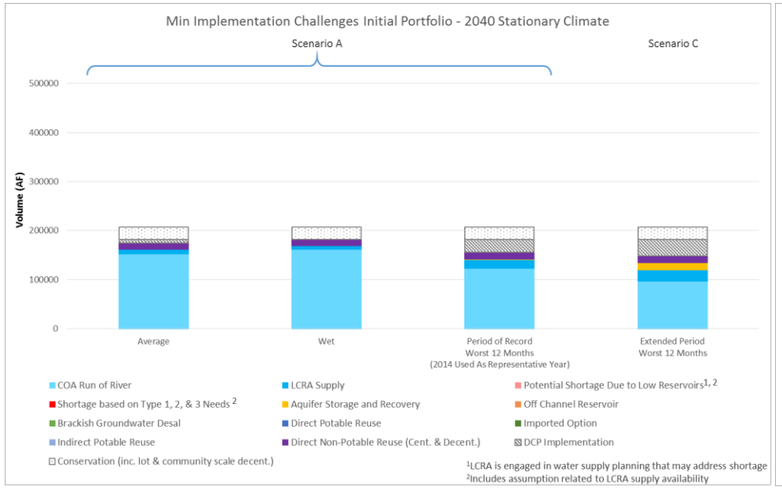


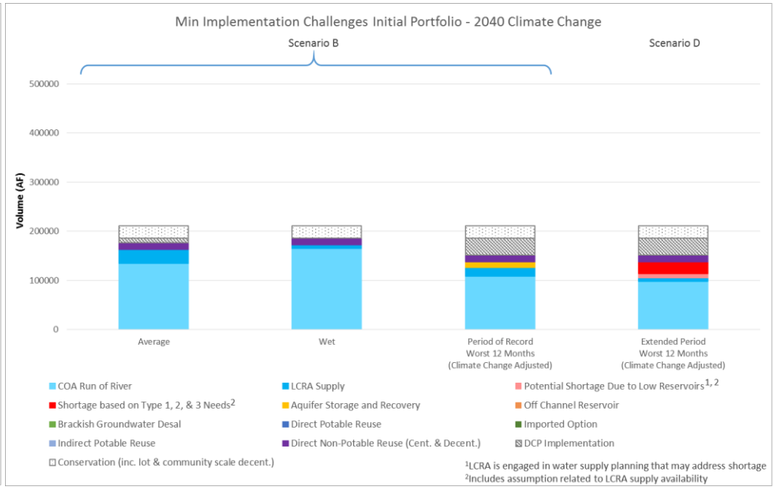


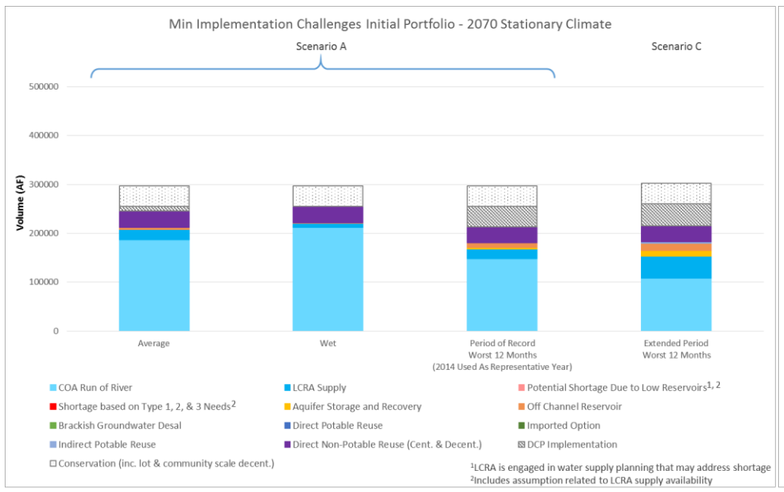


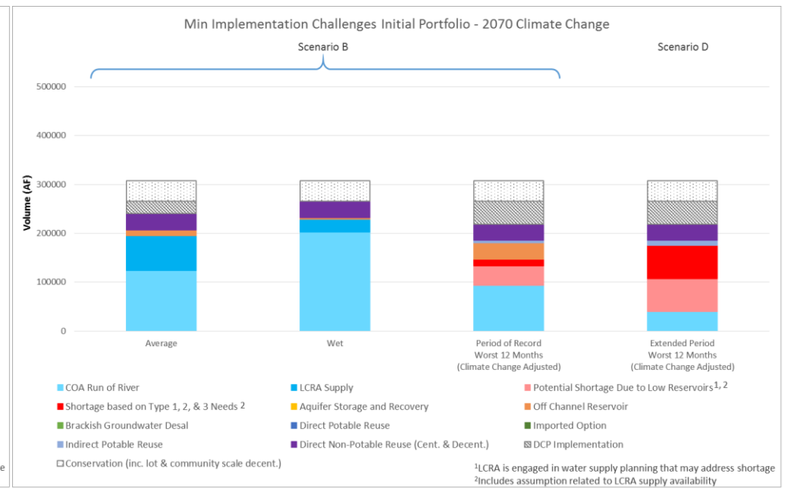


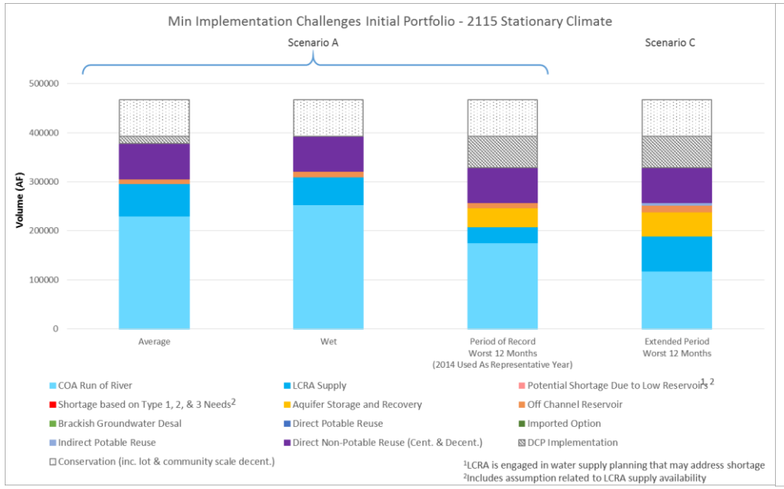
Portfolio Makeup		Avg/Droug	2040 Target Yield	2070 Target Yield	2115 Target Yield
D1	AMI	Both	3,882	5,766	9,371
D2	Water Loss Control	Both	9,326	10,918	13,064
D3	CII Ordinances	Both	1,063	1,063	1,063
D4	Benchmarking	Both	5,953	11,670	25,228
D5	Landscape Ordinance	Both	3,038	7,428	15,050
D6	Landscape Incentive	Both	321	633	929
D7	Irrigation Incentive	Both	205	427	394
D8	Lot Scale Stormwater Harvesting	Both	-	-	-
D9	Lot Scale Rainwater Harvesting	Both	-	-	-
D10	Gray Water Harvesting	Both	-	-	-
D11	Building Scale Wastewater Reuse	Both	-	-	-
D12	AC Condensate Reuse	Both	1,084	2,711	5,150
S1	Aquifer Storage and Recovery	Drought	-	30,000	60,000
S2	Brackish Groundwater Desal	Both	-	-	-
S3	Direct Non-Potable Reuse	Both	8,000	16,000	40,000
S4	Direct Potable Reuse	Drought	-	-	-
S5	Indirect Potable Reuse	Drought	10,000	10,000	20,000
S6	LCRA Additional Supply	Both	-	-	-
S7	Off Channel Reservoir	Both	25,827	25,827	25,827
S8	Imported Option	Both	10,000	20,000	45,000
S9	Distributed WW Reuse	Both	1,055	8,025	16,989
S10	Sewer Mining	Both	-	-	-
S11	Community Stormwater	Both	-	-	-
S12	Community Rainwater	Both	-	-	-

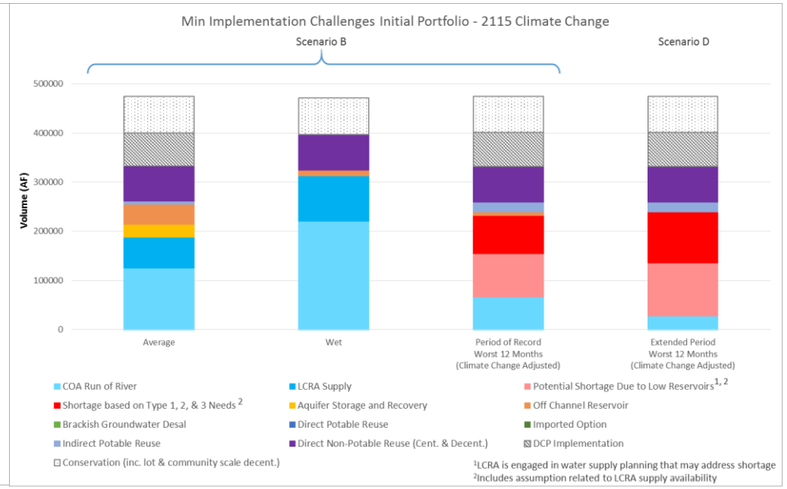




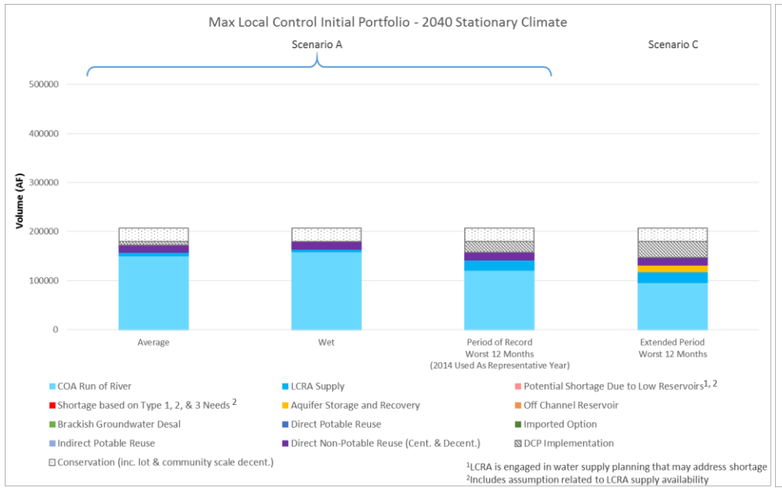


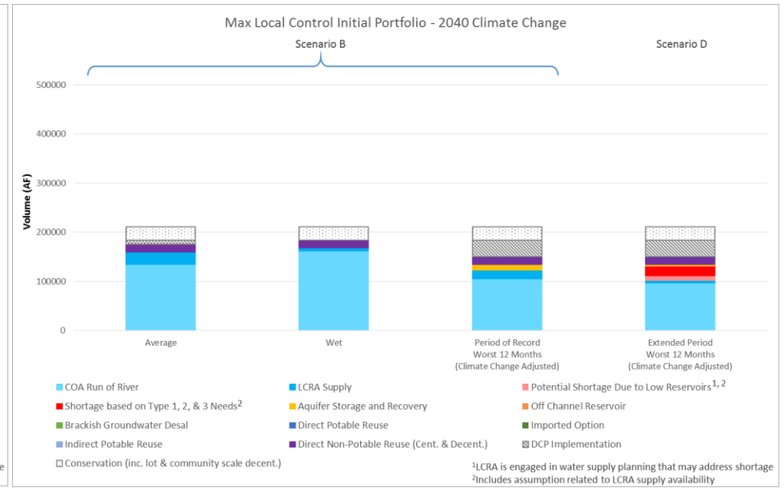


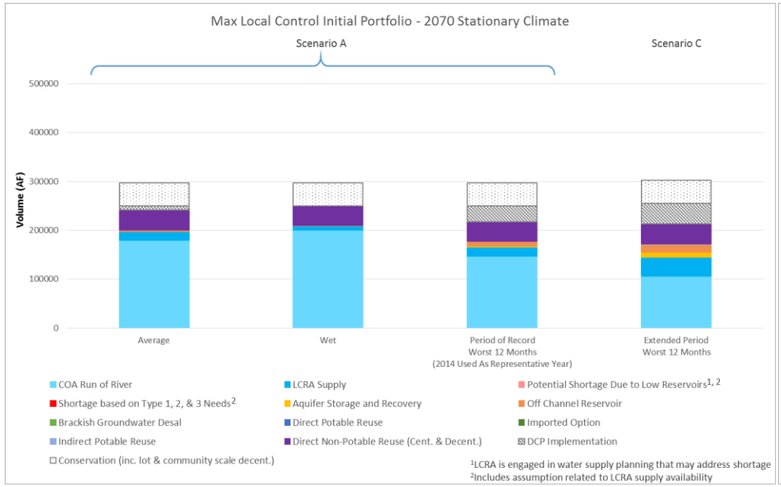


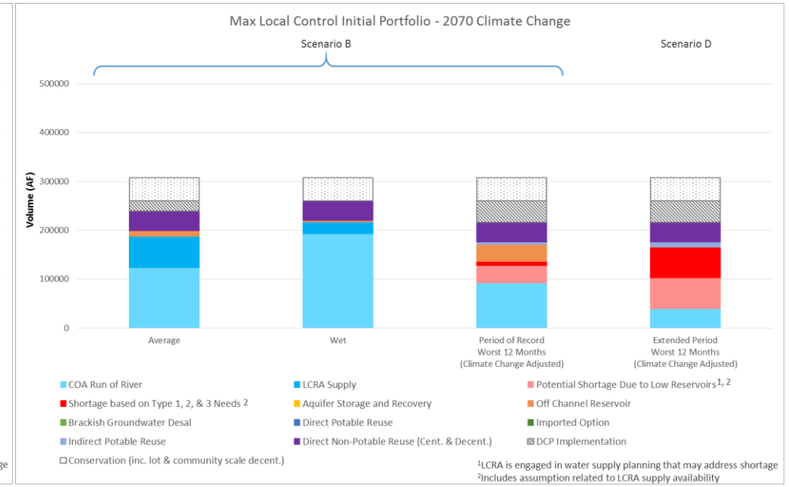


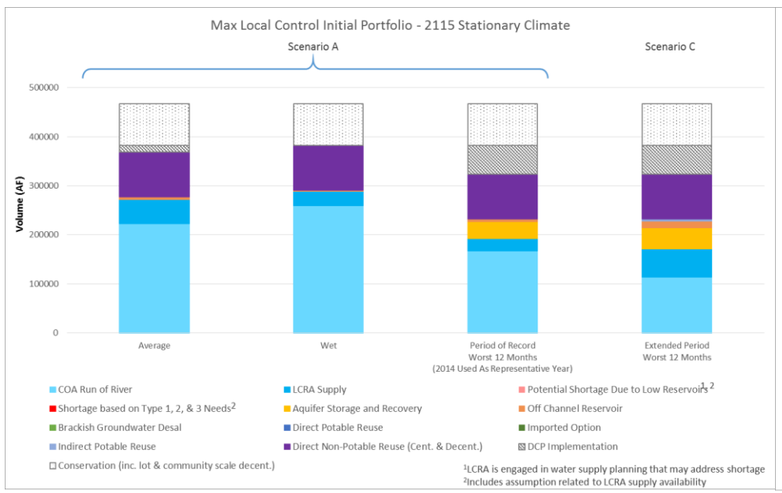
Portfolio Makeup		Avg/Drought	2040 Target Yield	2070 Target Yield	2115 Target Yield
D1	AMI	Both	3,882	5,766	9,371
D2	Water Loss Control	Both	9,326	10,918	13,064
D3	CII Ordinances	Both	1,063	1,063	1,063
D4	Benchmarking	Both	5,953	11,670	25,228
D5	Landscape Ordinance	Both	3,038	7,428	15,050
D6	Landscape Incentive	Both	-	-	-
D7	Irrigation Incentive	Both	207	434	401
D8	Lot Scale Stormwater Harvesting	Both	-	-	-
D9	Lot Scale Rainwater Harvesting	Both	823	2,133	4,887
D10	Gray Water Harvesting	Both	-	-	-
D11	Building Scale Wastewater Reuse	Both	-	-	-
D12	AC Condensate Reuse	Both	1,084	2,711	5,150
S1	Aquifer Storage and Recovery	Drought	30,000	30,000	60,000
S2	Brackish Groundwater Desal	Both	-	-	-
S3	Direct Non-Potable Reuse	Both	12,000	25,000	54,600
S4	Direct Potable Reuse	Drought	-	-	-
S5	Indirect Potable Reuse	Drought	-	10,000	20,000
S6	LCRA Additional Supply	Both	-	-	30,000
S7	Off Channel Reservoir	Both	-	25,827	25,827
S8	Imported Option	Both	-	-	-
S9	Distributed WW Reuse	Both	1,055	8,025	16,989
S10	Sewer Mining	Both	-	-	-
S11	Community Stormwater	Both	-	-	-
S12	Community Rainwater	Both	-	-	-

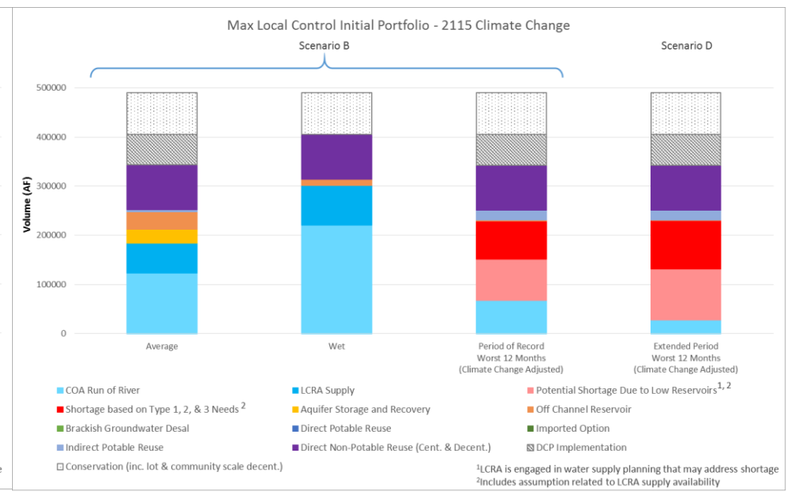




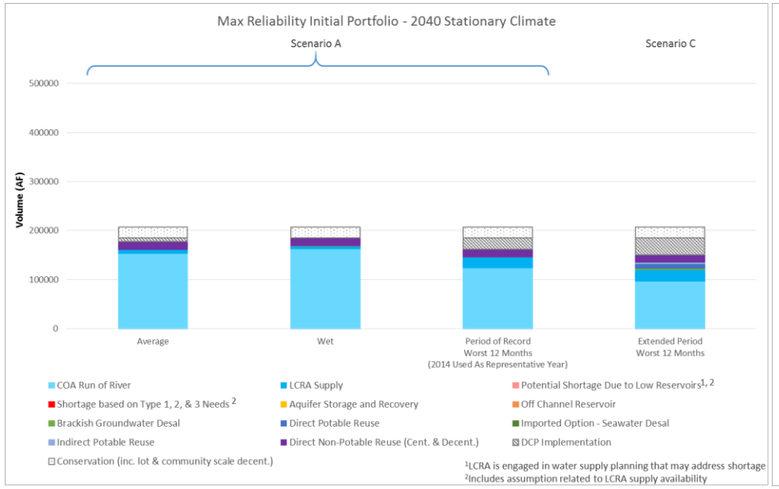


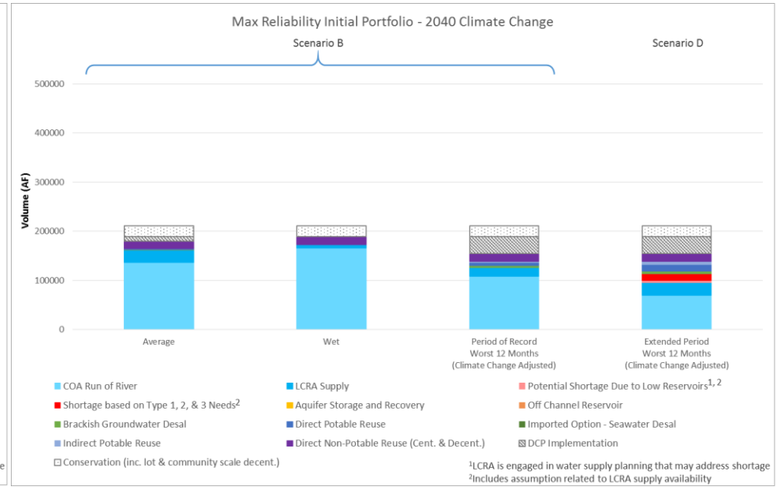


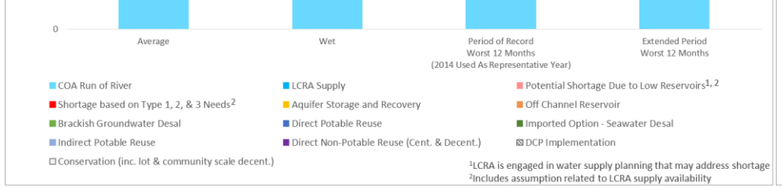


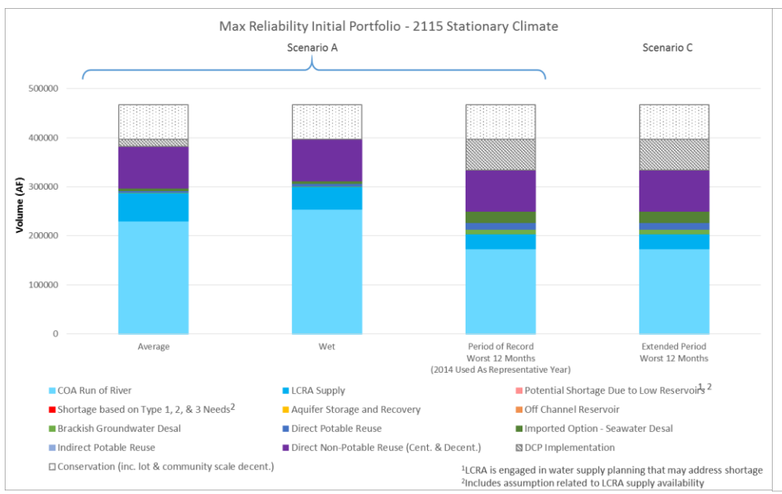


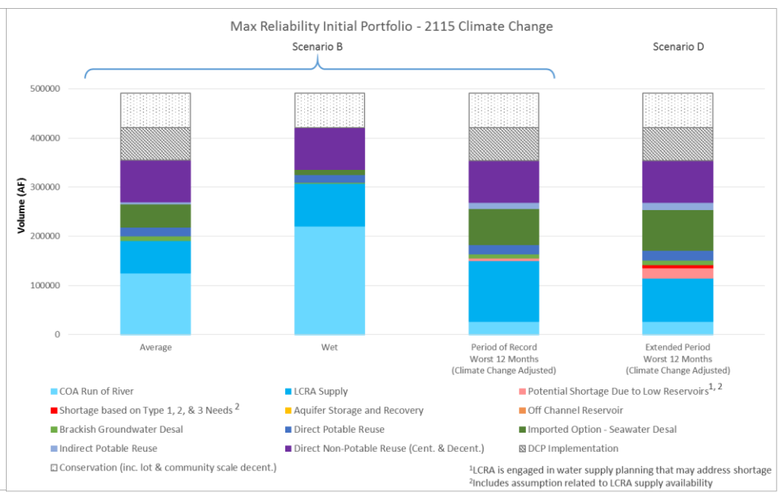
Portfolio Makeup		Avg/Droug	2040 Target Yield	2070 Target Yield	2115 Target Yield
D1	AMI	Both	3,882	5,766	9,371
D2	Water Loss Control	Both	9,326	10,918	13,064
D3	CII Ordinances	Both	1,063	1,063	1,063
D4	Benchmarking	Both	5,953	11,670	25,228
D5	Landscape Ordinance	Both	3,038	7,428	15,050
D6	Landscape Incentive	Both	-	-	-
D7	Irrigation Incentive	Both	-	-	-
D8	Lot Scale Stormwater Harvesting	Both	-	-	-
D9	Lot Scale Rainwater Harvesting	Both	917	2,350	4,819
D10	Gray Water Harvesting	Both	709	1,900	4,508
D11	Building Scale Wastewater Reuse	Both	-	-	-
D12	AC Condensate Reuse	Both	1,084	2,711	5,150
S1	Aquifer Storage and Recovery	Drought	30,000	30,000	60,000
S2	Brackish Groundwater Desal	Both	-	-	-
S3	Direct Non-Potable Reuse	Both	12,000	25,000	59,600
S4	Direct Potable Reuse	Drought	-	-	-
S5	Indirect Potable Reuse	Drought	-	10,000	20,000
S6	LCRA Additional Supply	Both	-	-	-
S7	Off Channel Reservoir	Both	-	25,827	25,827
S8	Imported Option	Both	-	-	-
S9	Distributed WW Reuse	Both	3,391	15,144	31,602
S10	Sewer Mining	Both	1,255	2,673	6,357
S11	Community Stormwater	Both	268	440	874
S12	Community Rainwater	Both	16	17	24







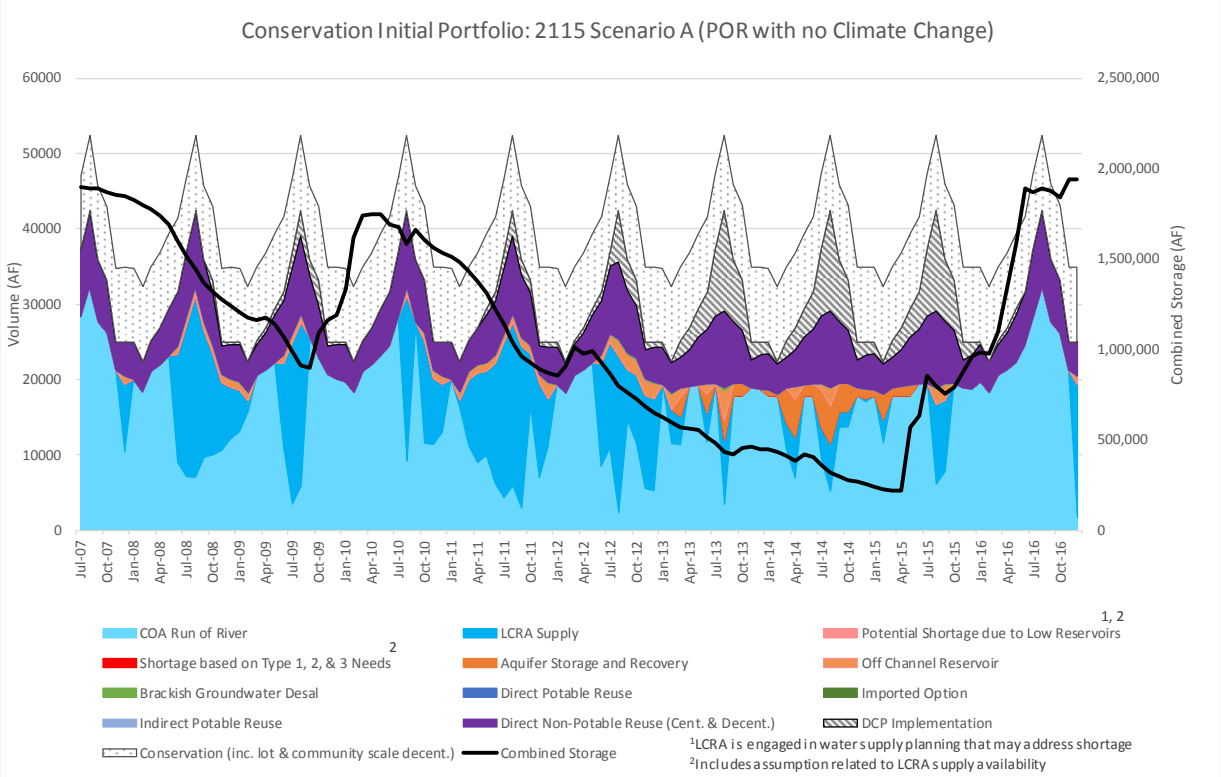


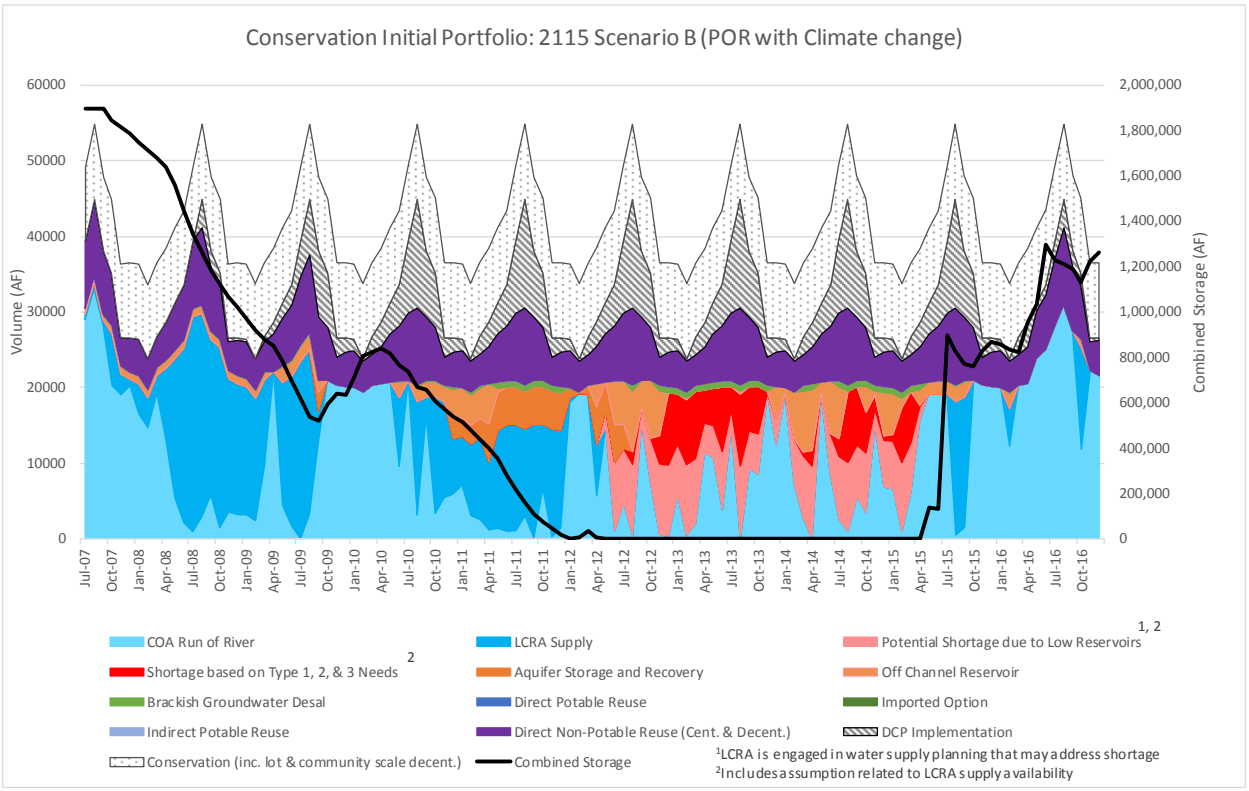


Portfolio Makeup		Avg/Droug	2040 Target Yield	2070 Target Yield	2115 Target Yield
D1	AMI	Both	3,882	5,766	9,371
D2	Water Loss Control	Both	9,326	10,918	13,064
D3	CII Ordinances	Both	1,063	1,063	1,063
D4	Benchmarking	Both	-	-	-
D5	Landscape Ordinance	Both	-	-	-
D6	Landscape Incentive	Both	-	-	-
D7	Irrigation Incentive	Both	-	-	-
D8	Lot Scale Stormwater Harvesting	Both	-	-	-
D9	Lot Scale Rainwater Harvesting	Both	-	-	-
D10	Gray Water Harvesting	Both	3,040	8,113	18,632
D11	Building Scale Wastewater Reuse	Both	2,570	7,145	16,021
D12	AC Condensate Reuse	Both	1,084	2,711	5,150
S1	Aquifer Storage and Recovery	Drought	-	-	-
S2	Brackish Groundwater Desal	Both	5,000	5,000	10,000
S3	Direct Non-Potable Reuse	Both	12,000	25,000	54,600
S4	Direct Potable Reuse	Drought	20,000	20,000	20,000
S5	Indirect Potable Reuse	Drought	10,000	10,000	20,000
S6	LCRA Additional Supply	Both	-	-	-
S7	Off Channel Reservoir	Both	-	-	-
S8	Imported Option	Both	-	40,000	84,000
S9	Distributed WW Reuse	Both	3,154	14,467	30,049
S10	Sewer Mining	Both	1,417	3,012	7,168
S11	Community Stormwater	Both	-	-	-
S12	Community Rainwater	Both	-	-	-

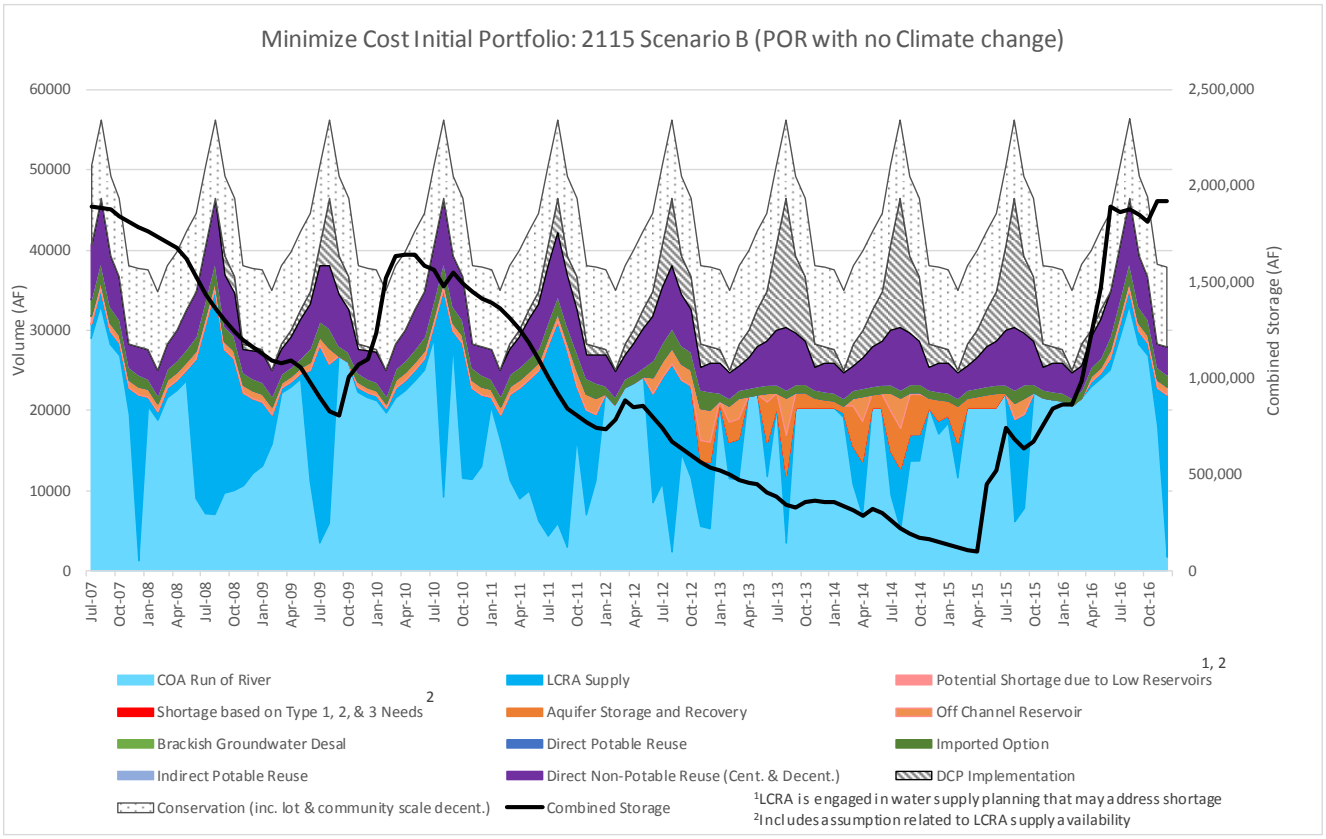
Monthly Time Series Graphs – Year 2115 WAM Results – Initial Portfolios

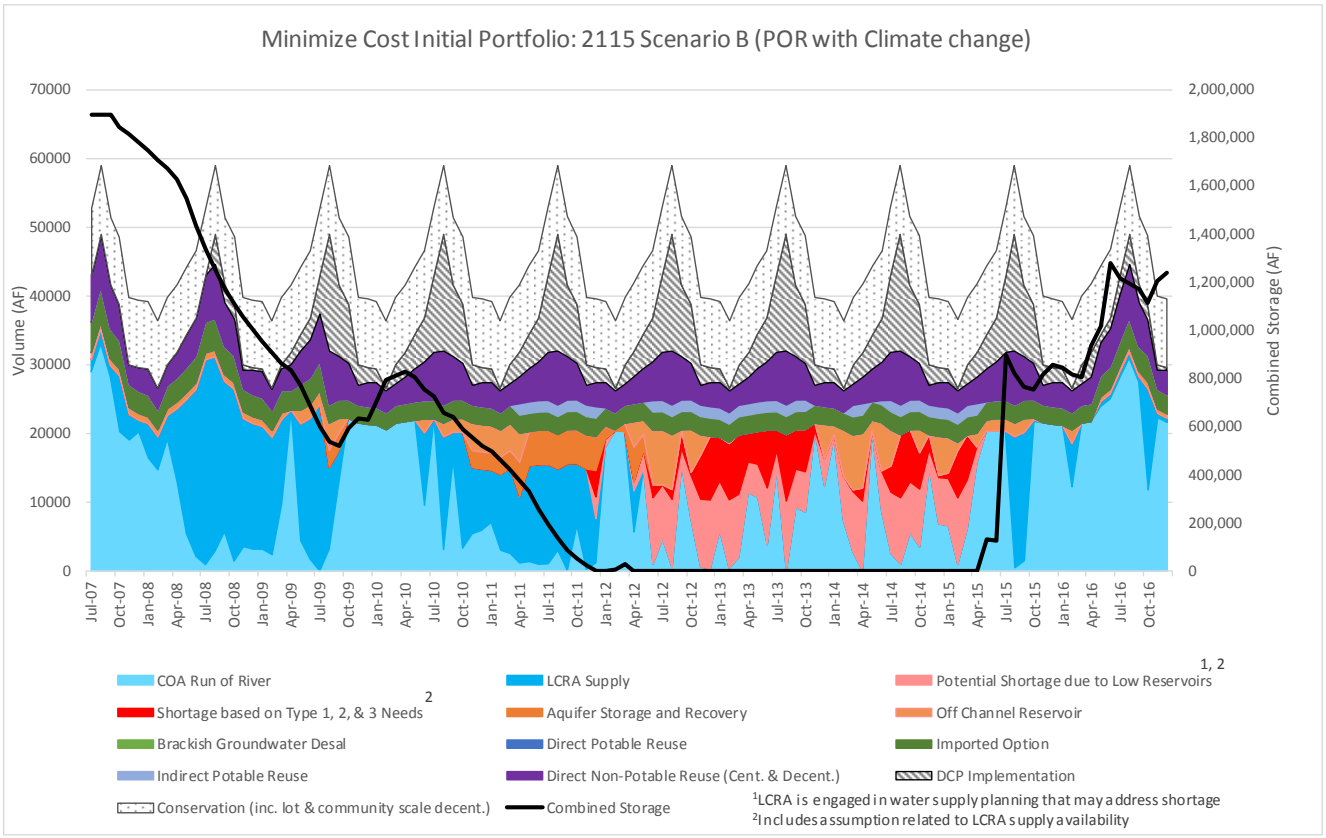
Maximize Conservation Portfolio



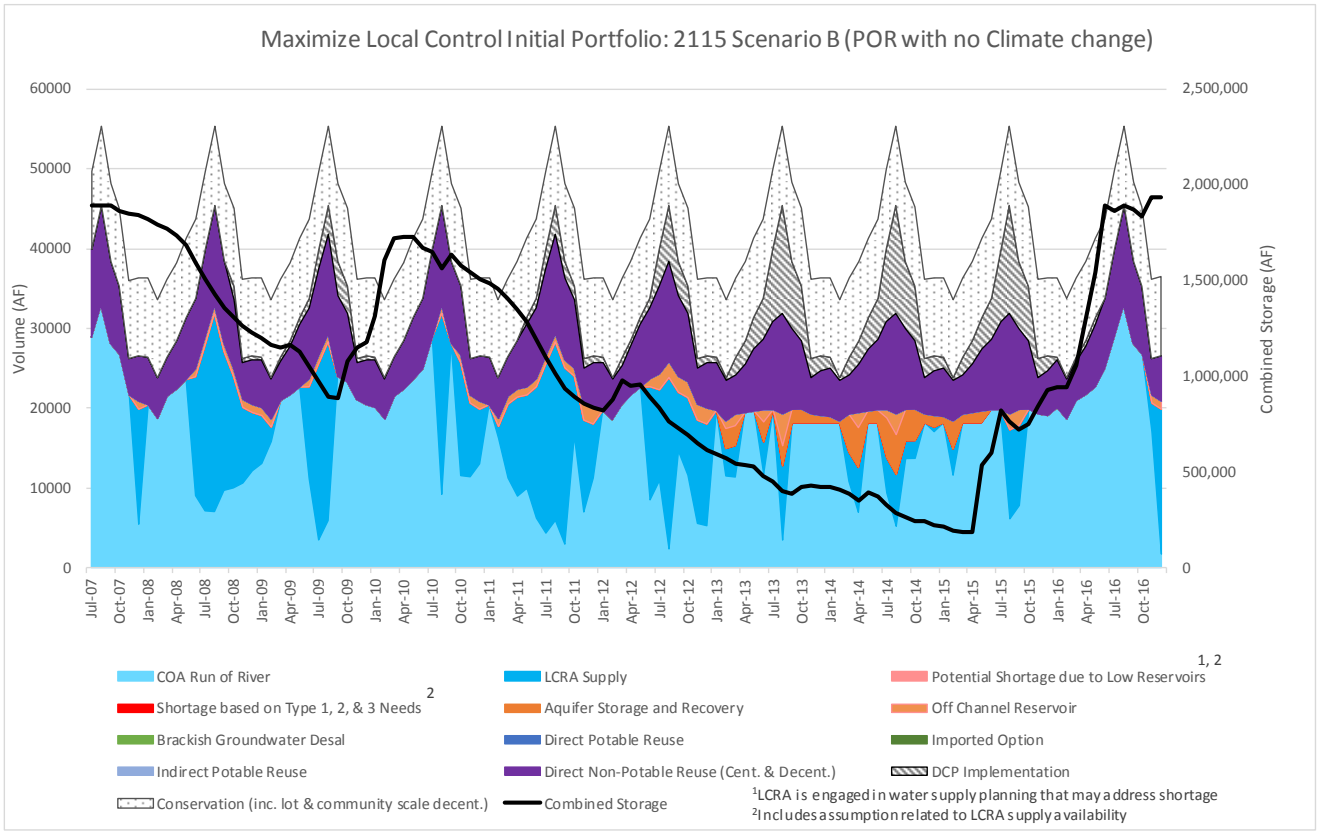


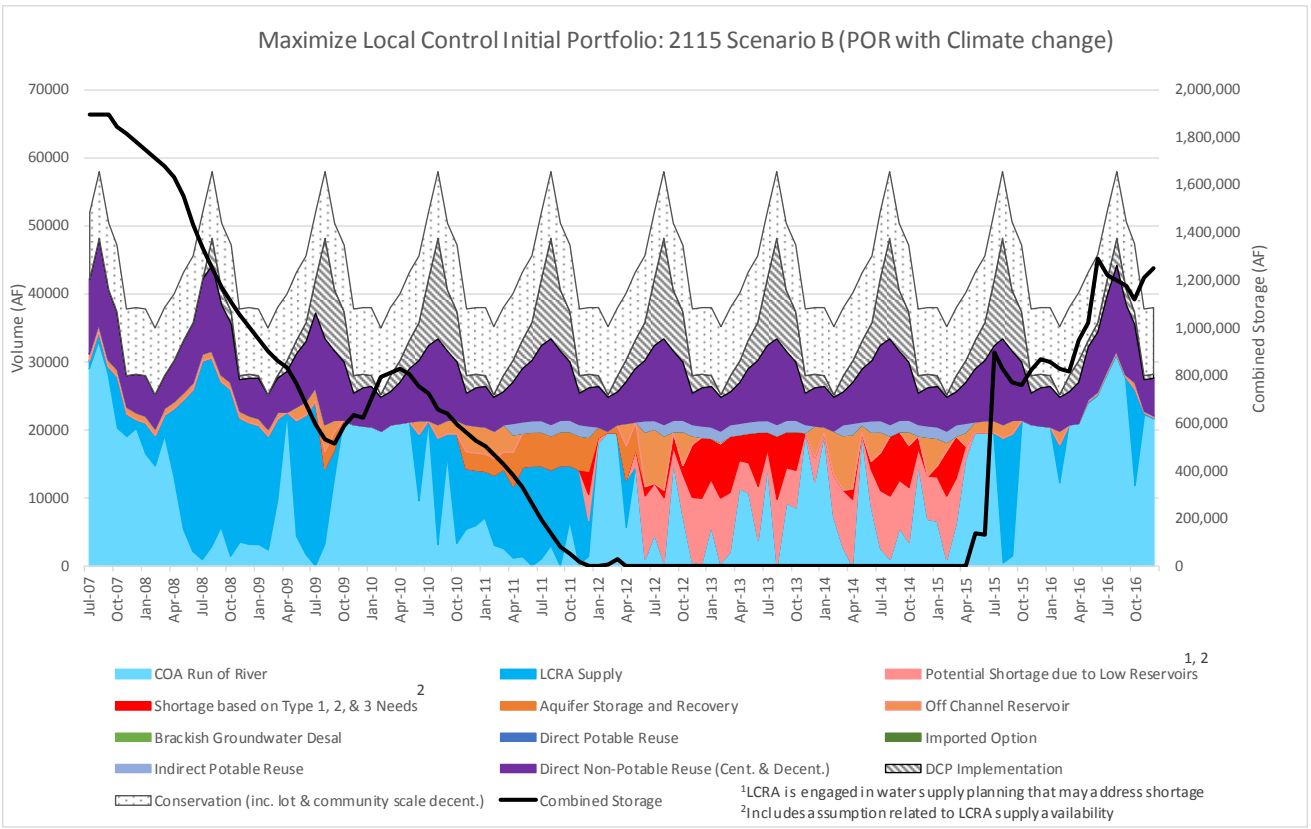
Minimize Cost Portfolio



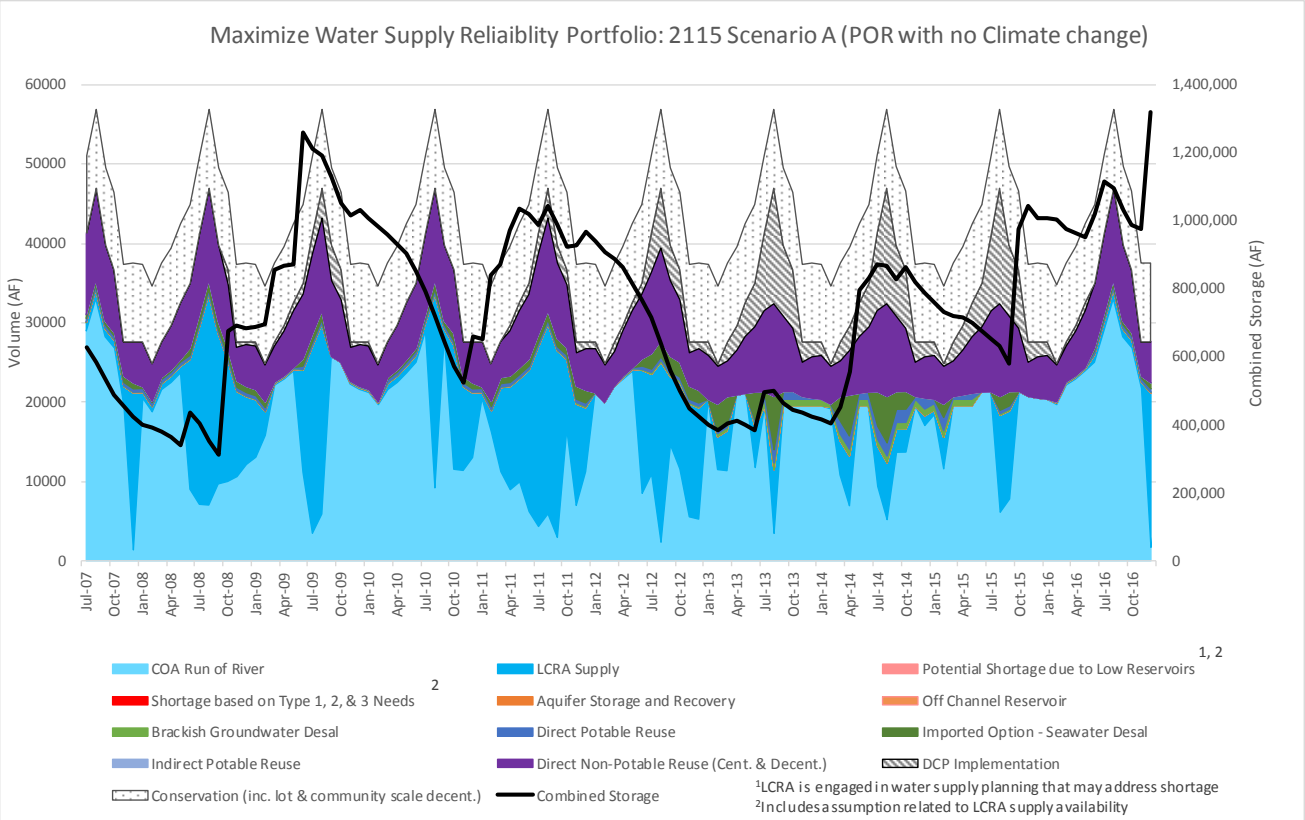


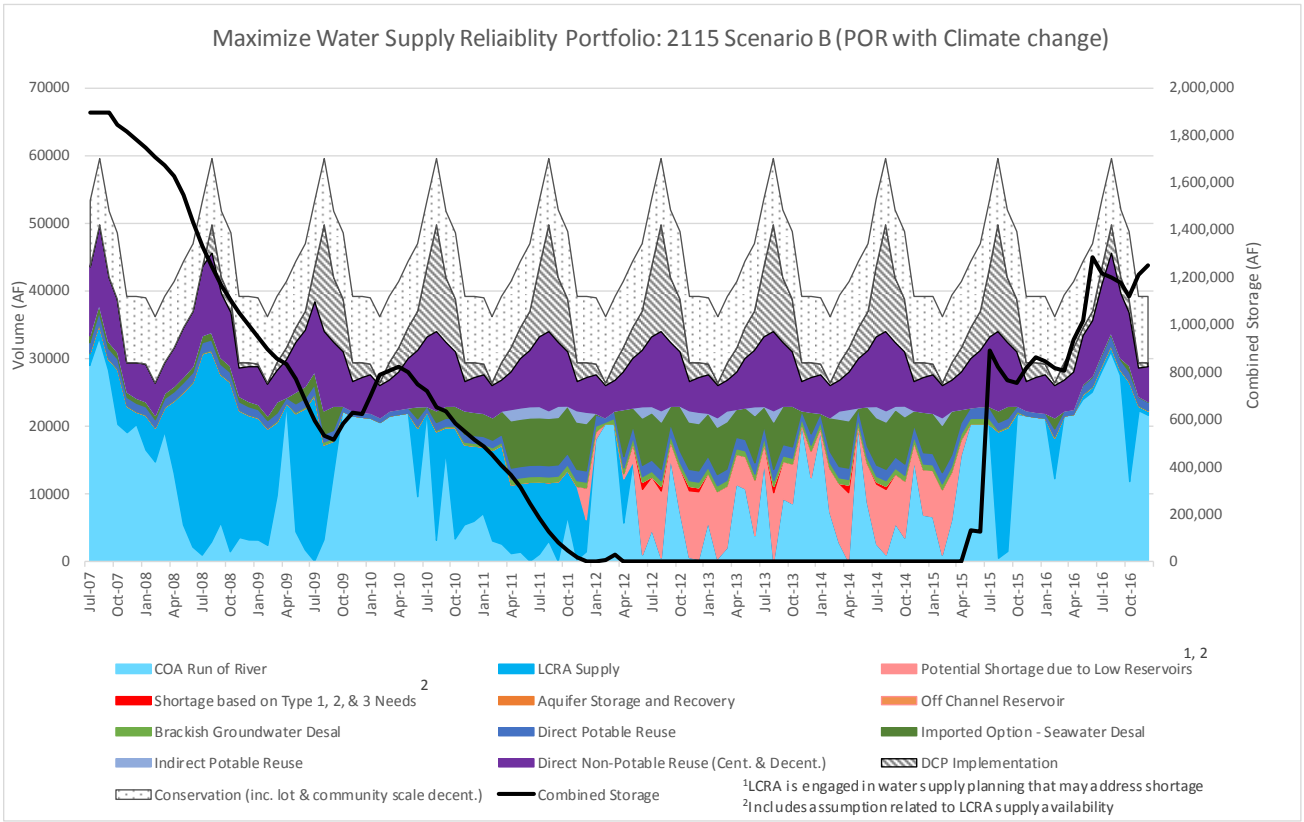
Maximize Local Control Portfolio





Maximize Water Supply Reliability Portfolio





Minimize Implementation Challenges Portfolio