



2020 Integrated Resources Plan

SCENARIO PLANNING

CONSTRUCTING SCENARIOS -QUALITATIVE-QUANTITATIVE ASSESSMENT

Member Agency Technical Workgroup Meeting

July 15, 2020

Objectives for Member Agency Technical Workgroup

- Drivers of Change survey results and how the information will be used
- Discuss the Qualitative-Quantitative Assessment process through examples
 - Methodology used to screen and examination drivers
 - Progress update
 - Opportunities to provide feedback



DRIVERS OF CHANGE SURVEY RESULTS

Drivers of Change Survey



Survey Response Statistics by Driver Board Members – 25 Responses (70%); 13% NA

	Not Impo	ortant	Slight	ly I	Moderate	ely 📃	Very	Extrer	mely Impo	ortant
Stress on River Basins	10%		29%				62%	0		
Rising Sea Level	14%		19%			38%			29%	
Hydrologic Variations	5% 5%			43%				48%		
Increased Costs	5%			55%				27%		14%
Uncertain Economy		25%			45%			10%		20%
Emerging Regulations	5% 10%	%		33%				52%		
Legislative Initiatives	5%		43%				43%	0		10%
Public Trust Initiatives	5%		48%	6			29%			19%
Uncertain Population	10%			55%			5%		30%	
Housing Densities	5%	24%				57%				10% 5%
Consumer Ethic	14%				57%				19%	10%
Public Support	9%		27%			41%			2	3%
Water Policy	11%		26%			47	1%			16%
Colorado River Cooporation	5%			57%					38%	
Regional Collaboration	5%	29%	6			38%			29%	
Treatment Technologies		29%			29%			29%		14%
Stormwater Capture		24%		19%		29%			19%	10%
Direct Potable Reuse		24%			33%			43%	6	
Outages and Disasters	14%	10%	6		33%			43%	6	
Groundwater Contamination		24%		19%		29%			29%	
Groundwater Management	5%		38%			29%			29%	
	10%			0%	1			45%		5%

Survey Response Statistics by Driver Member Agency- 23 Responses (89%); <1% NA

Stress on River Basins	13%		·	39%				48%		
Rising Sea Level	9%	1	26%	3370		39%		4070	26%	1
Hydrologic Variations	179	1	13%			3370	70%		2070	1
Increased Costs	4% 4%	/0	30%		22	%	1078	30	9%	
Uncertain Economy	9%	1	30%	ı	1	35%		9%	70	17%
Emerging Regulations	570	30%				52%	_	570		17%
Legislative Initiatives	4%	1	35%	I			52%			9%
Public Trust Initiatives	4%	1	35%	I		30%	52/0		30%	
Uncertain Population		13%		4	8%			22%		13%
Housing Densities	4%	17%		1	43%	1		26%		9%
Consumer Ethic		22%	· · · · ·	30%		1	35			13%
Public Support	9%	17%			43%				30%	1
Water Policy		35%	·		T	43%			22	2%
Colorado River Cooporation	9%	1		61%	6				30%	
Regional Collaboration		26%		3	0%			43%		
Treatment Technologies	4%	1	35%			35%			17%	9%
Stormwater Capture	179	%	22%		22	%		26%		13%
Direct Potable Reuse	4%	13%		35%				48%		
Outages and Disasters	5%	23%		2	7%			45%		
Froundwater Contamination	9%	13%		3	9%			39	9%	
Groundwater Management	13%		35	5%			43	%		9%
Replenishment	13%		30%			35	%		22	2%

Survey Response Statistics by Driver

Stakeholders-43 Responses (10%); 4.6% NA

	Not Impo	rtant	Slightly		Moderatel	у	Very	Extrem	ely Impoi	rtant
Stress on River Basins	3% 14%	6	30%					54%		
Rising Sea Level	<mark>3%</mark> 3%	19%			43%				32%	
Hydrologic Variations	8%	309	%				62%			
Increased Costs	3% 6%	26%			26%			40	%	
Uncertain Economy	6%	33%	5			33%			28%	
Emerging Regulations	3% 3%	32%				35%			26%	
Legislative Initiatives	9%		36%				36%			18%
Public Trust Initiatives	9%	25%				44%			22	%
Uncertain Population	3%	33%			21%		18%		24%	
Housing Densities	3%	18%		30%			30%			18%
Consumer Ethic	3%	33%				42%			21	L%
Public Support	12%		30%				39%			18%
Water Policy	6% 6%	5	35%				39%			13%
Colorado River Cooporation	4% 11%	6	22%			30%			33%	
Regional Collaboration	3% 3%	22%			44	%			28%	
Treatment Technologies	10%	26%	6			48	%			16%
Stormwater Capture	9%	22%		19	9%			50%		
Direct Potable Reuse	6%	12%		37%				44%		
Outages and Disasters	3% 9%		2	14%			1 1	44%		
Groundwater Contamination	3%	19%			50%				28%	
Groundwater Management	3%	24%			45	%			28%	
Replenishment	3%	33%	·			37%			27%	

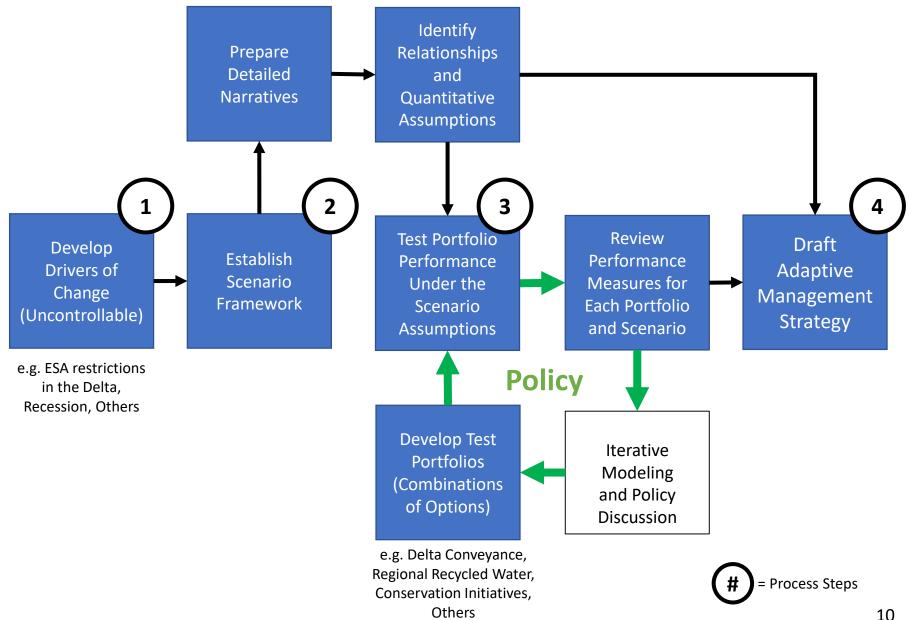
Top 5 Survey Rankings by Cohort Based on Percentage of Responses that Were Extremely or Very Important

Board Members	%	Member Agencies	%	Stakeholders	%
Colorado River Cooperation	95%	Colorado River Cooperation	91%	Hydrologic Variations	92%
Hydrologic Variations	90%	Stress on River Basins	87%	Outages and Disasters	87%
Stress on River Basins	90%	Direct Potable Reuse	83%	Stress of River Basins	84%
Emerging Regulations	86%	Hydrologic Variations	83%	Direct Potable Reuse	81%
Direct Potable Reuse	76%	Groundwater Contamination	78%	Groundwater Contamination	78%
Outages & Disasters	76%				

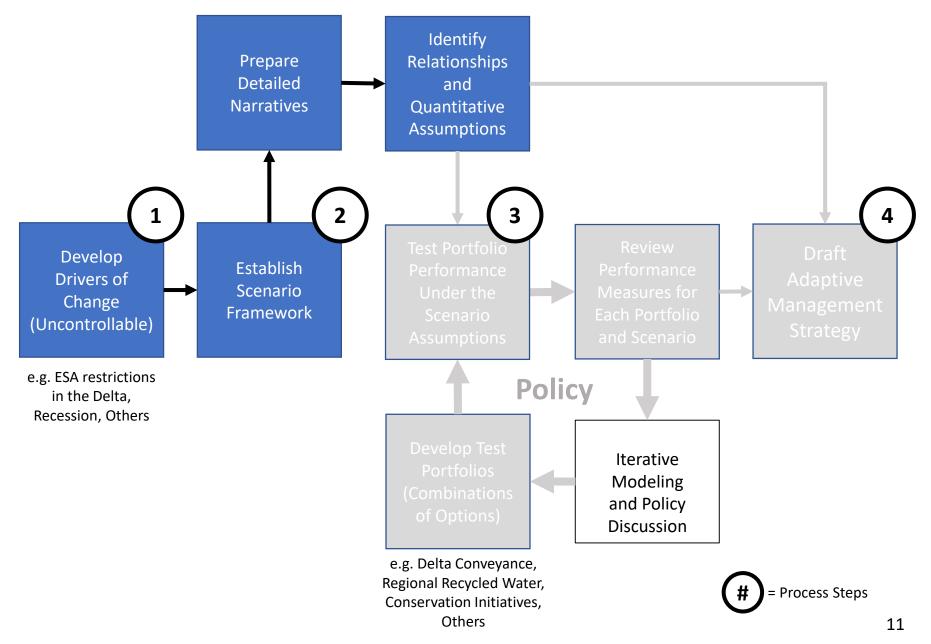


CONSTRUCTING SCENARIOS -RECAP OF PROCESS

2020 IRP Process Flow Chart

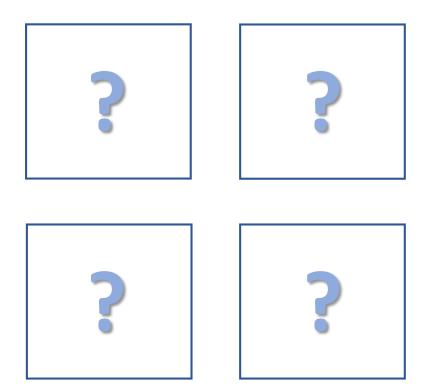


2020 IRP Process Flow Chart



Constructing Scenarios

Develop Scenario Descriptions for Plausible Futures



Metropolitan's Scenarios will have different views of the future, each with varying conditions on supply and demands

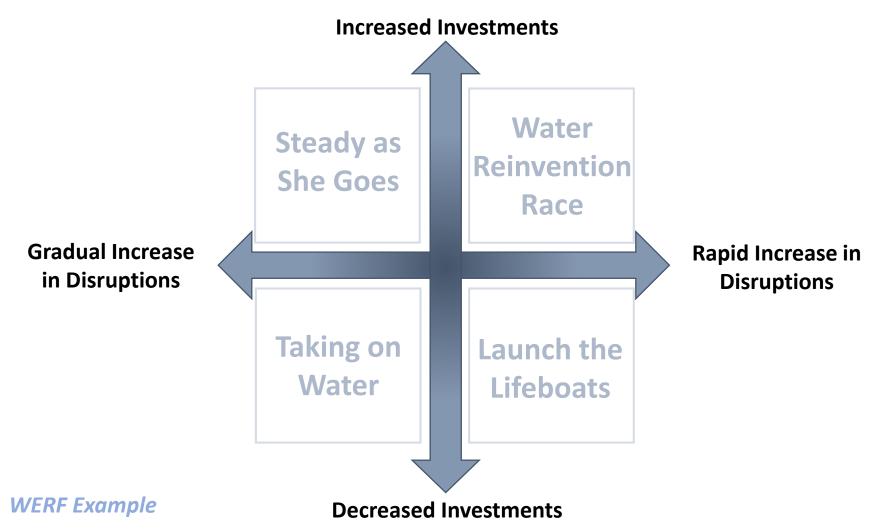
Constructing Scenarios

Develop Scenario Descriptions for Plausible Futures

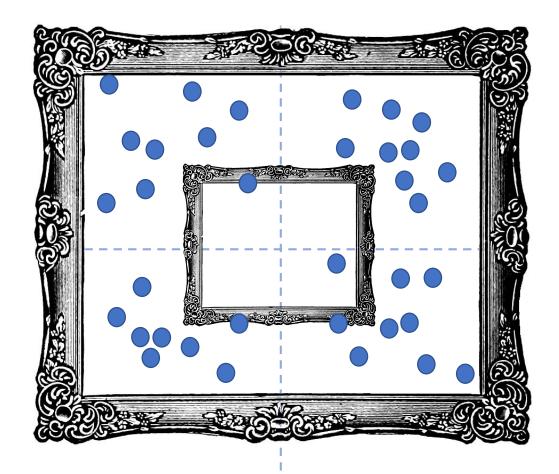


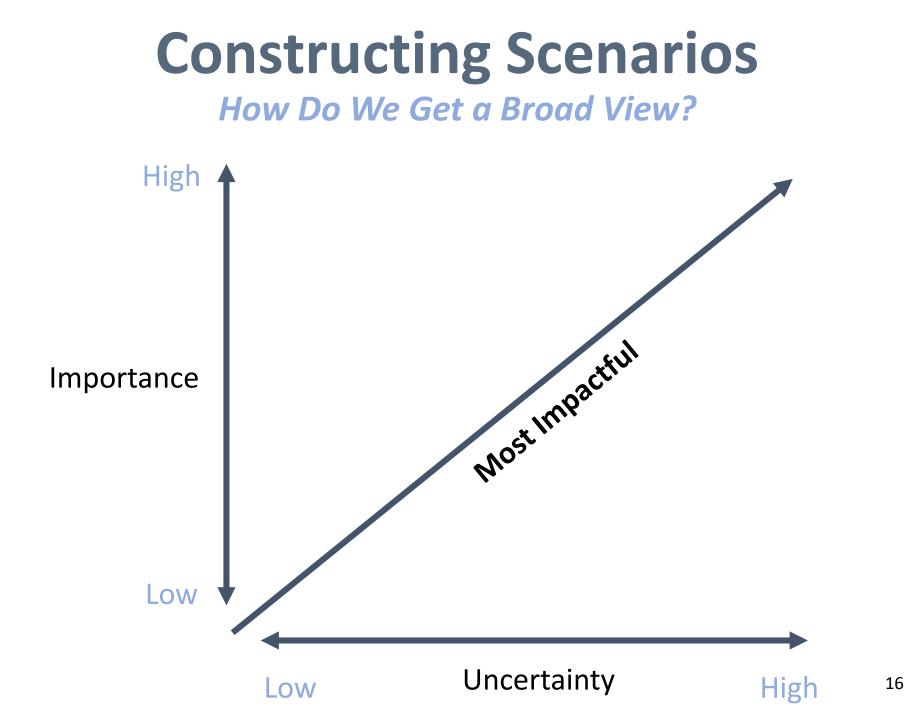
Constructing Scenarios

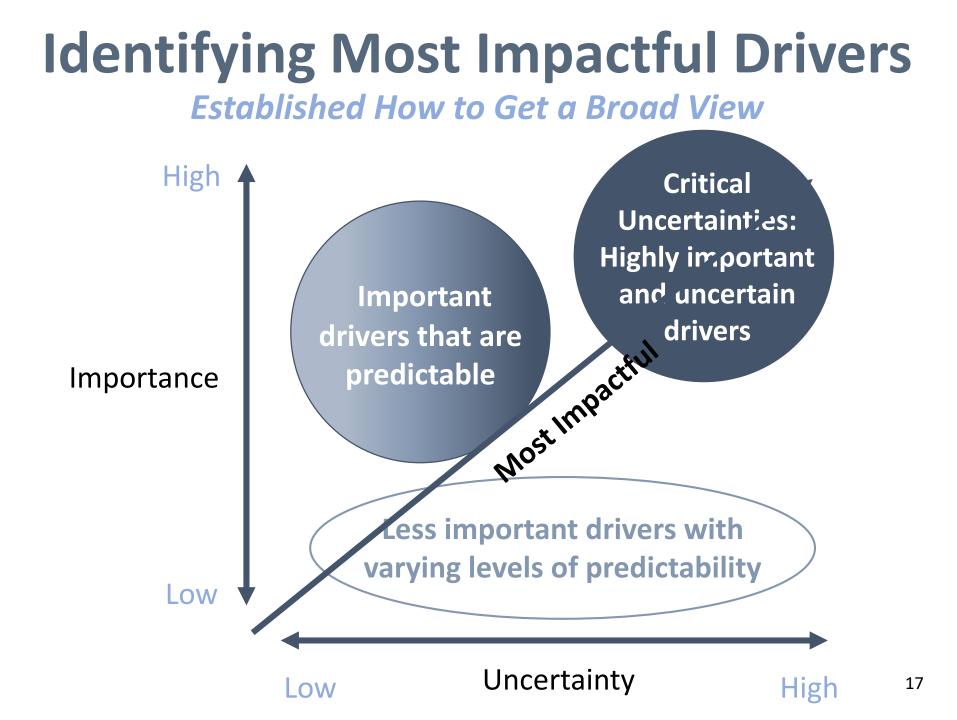
Identifying Scenario Framework to Allow for a Broad View



Constructing Scenarios *Why a Broad View?*

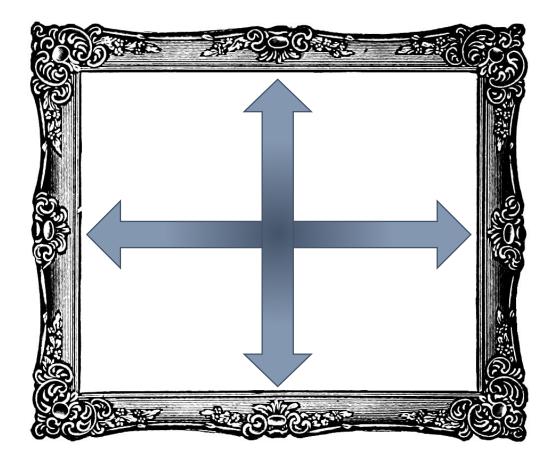




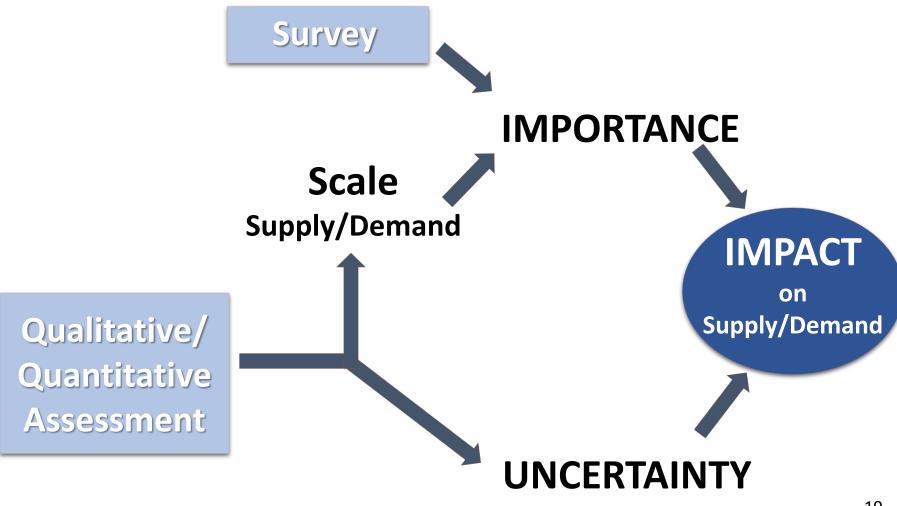


Utilizing All Drivers

Examine Other Drivers Within this Framework



Determining Most Impactful Drivers Inclusive Process with Member Agency Feedback





CONSTRUCTING SCENARIOS -QUALITATIVE/ QUANTITATIVE ASSESSMENT

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Qualitative-Quantitative Assessment Objectives

- Examine and organize the drivers
- Determine supply and demand links to the drivers
- Identify quantification methods and tools

 available and/or needed
- Identify data and input needs
- Open and iterative process

Connecting Drivers to the Analysis: *Supply – Demand Links*

- Makes explicit how the drivers affect supply/demand
- Identifies what needs to be quantified
- Identifies how we will quantify
 - Calculate using existing model approaches
 - Approximate where models do not exist or are not flexible
- Relates with geographic location

Single-Family Residential Pre-Conservation Retail Demand

Inputs

- Population
- Median Income
- Median Lot Size
- Retail Price
- Temperature
- Rainfall
- Occupied Households

Change to Reflect:

- Economic Outlook
- Demographic Change
- Average Climate Outcomes
- Outdoor Water Use

Change to Reflect:

- Behavioral Change
- Response to Price

Model Parameters

 How much water use per each unit of input

Outcomes Reflect:

 Demands given changes to Inputs and Model Parameters

> Result SFR Retail Demand

Commercial/Industrial Pre-Conservation Retail Demand

Inputs

- Retail Price
- Cooling Degree Days
- Average Max Temp
- Manufacturing Job Share
- Total Jobs

Change to Reflect:

- Economic Outlook
- Demographic Change
- Average Climate Outcomes

Change to Reflect:

Behavioral Change

Model Parameters

 How much water use per each unit of input

Outcomes Reflect:

 Demands given changes to Inputs and Model Parameters

CII Retail Demand

CALSIM State Water Project Model

Inputs

- Land Use
- River flow Hydrology

Change to Reflect:

- Economic Outlook
- Climate Change

Change to Reflect:

- Regulatory Outlook
- Operational Requirements
- System Changes

Model Parameters

- System Facilities and Capacities
- Operational Rules
- Regulatory Rules

Outcomes Reflect:

 Supply given changes to Inputs and Model Parameter

> Result SWP Allocation

Demand & Conservation Models

Single Family Residential (Pre-Conservation)

• MWD-EDM SFR

Multi-Family Residential (Pre-Conservation)

• MWD-EDM MFR

Commercial/Industrial/Institutional (Pre-Conservation)

• MWD-EDM CII

Agricultural (Retail Level) Replenishment for Groundwater Seawater Barrier

• Member Agency Survey

Active Conservation

- MWD Conservation Model (for accounting)
- Alliance for Water Use Efficiency Model (for planning)

Code-Based Conservation

• MWD Conservation Model

Price-Based Conservation

• MWD-EDM

System Loss

• Member Agency Survey

Retail Demand Response to Weather

• MWD-Fore

Resource (Supply) Models

State Water Project & Colorado River

CRSS/IRPSIM

Los Angeles Aqueduct

• LAASM (from LADWP)

Groundwater

• Member Agency Survey + Groundwater Agency Input + Safe/Adjudicated Yield

Surface Water

• Member Agency Survey + MWD regression model

Recycled Water & Groundwater Recovery

• Member Agency Survey + MWD regression model (for growth to ultimate yield)

Seawater Desalination

• Member Agency Survey

Regional Storage Portfolio Use and Operation & Water Transfers

• IRPSIM

Qualitative–Quantitative Assessment Process

- Initial Screening:
 - Can you calculate **Supply–Demand Links** of the driver?
- Does it impact supply?
 - How does it affect supply?
 - What is the scale of supply effect?
 - Can you quantify the supply effect?
- Does it impact demands (Consumptive and Replenishment)?
 - How does it affect demands?
 - What is the scale of demand effect?
 - Can you quantify the demand effect?



Category: Demographic Changes

Driver:

Uncertainty Regarding Population Projections

SCREENING

Can you calculate Supply-Demand Links given the driver? **YES, utilizing expert demographer input**

Example 1: Summary of Changes

BEFORE:

Category	Driver
Demographic Changes	Uncertainty Regarding Population Projections

AFTER: Identified Supply-Demand Link: Growth rate of population - MWD Service Area



Category: Demographic Changes

Driver:

Uncertainty Regarding Population Projections

Supply – Demand Link: Growth Rate of Population

> Location: MWD Service Area

Example 1: Demographic Changes

Uncertainty Regarding Population Projections Growth Rate of Population MWD Service Area

<u>SUPPLY</u>

- Does this driver affect supply? **NO**
- What is the scale of effect? N/A
- Can you quantify the supply effect? N/A

Example 1: Demographic Changes

Uncertainty Regarding Population Projections Growth Rate of Population MWD Service Area

CONSUMPTIVE DEMAND

- Does this driver affect demand? YES
- Can you quantify the demand effect? YES

How does it affect demand?	What is the Scale Effect?	How can you quantify the demand effect?
Increase in retail demand	Large	MWD-EDM - population Input
Changes in household size	Large	MWD-EDM - population Input
Changes in employment	Large	MWD-EDM - employment Input

Example 1: Demographic Changes

Uncertainty Regarding Population Projections Growth Rate of Population MWD Service Area

REPLENISHMENT DEMAND

- Does this driver affect demand? NO
- What is the scale of effect? N/A
- Can you quantify the demand effect? N/A



Category: Climate Change

Driver: Hydrologic Variations and Extremes

SCREENING

Can you calculate Supply-Demand Links given the driver? YES, using Global Climate Model and hydrology models

Example 2: Summary of Changes

BEFORE:

Category	Driver
Climate Change	Hydrologic Variations and Extremes
AFTER:	Expanded
Category	Driver
Category Climate Change	Driver Warming Temperatures

- Identified several Supply-Demand Links
 - i.e., Changing Runoff Quantity SWP Watershed



Category: Climate Change

Driver: Changing Precipitation

Supply–Demand Link: Changing Runoff Quantity

Location: SWP Watershed

Example 2:

Climate Change Changing Precipitation *Changing Runoff Quantity SWP Watershed*

<u>SUPPLY</u>

- Does this driver affect supply? YES
- Can you quantify the supply effect? YES

How does it affect supply?	What is the Scale Effect?	How can you quantify the supply effect?
Changes in Delta inflow	Large	CalSIM input hydrology
Changes in regulatory needs	Small	CalSIM input hydrology

Example 2:

Climate Change

Changing Precipitation *Changing Runoff Quantity SWP Watershed*

CONSUMPTIVE DEMAND

- Does this driver affect demand? NO
- What is the scale of effect?
 N/A
- Can you quantify the demand effect? N/A

REPLENISHMENT DEMAND

- Does this driver affect demand? **NO**
- What is the scale of effect?
 N/A
- Can you quantify the demand effect? N/A

Category: Groundwater Impacts

Drivers:

Groundwater Availability Due to Contaminations, Impacts of Mandatory Groundwater Management, Impacts on Replenishment

SCREENING

Can you calculate Supply-Demand Links given the drivers? **NO**

Example 3: Summary of Changes

BEFORE:

Category	Driver	_
Groundwater Impacts	Impacts on Replenishment	- Output
Groundwater Impacts	Impacts of Mandatory Groundwater Management	- Merged
Groundwater Impacts	Groundwater Availability Due to Contaminants	
AFTER:		
Category	Driver	
Legislative and Regulatory	Emerging Regulatory Requirements	
Category	Driver	Category
Groundwater Impacts		Removed

- Identified several Supply-Demand Links
 - i.e., Emerging Contaminant Regulations in MWD Service area

Category: Legislative and Regulatory

Driver: Emerging Regulatory Requirements

Supply–Demand Link: Emerging Contaminants Regulations

Location: MWD Service Area

Legislative and Regulatory

Emerging Regulatory Requirements *Emerging Contaminant Regulations MWD Service Area*

<u>SUPPLY</u>

- Does this driver affect supply? YES
- Can you quantify the supply effect? YES

How does it affect supply?	What is the Scale Effect?	How can you quantify the supply effect?
Loss of groundwater production without additional treatment	Large	Estimate by monitoring data

Legislative and Regulatory

Emerging Regulatory Requirements

Emerging Contaminant Regulations MWD Service Area

CONSUMPTIVE DEMAND

- Does this driver affect demand? **NO**
- What is the scale of effect? N/A
- Can you quantify the demand effect? N/A

Legislative and Regulatory

Emerging Regulatory Requirements

Emerging Contaminant Regulations MWD Service Area

REPLENISHMENT DEMAND

- Does this driver affect demand? YES
- Can you quantify the demand effect? NO

How does it affect demand?	What is the Scale Effect?	How can you quantify the demand effect?
Changes in replenishment needs/quantity	Small	N/A

Before

Number of categories: 8 Number of drivers: 22 Number of Supply-Demand Links: 50

<u>After</u> Number of categories: 7 Number of drivers: 19 Number of Supply-Demand Links : 63

Technical Workgroup Partnering

- Review and provide comments on draft qualitative assessment spreadsheet
- Help identify quantification tools
- Help with approximations
- Identify and provide data
- Ensure internal consistency

IRP Process Schedule

2020

Steps	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2. Construct Scenarios								
2.1 Qualitative Assessment							Addi	tional
2.2 Quantitative Assessment				-				tions eded
2.3 Scenario Framework								
2.4 Scenario Narratives								
2.4 Supply/Demand Gap calc.					\rightarrow			

= Metropolitan Board, Member Agency Input and Review Throughout the Process (examples only)

WHAT'S NEXT

- Continue Qualitative-Quantitative Assessment of Drivers
- Construct Scenarios

