CHINO BASIN WATERMASTER

2020 OBMP Update

Listening Session #1
January 15, 2019

Agenda

- Introductory Remarks
- History of the OBMP and its Implementation
- Rationale for an Update of the OBMP
- Summary and Next Steps

Why was the OBMP created?

- Paragraph 41 of the Judgment provides that "Watermaster, with advice of the Advisory and Pool Committees, is granted discretionary powers in order to develop an optimum basin management program 26 for Chino Basin, including both water quantity and quality considerations."
- Confronted with the then-existing challenges and opportunities facing the Basin, Judge Gunn ordered Watermaster to complete an OBMP by June 30, 2000.

How was the OBMP developed?

- Parties convened twice-a-month meetings and several workshops to develop the technical features of the OBMP and the implementation agreement
- Elapsed time from Court Order in February 1998 to start of implementation in July 2000 ~ 30 months
- Open, transparent, stakeholder process
- Stakeholders created a mission statement and core values to guide OBMP development process

- **Mission Statement**: *Develop a groundwater management program that enhances the safe yield and the water quality of the Basin, enabling all groundwater users to produce water from the Basin in a cost-effective manner.*
- **Core Values**:
  - ***Water Quality**: Maintain and enhance beneficial uses*
  - ***Long View**: Ensure stable planning and management*
  - ***Increase Local Supplies***
  - ***Manage Groundwater Storage**: Maximize water quality and reliability; minimize the cost of water supply for all producers*
  - ***Recharge**: Increase recharge of storm and recycled waters to maintain and enhance basin yield and water quality*
  - ***Cost:** Utilize poor-quality groundwater in a cost-effective and efficient manner*

Technical features of OBMP were developed by:

1. Compiling available data and defining the State of the Basin
2. Soliciting and considering all stakeholder issues, needs and wants
3. Asking the parties to clearly articulate management goals, the impediments to the goals and the expected result of removing the impediment (Table 3-8 from OBMP report)
4. Developing specific programs, facility plans and operating schemes to remove the impediments to the goals → nine OBMP Program Elements
5. Preparing a "time-certain" implementation plan for each Program Element

OBMP Program Elements

- Comprehensive Groundwater Monitoring – PE 1
- Comprehensive Recharge Program – PE 2
- Water Supply Plan for Impaired Areas – PE 3
- Subsidence Management Program – PE 4
- Regional Supplemental Water Program – PE 5
- Cooperative Programs with Regulators – PE 6
- Salinity Management Program – PE 7
- Storage Management Program – PE 8
- Storage and Recovery Program – PE 9

Peace Agreement

- The Peace Agreement provided the legal structure to enable binding commitments among the parties to the Judgment.
- The Agreement was unanimously supported by the Advisory and Pool Committees, the State of California and the individual members of the Appropriative Pool.
- Opened the door to state and federal funding >$100M
- Construction of 50 mgd of desalting capacity and the safe storage of 600 AF of water.

OBMP Programmatic EIR (PEIR)

- Why the programmatic approach to environmental compliance pursuant to CEQA for the OBMP?
- PEIR work began in 1999 and concluded in July 2000
- Environmental setting for the OBMP PEIR was substantially different in 2000 compared to today
  - Recycled-water discharges to Prado Basin were greater
  - Endangered species issues were much simpler

OBMP PEIR

- Only one potentially significant adverse impact identified in the PEIR: operational, cumulative air quality due to energy consumption
- Statement of overriding considerations adopted by the IEUA Board in 2000.
- The water issues encountered at each stage of OBMP implementation were addressed at those times.

OBMP PEIR

- All specific projects implemented between 2000 and 2010 relied on the PEIR and the subsequent Facilities Master Plans PEIR for environmental findings
- Subsequent EIRs:
  - Peace II Project SEIR (2010): Desalter Expansion, Basin Reoperation and Hydraulic Control
  - IEUA Facilities Master Plan PEIR (2016): Six IEUA Master Plans evaluated
- PEIR/SEIRs have been assisted successful grant applications

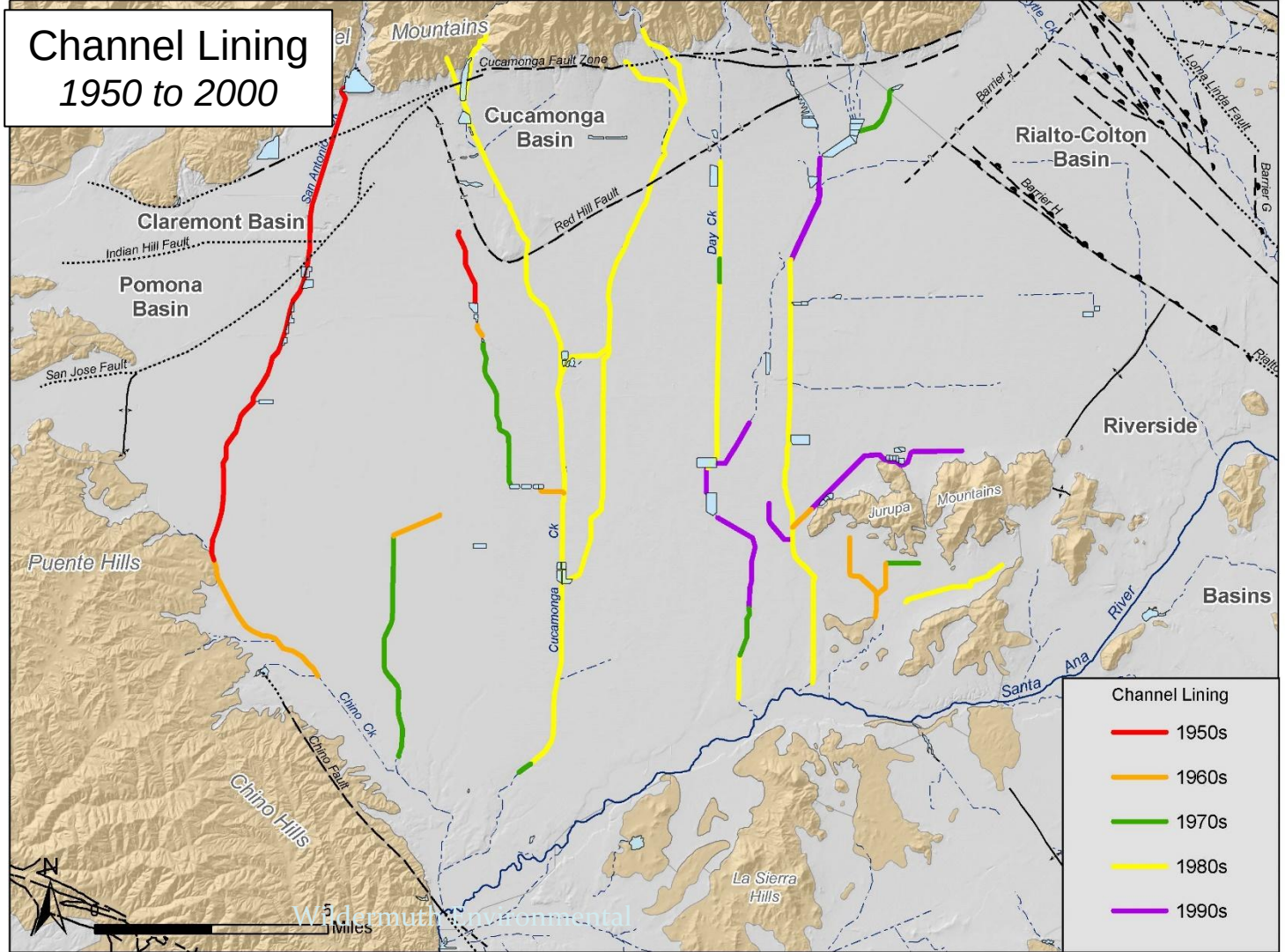
OBMP Implementation

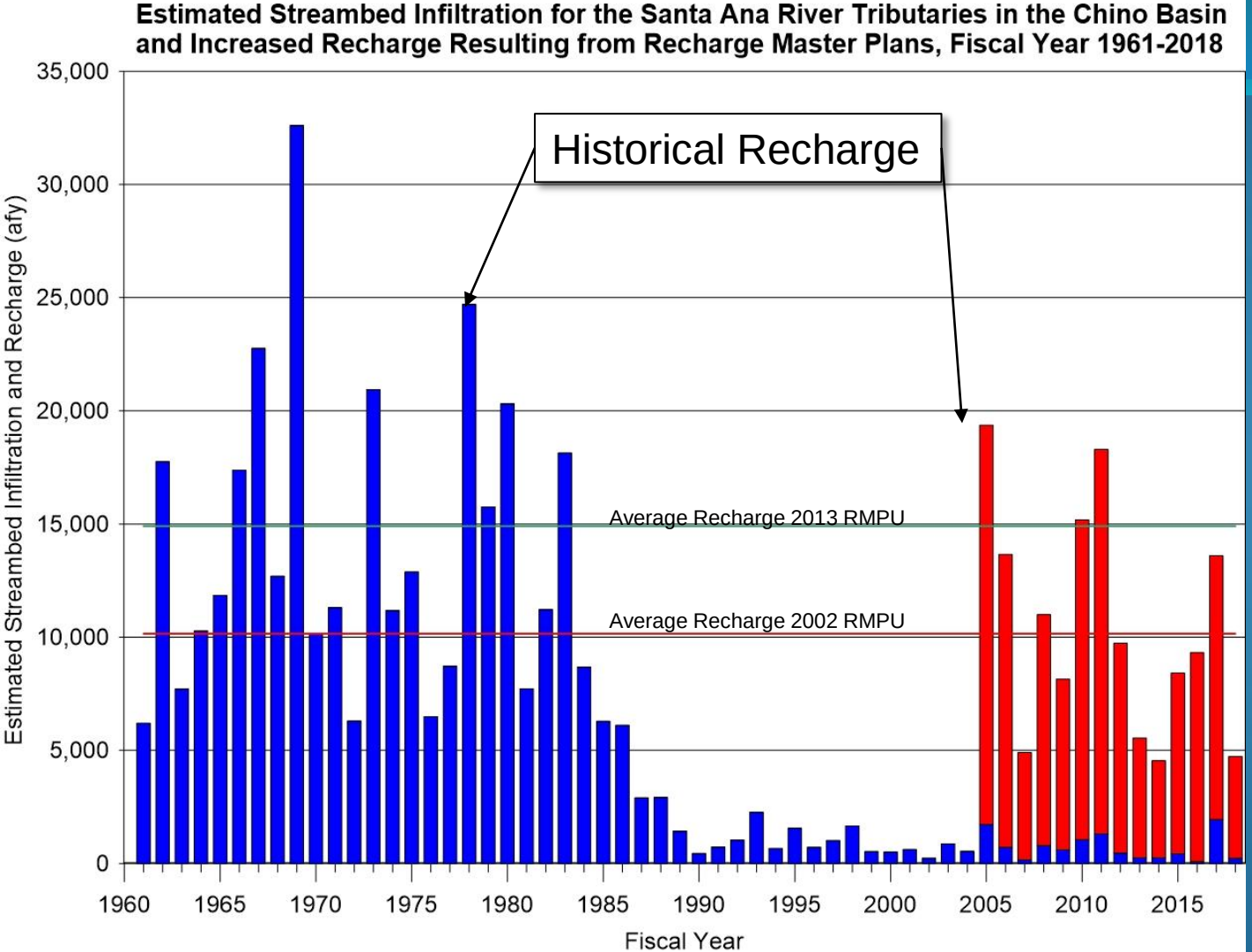
- What did we accomplish in implementing the OBMP?
- Costs/Benefits
- What did we not accomplish?

Storm and supplemental water recharge

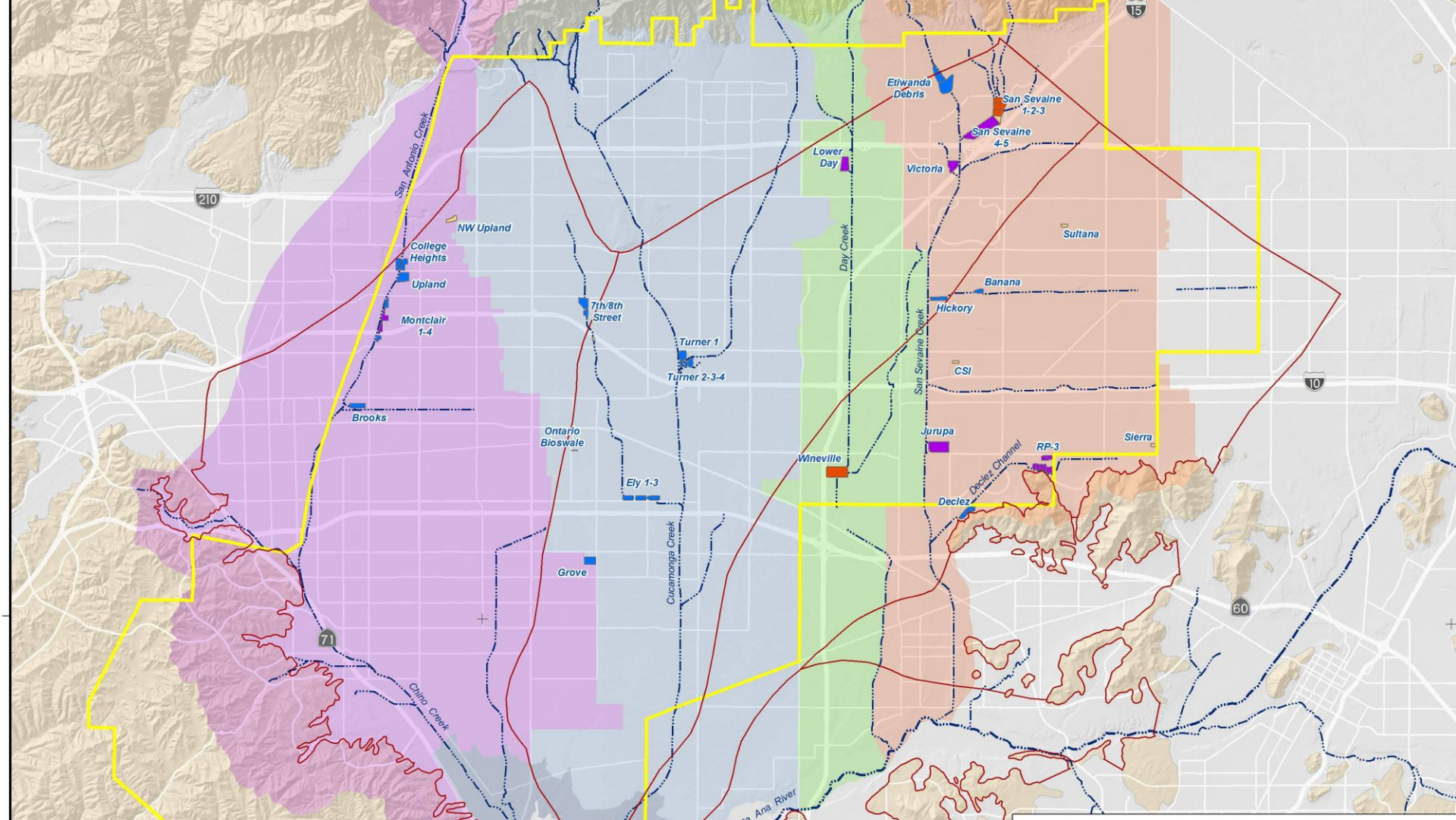
- Urbanization and flood control improvements reduced groundwater recharge and net recharge
- Existing recharge capacity was insufficient to meet Replenishment and other basin management needs.
- Recharge master plans were completed in 2002, 2013 and 2018
  - Recharge improvements have been completed at 20 existing and new recharge facilities
  - Additional improvements will be completed by 2021
  - Cumulative RMP stormwater recharge through 2018 is 137,000 af
  - Cumulative imported water recharge through 2018 is 196,000 af

Channel Lining
1950 to 2000





By 2021, the OBMP recharge projects implemented by Watermaster, IEUA , CBWCD and SBCFCD will have mitigated the stormwater recharge lost through channel lining


Etiwanda Debris
San Sevaine 1-2-3
San Sevaine 4-5
Lower Day
Victoria
Sultana
Banana
Hickory
CSI
Jurupa
RP-3
Sierra
Declez Channel
Declez
Wineville
Turner 1
Turner 2-3-4
7th/8th Street
NW Upland
College Heights
Upland
Montclair 1-4
Brooks
Ontario Bioswale
Ely 1-3
Grove
San Antonio Creek
Day Creek
San Sevaine Creek
Cucamonga Creek
Chino Creek
210
15
10
60
71

21 Recharge facilities were improved:

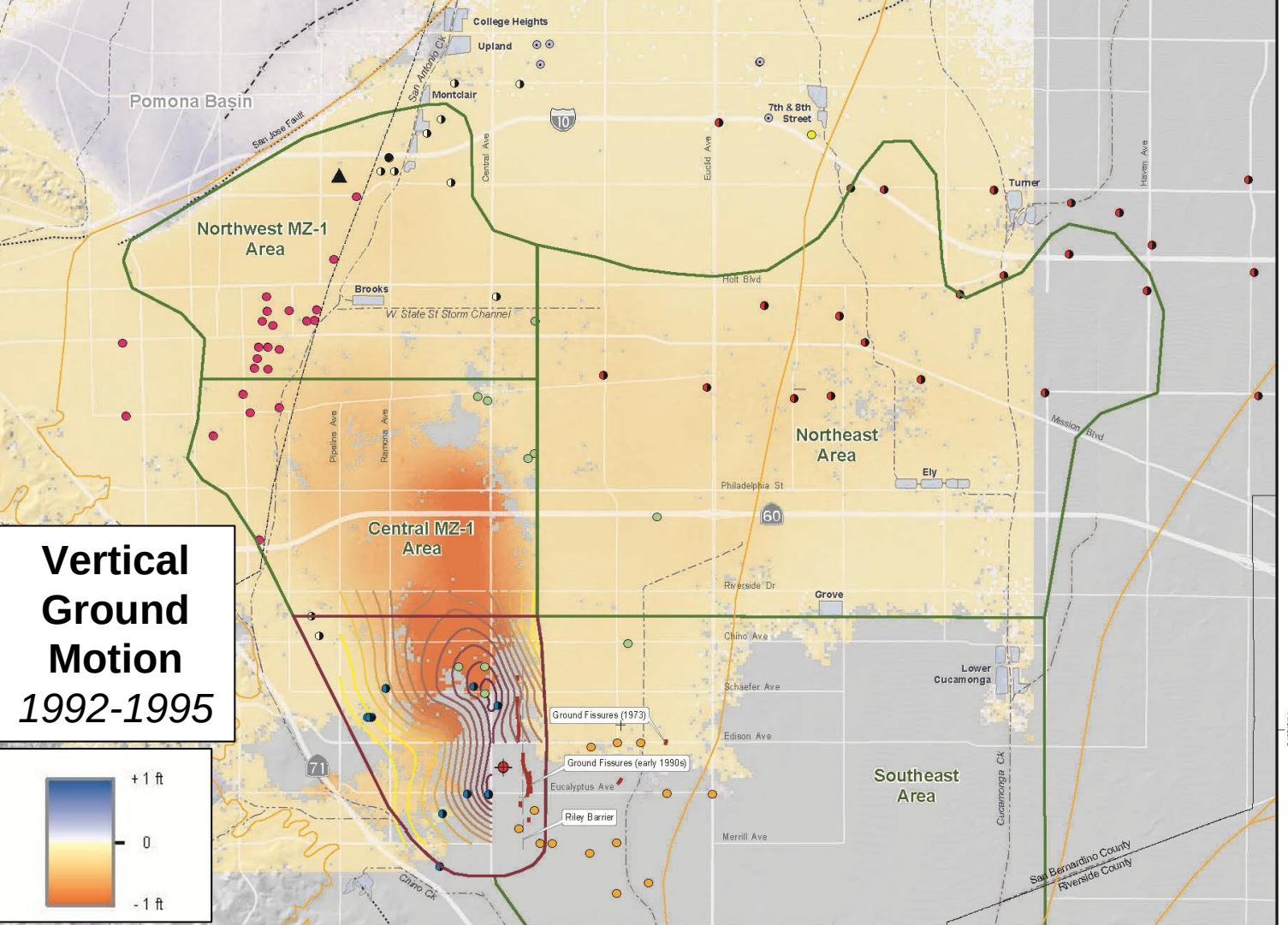
- Storm water recharge increased by 9,000 afy in 2006 and will increase to 13,800 afy in 2021
- Supplemental recharge capacity increased by 26,700 afy
- Recycled water recharge increase by 16,000 afy

Land subsidence management

- Land subsidence and ground fissuring occurred in the City of Chino in the early 1990s
- Subsidence management plans were adopted in 2007; updated in 2015
  - Subsidence has reduced in the "MZ-1 Managed Area" to what appears to be tolerable rates. Monitoring is ongoing.
  - The monitoring program has revealed other areas of ongoing land subsidence.
    - Northwest MZ-1
    - Northeast Area (central MZ-2)

Land subsidence management

- A similar approach to developing subsidence-management strategies is being employed in these areas:
  - Monitoring and investigations
  - Modeling to assist development of management strategies
  - Stakeholder engagement
- Management plan for Northwest MZ-1 will be developed in the next few years



Vertical Ground Motion
1992-1995

Contours of Relative Change in Land Surface Altitude as Measured by Leveling Surveys 1987 to 1999

0.0 ft

-2.2 ft

Relative Change in Land Surface Altitud as Measured by InSA Sep-1992 to Dec-199

+1 ft

0

-1 ft

InSAR data abs (incoherent)

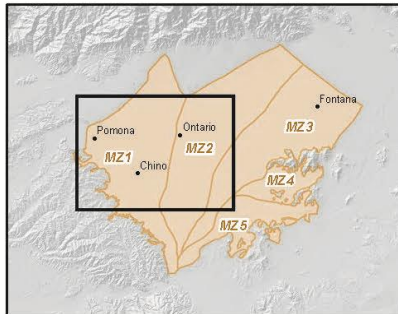
Active Production Wells by Owner: 1987 to 1999

- Ontario
- Pomona
- SAWCo
- Upland
- GSWC
- CIM
- Chino Hills
- Chino
- MVWD

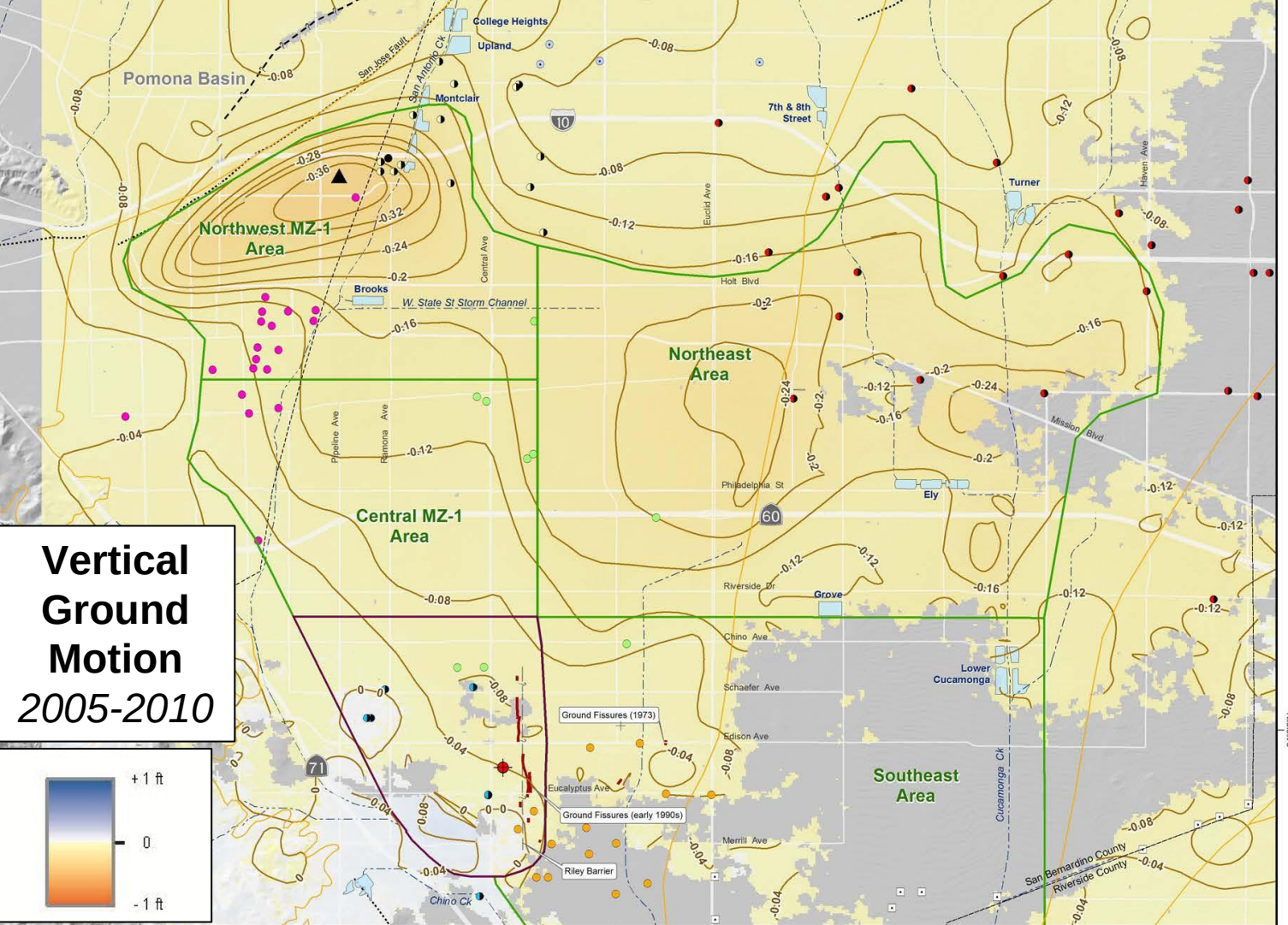
- Northwest MZ-1 InSAR Measurement Point
- Ground Fissures
- Ayala Park Extensometer
- Streams & Flood Control Channels
- Flood Control & Conservation Basins
- MZ-1 Managed Area
- Areas of Subsidence Concern

Faults

- Location Certain
- Location Approximate
- Approximate Location of Groundwater Barrier
- Location Conce
- Location Uncert



34°0'0"N



Vertical Ground Motion
2005-2010

+1 ft
0
-1 ft

Relative Change in Land Surface Altitude as Measured by InSAR Jun-2005 to Sep-2010

+1 ft
-0.04
0
-1 ft

InSAR data absent (incoherent)

Active Production Wells by Owner: 1996 to 2000

- Ontario
- Upland
- Chino Hills
- Pomona
- GSWC
- Chino
- SAWCo
- CIM
- MVWD

- Northwest MZ-1 InSAR Measurement Point
- Chino Basin Desalter Authority Well
- Ground Fissures
- Ayala Park Extensometer
- Streams & Flood Control Channels
- Flood Control & Conservation Basins
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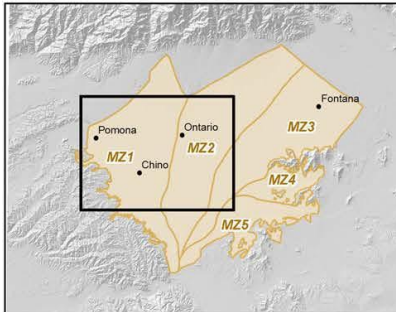
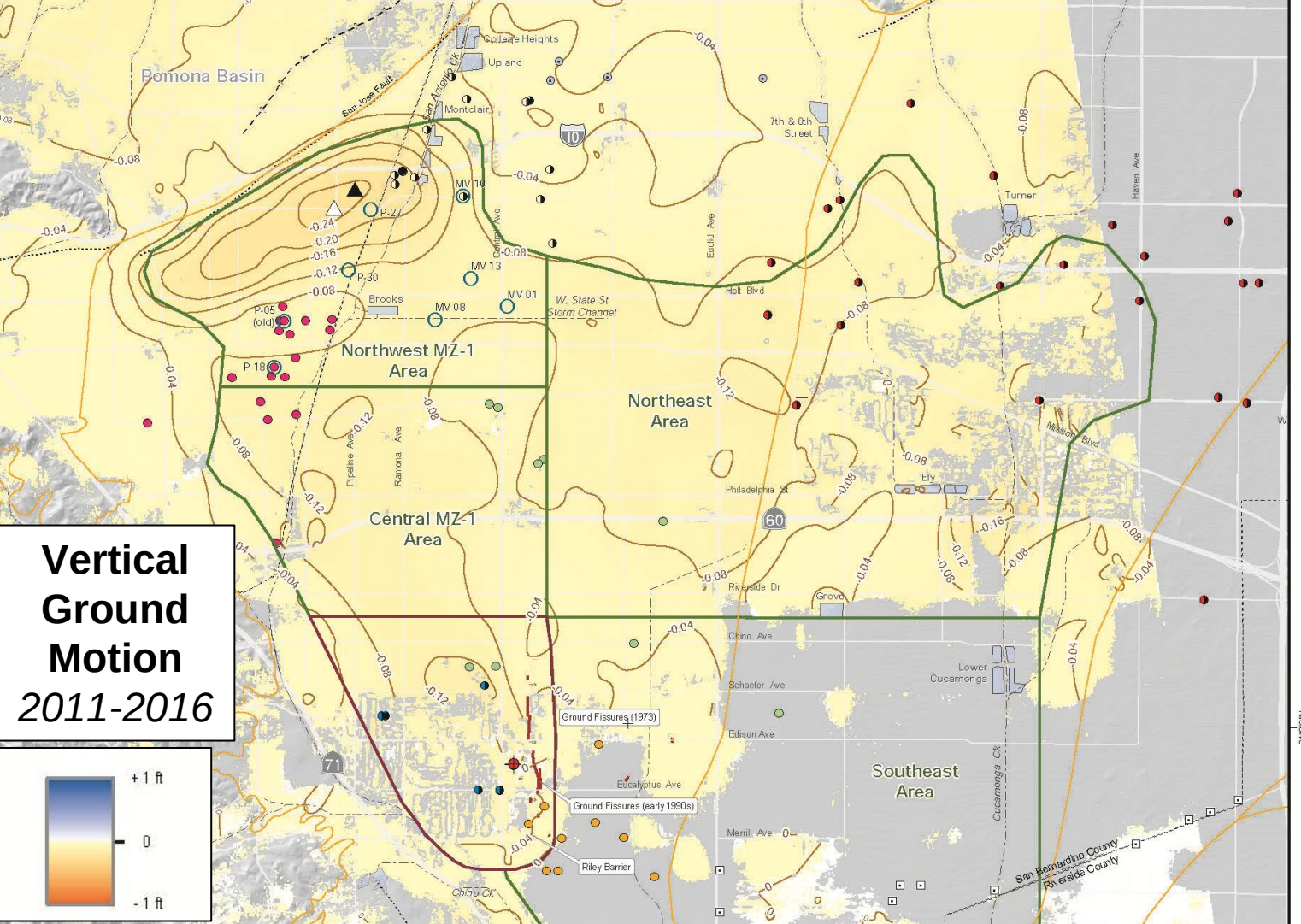




Vertical Ground Motion
2011-2016

+1 ft
0
-1 ft

Relative Change in Land Surface Altitude as Measured by InSAR Mar-2011 to Jan-2016

+1 ft
-0.04
0
-1 ft

InSAR data absent (incoherent)

Active Production Wells by Owner: 1996 to 2000

Ontario
Upland
Chino Hills
Pomona
GSWC
Chino
SAWCo
CIM
MVWD

Northwest MZ-1 InSAR Measurement Point

Benchmark Monument with vertical ground-motion data shown on Figure 1-2

Wells with piezomentric-level data shown on Figure 1-2

Chino Basin Desalter Authority Well

Ground Fissures

Ayala Park Extensometer

Streams & Flood Control Channels

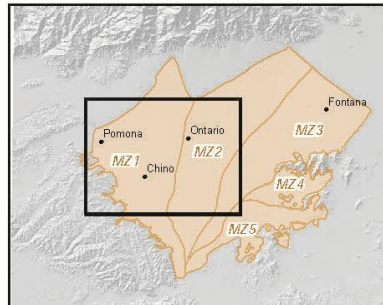
Flood Control & Conservation Basins

MZ-1 Managed Area

Areas of Subsidence Concern

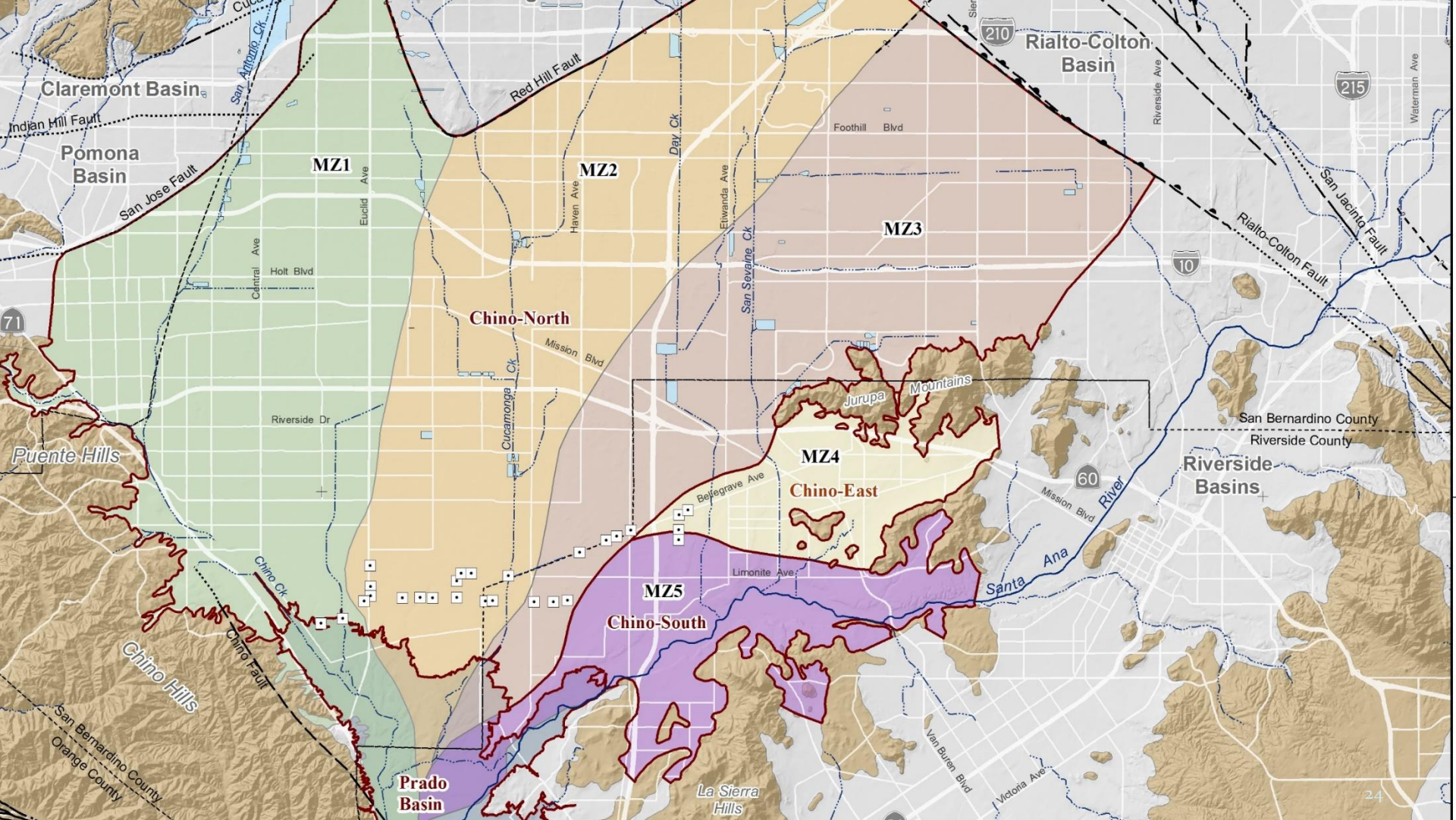
Faults

Location Certain
Location Approximate
Approximate Location of Groundwater Barrier
Location Co
Location Ur



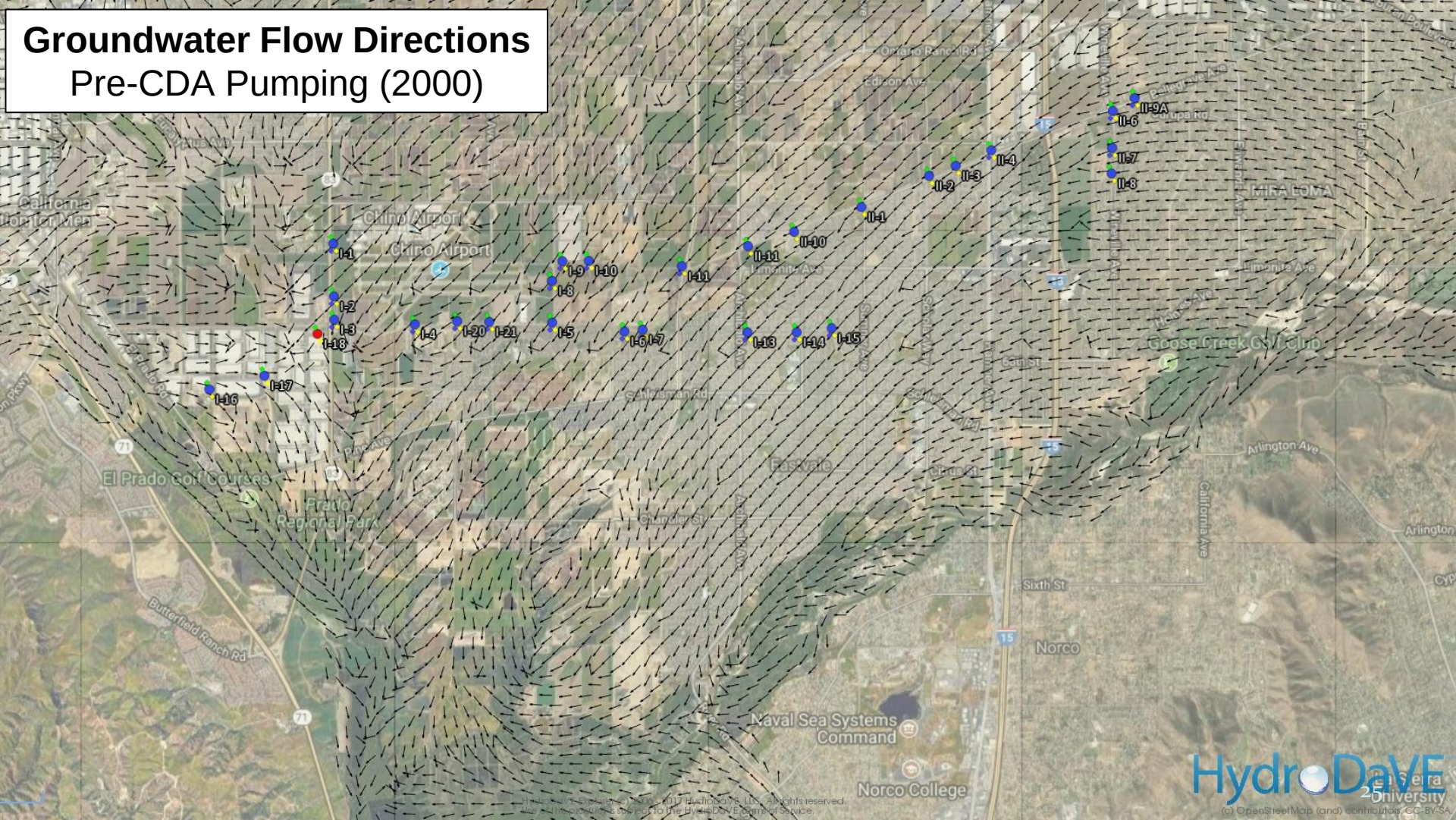
Groundwater desalters

- The groundwater desalting program was designed to protect and enhance safe yield:
  - By replacing declining agricultural groundwater pumping in the southern part of the basin with new groundwater pumping
  - To meet increasing municipal water demands in the same area
- The desalter wells were constructed in strategic locations to:
  - Minimize groundwater outflow to the Santa Ana River
  - Increase the Santa Ana River recharge into the basin
  - Minimize future TDS and nitrogen regulatory liabilities in the Chino Basin and the Santa Ana River


Claremont Basin
Indian Hill Fault
Pomona Basin
San Jose Fault
San Antonio Ck
Red Hill Fault
MZ1
MZ2
MZ3
MZ4
MZ5
Chino-North
Chino-East
Chino-South
Day Ck
Euclid Ave
Haven Ave
Etiwanda Ave
San Sevaine Ck
Foothill Blvd
Holt Blvd
Central Ave
Mission Blvd
Riverside Dr
Cucamonga Ck
Jurupa Mountains
Bellegrave Ave
Limonite Ave
Chino Ck
Chino Fault
Chino Hills
Puente Hills
San Bernardino County
Orange County
Prado Basin
La Sierra Hills
Van Buren Blvd
Victoria Ave
Rialto-Colton Basin
Riverside Ave
Waterman Ave
San Jacinto Fault
Rialto-Colton Fault
San Bernardino County
Riverside County
Riverside Basins
Santa Ana River
210
215
10
60
71

Groundwater Flow Directions

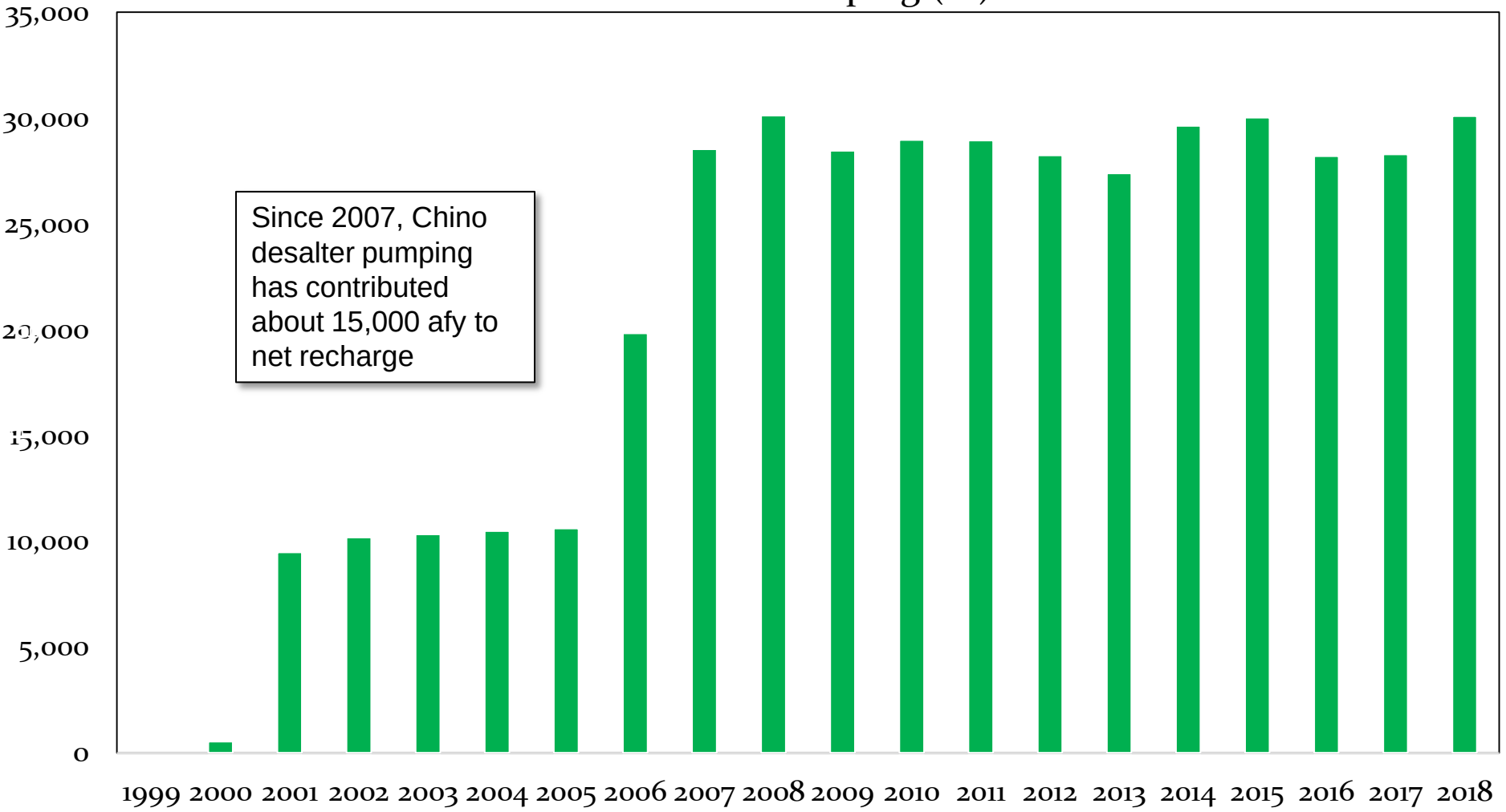
Pre-CDA Pumping (2000)



Groundwater Flow Directions

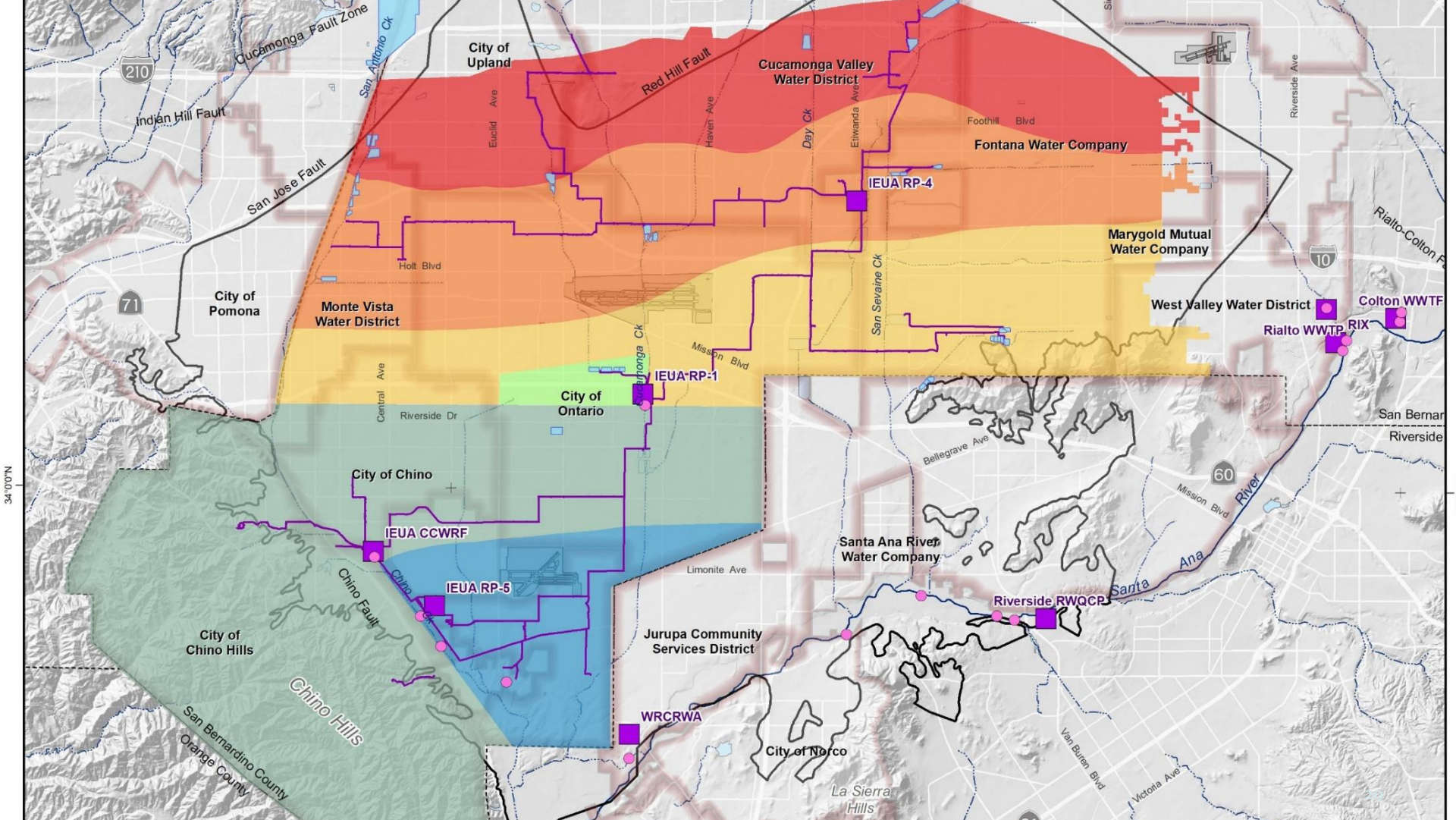
Post-CDA Pumping (2011)

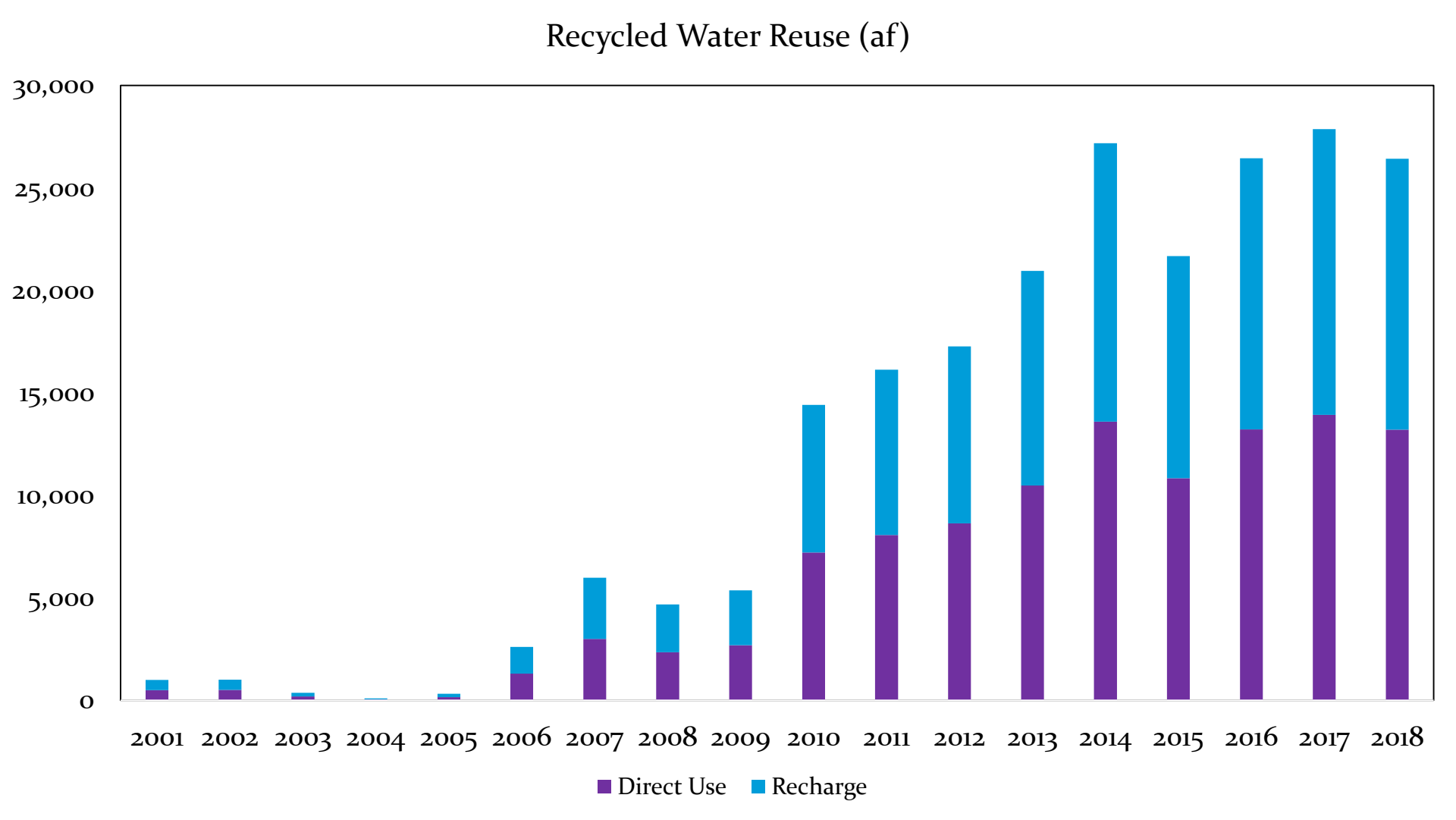
Annual CDA Pumping (af)



Recycled water

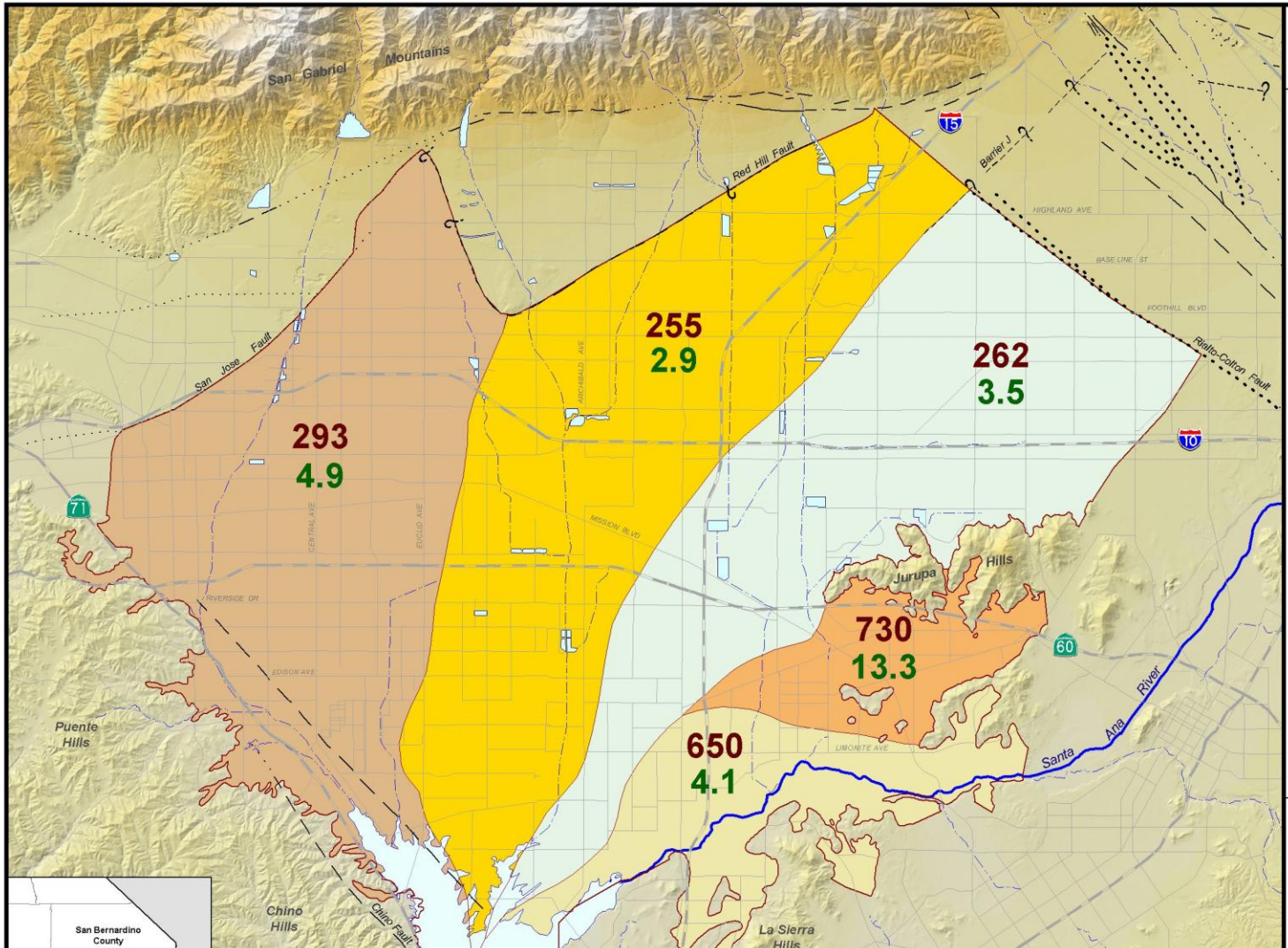
- Since 2000, the IEUA has constructed and operated a recycled water conveyance system throughout the basin enabling it to provide recycled water to its member agencies
- Recycled water deliveries grew from about 3,400 afy in 2000 to about 34,000 afy in 2017. Cumulatively through FY 2018 = 357,000 af
- Recycled water provided by the IEUA has replaced a like amount of groundwater and imported water that would have otherwise been used for non-potable purposes
- Recycled water is more reliable than imported water, and thus using it in lieu of imported water has improved the sustainability of the Chino Basin and water-supply reliability


Cucamonga Fault Zone
San Antonio Ck
City of Upland
Red Hill Fault
Cucamonga Valley Water District
Indian Hill Fault
Euclid Ave
Haven Ave
Day Ck
Etiwanda Ave
Foothill Blvd
Riverside Ave
Fontana Water Company
San Jose Fault
IEUA RP-4
Marygold Mutual Water Company
Holt Blvd
Rialto-Colton F
City of Pomona
Monte Vista Water District
San Sevaine Ck
West Valley Water District
Colton WWTF
Rialto WWTP
RIX
Central Ave
Mission Blvd
IEUA RP-1
City of Ontario
Riverside Dr
San Bernar
Riverside
Bellegrave Ave
City of Chino
Mission Blvd
River
IEUA CCWRF
Santa Ana River Water Company
Limonite Ave
Santa Ana
Chino Fault
IEUA RP-5
Riverside RWQCP
City of Chino Hills
Jurupa Community Services District
Chino Hills
San Bernardino County
Orange County
WRCRWA
City of Norco
Van Buren Blvd
Victoria Ave
La Sierra Hills
34°0'0"N


Recycled Water Reuse (af)
30,000
25,000
20,000
15,000
10,000
5,000
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Direct Use
Recharge

Maximum Benefit update

- During the period 1998 through 2002, the Regional Board and watershed stakeholders were completing an update to the salt and nutrient management plan in the Basin Plan
  - Proposed new groundwater management areas designated as "groundwater management zones"
  - New antidegradation TDS and nitrate objectives were established based on 1973 conditions
  - Resulted in a finding of no assimilative capacity for TDS and nitrate in the Chino Basin



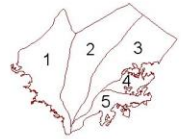
Optimum Basin Management Program

Chino Basin Watermaster

Proposed Water Quality Objectives by Management Zone

262 TDS (mg/L)

3.5 Nitrate as Nitrogen (mg/L)



Chino Groundwater Basin and Management Zones

Other Map Features

Flood Control and Conservation Basins

Fault

Solid where known; Dashed where approximate;
Dotted where concealed; queried where uncertain;
Large dots where probable and barrier to groundwater flow

Figure 1

Proposed Water Quality Objectives
Based on Historical Ambient Water Quality
for Chino Basin Management Zones

Maximum Benefit update

- Under the traditional Regional Board approach, the Regional Board:
  - Would require mitigation for imported water recharge if TDS of imported water exceeded the objective
  - Would require mitigation for recycled water reuse
  - Mitigation of these salt loads would be required on one-for-one basis in each groundwater management zone

Figure 1-2
Historical TDS Concentration in State Water Project (SWP) Water at Silverwood Lake Reservoir

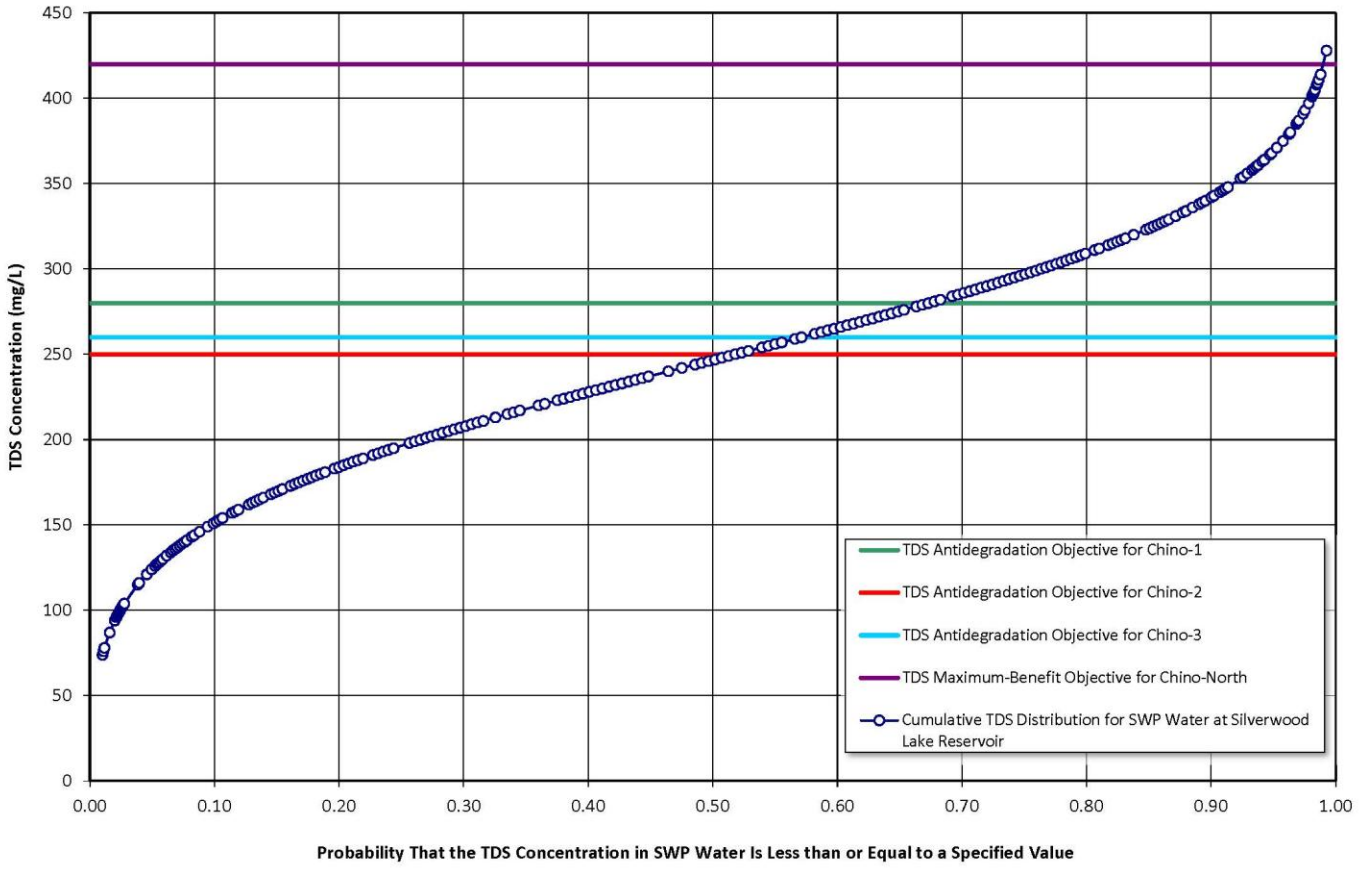
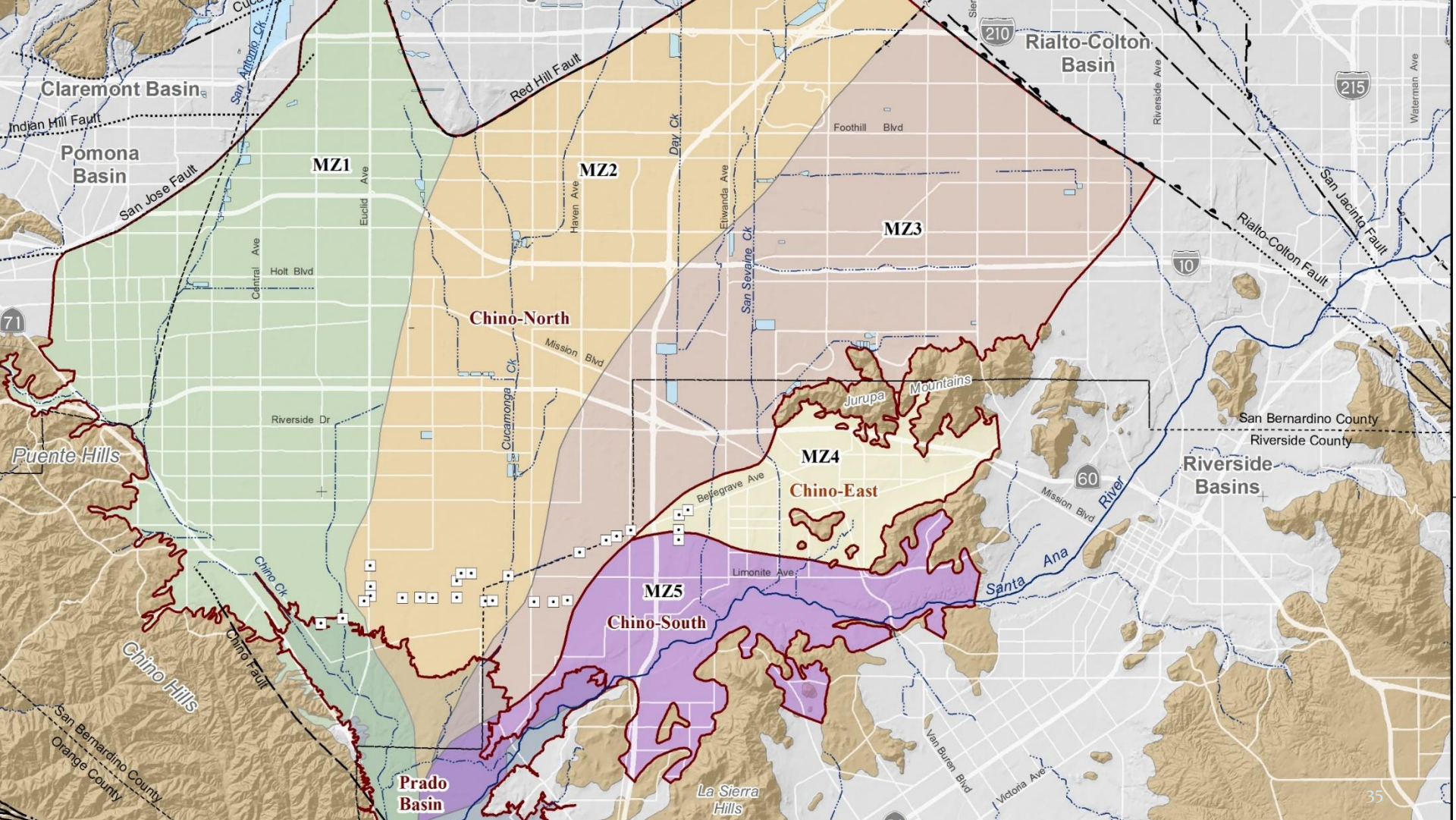


Figure_1-2_Historical TDS_SWPv2-- Figure 1-2

Without maximum benefit-based objectives, mitigation would be required to recharge imported water when its TDS exceed the TDS objective ~ 30 to 50 percent of the time

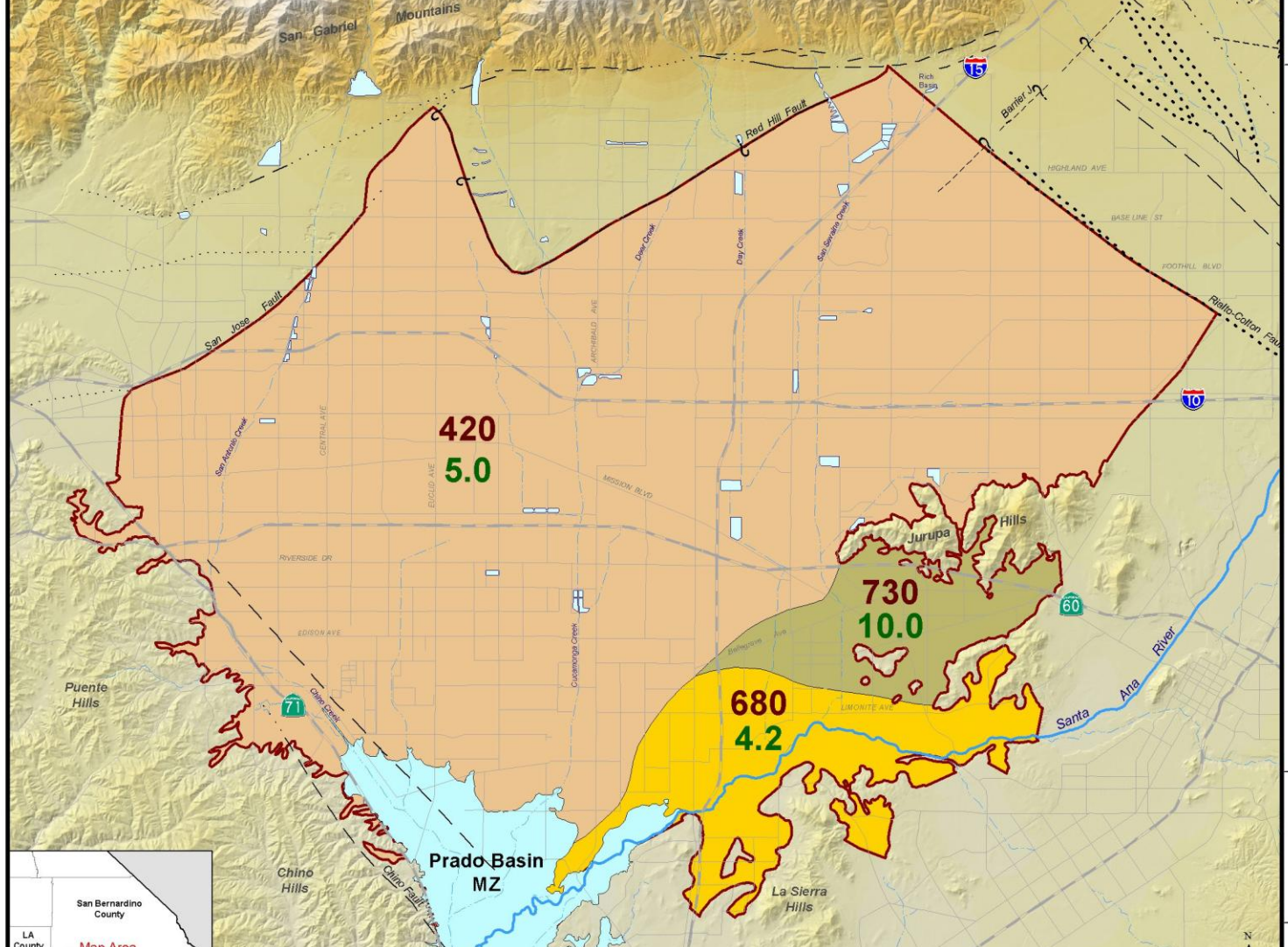

Claremont Basin
Indian Hill Fault
Pomona Basin
San Jose Fault
San Antonio Ck
Red Hill Fault
MZ1
MZ2
MZ3
MZ4
MZ5
Chino-North
Chino-East
Chino-South
Day Ck
Euclid Ave
Haven Ave
Etiwanda Ave
San Sevaine Ck
Foothill Blvd
Holt Blvd
Central Ave
Mission Blvd
Riverside Dr
Cucamonga Ck
Jurupa Mountains
Bellegrave Ave
Limonite Ave
Chino Ck
Chino Fault
Chino Hills
Puente Hills
San Bernardino County
Orange County
Prado Basin
La Sierra Hills
Van Buren Blvd
Victoria Ave
Rialto-Colton Basin
Riverside Ave
Waterman Ave
San Jacinto Fault
Rialto-Colton Fault
San Bernardino County
Riverside County
Riverside Basins
Santa Ana River
210
215
10
60
71

Maximum Benefit update

- Watermaster/IEUA proposed a new water quality paradigm called “maximum benefit” based on SWRCB resolution 68-18 and Water Code 13241
- New paradigm required the Chino Basin parties to commit to the recharge and groundwater desalting plans in the OBMP and attainment of hydraulic control

Maximum Benefit update

- Resulting Basin Plan changes:
  - The regulatory groundwater management zone boundaries were changed creating the Chino North GMZ
  - TDS and nitrate objectives for Chino North GMZ were developed to enable the implementation of the OBMP — particularly the use of recycled and imported water — without TDS and nitrate mitigation for at least 30 years (~2034)
  - Groundwater TDS trends suggest that TDS mitigation related to ambient TDS concentrations will not be required until at least 2051



Optimum Basin Management Program

Chino Basin Watermaster

Proposed Water Quality Objectives by Management Zone

680 TDS (mg/L)

4.2 Nitrate as N (mg/L)

Chino Basin and Management Zones

Other Map Features

Flood Control and Conservation Basins

Fault

Solid where known; Dashed where approximate;
Dotted where concealed; queried where uncertain;
Large dots where probable and barrier to groundwater flow

Figure 2

Proposed Water Quality Objectives
Based on Maximum Benificial Use of Water
for Chino Basin Management Zones

Maximum Benefit update

- Because of new maximum benefit-based TDS objectives, the following occurred since 2004 without the cost of TDS removal:
  - Direct recycled water reuse = 230,000 af
  - Recharge of recycled water = 109,000 af
  - Recharge of imported water = 168,000 af
  - Total 507,000 af

Storage and Recovery

- Per the Peace Agreement, the parties were encouraged to develop and implement Storage and Recovery programs that would provide broad mutual benefit to the Judgment Parties and reduce the cost of OBMP implementation
- Watermaster, IEUA, TVMWD, WMWD, and Metropolitan implemented a 100,000 af storage program called the Dry-Year Yield Program (DYYP) in 2005. This program runs through 2028.
- IEUA is currently working to obtain a $207 million grant to develop and implement a Storage and Recovery program

What was not accomplished

- Goal Enhance Basin Water Supplies
  - Impediment: Unless certain actions are taken, groundwater levels in MZ1 will continue to decline adding to the potential for additional subsidence, and fissures, lost production capability and water quality problems
  - OBMP action – Manage groundwater production in MZ1 to a sustainable level to minimize subsidence
  - Efficacy – Implemented in the “Managed Area” but not outside of the Managed Area where active land subsidence is occurring. Needs management plan and infrastructure to implement.

What was not accomplished

- Goal Enhance Basin Water Supplies
  - Impediment: Because future demands are increasing and there are limitations in basin and traditional supplemental water supplies, new sources of supplemental water need to be developed
  - OBMP action – Development of new supplemental water supplies and regional conveyance
  - Efficacy – Not implemented

What was not accomplished

- Protect and enhance water quality
  - Impediment: There is ongoing salt and nitrogen loading from dairies
  - OBMP action – Treat dairy sewage and eliminate discharge to groundwater or export it
  - Efficacy – Not implemented

What was not accomplished

- Protect and enhance water quality
  - Impediment: Existing production patterns in the basin cause salt and nitrate to accumulate in the southern part of the basin
  - OBMP action – Increase recharge without an increase in production to cause an increase in rising water
  - Efficacy – Determined not feasible or desirable and not implemented

What was not accomplished

- Equitably finance the OBMP
  - Impediment: The equitable distribution of cost associated with the OBMP is not defined
  - OBMP action – Identify ways to recover value from utilizing basin assets including storage and rising water leaving the basin
  - Efficacy – Need a storage management plan update, infrastructure, and out-of-basin partner(s) to derive broad mutual benefit from storage and recovery programs

Break

Rationale for OBMP Update

Definitions (Exhibit 1)

- Drivers
- Trends
- Implications

Exhibit 1 – Drivers and Trends and Their Implications
2020 OBMP Update

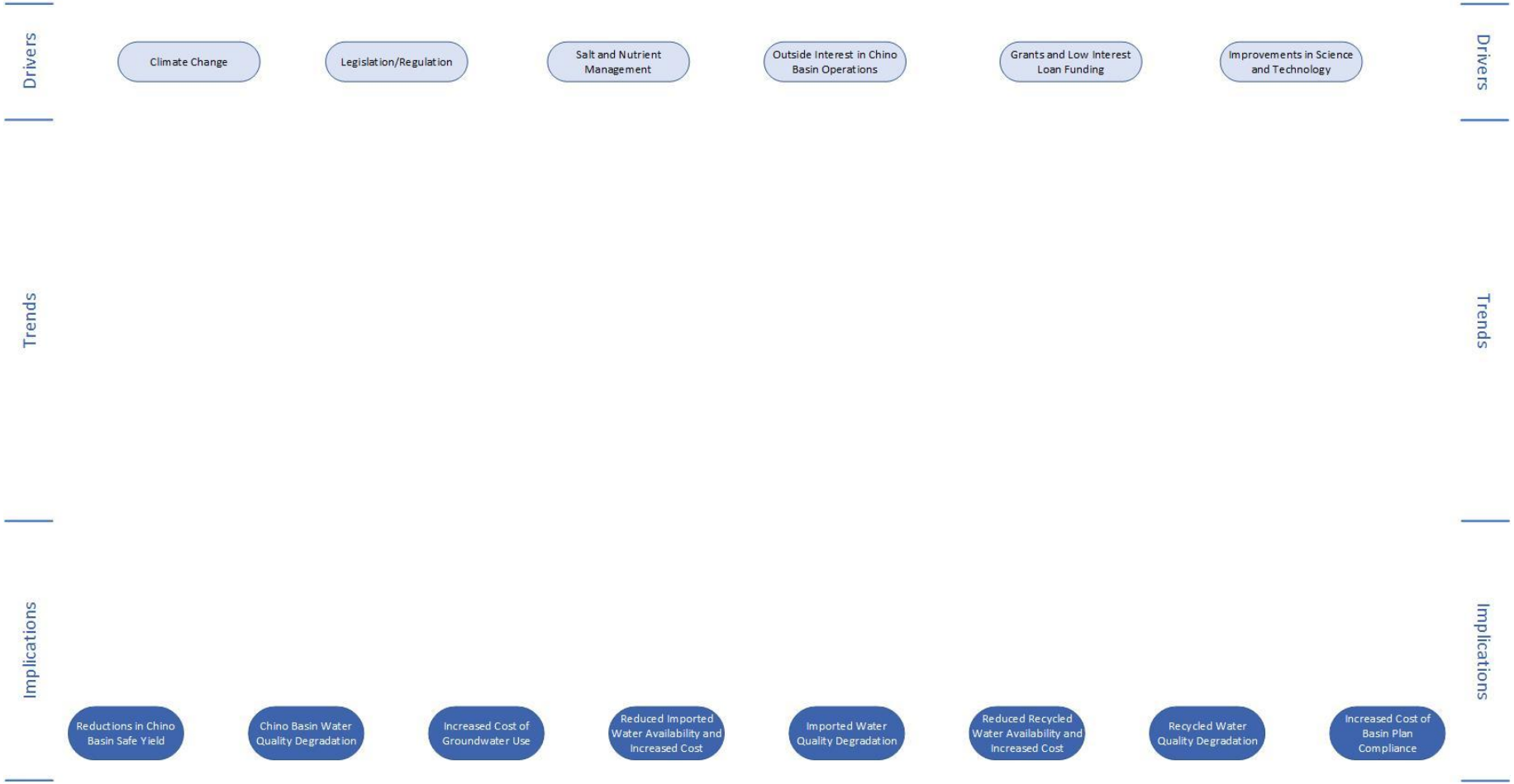


Exhibit 1 – Drivers and Trends and Their Implications
2020 OBMP Update

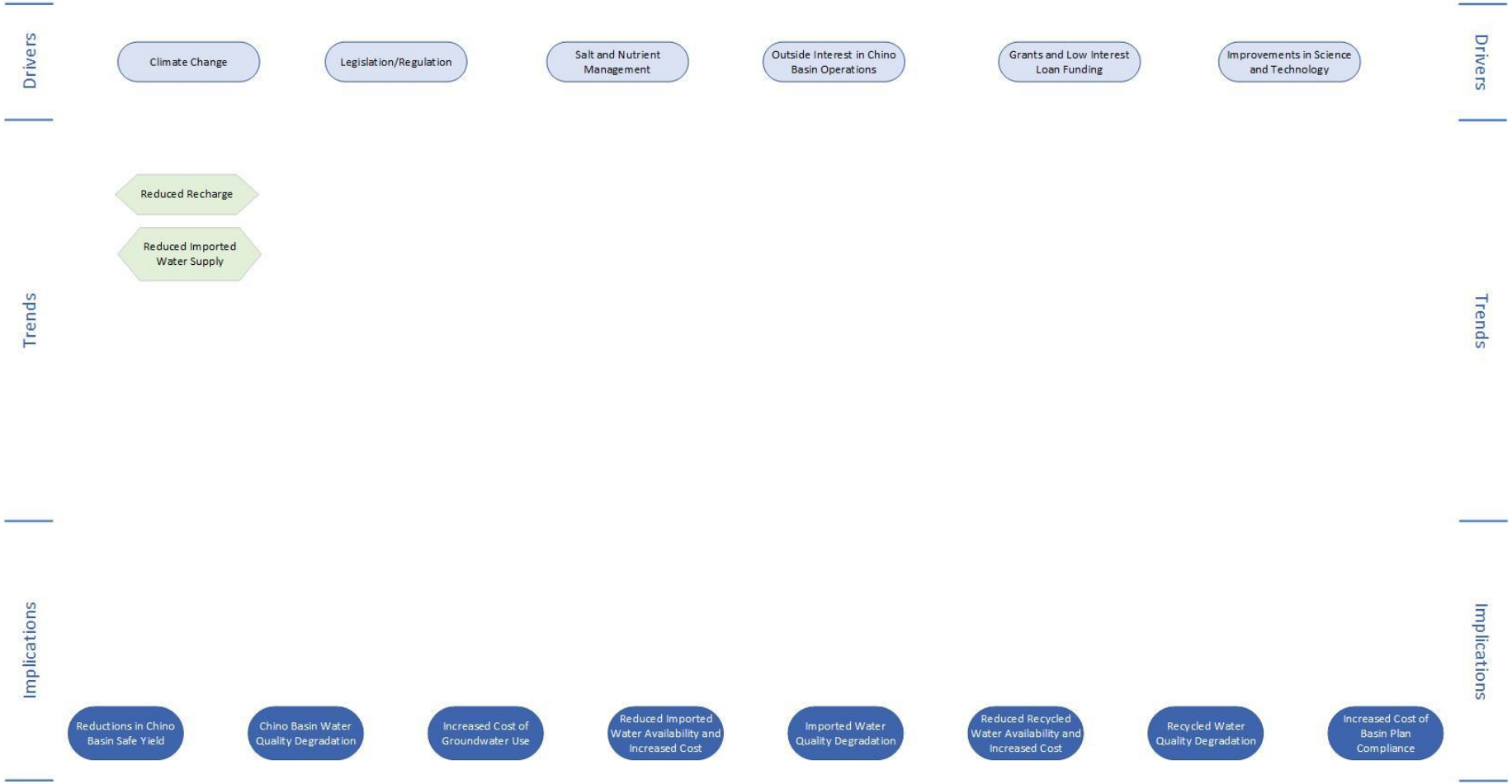


Exhibit 1 – Drivers and Trends and Their Implications
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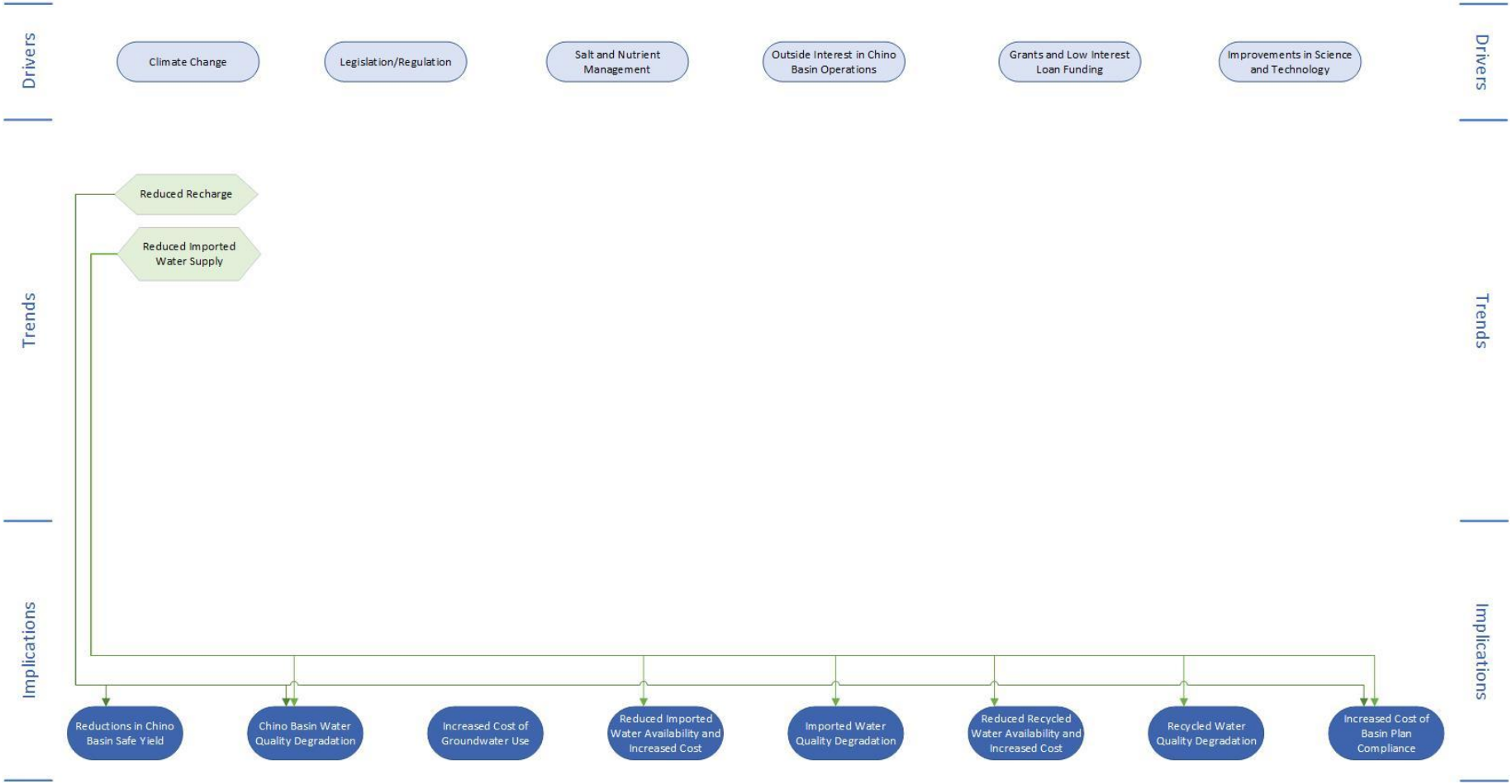
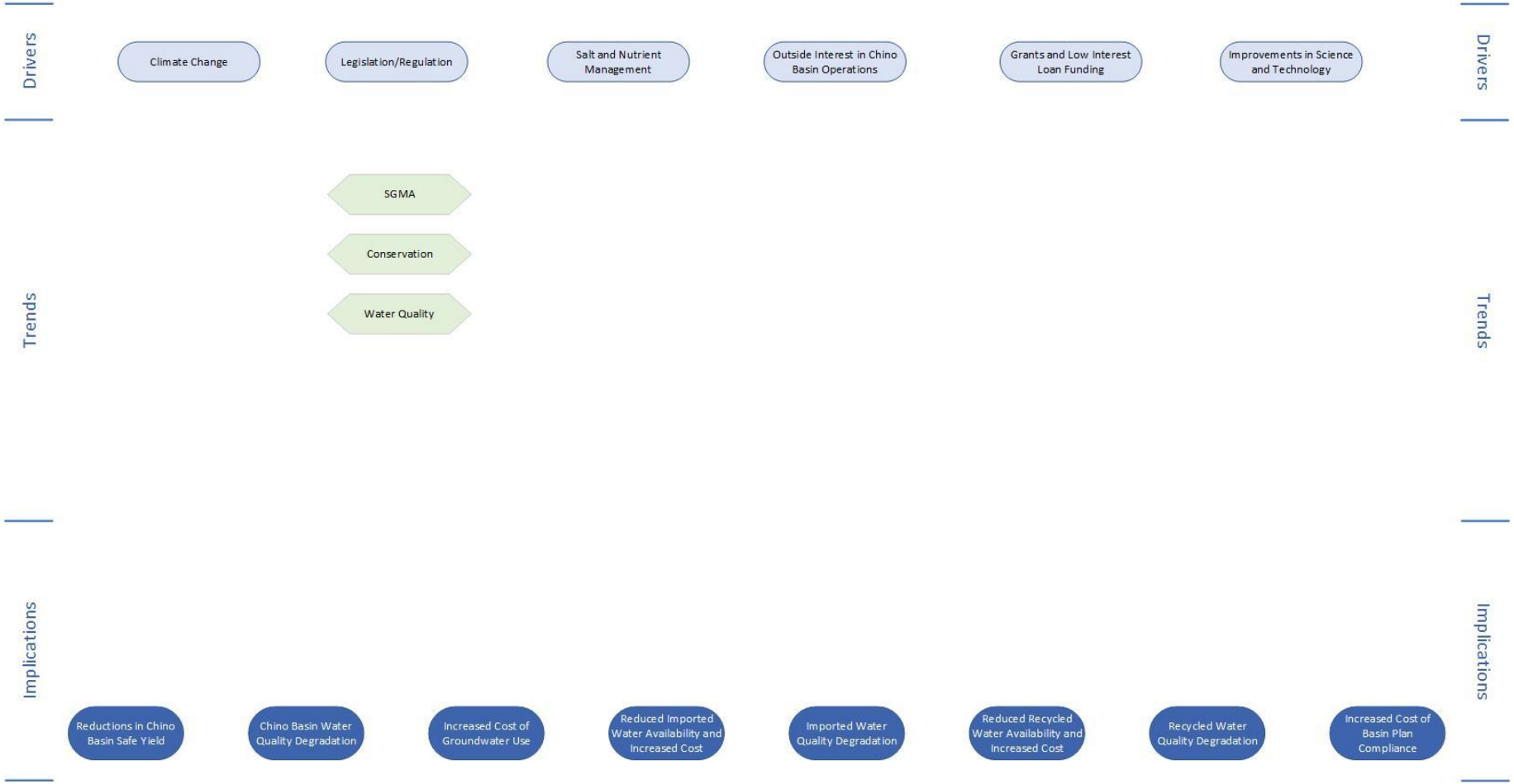


Exhibit 1 – Drivers and Trends and Their Implications
2020 OBMP Update



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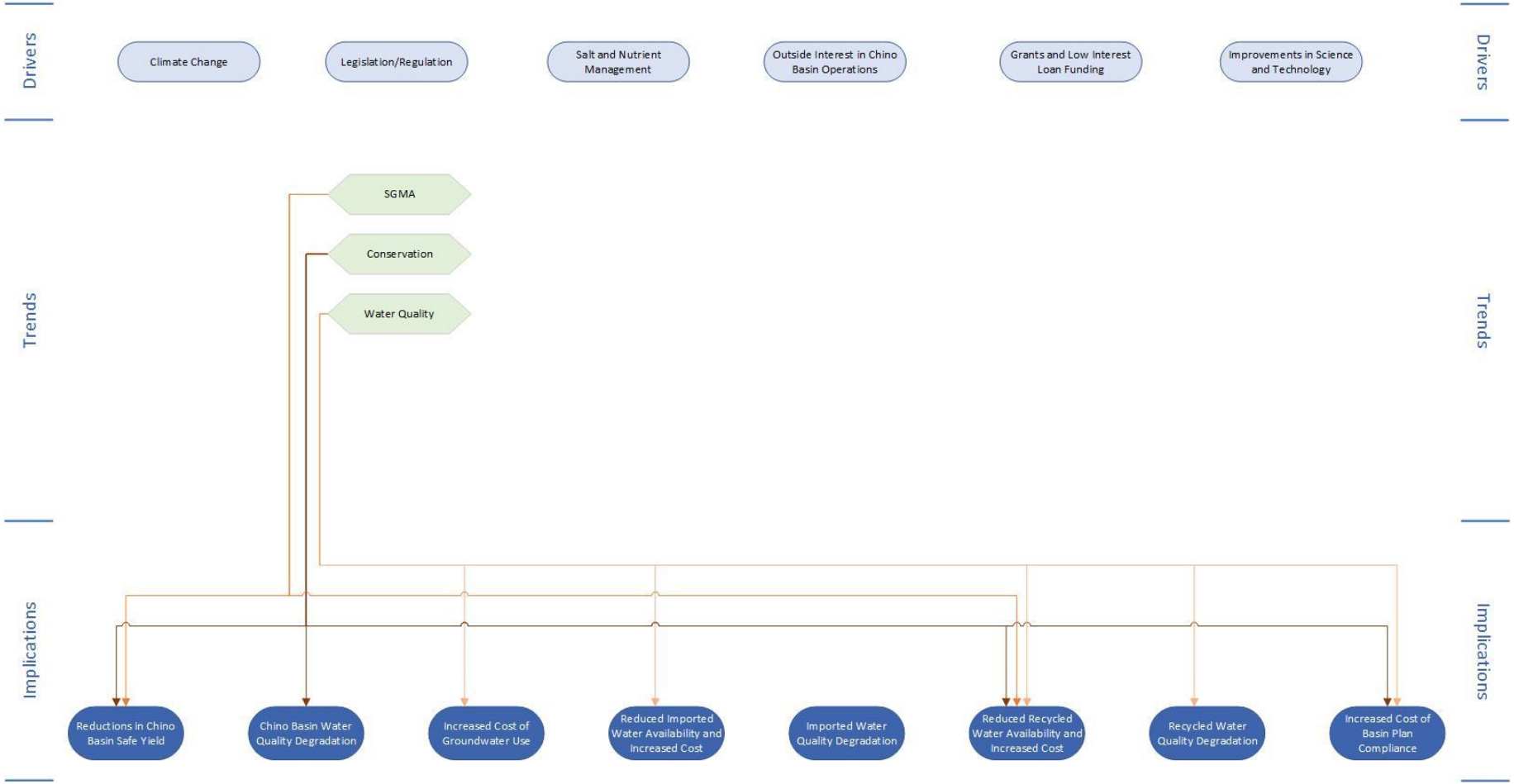

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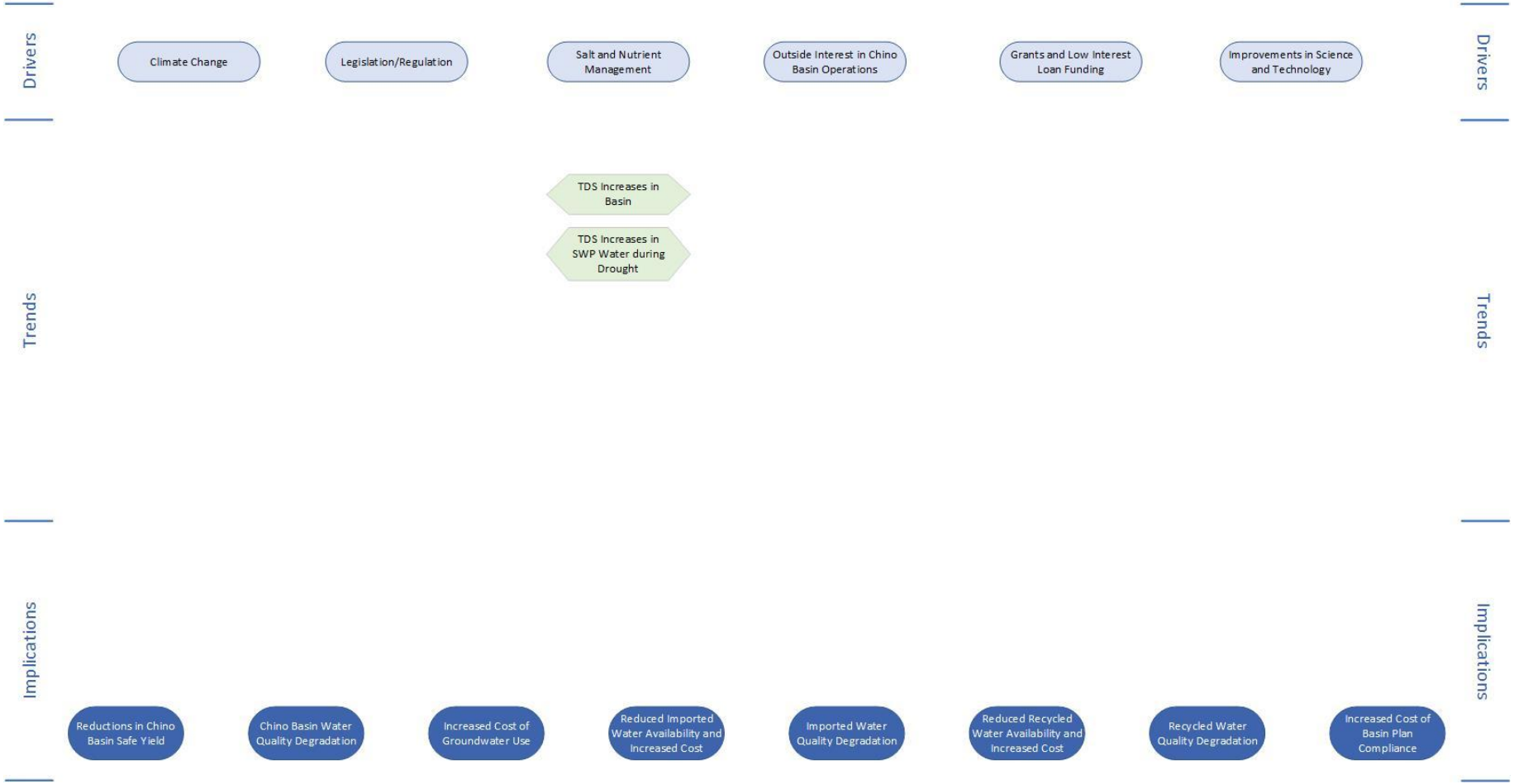

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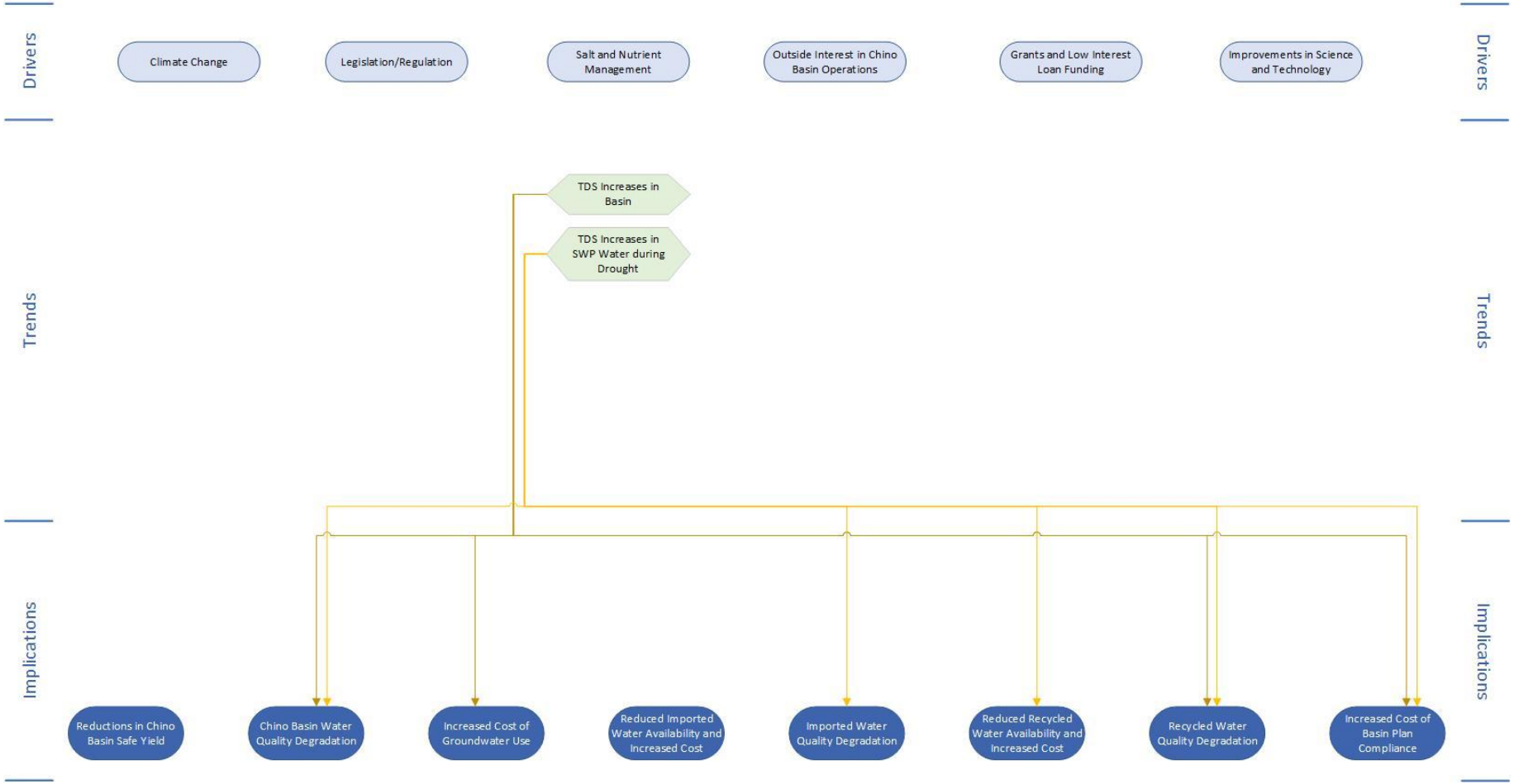

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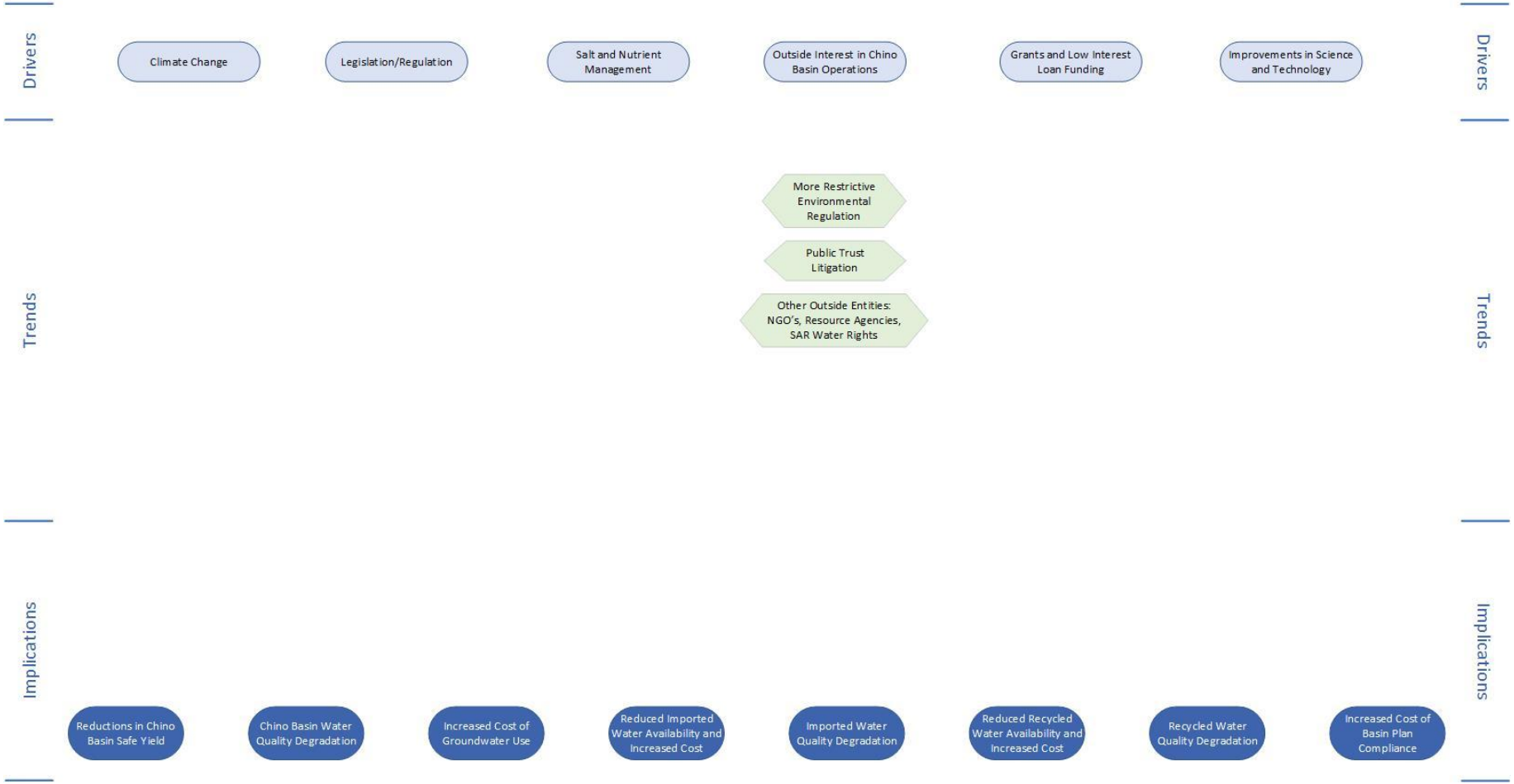

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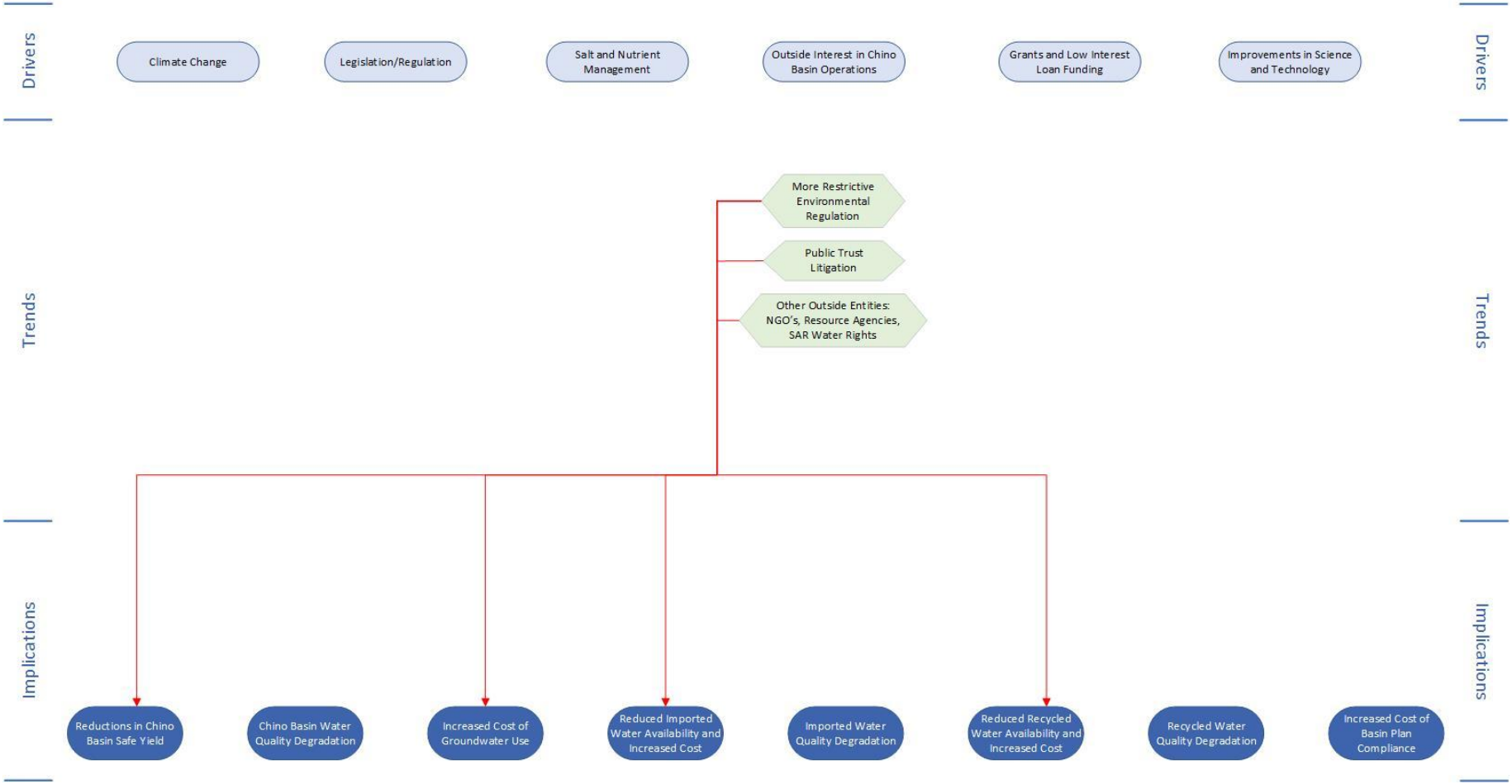

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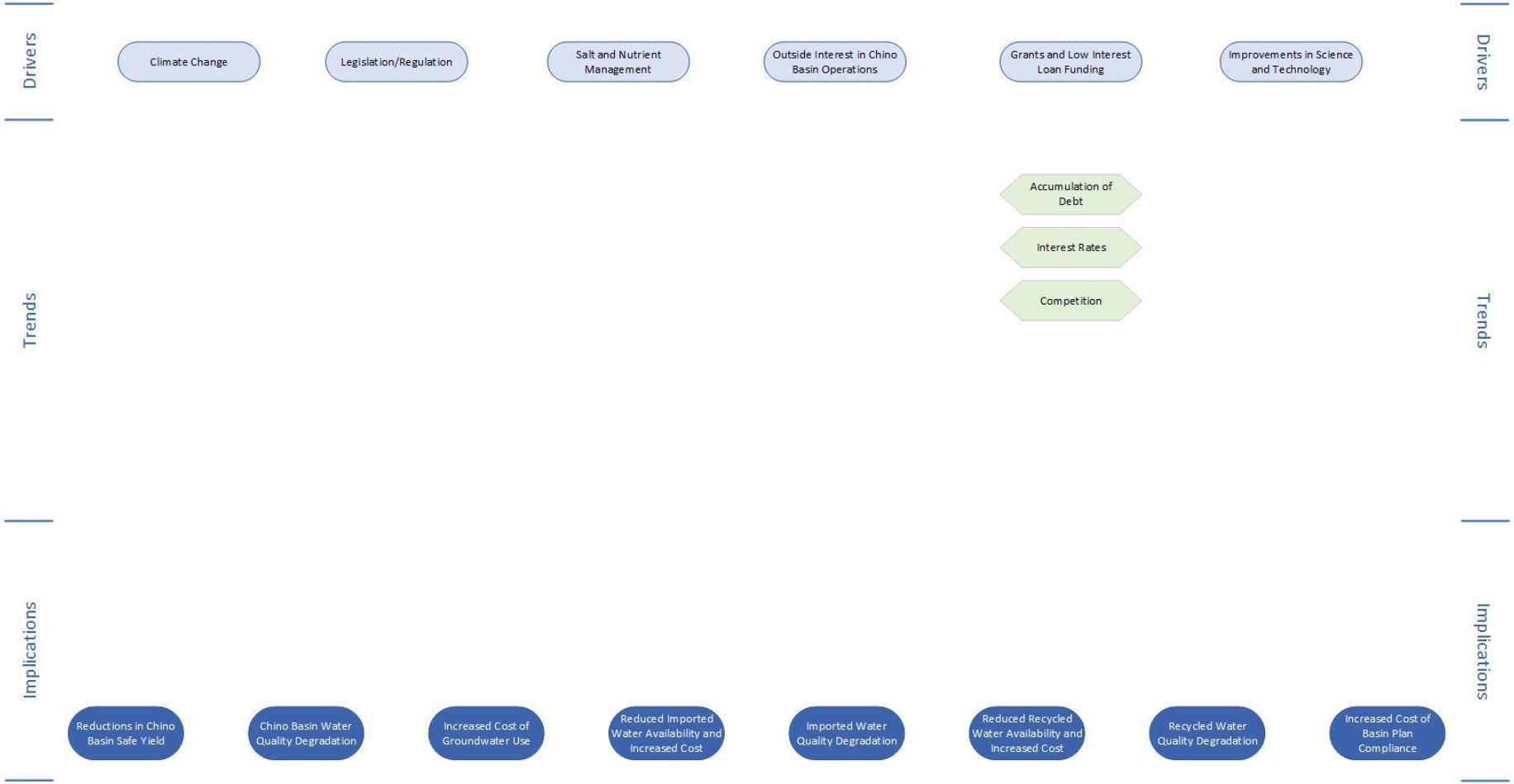

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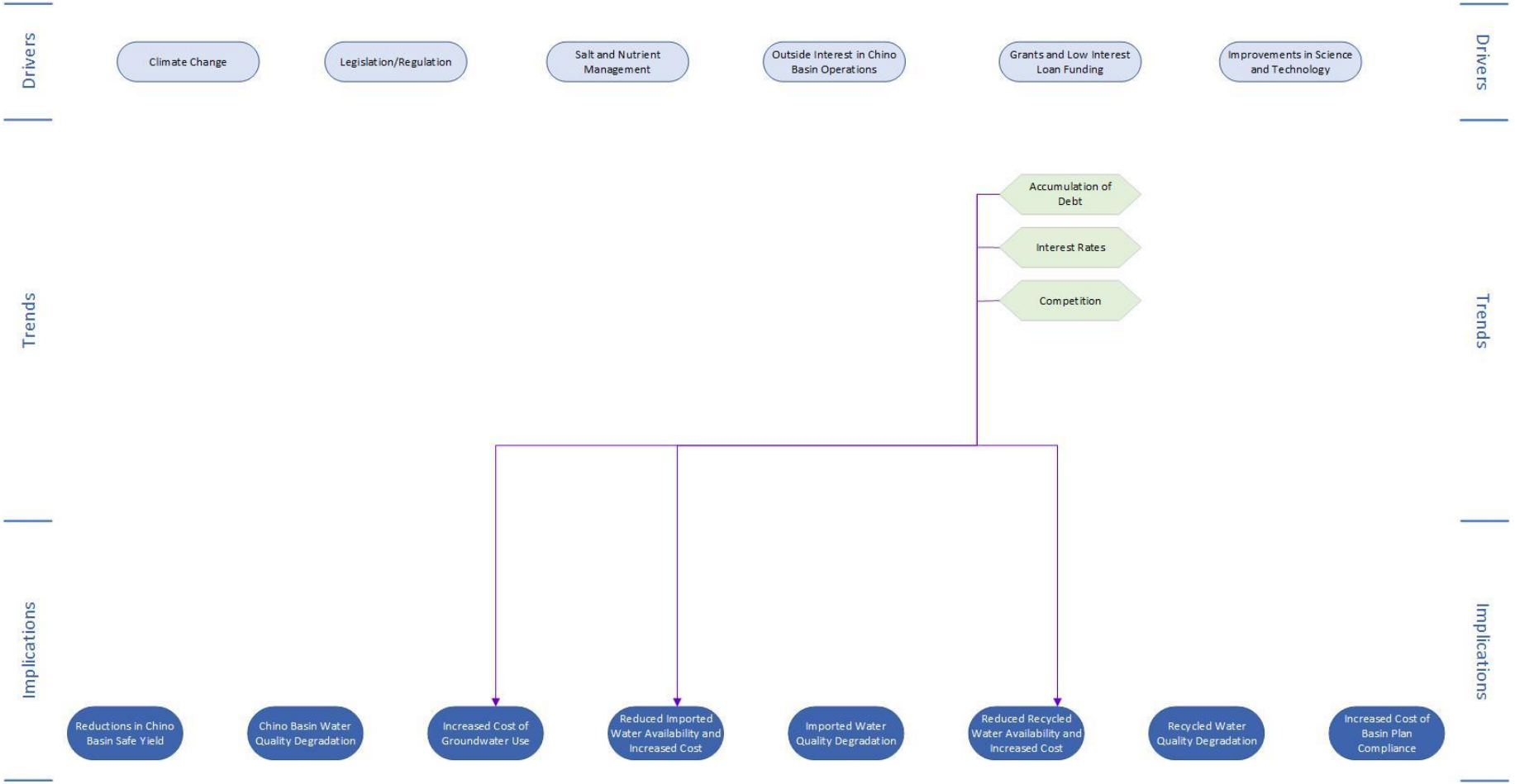

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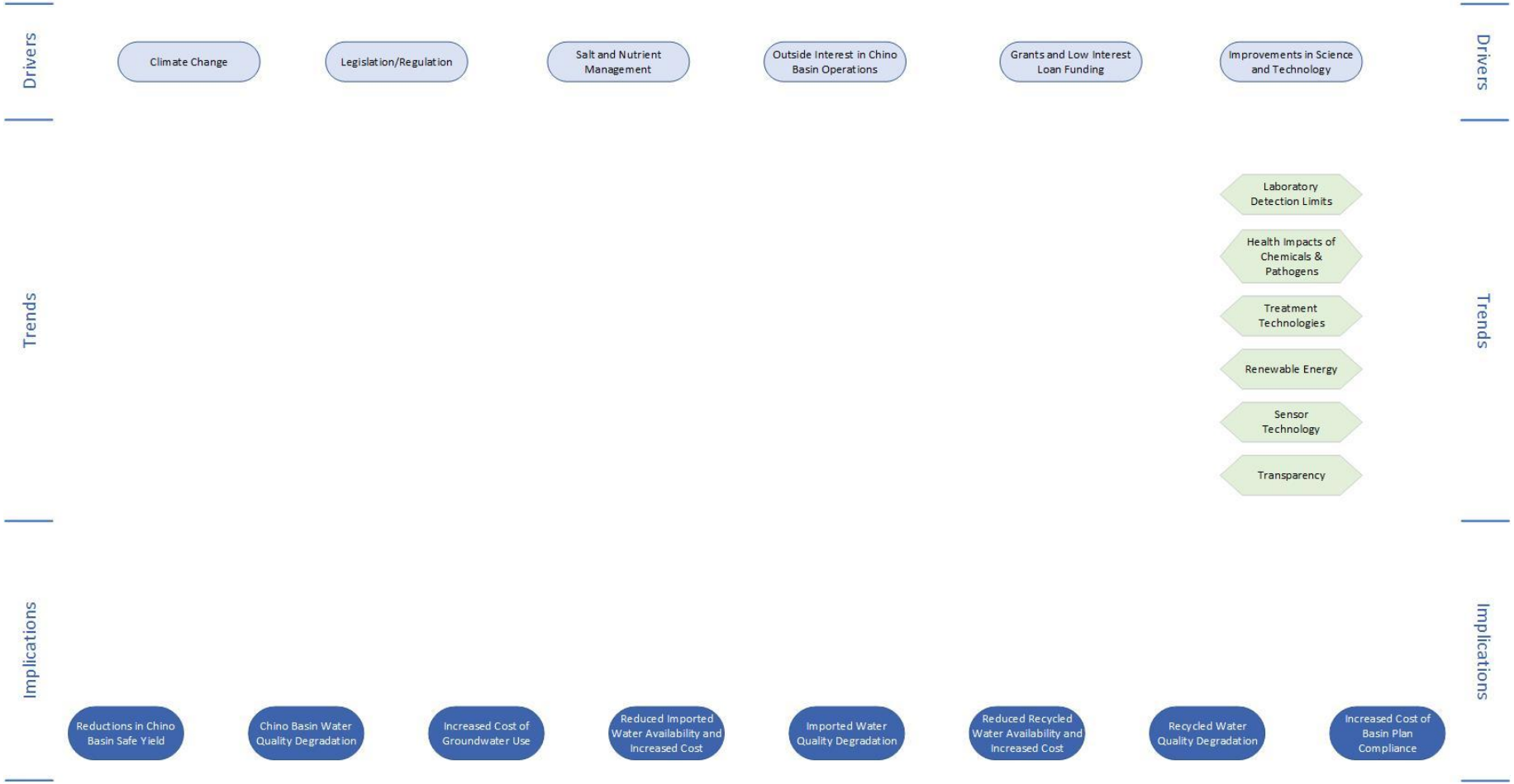

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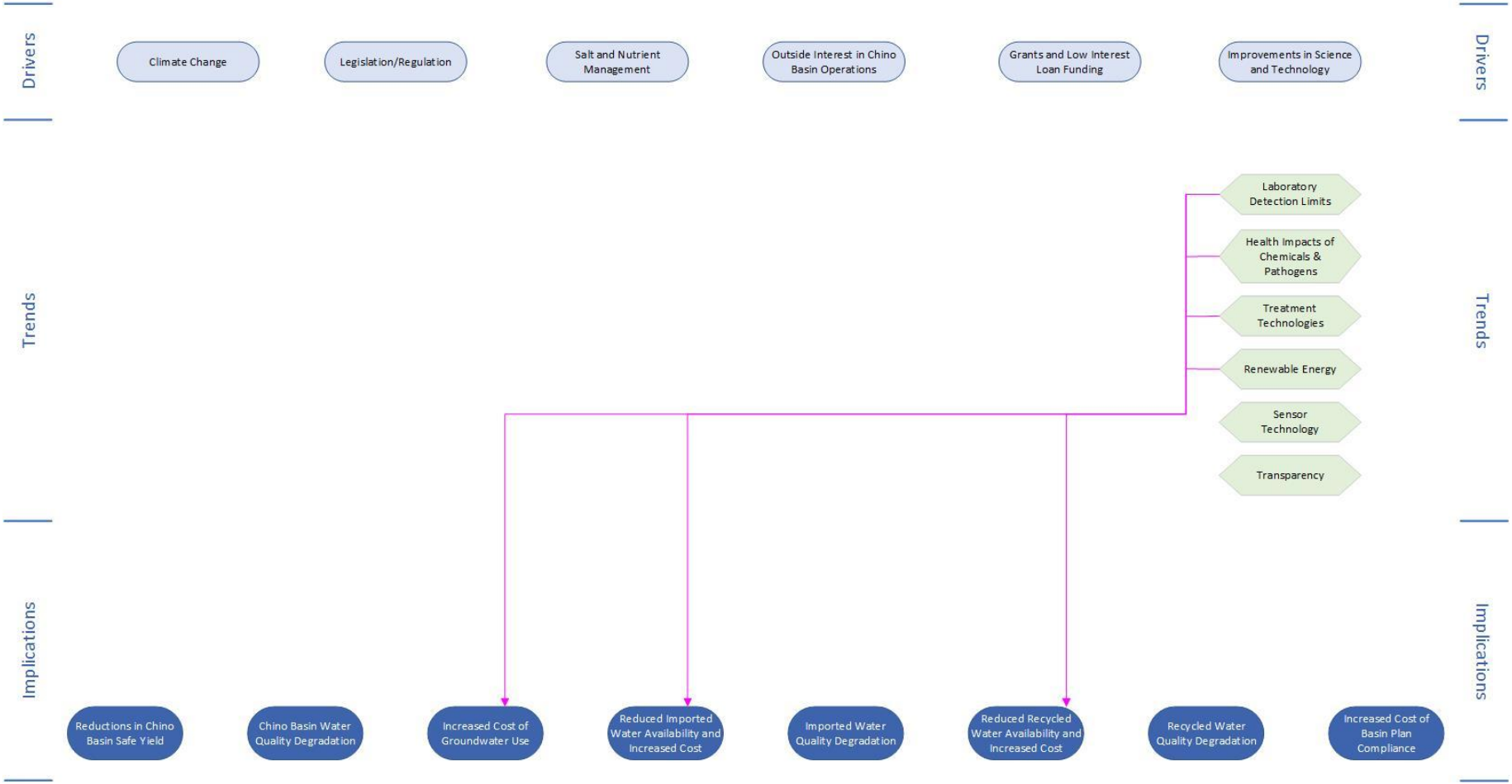

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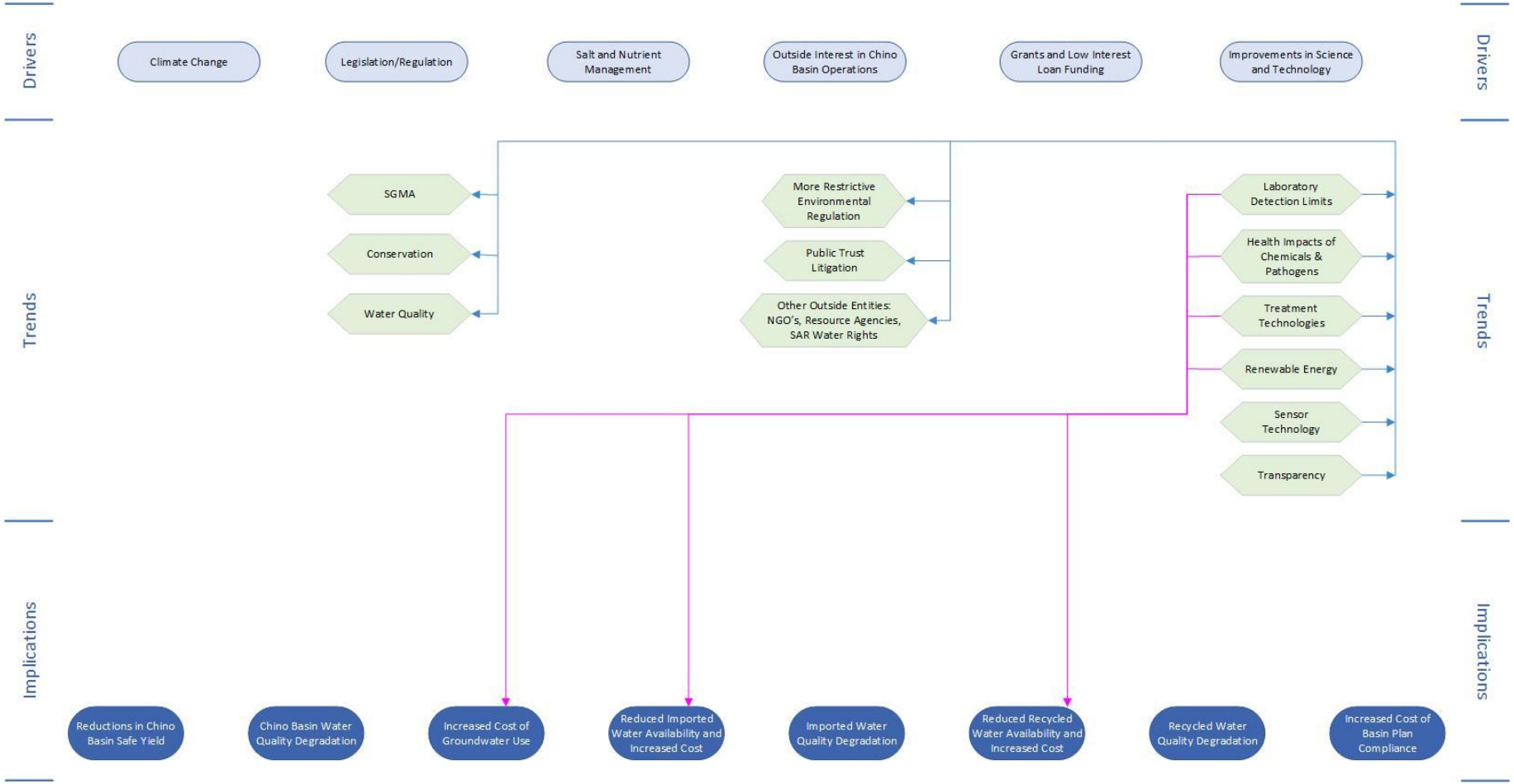

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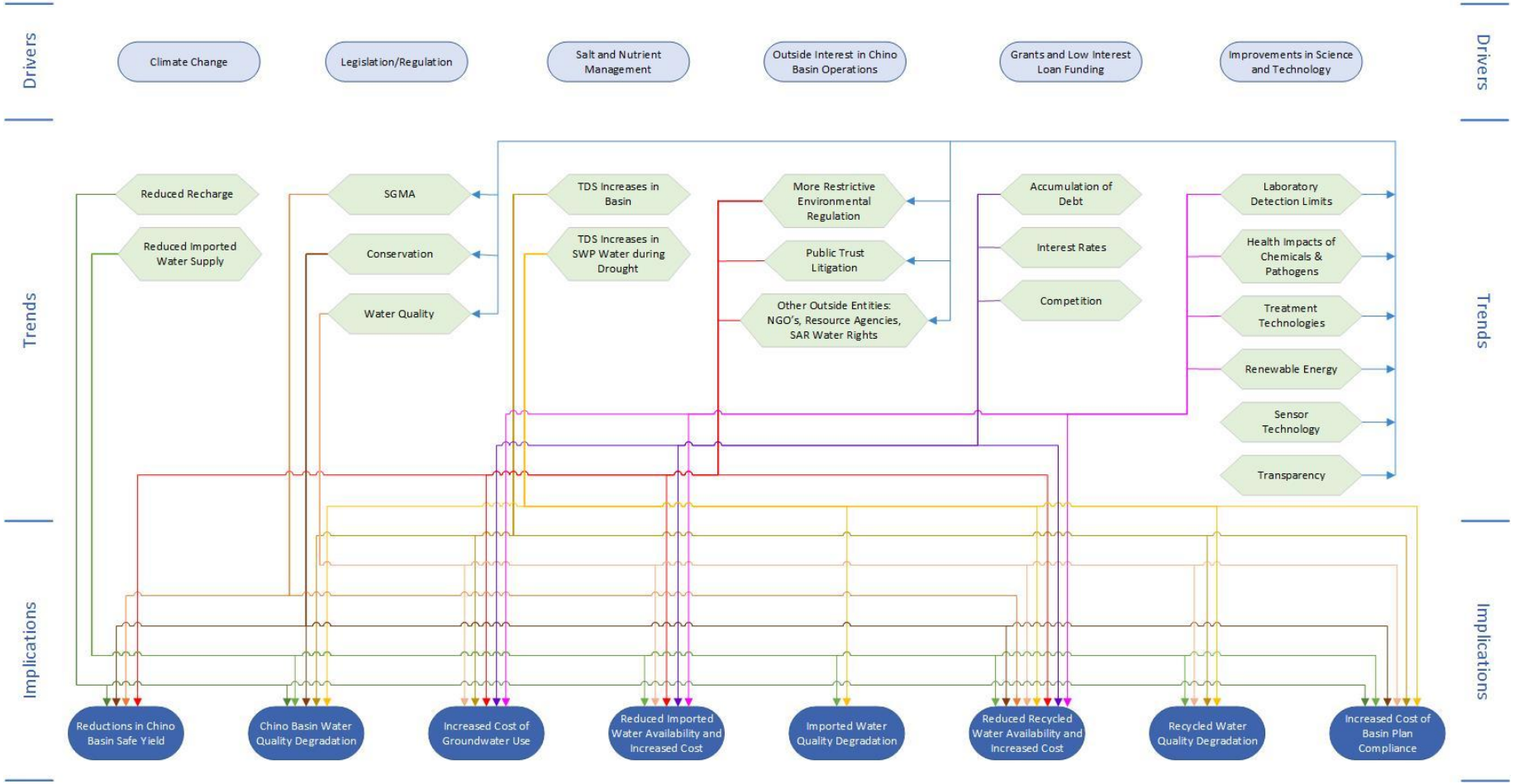


Open Session

- Break up into 4 groups for 10 minutes
- Discuss and prepare comments and suggested revisions/additions for Drivers, Trends, and Implications
- Report back to the larger group

Issues, Needs and Wants

- Definitions:
  - **Issue** = a Concern
  - **Need** = a Requirement
  - **Want** = a Desire
- Can be related to an individual Party, collective of Parties, or the basin
- Will be used to develop OBMP goals, focus problem identification, and develop the scope of the OBMP

Issues, Needs and Wants

- Classes:
  - Safe yield
  - Recharge
  - Water quality
  - Infrastructure
  - Storage
  - Costs
  - Governance
- Water-supply reliability
- Regulations
- Groundwater levels
- Supplemental waters
- Conjunctive use
- Equity
- Administration
- Other

Example #1:

- Issue: Threat of declining Safe Yield
- Need/Want: Maintain or enhance Safe Yield
- OBMP Goal: Enhance basin water supplies
- Impediments to Goal:
  - Increasing groundwater outflow to the SAR due to declining ag pumping
  - Decreasing stormwater recharge from urbanization and channel lining
- Actions to remove impediments:
  - Chino Basin Desalters
  - Recharge Master Plan development and implementation

Example #2:

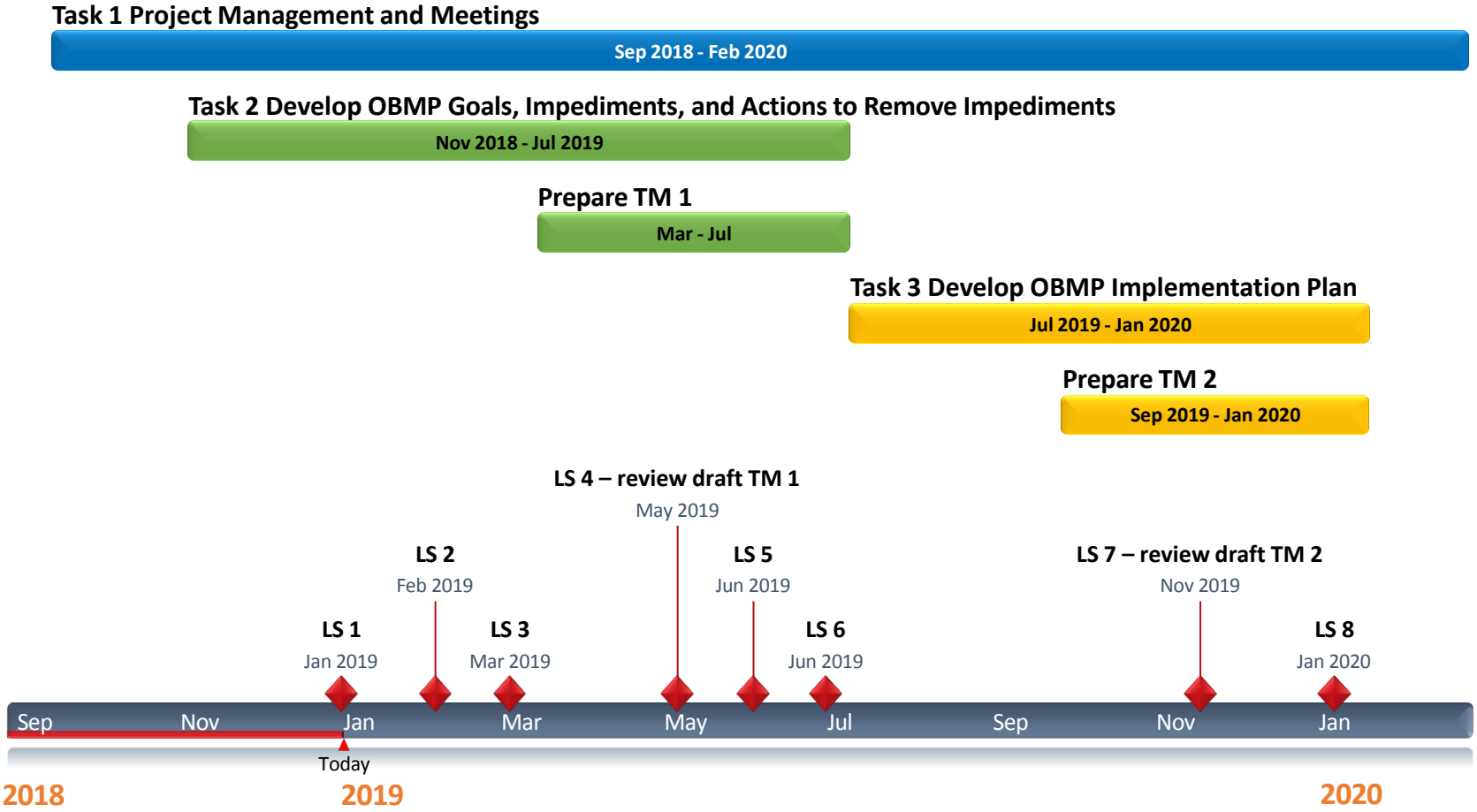
- Issue: Rialto pipeline shutdown
- Need/Want: Meet all demands with local water supplies
- OBMP Goal: Enhance water-supply reliability
- Impediments to Goal:
  - Groundwater pumping is constrained by capacity, poor quality and subsidence
  - Intra-basin conveyance is insufficient to utilize groundwater in storage
- Actions to remove impediments:
  - Develop a Storage Management Plan (SMP)
  - Build pumping, conveyance and treatment facilities to implement the SMP

Open Session

- Discussion
  - Issues
  - Needs
  - Wants

Summary and Next Steps

- Recap of meeting
- Next steps:
  - Staff will compile meeting notes and emailed input from the Parties into a ***Listening Session #1 Memorandum***
  - Parties will review Memorandum and provide comments and suggested edits to the DTI chart and the INW matrix
  - Listening Session #2 (2/13/2019, tentative):
    - Finalize DTI chart and INW matrix
    - Begin defining OBMP Update goals and impediments


Task 1 Project Management and Meetings
Sep 2018 - Feb 2020
Task 2 Develop OBMP Goals, Impediments, and Actions to Remove Impediments
Nov 2018 - Jul 2019
Prepare TM 1
Mar - Jul
Task 3 Develop OBMP Implementation Plan
Jul 2019 - Jan 2020
Prepare TM 2
Sep 2019 - Jan 2020
LS 4 – review draft TM 1
May 2019
LS 2
Feb 2019
LS 5
Jun 2019
LS 7 – review draft TM 2
Nov 2019
LS 1
Jan 2019
LS 3
Mar 2019
LS 6
Jun 2019
LS 8
Jan 2020
Sep
Nov
Jan
Mar
May
Jul
Sep
Nov
Jan
Today
2018
2019
2020

Schedule of Major Watermaster Initiatives

2018-2020