



Sustainable Management Criteria BMP

February 28, 2018



*California Department of Water Resources
Sustainable Groundwater Management Program*

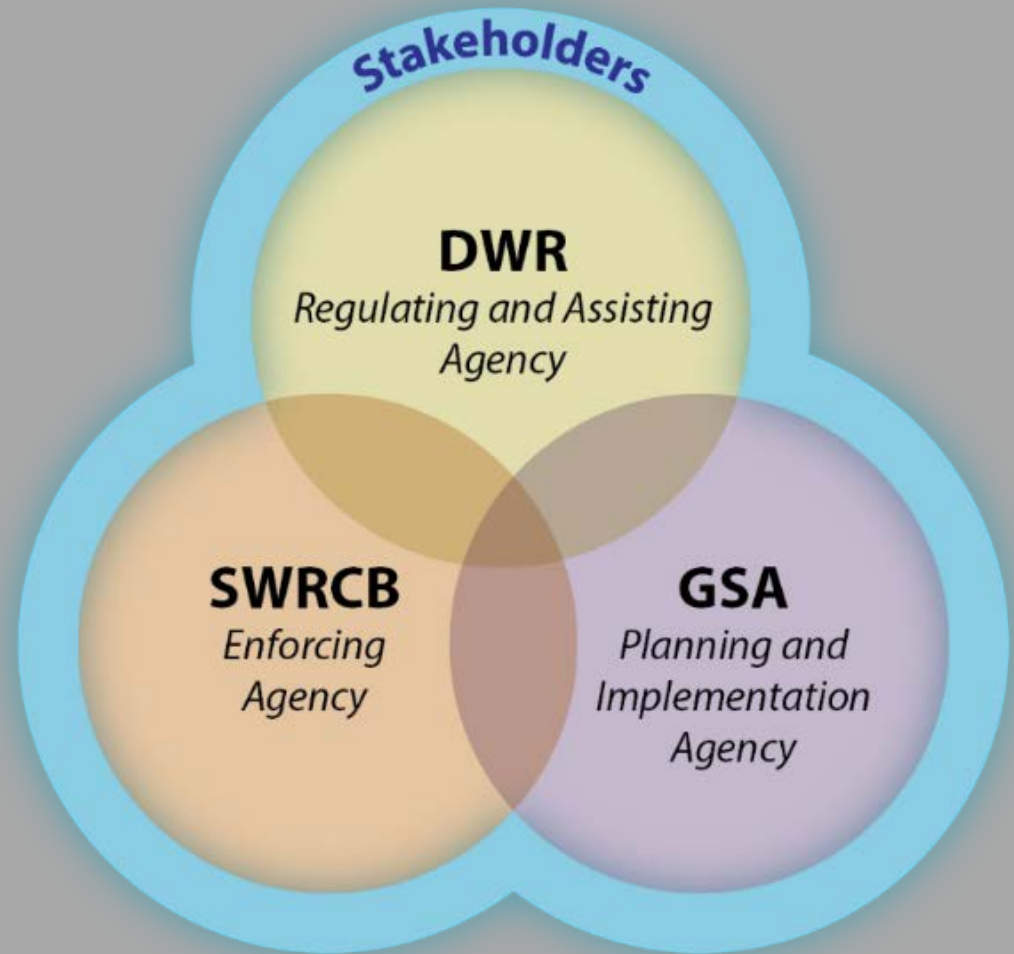
SGMA Overview

Local Control



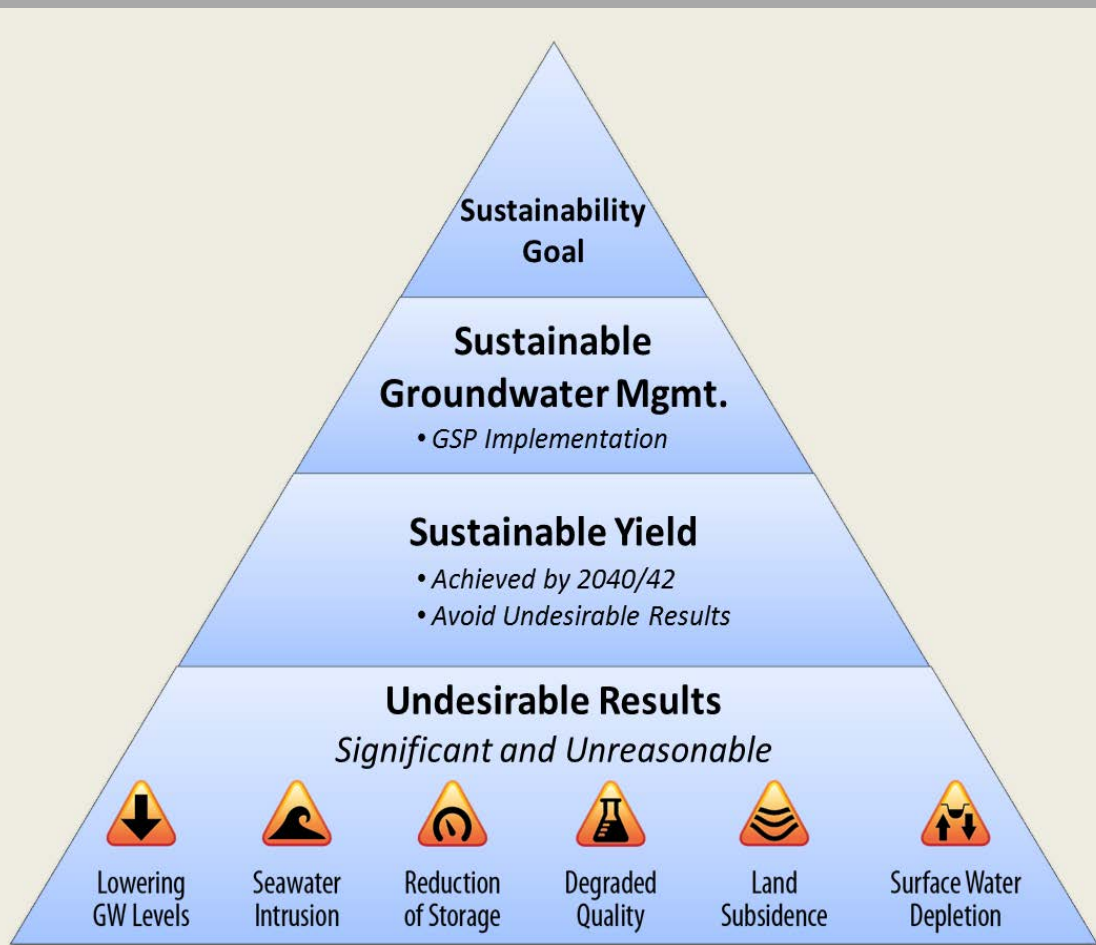
“A central feature of these bills is the recognition that groundwater management in California is best accomplished locally.”

Governor Jerry Brown, September 2014

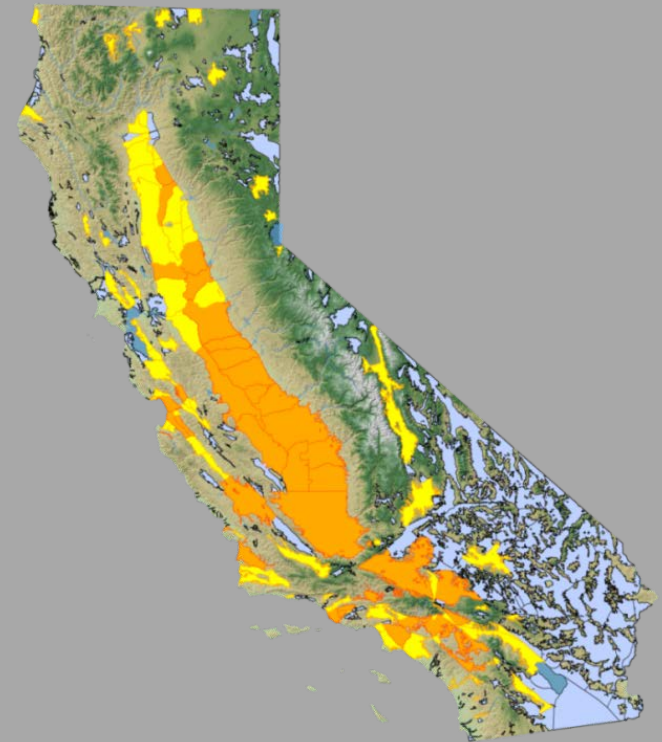


SGMA Overview

Sustainability



Groundwater Basins

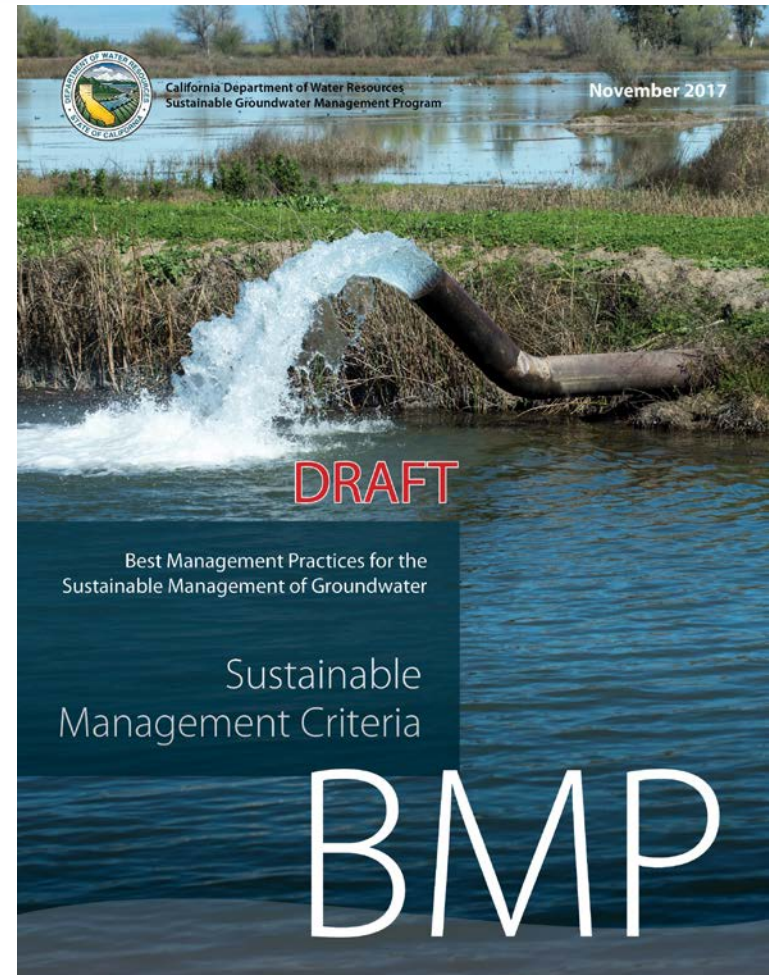


Groundwater Sustainability Plans
Required for **High** and **Medium**
Priority Basins by 2020/22



Outline

- Overview of DWR's SGMA Best Management Practice (BMP) and Guidance Documents
- Discussion of the Sustainable Management Criteria BMP





Best Management Practices and Guidance Documents



Legislation

Water Code 10729

(d)(1) By January 1, 2017, the department shall publish on its Internet Web site best management practices for the sustainable management of groundwater

(2) The department shall develop the best management practices through a public process involving one public meeting conducted at a location in northern California, one public meeting conducted at a location in the San Joaquin Valley, one public meeting conducted at a location in southern California, and one public meeting of the California Water Commission.



BMPs vs. GSP Regulations

- Role of BMPs to provide clarification, technical assistance, and examples to help GSAs develop elements of GSPs
- BMPs (technical assistance) vs. GSP Regulations (requirements)

- GSP Regulations

- Sec. 352.2 (Monitoring Protocols)

(BMP #1 - Monitoring Protocols, Standards, and Sites)

- Sec. 352.4 (Installation of Monitoring Sites)

(BMP #2 - Monitoring Networks and Identification of Data Gaps)

BMP Development Phase I

Develop highest ranked BMP topics

Topics not identified as highest rank developed at lower level of detail

BMP Development Phase II

Remaining BMPs developed to a higher level of detail





Existing BMPs and Guidance Documents

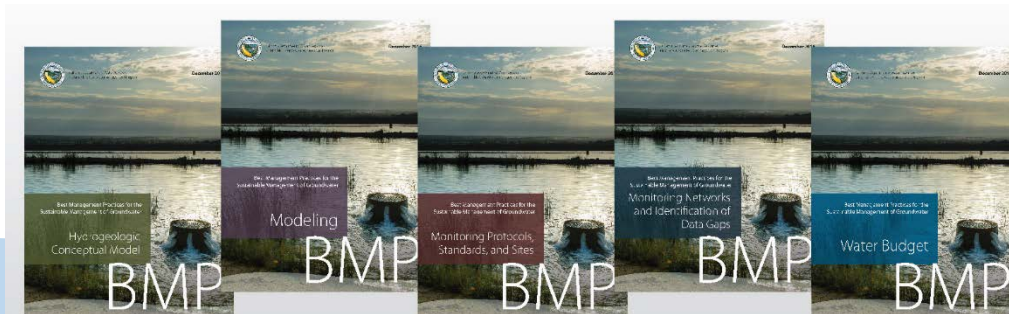
<http://www.water.ca.gov/groundwater/sgm/bmps.cfm>

BMPs (Dec. 2016)

1. Monitoring Protocols, Standards, and Sites
2. Monitoring Networks and Identification of Data Gaps
3. Hydrogeologic Conceptual Model
4. Water Budget
5. Modeling

Guidance Documents

- Preparation Checklist (Dec. 2016)
- GSP Annotated Outline (Dec. 2016)
- Engagement with Tribal Governments (Jan 2018)
- Stakeholder Communication and Engagement (Jan 2018)





Sustainable Management Criteria



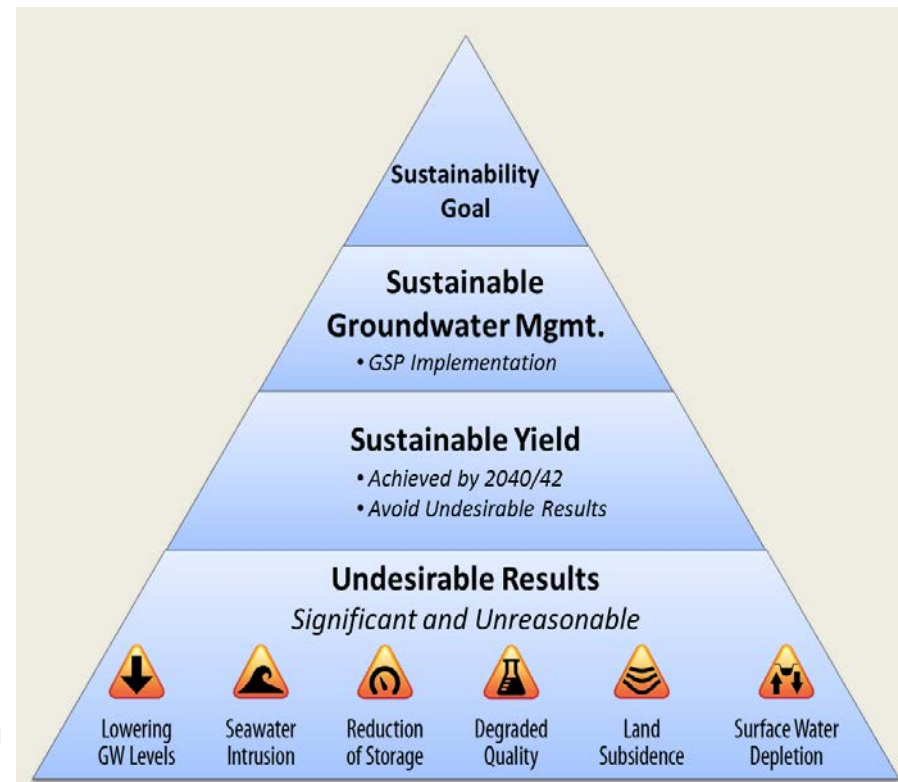
Article 5. Plan Contents

- **1. Administrative Information**
 - §354.4. General Information
 - §354.6. Agency Information
 - §354.8. Description of Plan Area
 - §354.10. Notice & Communication
- **2. Basin Setting**
 - §354.14. Hydrogeologic Conceptual Model
 - §354.16. Groundwater Conditions
 - §354.18. Water Budget
 - §354.20. Management Areas
- **3. Sustainable Management Criteria**
 - §354.24. Sustainability Goal
 - §354.26. Undesirable Results
 - §354.28. Minimum Thresholds
 - §354.30. Measurable Objectives
- **4. Monitoring Networks**
 - §354.34. Monitoring Network
 - §354.36. Representative Monitoring
 - §354.38. Assessment & Improvement
 - §354.40. Reporting Monitoring Data to the Department
- **5. Projects and Management Actions**
 - §354.44. Projects & Management Actions

Undesirable Results and Sustainability Indicators



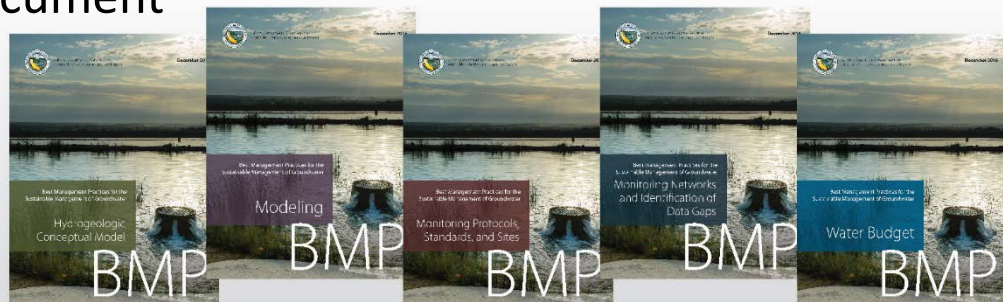
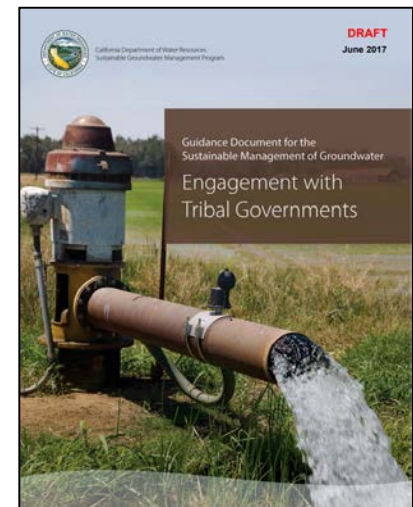
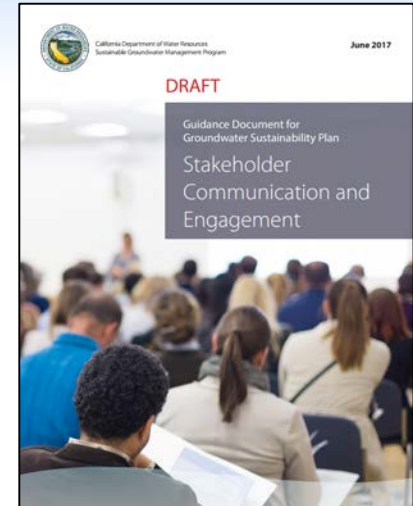
- ⚠️ Chronic **lowering of groundwater levels** indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon....
- ⚠️ Significant and unreasonable **reduction of groundwater storage**
- ⚠️ Significant and unreasonable **seawater intrusion**
- ⚠️ Significant and unreasonable **degraded water quality**, including the migration of contaminant plumes that impair water supplies
- ⚠️ Significant and unreasonable **land subsidence** that substantially interferes with surface land uses
- ⚠️ **Depletions of interconnected surface water** that have significant and unreasonable adverse impacts on beneficial uses of the surface water



Preliminary Activities



- Understand the Basin Setting
 - Hydrogeologic Conceptual Model BMP
 - Modeling BMP
 - Water Budget BMP
- Inventory Existing Monitoring Programs
 - Monitoring Protocols, Standards, and Sites BMP
 - Monitoring Networks and Identification of Data Gaps BMP
- Engage Interested Parties in the Basin
 - Engagement with Tribal Governments Guidance Document
 - Stakeholder Communication & Engagement Guidance Document





Assess Sustainability Indicators

- Start by assessing all six *sustainability indicators*
 - Default position should be that all six apply
 - Individual sustainability indicators can be removed from consideration only after demonstrating that they do not exist and are not likely to occur
- For each indicator, consider the conditions that would represent *significant and unreasonable*
 - Local decision based on local conditions and concerns
 - Later, these will be translated into quantitative undesirable results
- Consider the use of *management areas* (optional)
- Develop initial *representative monitoring sites*
 - A subset of all monitoring sites in a basin where minimum thresholds and measurable objectives will be set

Minimum Threshold



- Quantitative value representing conditions at a monitoring site that, when exceeded individually or in combination with other minimum thresholds, may cause an undesirable result in the basin
- Set for each representative monitoring site
- Set for each sustainability indicator

Sustainability Indicators	 Lowering GW Levels	 Reduction of Storage	 Seawater Intrusion	 Degraded Quality	 Land Subsidence	 Surface Water Depletion
Metric(s) Defined in GSP Regulations	• Groundwater Elevation	• Total Volume	• Chloride concentration isocontour	• Migration of Plumes • Number of supply wells • Volume • Location of isocontour	• Rate and Extent of Land Subsidence	• Volume or rate of surface water depletion

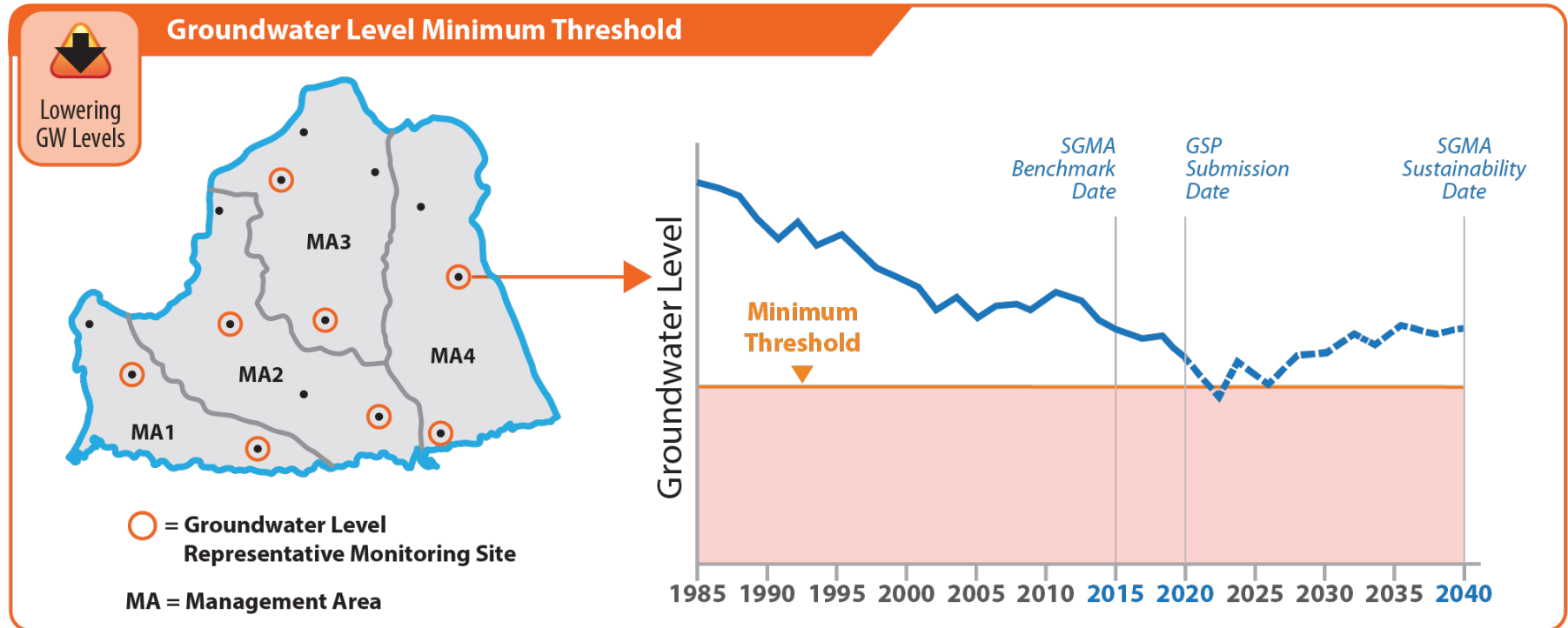


Minimum Thresholds

Each minimum threshold must be supported by documentation:

1. Information and criteria
2. Relationship between the minimum thresholds for each sustainability indicator
3. Avoid causing undesirable results in adjacent basins
4. Affects to the interests of beneficial uses and users of groundwater or land uses and property interests.
5. State, federal, or local standards
6. Quantitatively measured, consistent with the monitoring network requirements

Minimum Threshold – Declining Groundwater Levels





Lowering of Groundwater Levels

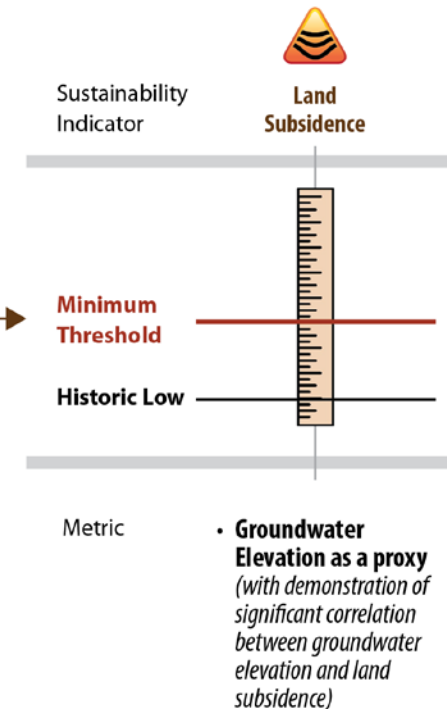
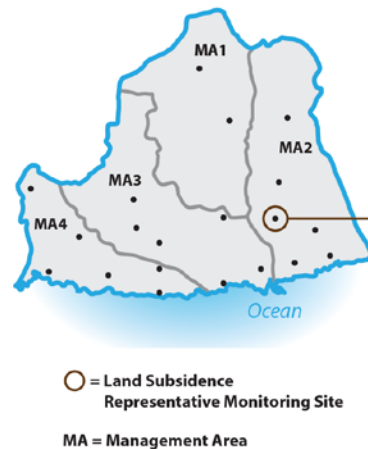
- What are the:
 - historical groundwater conditions in the basin?
 - average, minimum, and maximum depths of municipal, agricultural, and domestic wells?
 - screen intervals of the wells?
 - adjacent basin's minimum thresholds for groundwater elevations
 - potential impacts of changing groundwater levels on groundwater dependent ecosystems?
- What impacts do water levels have on pumping costs (e.g., energy cost to lift water)?
- Which principal aquifer, or aquifers, is the representative monitoring site evaluating?

Groundwater Elevations as a Proxy

- Groundwater elevation can be used as a proxy metric for any sustainability indicator
- GSP must demonstrate significant correlation between groundwater elevation and the other metric

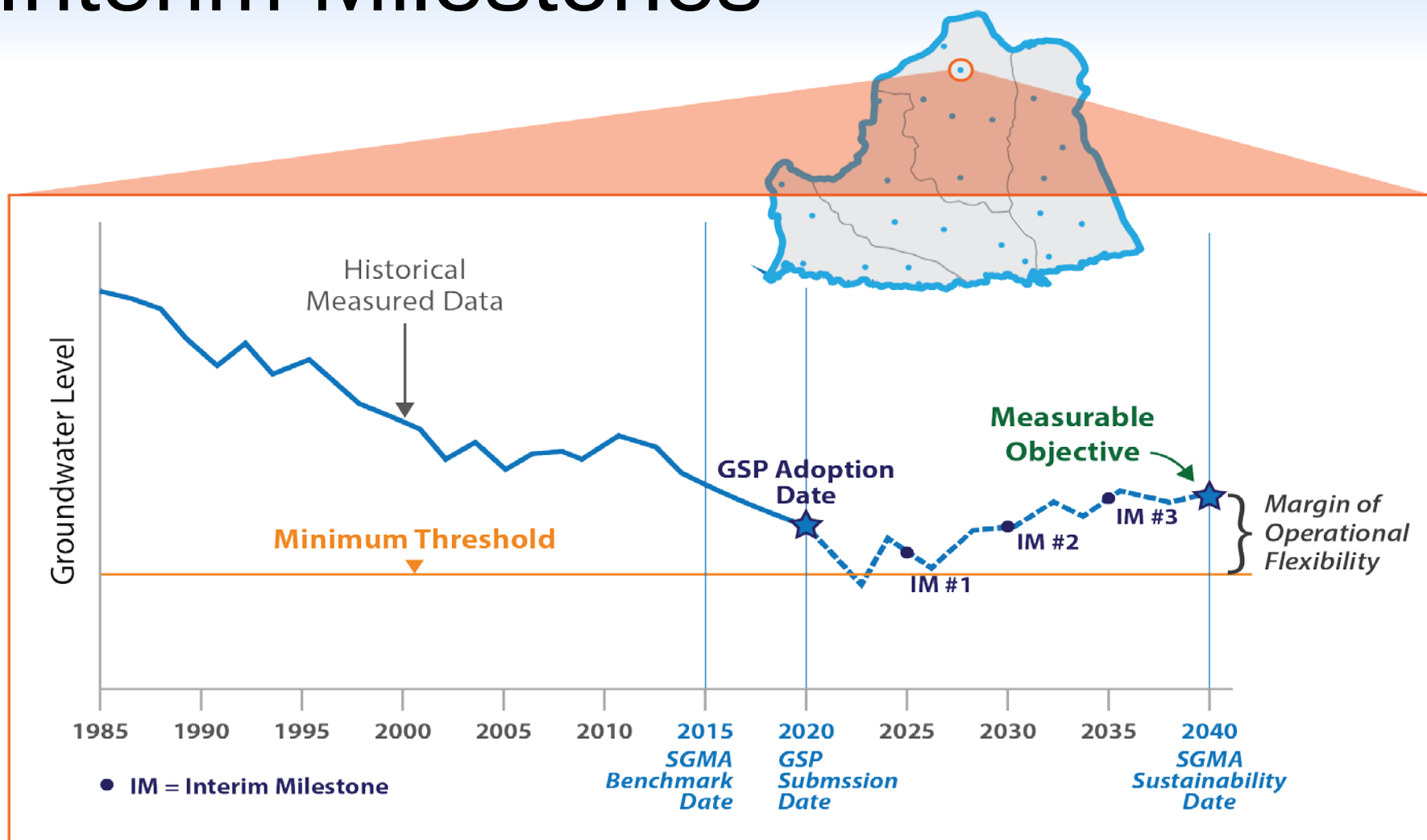
EXAMPLE 2

Groundwater elevation as a proxy for land subsidence



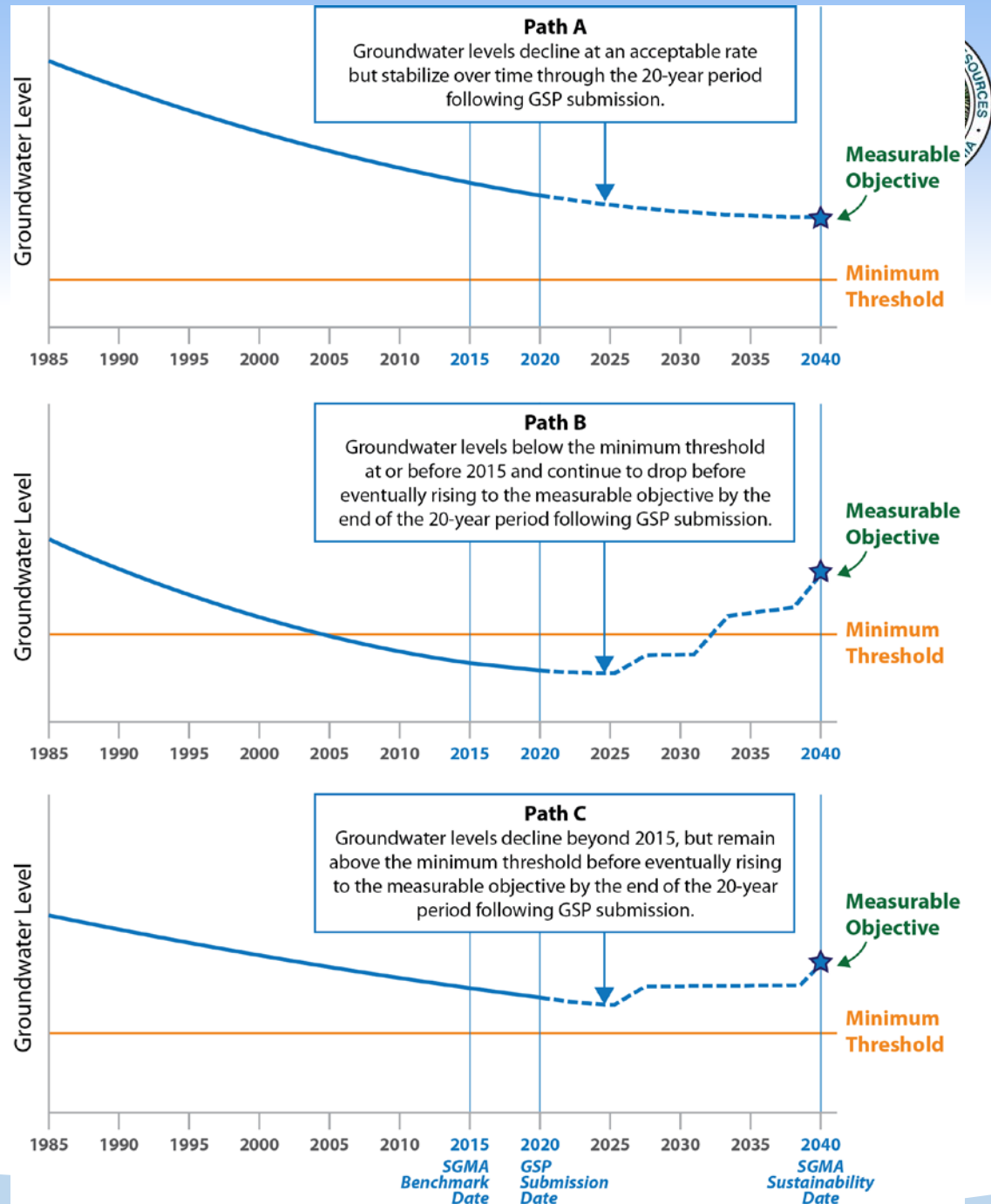
Note: This example uses groundwater elevation as a proxy metric for the land subsidence sustainability indicator, but groundwater elevation can be used as a proxy for other sustainability indicators.

Measurable Objectives and Interim Milestones



Paths to Sustainability

- Defined locally
- Will vary based on local conditions and values





Undesirable Result

- Occurs when any of the six sustainability indicators become *significant and unreasonable*, as defined locally
- Based on a combination of minimum threshold exceedances
- Must be eliminated within 20 years of GSP implementation
 - Some basins will experience undesirable results within the implementation period
- Must be coordinated for the entire basin



Sustainability Goal

- A goal that culminates in the absence of undesirable results within 20 years of GSP implementation
- Description of goal includes
 - Information from basin setting used to establish the goal
 - Discussion of measures that will be implemented
 - Explanation of how the goal will be achieved within 20 years of GSP implementation and is likely to be maintained through the planning and implementation horizon (50 years)



Example

Illustrating the relationship between minimum thresholds, undesirable results, and sustainable management

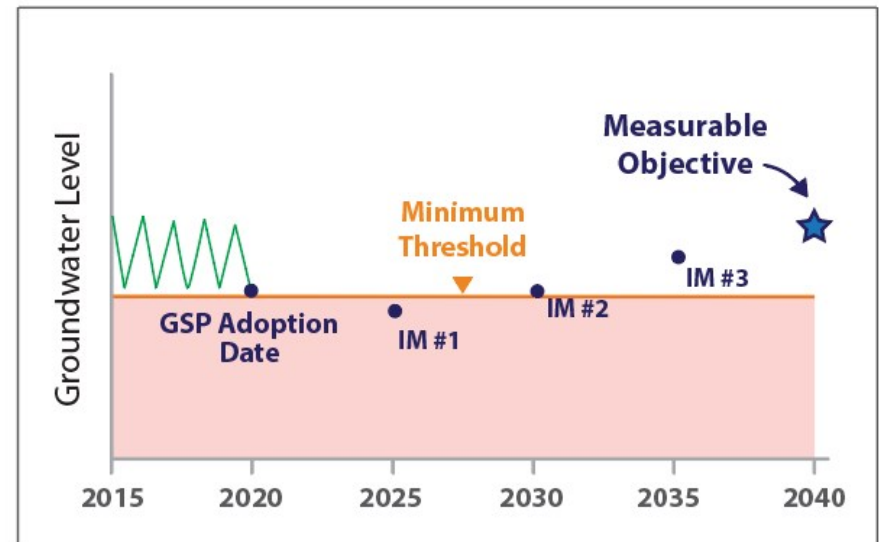


Example

- Purpose:
 - To illustrate the relationship between minimum thresholds, measurable objectives, interim milestones, undesirable results, and sustainable management.
- Disclaimer:
 - This example is entirely hypothetical and is intentionally simplified. Groundwater conditions and local priorities will be more complex in the real world.
 - Do not assume that any numbers used in this simple example will be suitable for your GSP (e.g., the number of representative monitoring sites used in the basin or the number of minimum threshold exceedances that lead to an undesirable result)

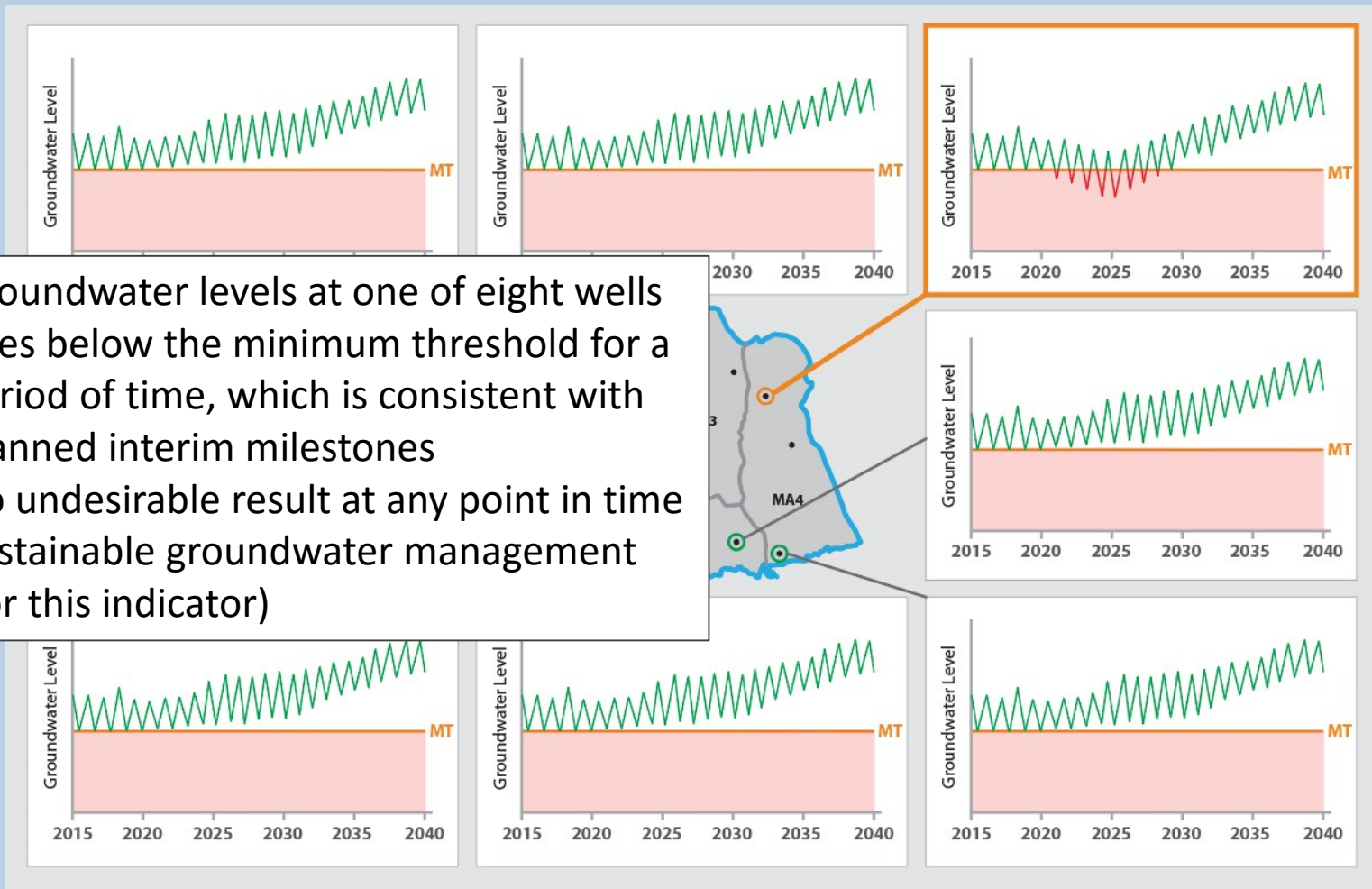
Example Description

- A hypothetical basin sets minimum thresholds, interim milestones, and measurable objectives at eight representative monitoring sites
- For simplification, assume the criteria are the same at each representative monitoring site
- Further, the GSA(s) has determined that minimum threshold exceedances at three or more sites is a significant and unreasonable condition, and is, therefore, an undesirable result

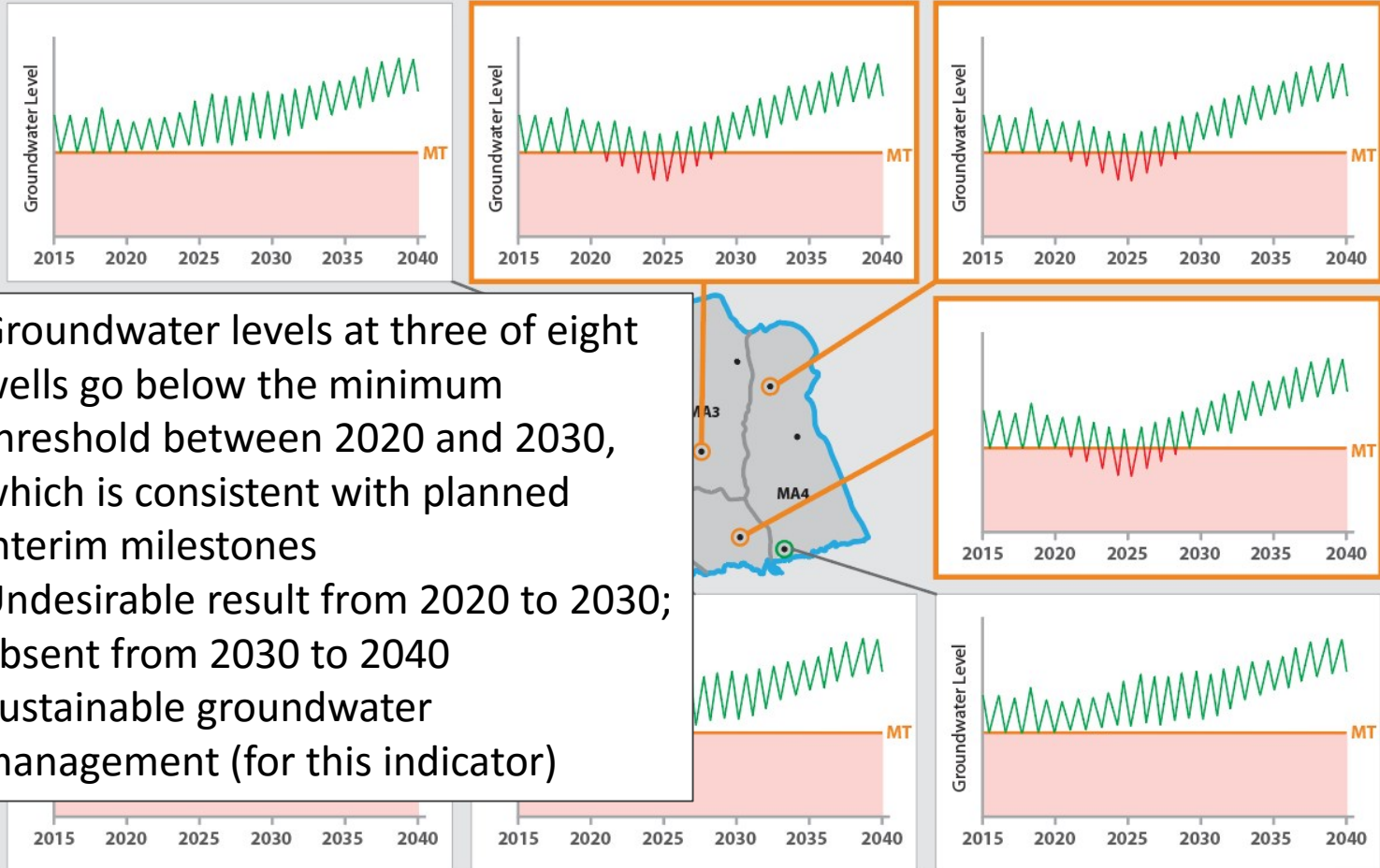


Example - Scenario 1

- Groundwater levels at one of eight wells goes below the minimum threshold for a period of time, which is consistent with planned interim milestones
- No undesirable result at any point in time
- Sustainable groundwater management (for this indicator)



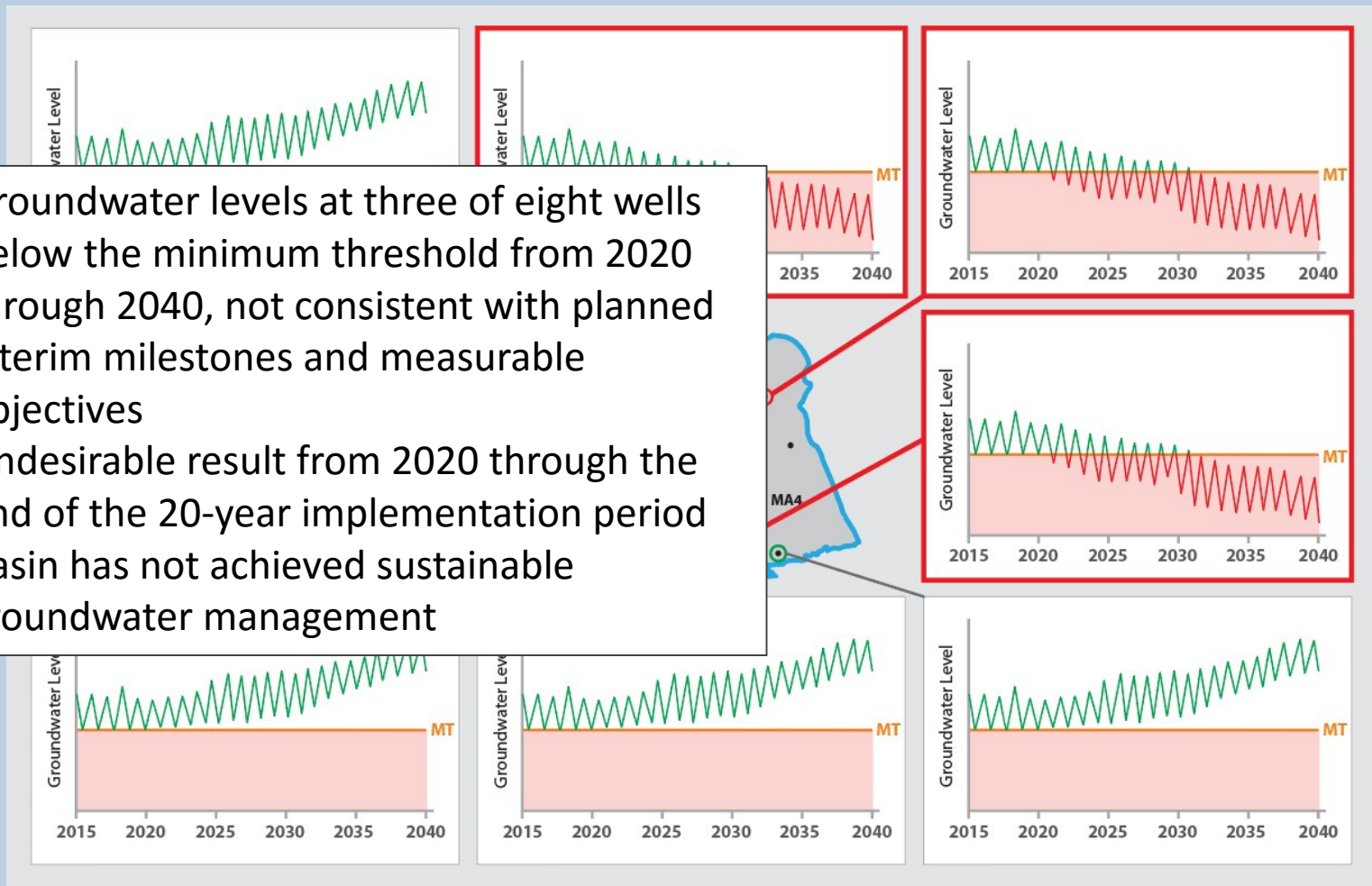
Example - Scenario 2



- Groundwater levels at three of eight wells go below the minimum threshold between 2020 and 2030, which is consistent with planned interim milestones
- Undesirable result from 2020 to 2030; absent from 2030 to 2040
- Sustainable groundwater management (for this indicator)

Example - Scenario 3

- Groundwater levels at three of eight wells below the minimum threshold from 2020 through 2040, not consistent with planned interim milestones and measurable objectives
- Undesirable result from 2020 through the end of the 20-year implementation period
- Basin has not achieved sustainable groundwater management





Conclusions



Conclusions

- SMC are the required, quantitative metrics that define sustainable management of a basin
- SMC are determined locally
- SMC support an outcome-driven process to achieving sustainability
- DWR staff (headquarters staff, regional coordinators, POCs)