MARIN WATER

Strategic Water Supply Assessment

BOARD WORKING SESSION #3

May 24, 2022

Board Working Session #3 Agenda

- Proposed Planning Scenarios
- Decision Support Model Overview
- DRAFT Baseline Simulation Results
- Next Steps

Preview of Board Engagement Schedule

- Periodic Updates and Board Discussions
- April
  - Overview of Water Supply Assessment
- May
  - Demand Management
  - **Drought Scenarios & Baseline Reliability** ★
- June/July/August
  - Scenarios and Results
  - Water Supply Alternatives
  - Evaluation Process
  - Roadmap

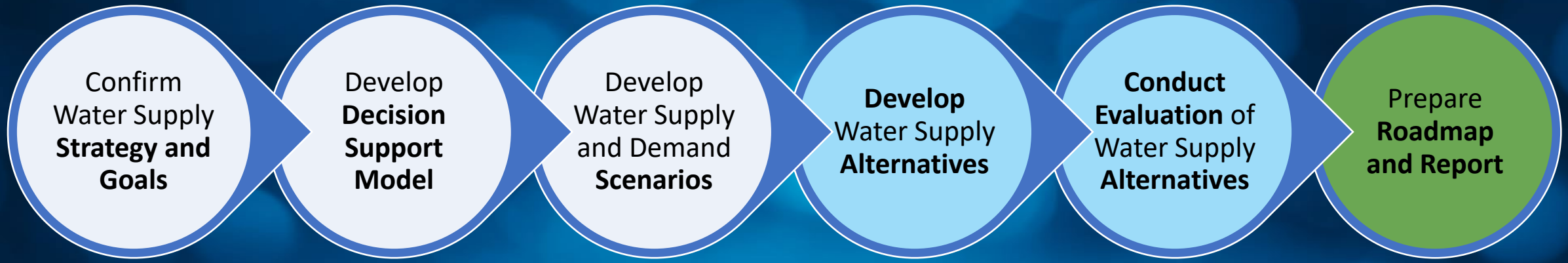
Assessment & Process

Key Project Scope Elements

Understanding Current Risks & Establishing Goals

Identifying & Evaluating Alternatives

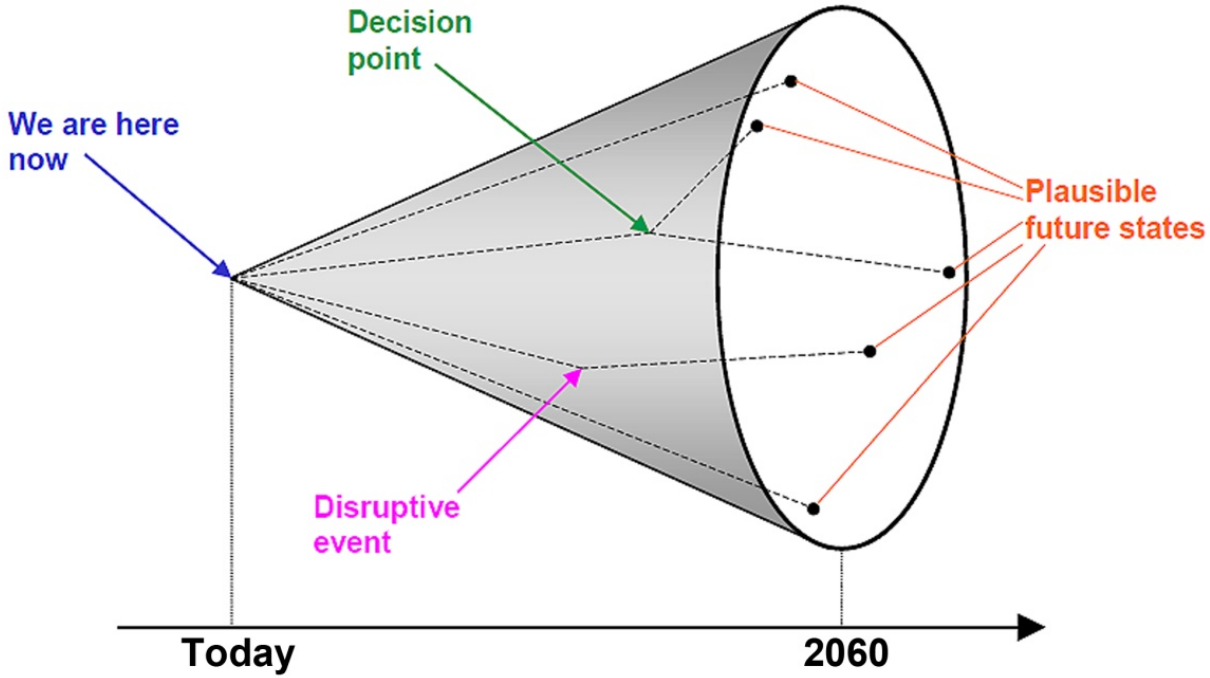
Recommendations & Path Forward



Drought Scenarios

Water Supply and Demand Scenarios

- Recognizing that future is uncertain
  - Climate change
  - Drought variability
  - Demands
  - Policies and regulations
- Seeking robust solutions
- Scenarios allow us to explore plausible future conditions and identify promising solutions
  - Historical droughts
  - Climate projections
  - Paleo reconstructions
  - Stress tests



Scenarios are alternative views of how the future might unfold. Scenarios are not predictions or forecasts of the future

Scenarios

- Scenarios are intended to capture uncertainty that is NOT in management control for this decision
- Water Supply - Hydroclimate
  - Historical
  - Climate projections
  - Paleo reconstructions
  - Synthetic droughts
- Water Demand
  - Recent trends
  - Population growth and land use
  - Passive levels increasing water use efficiency

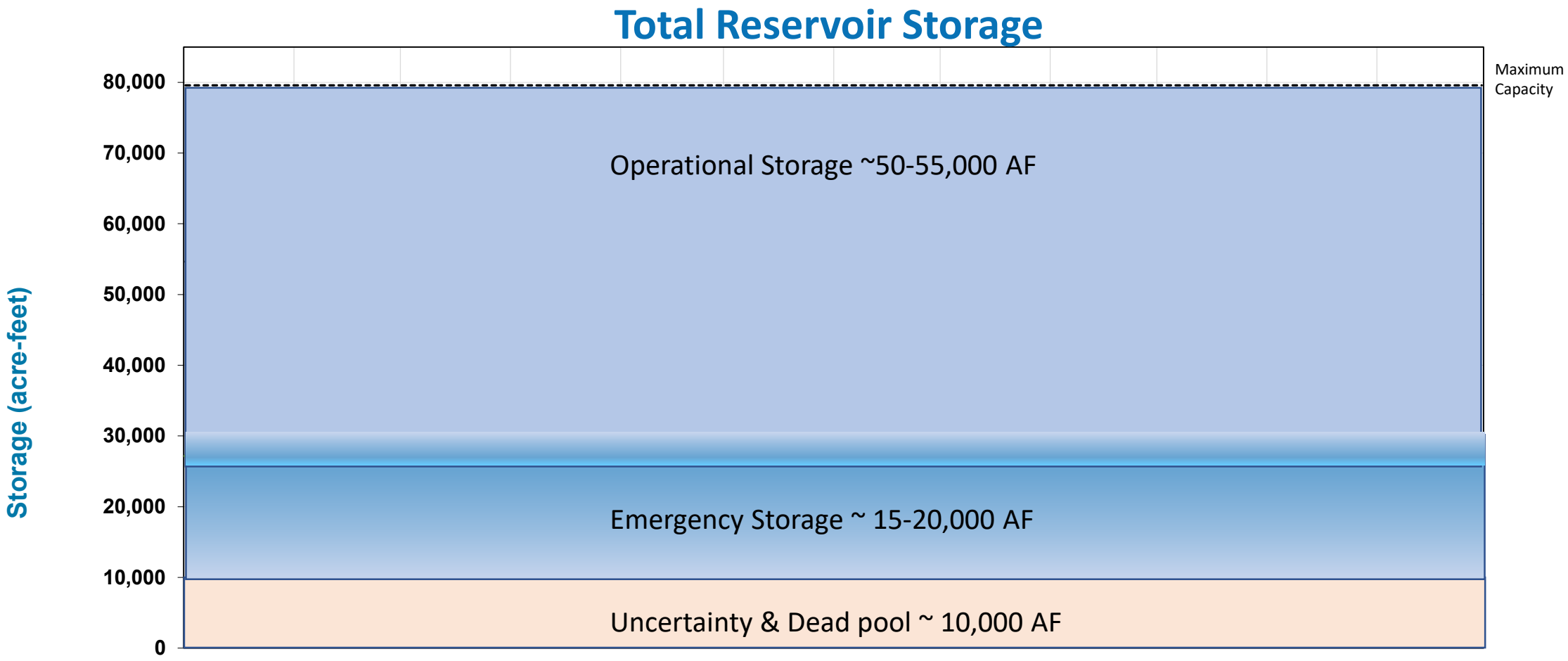
Draft Scenarios – *Explore Uncertainties We Don't Control*

- Scenario 1 – Current Trends
- Scenario 2 – Accelerated Conservation
- Scenario 3 – Short and Severe Drought
- Scenario 4 – Beyond Drought of Record
- Scenario 5 – Abrupt Disruptions

Draft Scenario Assumptions

Scenario	Hydroclimate Assumptions	Demand Assumptions	Operational Assumptions
Scenario 1 – Current Trends	Historical observed	Passive-level savings per UWMP; approx. 8% less than w/o passive by 2045	Current operations; local supply preference; supplemental water with KPS rehab
Scenario 2 – Accelerated Conservation	Historical observed	Passive plus programmatic savings; approx. 14% less than w/o passive by 2045	Current operations; local supply preference; supplemental water with KPS rehab
Scenario 3 – Short and Severe Drought	Synthetic 4-Yr drought (2020, 2021, 1976, 1977)	Combine with either passive or passive plus programmatic assumptions	Current operations; local supply preference; supplemental water with KPS rehab
Scenario 4 – Beyond Drought of Record	Long-range, extended 6- or 7-Yr drought (based on downscaled GCMs)	Combine with either passive or passive plus programmatic assumptions	Current operations; local supply preference; supplemental water with KPS rehab
Scenario 5 – Abrupt Disruptions (TBD)	Synthetic 4-Yr drought (2020, 2021, 1976, 1977); high wildfire likelihood	Combine with either passive or passive plus programmatic assumptions	EX: Operational disruptions due to post-wildfire sediment loads Ex: Seismic, PVP, Policy-based disruptions

Defining Minimum Acceptable Storage Levels



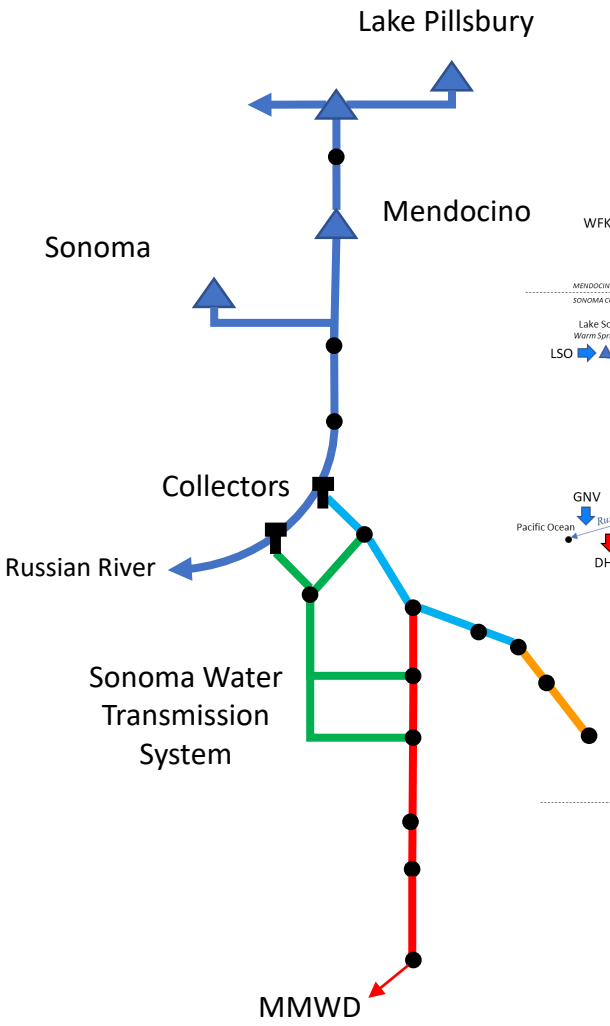
Decision Support Model

Model Purpose

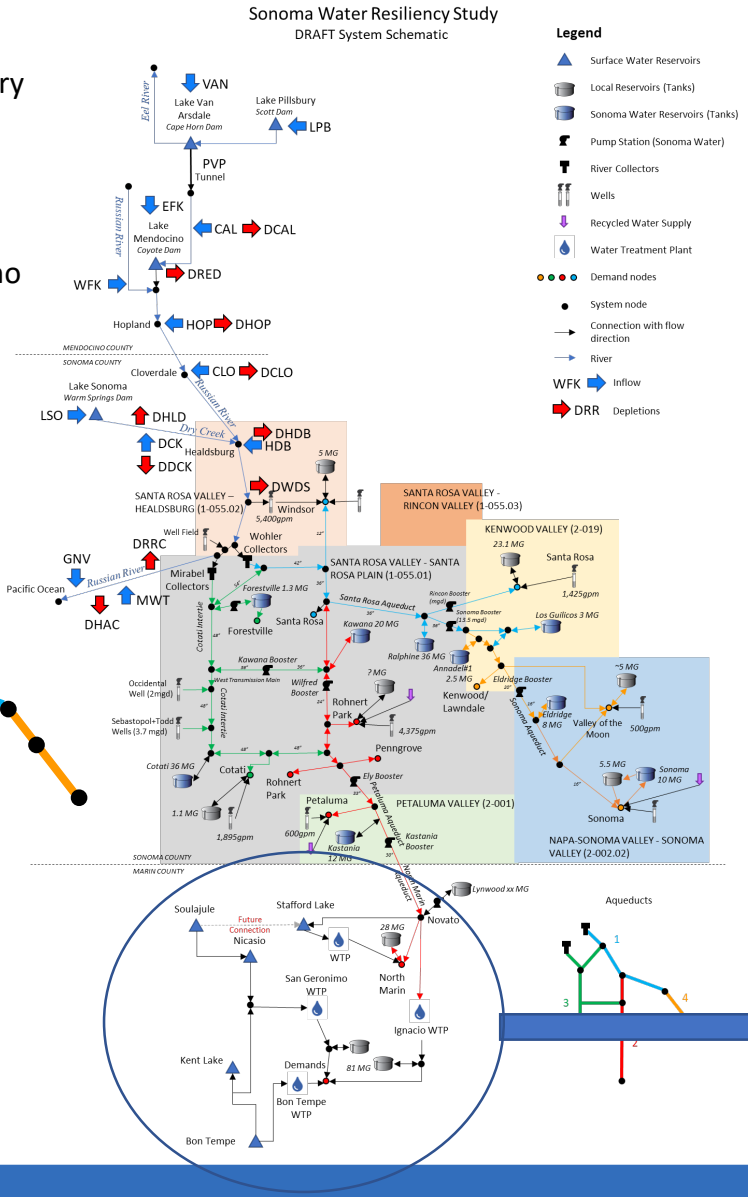
- Model to provide information on system performance under various scenarios and water management
  - What is the current risk to MMWD's water delivery reliability under recent and projected future droughts?
  - How much additional water supply is needed under different future hydrologic drought and demand scenarios?
  - Test performance of future water management alternatives
- Water balance and system operations representation of the MMWD system
- Calculations daily time step
- Not a Hydraulic model

DSM – System Representation

Simplified Model Domain

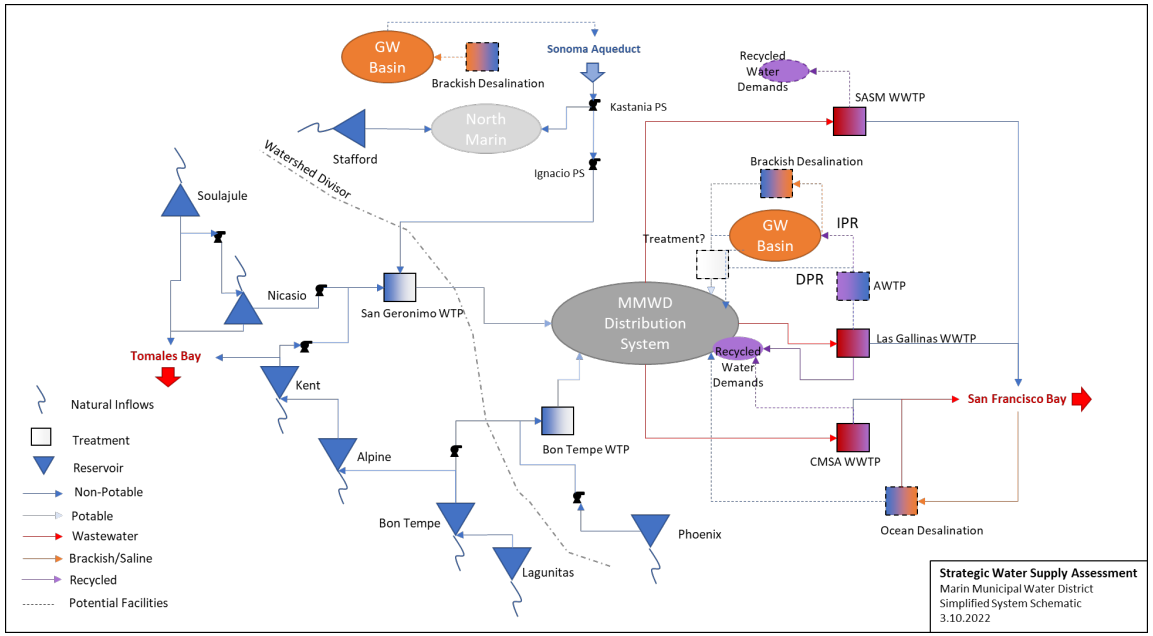


Model Schematic

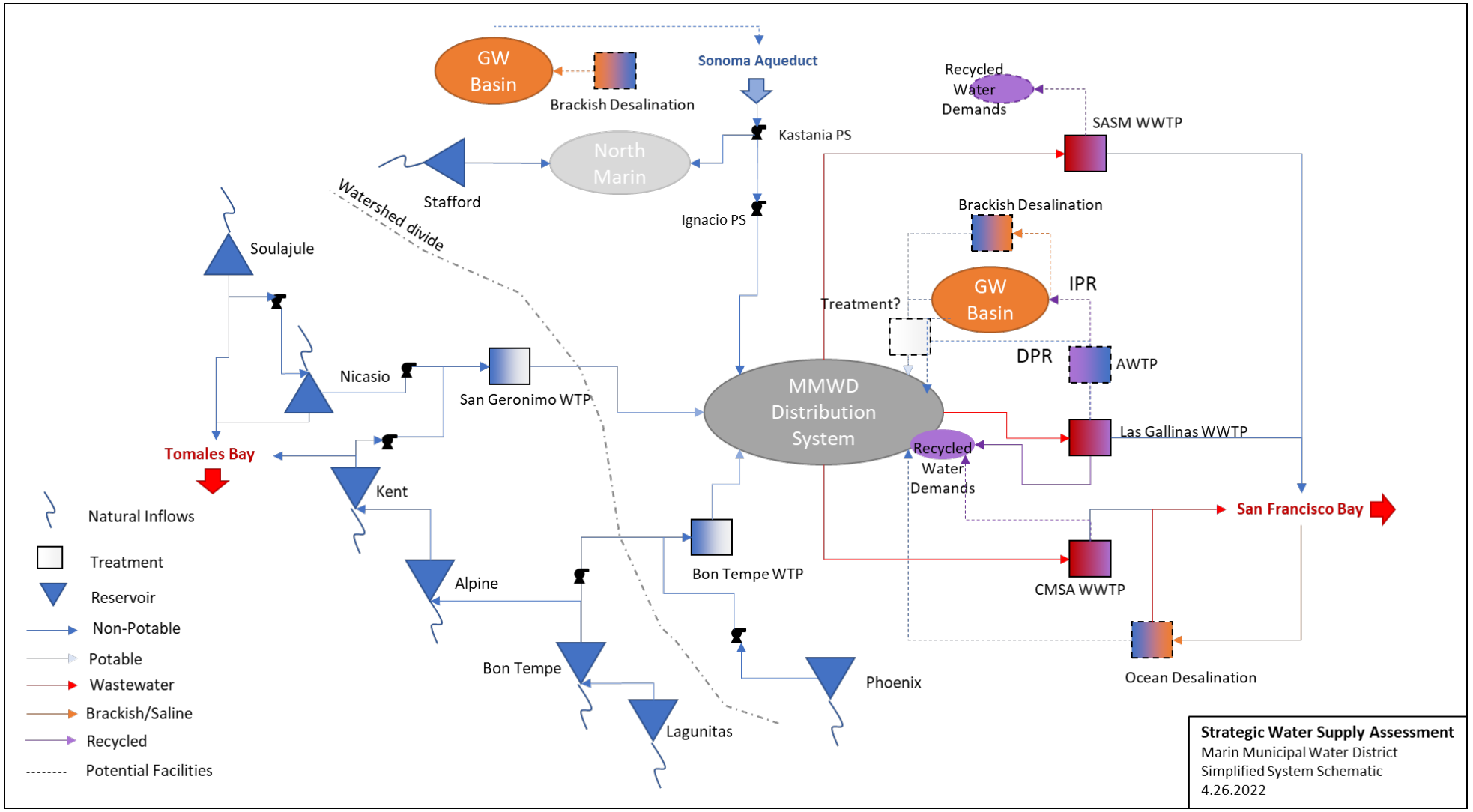


Top-Down model development approach, start with high level assumptions, add details as needed

Additional details for MMWD



DSM – Marin Municipal WD Representation



Key Model Assumptions/Input Data Quality

- Inflows to MMWD reservoirs (1927-2021) monthly time step:
  - Historical Data (1927-2000) - *2002 Water Supply Planning Model & Preliminary Water Supply Option Analyses report*
  - Historical Data (1992-2021) - *Water Resources Plan 2040 report* and updated since 2017
- Inflows to Russian River (1910-2017):
  - Obtained from Sonoma Water BCM & HEC ResSim model daily flows
- Lagunitas Precipitation Records (1879-present)
- Existing system, plus future projects that can be turned ON/OFF
- Daily time step with results reported in monthly/annual time scale since not all inputs are available in a daily time scale
- Assume that the inflow and precipitation records are accurate
  - High-level independent checks are being performed

Main Model Inputs:

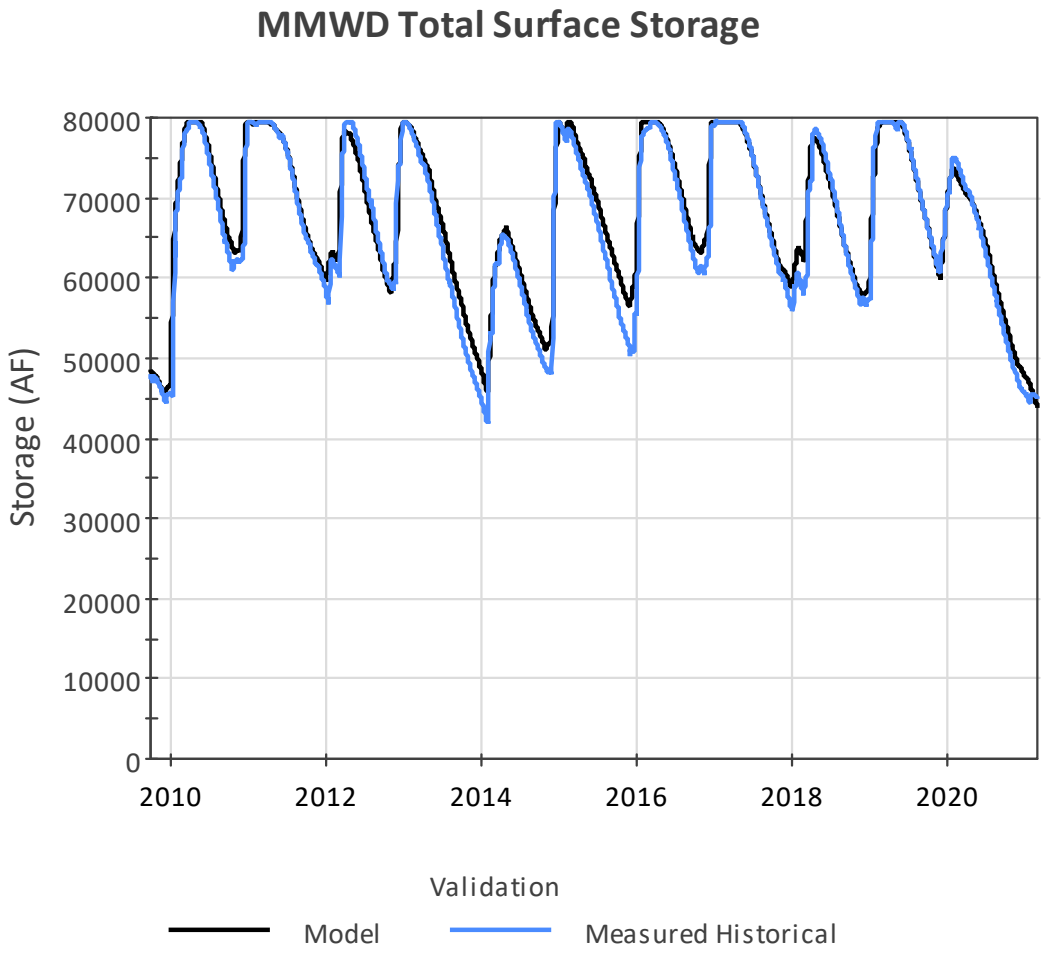
- River flows
- Reservoir inflows
- Local supplies
- System demands
- Flow limitations
- System operation

Main Model Outputs:

- Model Scenarios
- System deliveries for different supplies
- Reservoir Levels
- System flows

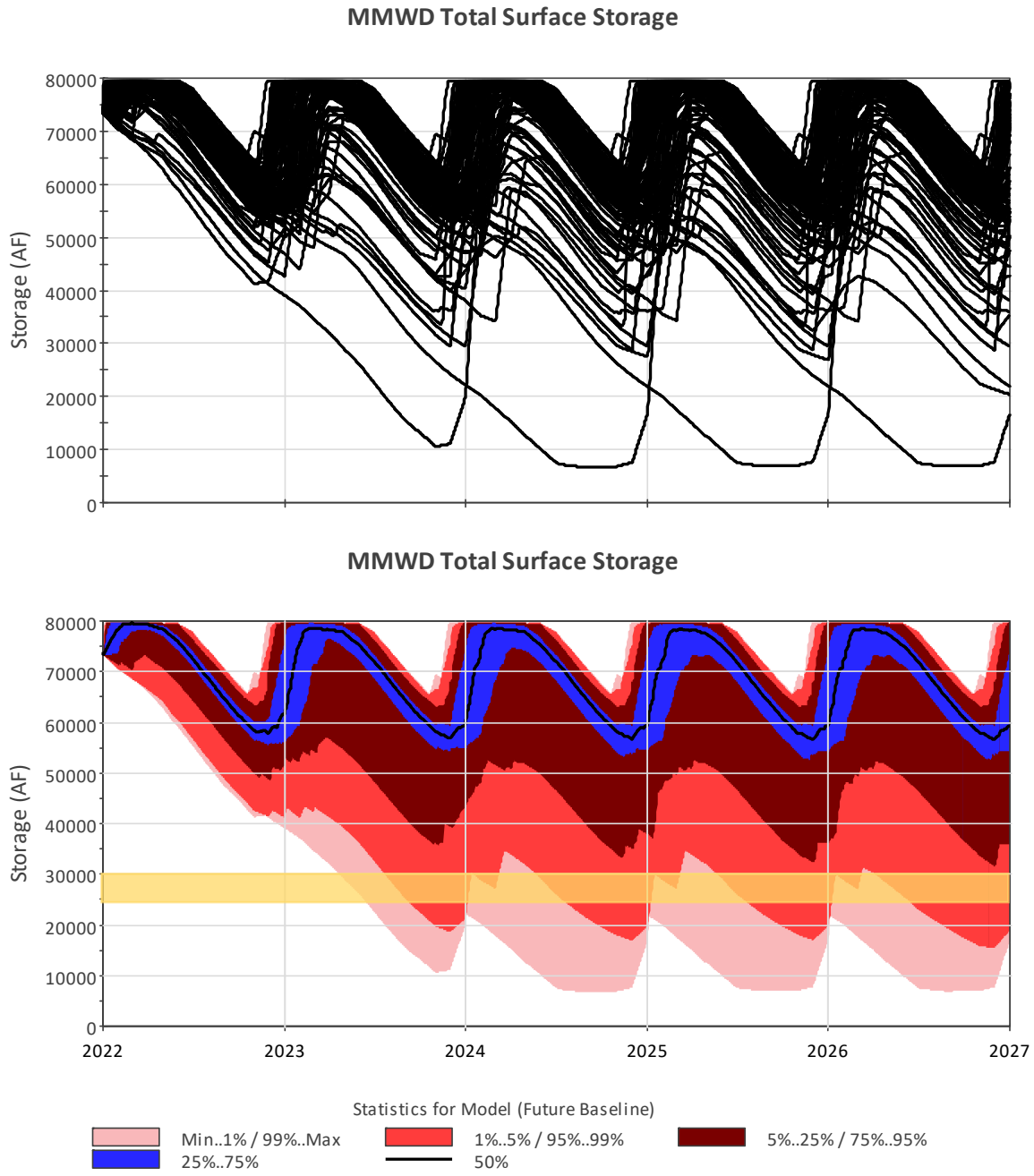
Model Validation

- Main model validation is the historical run of the model, where historical demands and historical reservoir inflows are used
- Validation Period: 2009 - 2021
- Validation Parameters:
  - Reservoir storage, deliveries of supplies, water treatment plant production
- Validation Approach:
  - Review data, review operations, add more model detail
- MMWD staff is working together with Jacobs to validate model results independently based on systems knowledge



Sample Model Simulation Results

- For each scenario:
  - Initial storage conditions
  - Demand assumptions
  - 107 individual hydrological inflow traces
- Results evaluation:
  - Individual trace outcomes OR
  - Probabilities based on ensemble of results
- Compare to performance measure
  - Frequency and magnitude of deficits



Status and Next Steps

Work in Progress

- Full quantification of scenarios
- Updates to decision support model
- Further development of water supply alternatives
  - alignments, cost, quality, feasibility, etc
- Detailed evaluation criteria

Schedule

- Proposed Upcoming Board Discussion Focus Areas
  - May
    - May 10 - Demand Management
    - May 24 - Drought Scenarios & Baseline Reliability
  - June
    - June 14 – Scenarios
    - June 28 - Water Supply Alternatives
  - July/August
    - Evaluation Process
    - Roadmap Development
- Public Meetings
  - June 2 – Public Workshop #2
  - August TBD – Public Workshop #3

Q & A