Integrated Water Resource Plan

Water and Sewer Board Update

April 20, 2022

City of Greeley Colorado

Stantec

Shift in Planning Methodology

Past Approach:

Predicating a single future demand and firm yield

- Single expected future condition
- Last Water Master Plan completed 2003, did not consider Terry Ranch

Current Approach:

Incorporates risk and uncertainty

- Multiple future conditions

What is an Integrated Water Resource Plan?

- Planning-level study focused on Greeley's water resources system
- Evaluates long-term water supply sustainability
- Develops road map to Buildout
- Identifies near-term Capital Improvement Plan components

IWRP Objectives

Create a long-term adaptive planning document that:

- Develops a suite of planning scenarios that explore future risks and uncertainties
- Investigates Greeley's ability to meet Level of Service Goals in an uncertain future
- Identifies an actionable water resources strategy
- Evaluates the timing and integration of Terry Ranch
- Produces a water resources CIP

IWRP Vision Statement

“An actionable and adaptive master plan for Greeley’s water resources that uses modern, defensible methods to develop a roadmap ensuring a reliable water supply for our community through an uncertain future.”

IWRP Process

1 Define Goals and Objectives

- What questions should the IWRP answer?

2 Lay IWRP Groundwork

- What risks should be evaluated?
- How should performance be measured?
- What tool should be used?

3 Define Planning Scenarios

- What future conditions does the IWRP need to evaluate?

4 Analyze Future Water Supply System

- What does Greeley need to do to ensure sustainable water supply?

IWRP Process

Focus of today's presentation

1 Define Goals and Objectives

- What questions should the IWRP answer?

2 Lay IWRP Groundwork

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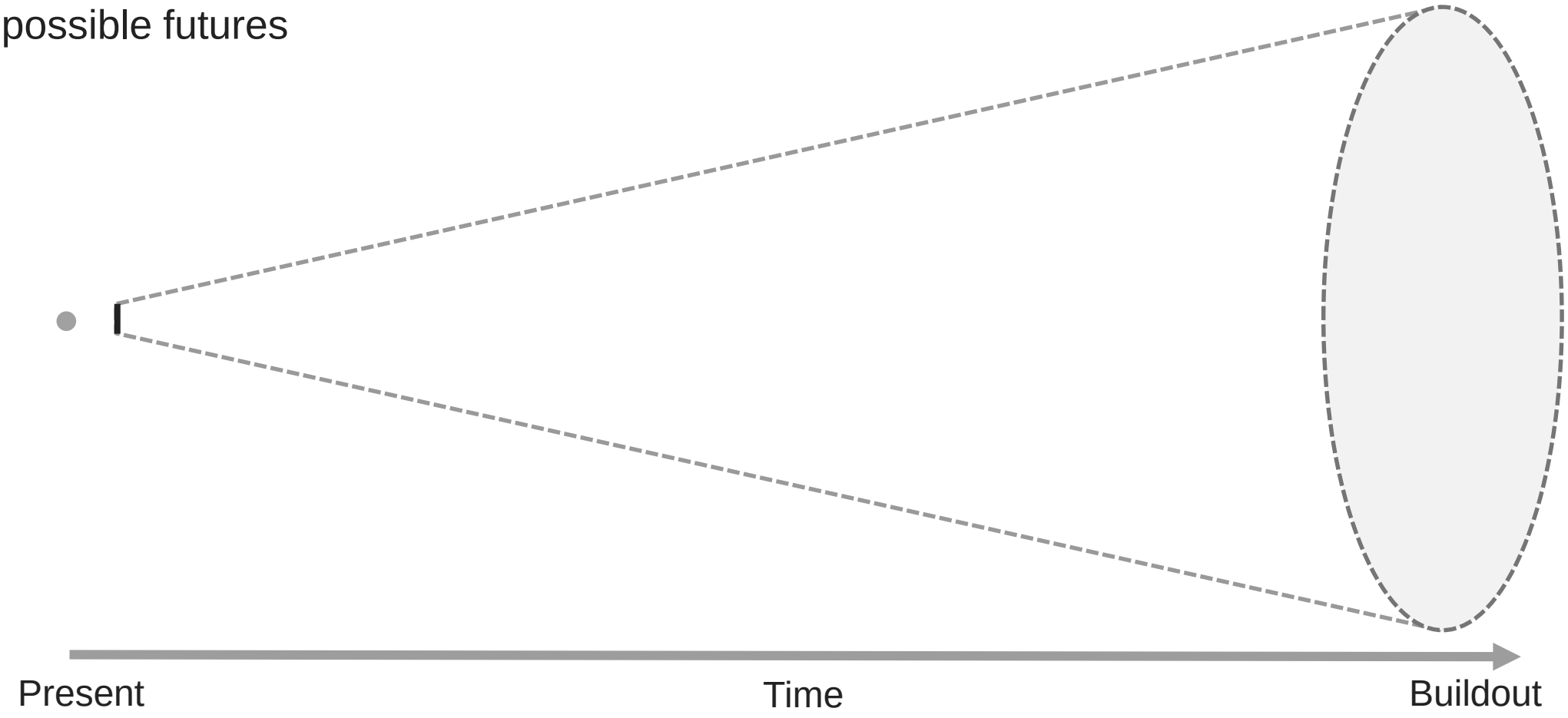
PLANNING SCENARIO BACKGROUND

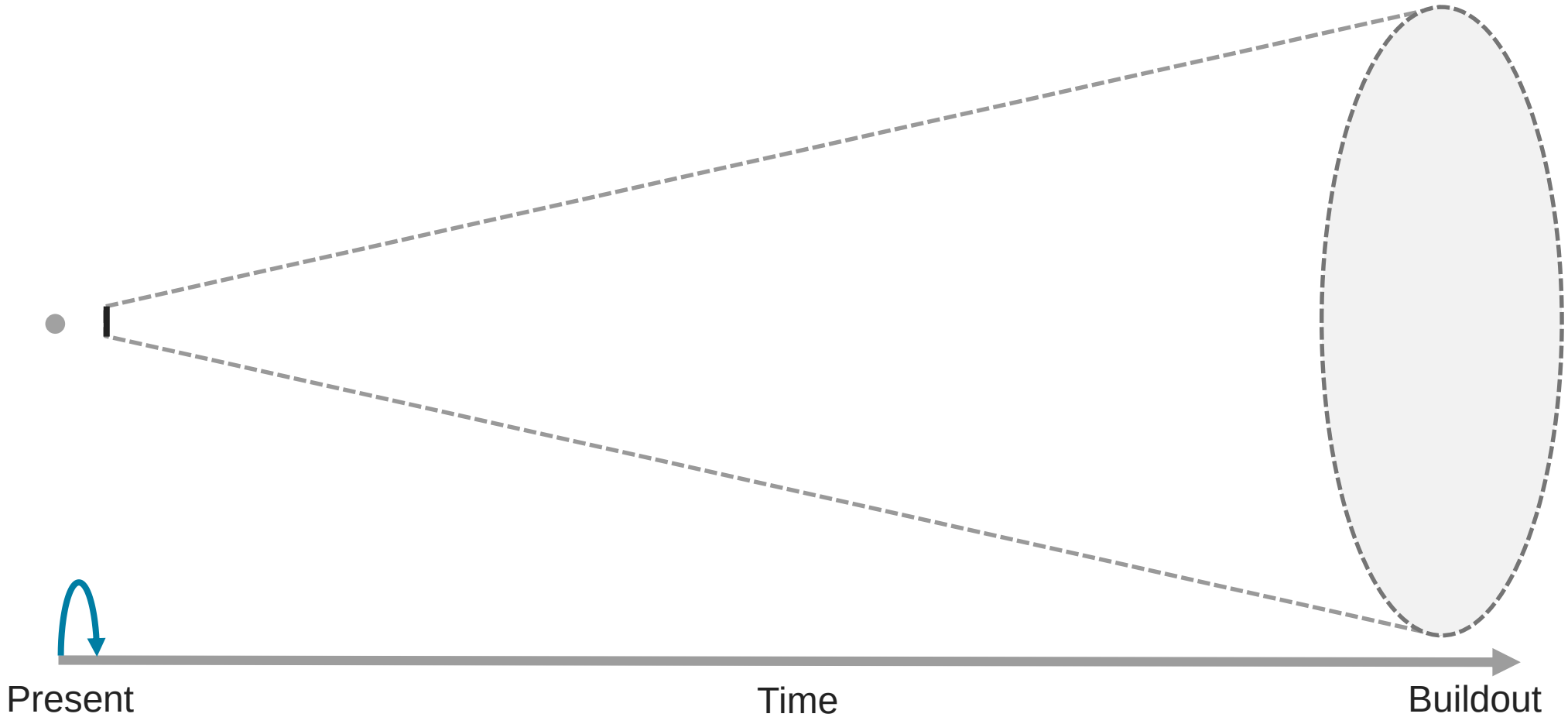
This cone represents all potential futures of Greeley's water supply system

Develop a plan that encompasses these possible futures



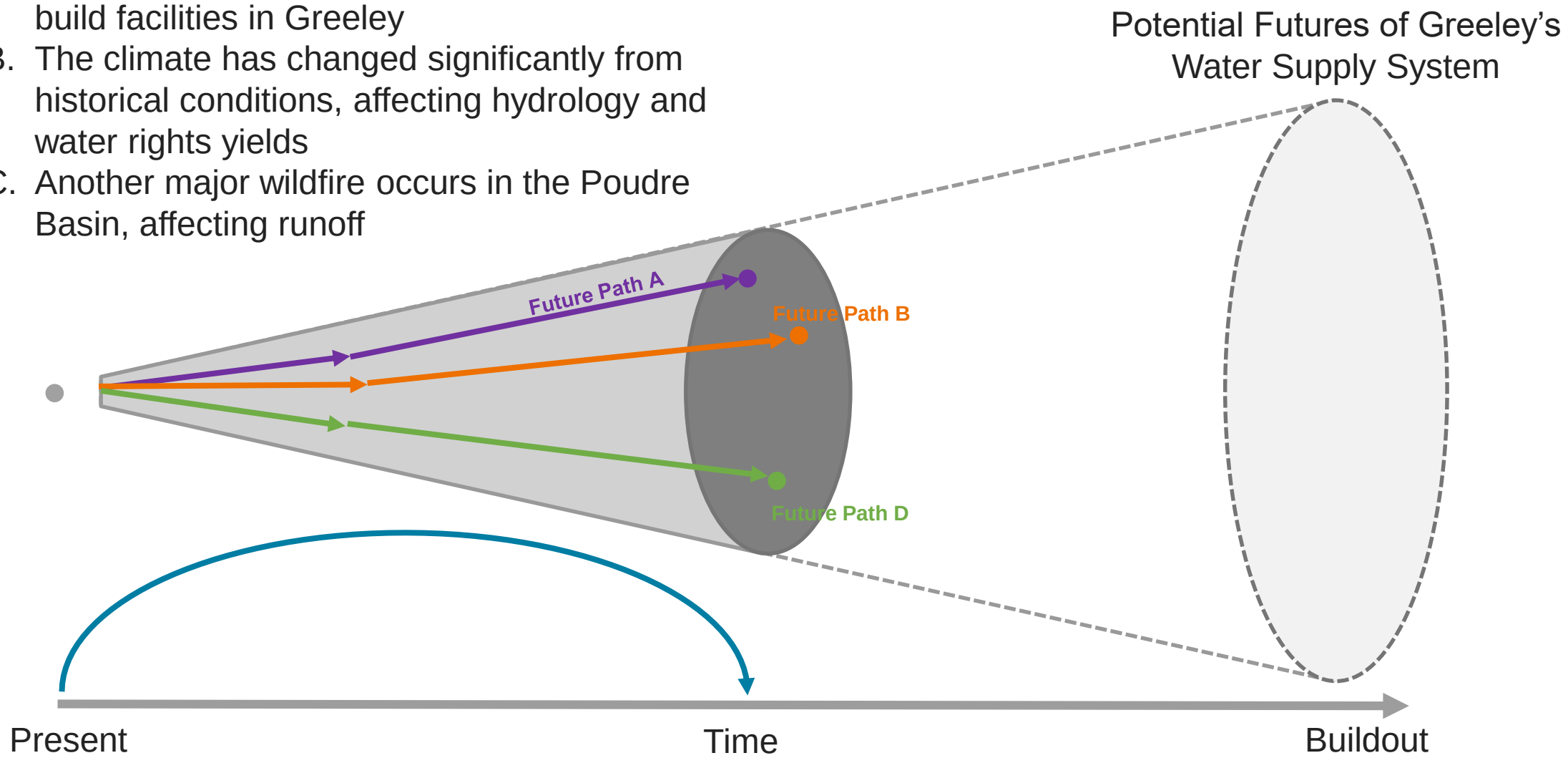
Looking to Next Year…

- New water demands are known
- Unknown if it will be a drought year



Looking Out to 2050…

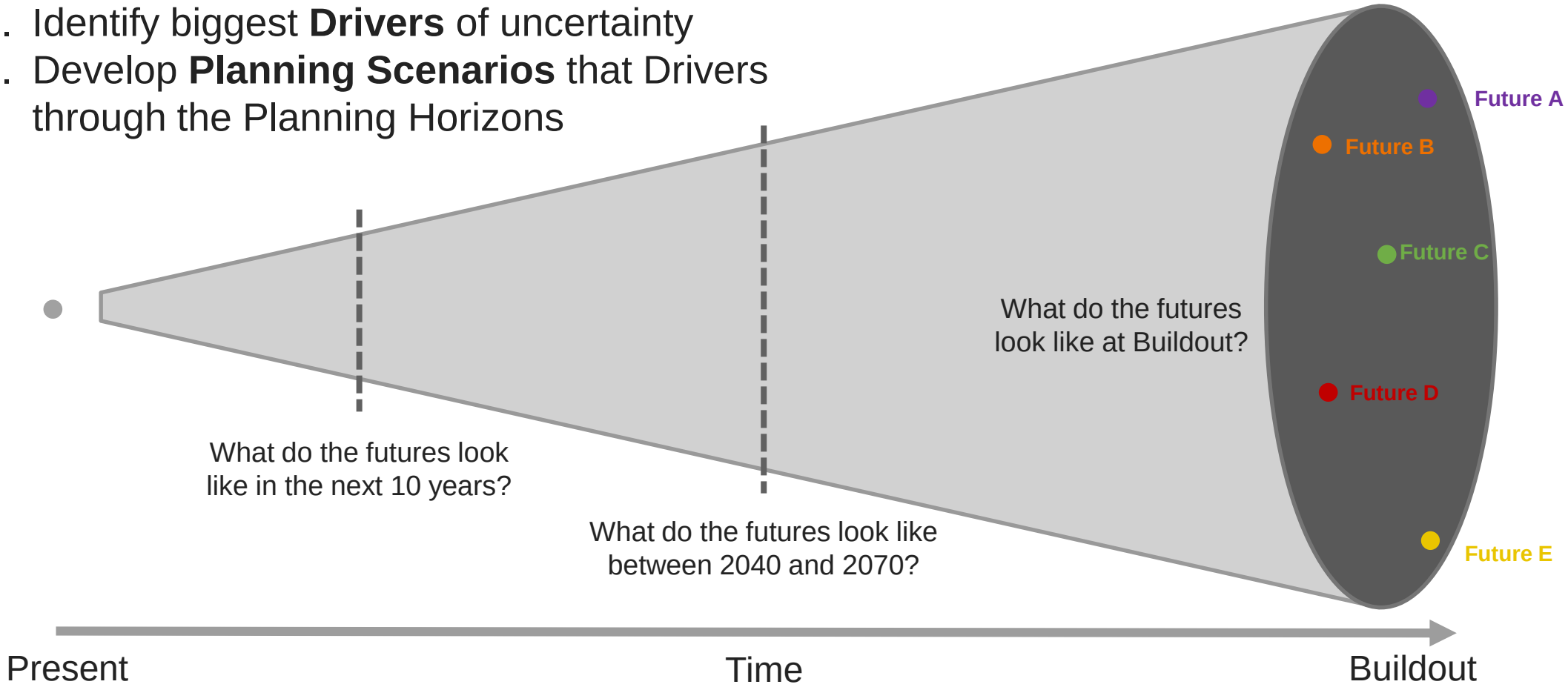
A. Terry Ranch encourages multiple industries to build facilities in Greeley
B. The climate has changed significantly from historical conditions, affecting hydrology and water rights yields
C. Another major wildfire occurs in the Poudre Basin, affecting runoff



Incorporating future uncertainty in the IWRP…

Cannot quantify system performance under all possible future conditions. Instead:

1. Define key **Planning Horizons** to plan for
2. Identify biggest **Drivers** of uncertainty
3. Develop **Planning Scenarios** that Drivers through the Planning Horizons



PLANNING SCENARIOS

Planning Horizons

- IWRP will define planning horizons, which are either:
  - Specific point in time (2030)
  - Specific set of future conditions (Buildout)

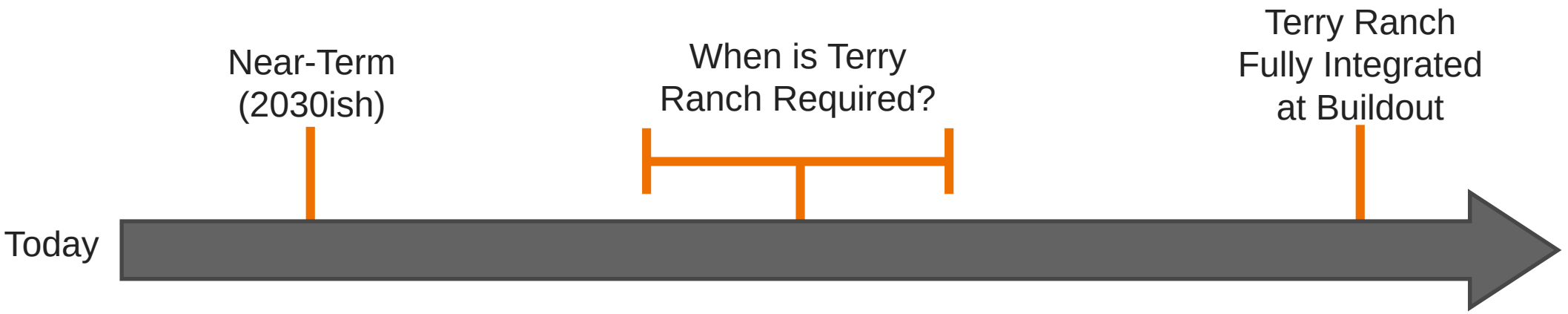
Planning Horizons

- How could Greeley use Terry Ranch?
- What is a sustainable use of Terry Ranch?

Planning Horizons

- Water resources projects for the next 10-20 years

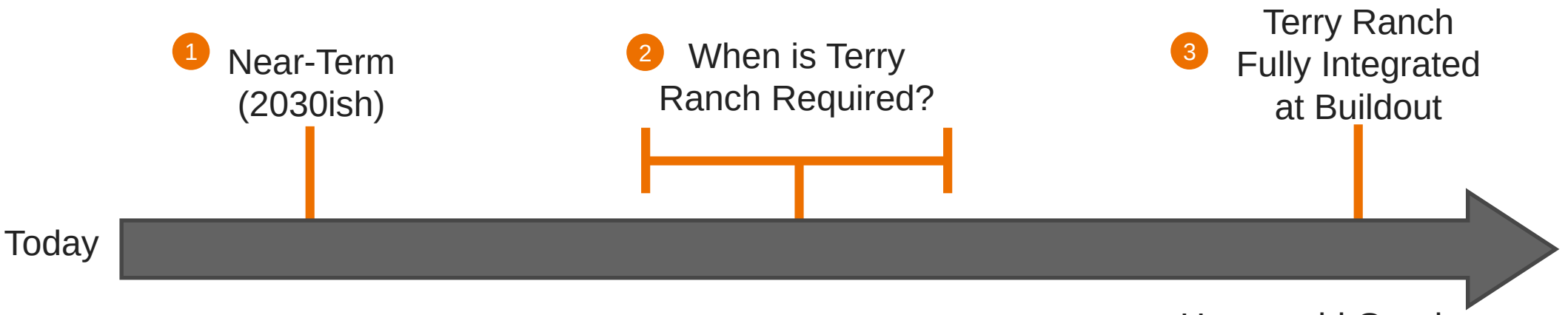
Planning Horizons



How is the timing of Terry Ranch affected by:

- Demand growth
- Climate change
- Water rights portfolio
- Other Risks

Planning Horizons



- Water resources projects for the next 10-20 years

How is the timing of Terry Ranch affected by:

- Demand growth
- Climate change
- Water rights portfolio
- Other Risks

- How could Greeley use Terry Ranch?
- What is a sustainable use of Terry Ranch?

Planning Scenario Drivers

Water Rights Competition and Administration

Water Demands

Future Climate Conditions

System Risks

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- Yields could be reduced due to competition and changes in administration/regulation

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Future Climate Conditions

- Variety of long-term changes in average temperature and precipitation possible

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- Growth rate and per capita water use uncertain

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Future Climate Conditions

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System Risks

- Colorado River Basin yields could be impacted several ways
- Other water providers could see water supply failures

Initial Planning Scenarios

Planning Scenario	Description
High Bookend	A hot and dry future in which Greeley grows at a rate faster than expected. Greeley's water right yields are reduced overall and are impacted by Colorado River Basin issues, wildfires, and regional water issues.
Median	A warmer future in which Greeley grows as expected, water supply yields are reduced and source water threats like Colorado River Basin issues and wildfires occur.
Low Bookend	A warmer and wetter future in which Greeley grows at a rate slower than expected. However, issues within the Colorado River Basin impact Greeley’s yields.
No Climate Change	Greeley grows as expected with climate reflective of historical conditions. Source water threats like Colorado River Basin issues and wildfires occur.
Mix and Match	A hot and wet future in which Greeley grows as expected. Greeley's water right yields are reduced overall and are impacted by Colorado River Basin issues, wildfires, and regional water issues

Initial Planning Scenarios

Planning Scenario Name	Water Supply System	Climate	Demands	Risks
High Bookend	Reduced Yields	Hot and Dry	Increased growth rate, Low decrease in per capita water use	CO Basin Reductions Increased Wildfires Increased Evaporation Regional water issues
Median	Reduced Yields	Warm	Planned growth rate, Planned per capita water use	CO Basin Reductions Increased Wildfires Increased Evaporation
Low Bookend	Expected Yields	Warm and Wet	Reduced growth rate, High decrease in per capita water use	CO Basin Reductions
No Climate Change	Expected Yields	No Change	Planned growth rate, Low decrease in per capita water use	CO Basin Reductions
Mix and Match	Reduced Yields	Hot and Wet	Planned Growth rate, High decrease in per capita water use	CO Basin Reductions Increased Wildfires Regional water issues

QUESTIONS

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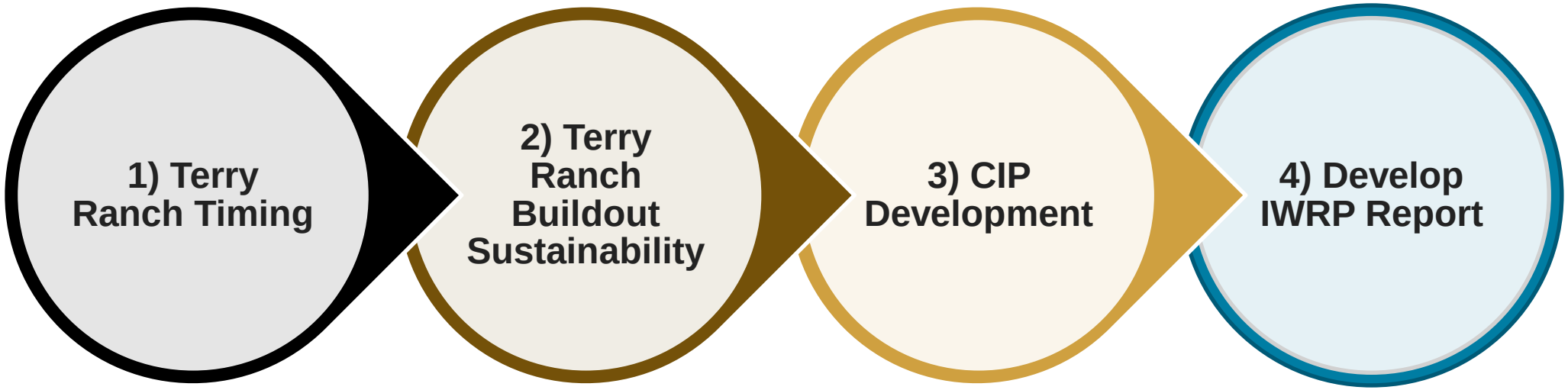
IWRP Analysis Progression



- When does Terry Ranch need to be online?
- How sustainable is Terry Ranch's used in the Planning Scenarios?
- What are the costs and timing for water resource projects for the next 5 years?

Initial Planning Scenarios

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Low Bookend	Expected Yields	Warm and Wet	Reduced growth rate, High decrease in per capita water use	CO Basin Reductions
No Climate Change	Expected Yields	No Change	Planned growth rate, Low decrease in per capita water use	CO Basin Reductions
Mix and Match	Reduced Yields	Hot and Wet	Planned Growth rate, High decrease in per capita water use	CO Basin Reductions Increased Wildfires Regional water issues

Planning Scenarios: Near-Term Planning Horizon

Planning Scenario Name	Water Supply System	Climate	Demands	Risks
High Bookend	Reduced Yields *-10%*	Hot and Dry *+2T, -5%P*	Increased growth rate, Decreased water use *WMP High*	CO Basin Reductions Increased Wildfires Increased Evaporation Regional water issues
Median	Reduced Yields *-10%*	Warm *+2T*	Planned growth rate, Planned water use *WMP Moderate*	CO Basin Reductions Increased Wildfires Increased Evaporation
Low Bookend	Expected Yields *No Change*	Warm and Wet *+2T, +7%P*	Reduced growth rate, Decreased water use *WMP Low*	CO Basin Reductions
No Climate Change	Expected Yields *No Change*	No Change	Planned growth rate, Decreased water use *WMP Moderate*	CO Basin Reductions
Mix and Match	Reduced Yields *-10%*	Hot and Wet *+2T, +7%P*	Planned Growth rate, Decreased water use *WMP Moderate*	CO Basin Reductions Increased Wildfires Regional water issues

Planning Scenarios: Long-Term Planning Horizon

Planning Scenario Name	Water Supply System	Climate	Demands	Risks
High Bookend	Reduced Yields *-25%*	Hot and Dry *+8T, -5%P*	Increased growth rate, Decreased water use *TBD*	CO Basin Reductions Increased Wildfires Increased Evaporation Regional water issues
Median	Reduced Yields *-25%*	Warm *+5T*	Planned growth rate, Planned water use *TBD*	CO Basin Reductions Increased Wildfires Increased Evaporation
Low Bookend	Expected Yields *No Change*	Warm and Wet *+5T, +7%P*	Reduced growth rate, Decreased water use *TBD*	CO Basin Reductions
No Climate Change	Expected Yields *No Change*	No Change	Planned growth rate, Decreased water use *TBD*	CO Basin Reductions
Mix and Match	Reduced Yields *-25%*	Hot and Wet *+8T, +7%P*	Planned Growth rate, Decreased water use *TBD*	CO Basin Reductions Increased Wildfires Regional water issues