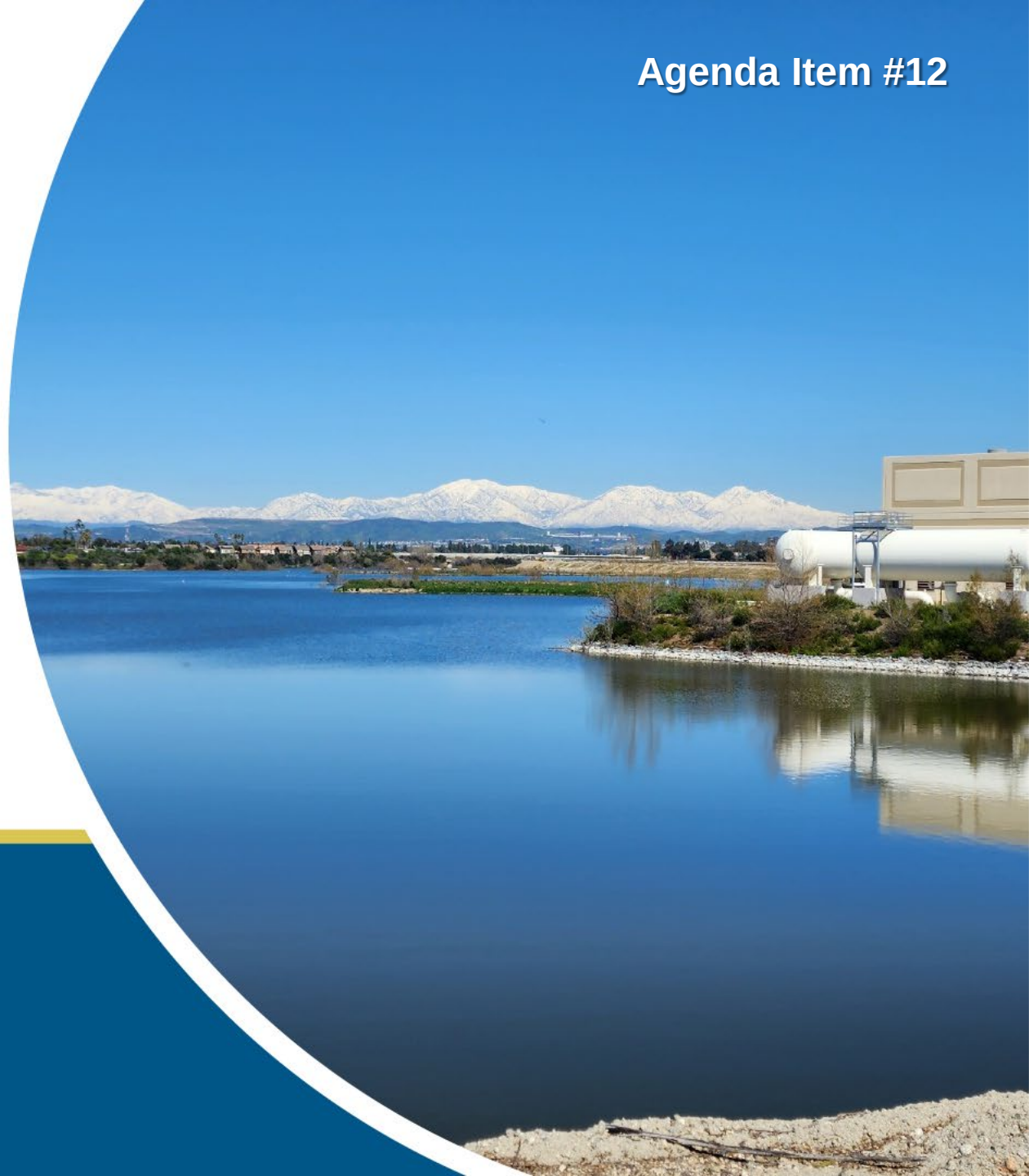
Agenda Item #12

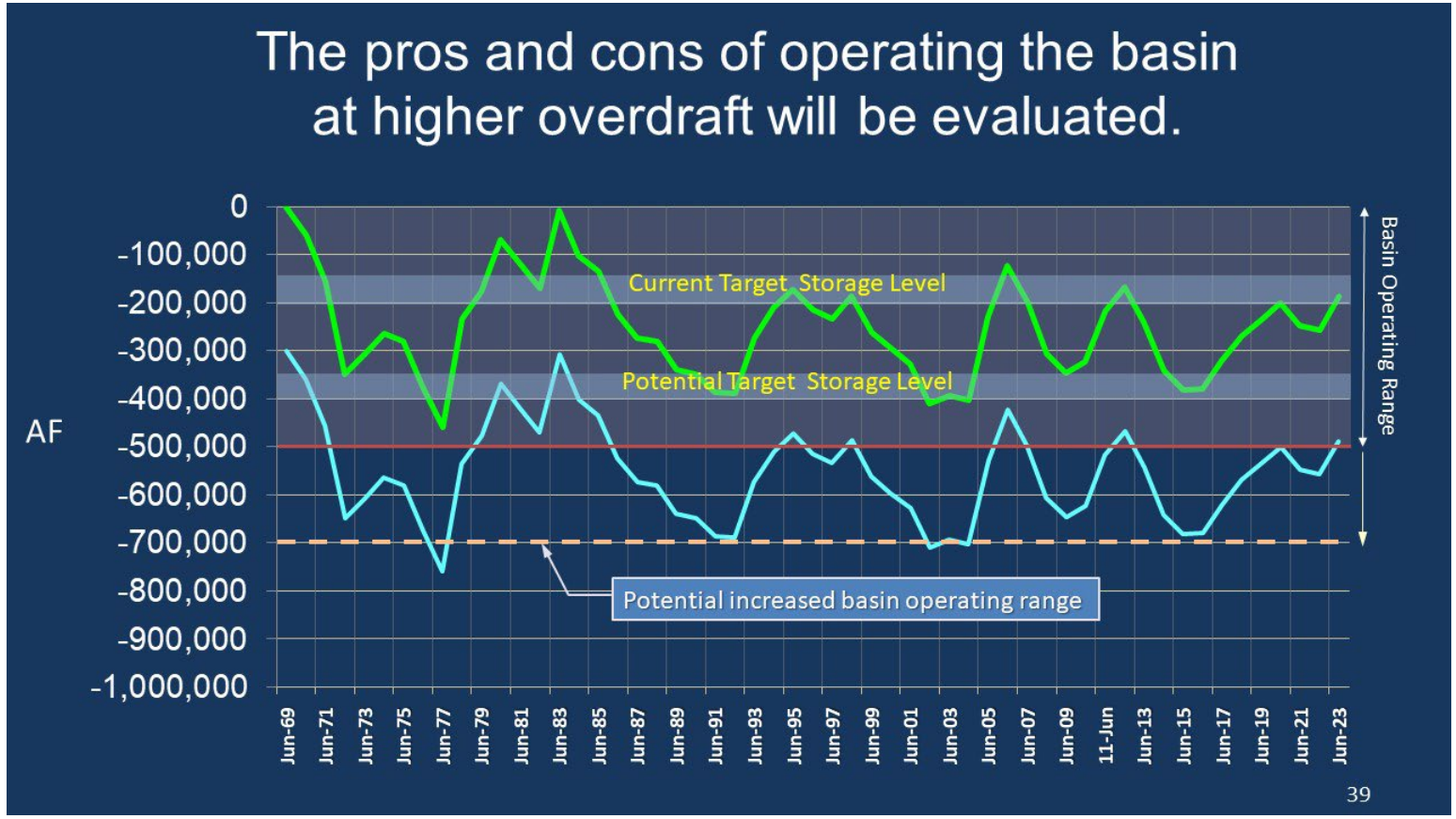
Evaluation of Historical and Potential Future Land Subsidence



Water Issues Committee
March 12, 2025

Groundwater Basin Operating Range Expansion

- Examine potential of expanding the groundwater basin operating range
- Could provide additional drought resilience and reduce underflow to LA County
- Need to evaluate risks of increased seawater intrusion and **subsidence**



How can reduced groundwater storage cause land subsidence?

Reduced storage lowers groundwater levels

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Lower groundwater levels reduces pore pressures

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Weight of overlying earth causes clays/silts to compact

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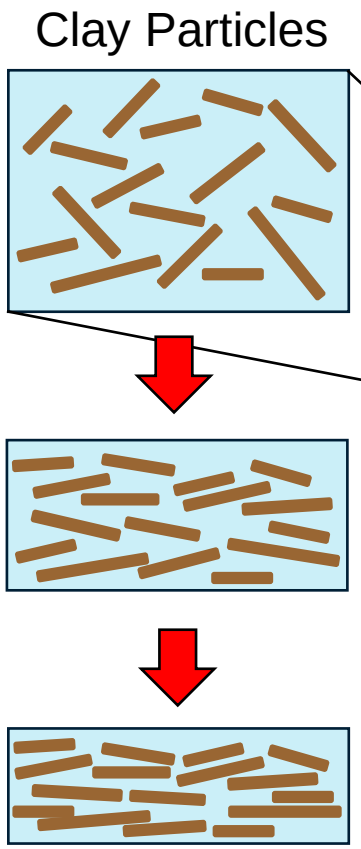
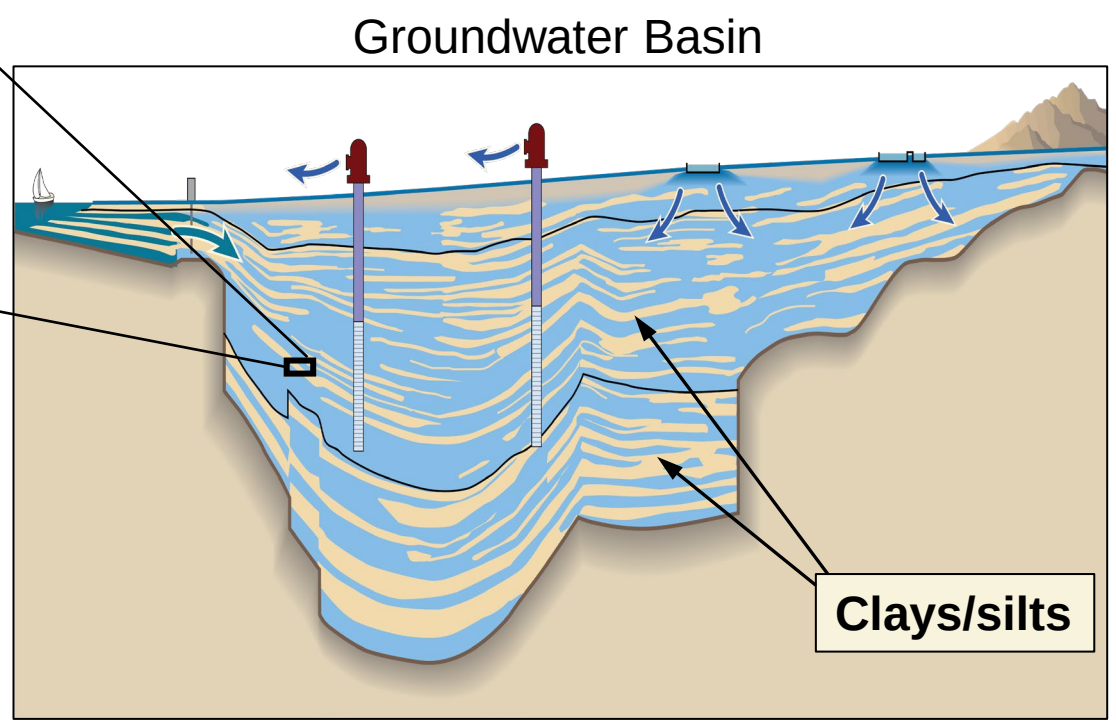
Cumulative compaction results in ground surface sinking (subsidence)

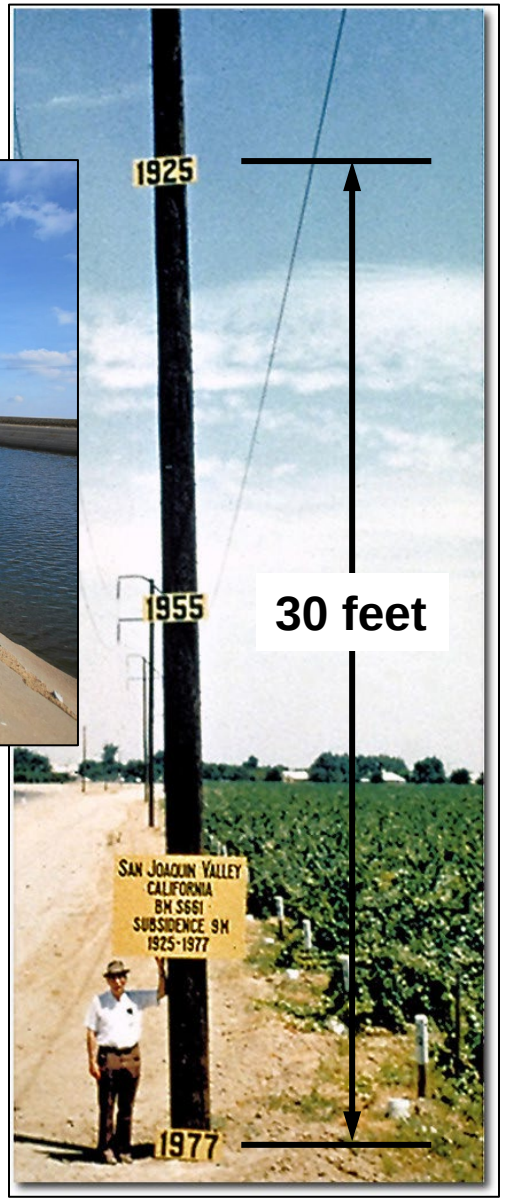




Land subsidence can have significant long-term consequences.

- Subsidence is a slow process
- May continue for years once triggered, even after over-pumping has stopped
- Past [inelastic] subsidence is irreversible

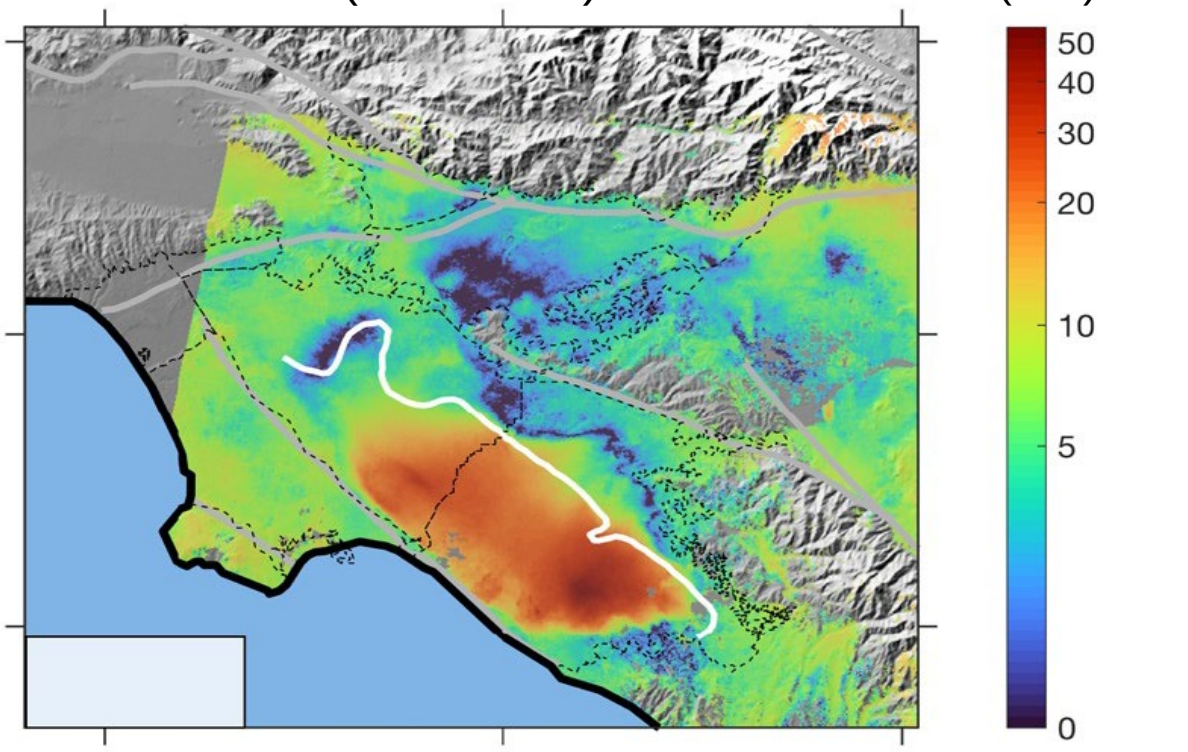
Southern Central Valley



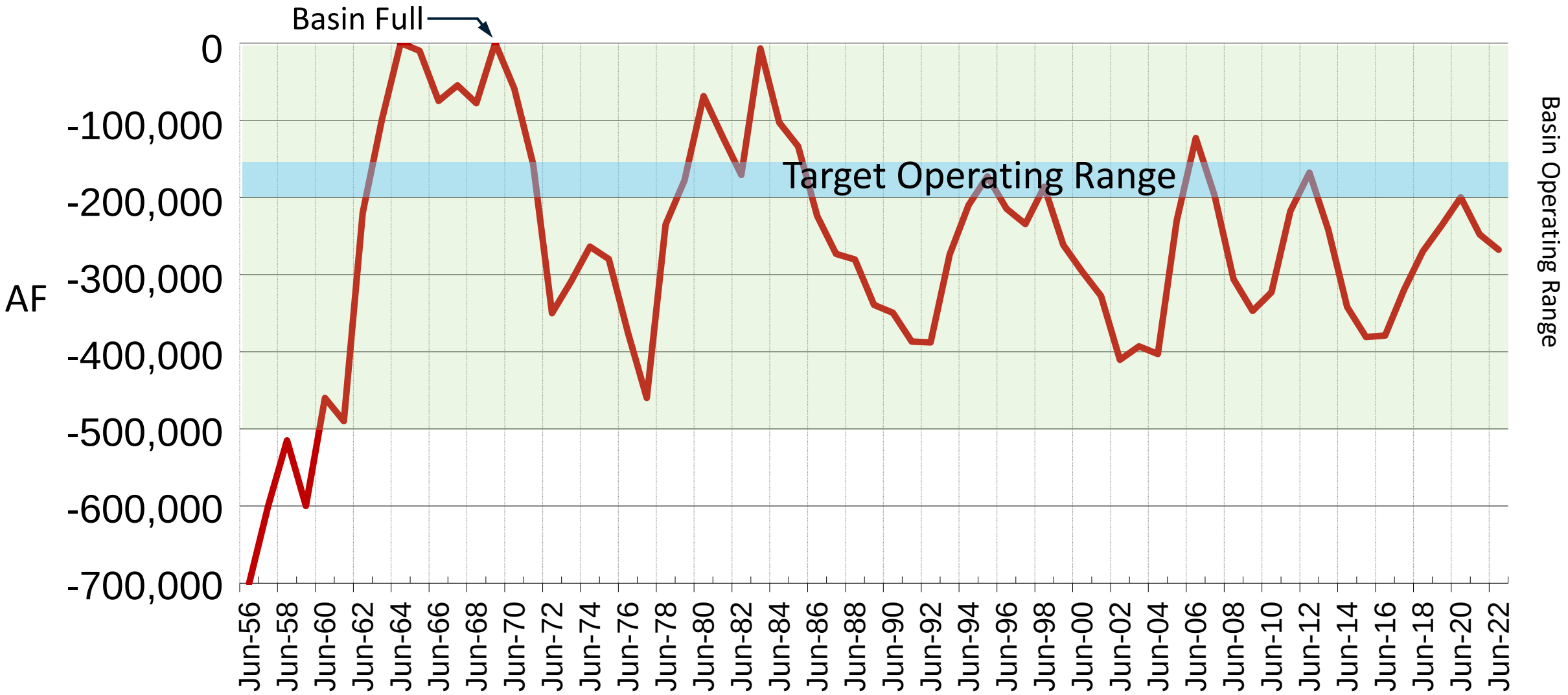
Is there risk of land subsidence in the Orange County groundwater basin?

- Yes. The basin contains clays/silts that are compactable.
- Subsidence may have occurred in the 1950s or earlier.
- No permanent subsidence in recent years; however “elastic” (temporary) subsidence is observed in data.
- Permanent subsidence could occur if groundwater storage is decreased below historical conditions.

Elastic subsidence from satellite radar (1992-2011)



Groundwater storage may have been the lowest in the 1950s.



Staff proposes an initial subsidence evaluation.

Objectives

- Identify areas and magnitude of historical subsidence
- Identify areas that may be more susceptible to subsidence
- Identify data gaps that prevent more definitive subsidence evaluation

Lead Investigators

- Prof. Nicholas Sitar, UC Berkeley Dept. of Civil and Environmental Engineering
- Dr. Bill Mok, PE, PG, GSI Environmental

Staff Recommendation

Authorize issuance of a professional services agreement to GSI Environmental in an amount not to exceed $34,333 to evaluate land subsidence in the Orange County groundwater basin.