Seaside Groundwater Basin Board of Directors Meeting
August 7, 2013

Results of Coastal Injection Modeling

Project Purposes

A. Compare benefits of injecting water near the coast to injecting water at existing ASR wells

B. Criteria:
   A. Time to reach protective elevations
   B. Injection rates
   C. Total quantity of injected water
   D. Outflow to ocean

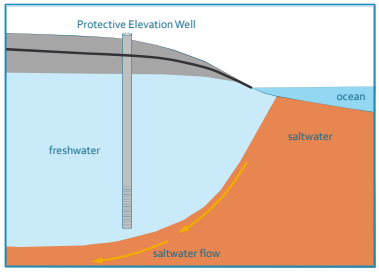
Project Purposes

These results provide only guidance and general direction

Results do not simulate any project

Protective Groundwater Elevations

Achieving protective elevations eliminates the threat of seawater intrusion



Previous Modeling

- Inject at existing ASR sites
- Inject approximately 1,000 AFY
- Leave water in the basin
- Protective elevations are achieved by 2041

Inland and Coastal Injection Sites

Assumptions

- Implement Cal-Am's 25-year replenishment repayment schedule
- All other producers subject to triennial pumping reductions
- Repeat historical rainfall

Modeling Scenarios Encompass Reasonable Operations

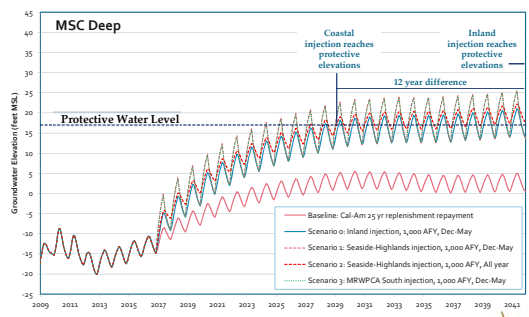
Scenario	Injection Rate	Injection Location	Reduce Injection in Late Time?	Injection Season
0	1,000 AFY	Existing Inland ASR	No	Dec – May
1	1,000 AFY	Seaside - Highlands	No	Dec – May
2	1,000 AFY	Seaside - Highlands	No	All Year
3	1,000 AFY	MRWPCA South	No	Dec – May
4	Reach protective elevations in 2041	Seaside – Highlands	No	Dec – May
5	Reach protective elevations is 5 years	Seaside - Highlands	No	Dec – May
6	1,000 AFY	Seaside - Highlands	Yes	Dec – May
7	Reach protective elevations is 5 years	Seaside - Highlands	Yes	Dec – May

Modeling Results

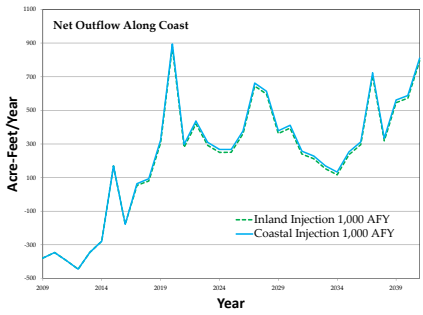
Inland vs. Coastal Injection

Scenario	Injection Rate	Injection Location	Reduce Injection in Late Time?	Injection Season
0	1,000 AFY	Existing Inland ASR	No	Dec – May
1	1,000 AFY	Seaside - Highlands	No	Dec – May
2	1,000 AFY	Seaside - Highlands	No	All Year
3	1,000 AFY	MRWPCA South	No	Dec – May

Inland vs. Coastal Injection

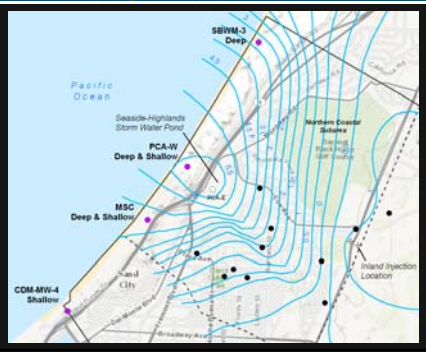


Inland vs. Coastal Injection



Inland vs. Coastal Injection

Groundwater Level Difference in Santa Margarita Aquifer (Coastal Injection WL– Inland Injection WL)

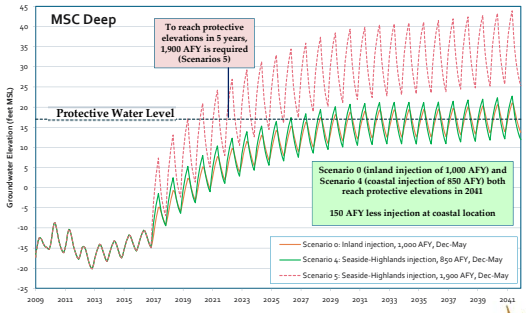


Modeling Results

How much injection in needed to reach protective elevations in 25 years and 5 years?

Scenario	Injection Rate	Injection Location	Reduce Injection in Late Time?	Injection Season
4	Reach protective elevations in 2041	Seaside – Highlands	No	Dec – May
5	Reach protective elevations is 5 years	Seaside - Highlands	No	Dec – May

Protective Elevations in 25 years or 5 years

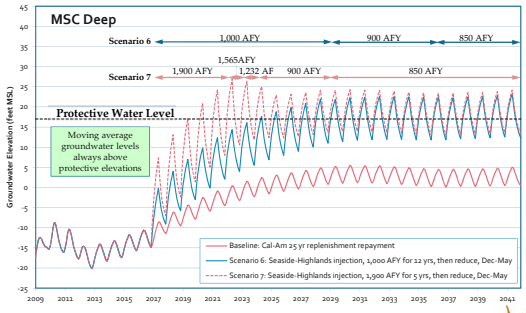


Maintaining Protective Groundwater Elevations

How much to reduce injection once protective elevations have been reached?

Scenario	Injection Rate	Injection Location	Reduce Injection in Late Time?	Injection Season
6	1,000 AFY	Seaside - Highlands	Yes	Dec – May
7	Reach protective elevations is 5 years	Seaside - Highlands	Yes	Dec – May

Maintaining Protective Groundwater Elevations



Scenario Comparison

Scenario	Years to Reach Protective Elevations	Injected Volume through 2041 (acre-feet)	Outflow to Ocean (acre-feet)
0: Inland, 1,000AFY, Dec-May	25	25,000	9,310
1 : S-H, 1,000 AFY, Dec-May	12	25,000	9,720
2: S-H, 1,000 AFY, all year	12	25,000	9,730
3: MRWPCA, 1,000 AFY, Dec-May	12	25,000	9,780
4: S-H, 850 AFY, Dec-May	25	21,250	9,140
5: S-H, 1,900 AFY, Dec-May	5	47,500	13,830
6: S-H, 1,000 to 900 AFY, Dec-May	12	23,600	9,550
7: S-H, 1,900 to 850 AFY, Dec-May	5	28,850	10,990

Conclusions

1. Seaside-Highland or MRWPCA South site equally suitable as coastal injection location.
2. Average groundwater elevations similar if injected seasonally or year round.
3. Coastal injection reaches protective elevations 12 years faster than inland injection at existing ASR wells.
4. Offshore flow ranges from 100 to 900 AFY.

Conclusions continued

5. 150 AFY less water is needed for coastal injection to achieve protective elevations by the end of 2041 compared to injecting in existing ASR wells.
6. Protective elevations can be reached in 5 years if 1,900 AFY are injected at the coast.
7. 850 AFY is required to maintain groundwater levels above protective elevations once they have been reached by:
   - Injecting 1,000 AFY for 12 years, and ramping down
   - Injecting 1,900 AFY for 5 years, and ramping down

Questions?