Objectives & Scenarios

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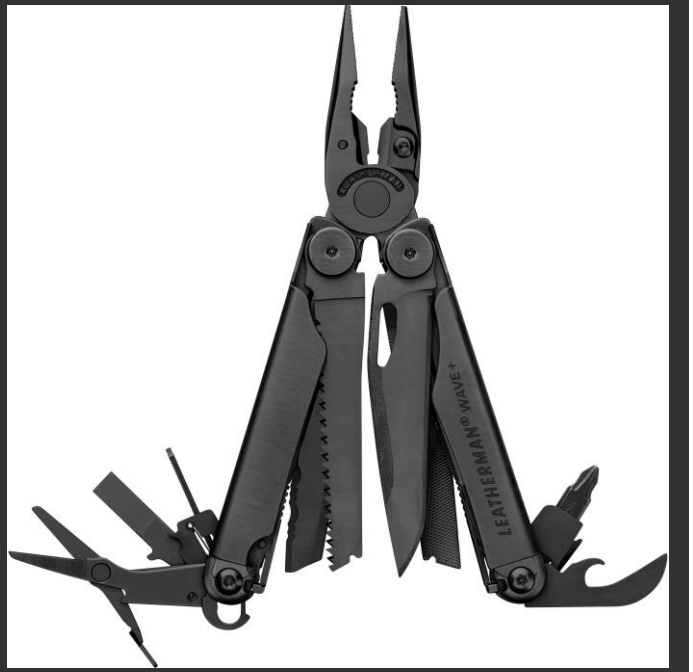
Goal of this talk

Describe our chosen
Model objectives &
Scenarios

Objectives vs. Scenarios

Objectives



Scenarios

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Model Objectives

1. **Simulate interactions between surface water and groundwater**
   - Big Lost River modelled as SFR. Model simulating flow and seepage.
   - Relatively small (100's of meters) grid
   - *Maybe* other surface water bodies represented explicitly

2. **Provide a more accurate estimate of discharge to ESPA**
   - Ability to do uncertainty and sensitivity analysis for this output
   - Probably won't deviate much from Clark (2022), but will assimilate more information
   - Monthly and annual variations

3. **Be a tool for water rights administration**
   - Will the location of actual pumping wells (PODs) in the model
   - Future users can develop administration scenarios with the wells and

4. **Ability to simulate subregional impacts of pumping (and MAR)**
   - Well to well impacts are too specific for the model
   - The impacts of well or groups of wells on collection of cells (resolution of 100's of meters, rather than at a single specific well)

5. **Ability to simulate how pumping and consumptive use in the upper valley impacts Mackay**
   - Pumping → Groundwater levels → Stream gains → Mackay inflow → Downstream water availability

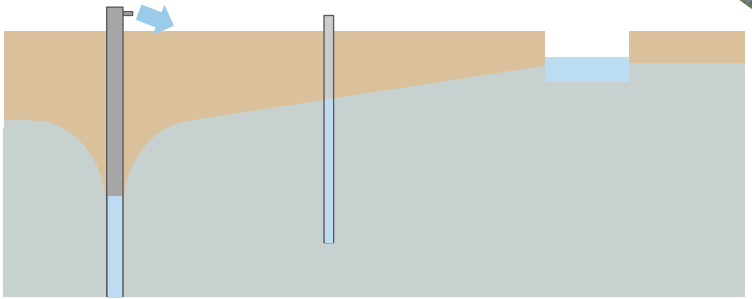
Universal Pumping Reduction

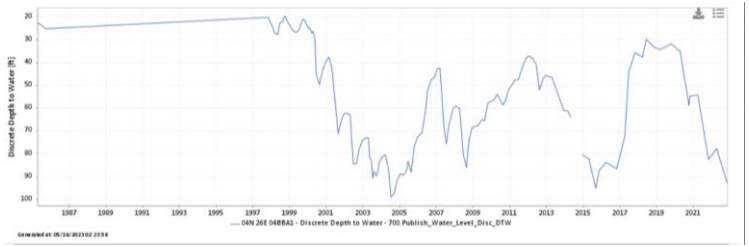
A universal cessation (or large reduction) in pumping to investigate how pumping affects the system overall.

The following changes would be expected:

- Increased water level (more water in aquifer ‘storage’)
- Smaller losses (larger gains) in the Big Lost River – more streamflow
- More discharge from the basin
  - GW and SW

What are the relative magnitudes?
Where does each occur?
How does each change over time?





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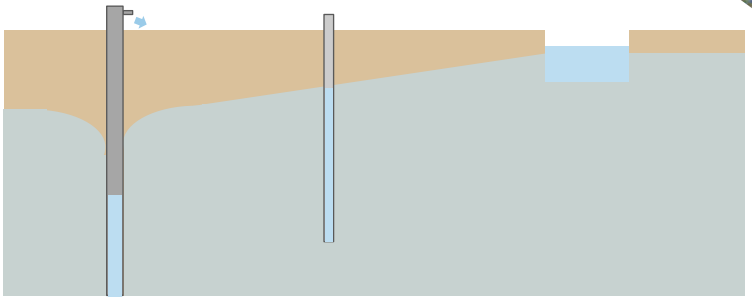


Pumping Reduction

Action

Pumping is reduced in all wells entirely or by a large percent.

Outcome

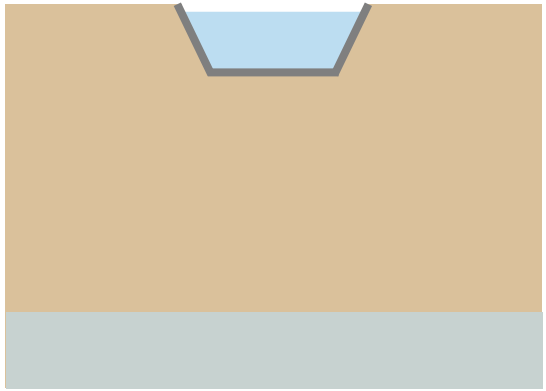
- Flow in the Big Lost River at specific locations: gages, diversion locations, other important points
- How do water levels (aquifer storage) change?
- How does basin discharge to ESPA change?

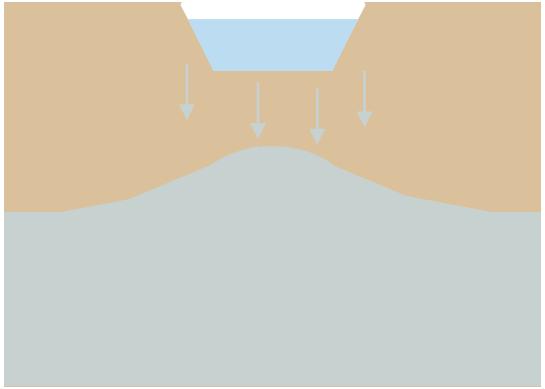
Notes

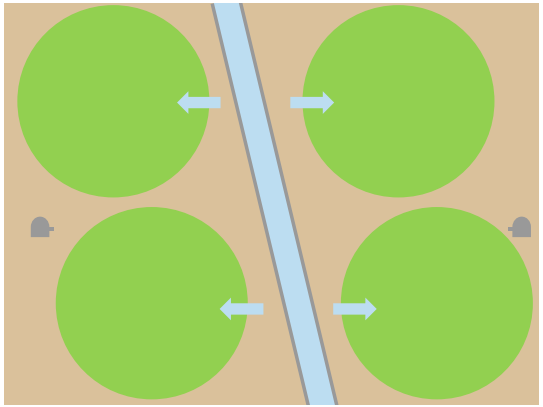
- The historic scenario will be used as comparative baseline
- We'll rerun historic scenario by removing all pumping, or multiplying by a small factor (e.g. 0.1)
- Assume that pumping is not replaced by additional river diversions -> fields fallowed
- Incidental recharge will be reduced alongside pumping
- Canal leakage will be reduced (less water in canals -> less leakage)
- Any additional flow in the Big Lost River will be allowed to flow out of basin

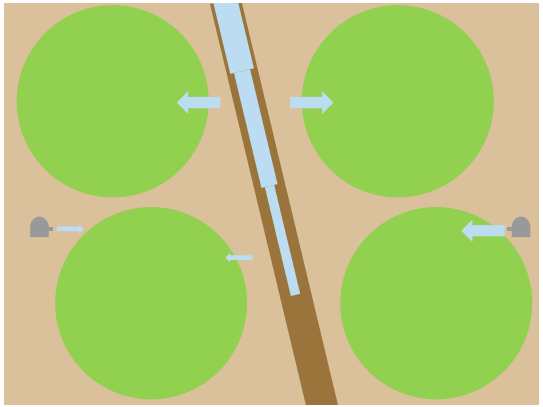
Canal Unlining (increased canal leakage)

- Canals have been lined to reduce leakage losses
- One man's leakage loss is another man's recharge
- We'll run a scenario that pretends no canal lining has occurred (increase canal leakage)
- More water will remain in canal and be available further along the canal. Will this lead to less pumping?









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Canal Unlining

Action

No canals were ever lined during the past ~20 years. Increase canal leakage.

Outcome

- Flow in the Big Lost River at specific locations: gages, diversion locations, other…
- How do water levels (aquifer storage) change?
- How does basin discharge change?
- How does surface water availability and pumping change?

Notes

- The historical simulation will be used as a comparative baseline
- Total irrigation, consumptive use of water, and incidental recharge does not change
- Any shortfall in irrigation water due to canals going dry will be made up by increased pumping

Thanks!

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