Proposed Additional Projects and Management Actions
In-Lieu / Conjunctive Use

Presentation Goals

- Describe a possible In-Lieu Conjunctive Use operational plan
- Lists the potential benefits and cost impacts
- At end board decides if plan merits being considered for study as one of the potential SMGWA “Management Actions”

Definitions

- SVWD
  Scotts Valley Water District
- SLVWD
  San Lorenzo Valley Water District
- SCWD
  Santa Cruz City Water District
- SMA
  Santa Margarita Aquifer
- SLR
  The San Lorenzo River
- GSP
  Groundwater Sustainability Plan

Definitions -continued

- **Conjunctive Use**

  The term for water exchanges across system boundaries, in order to achieve desired benefits.

- **In-Lieu Recharge**

  The term used to describe the intentional resting of aquifer pumping, to allow aquifers to naturally recharge and raise their stored water levels.

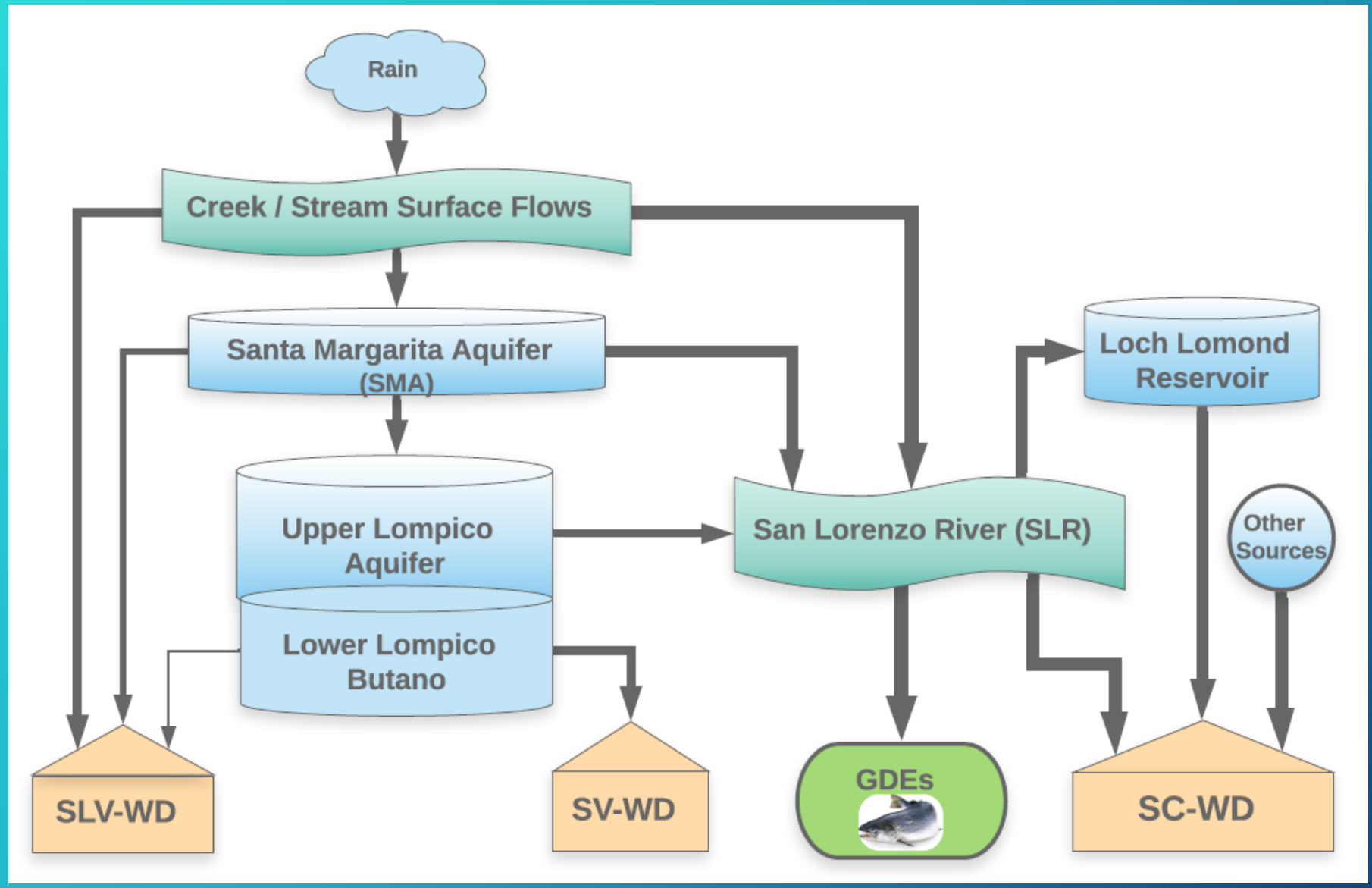
- **GDEs**

  Groundwater Dependent Ecosystems. Flora and fauna in or around the streams and rivers which require the reliable seepage of water from the ground water aquifers to thrive.

- **Base Flow**

  The minimum surface water levels that are achieved in the Fall mostly by seepage of water out of the groundwater aquifers. This flow is critical for GDEs.

Simplified diagram of water use in the Santa Margarita Basin



Problem Statement

- Lompico Aquifer storage levels are depleted from historic levels
- Depleted aquifer storage levels reduce SLR base flows, which reduces water availability downstream for GDEs and SCWD
- During drought years, surface waters are less available, forcing greater reliance on groundwater sources including the SMA
- Increases in SMA pumping during droughts further diminishes SMA base flow contributions, which might otherwise help the GDEs and SCWD

Proposed alternate water sources have issues

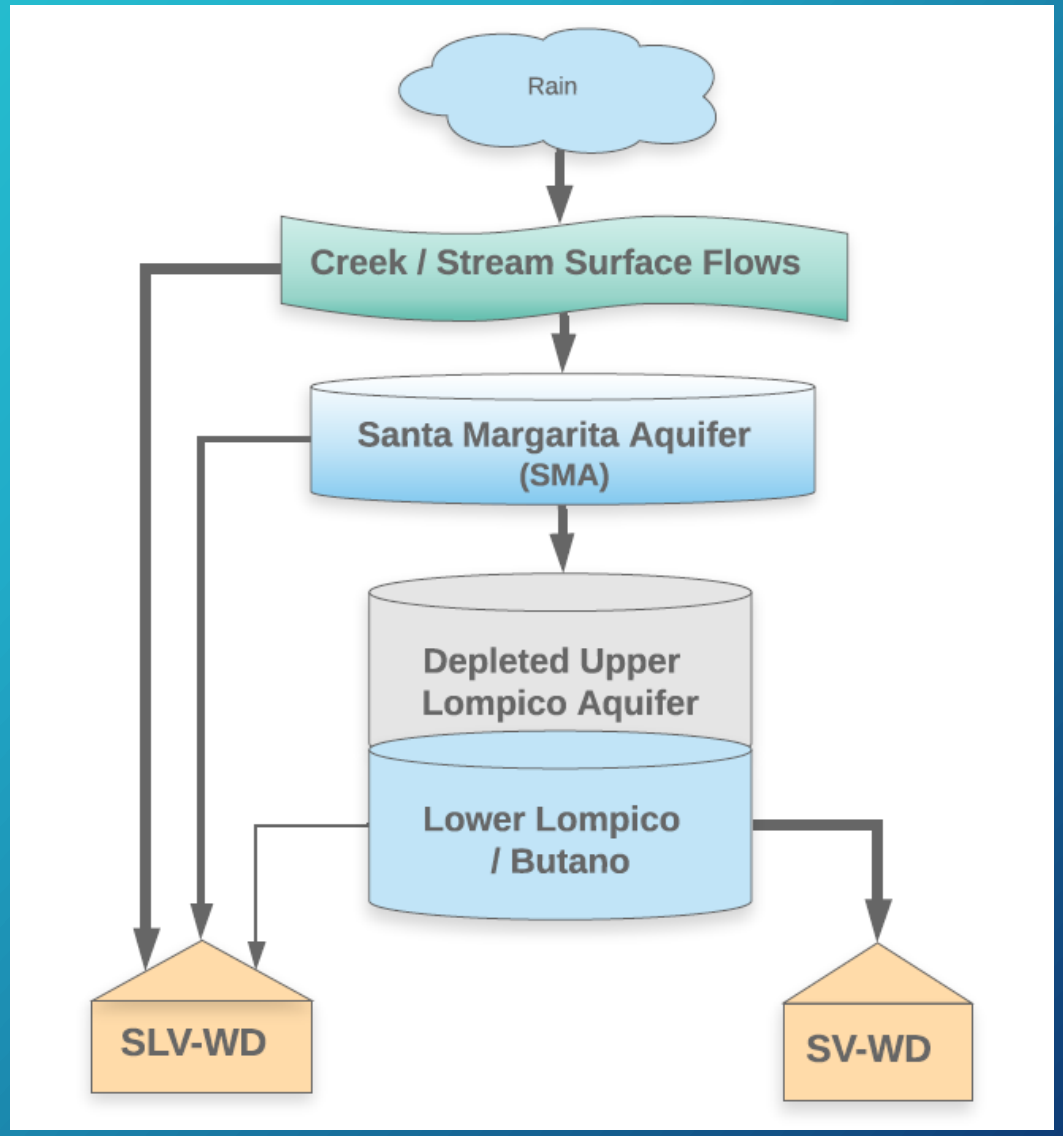
- Use of excess non Loch Lomond surface waters for a conjunctive use project is unreliable, because in many months and years there may not be surplus surface water
- Use of Loch Lomond surface waters for a conjunctive use project requires infrastructure to treat / transfer water
- If SLVWD sells its Loch Lomond water share, then SCWD loses an important source of water
- If SVWD uses recycled water sources, those sources are expensive to process and have a large carbon footprint

Potential Solution: Advanced In-Lieu

- Focus on the SVWD (Scotts Valley) and SLVWD (San Lorenzo Valley) water systems:

  SLVWD uses a combination of surface water diversion, and pumping from the SMA and Lompico aquifer

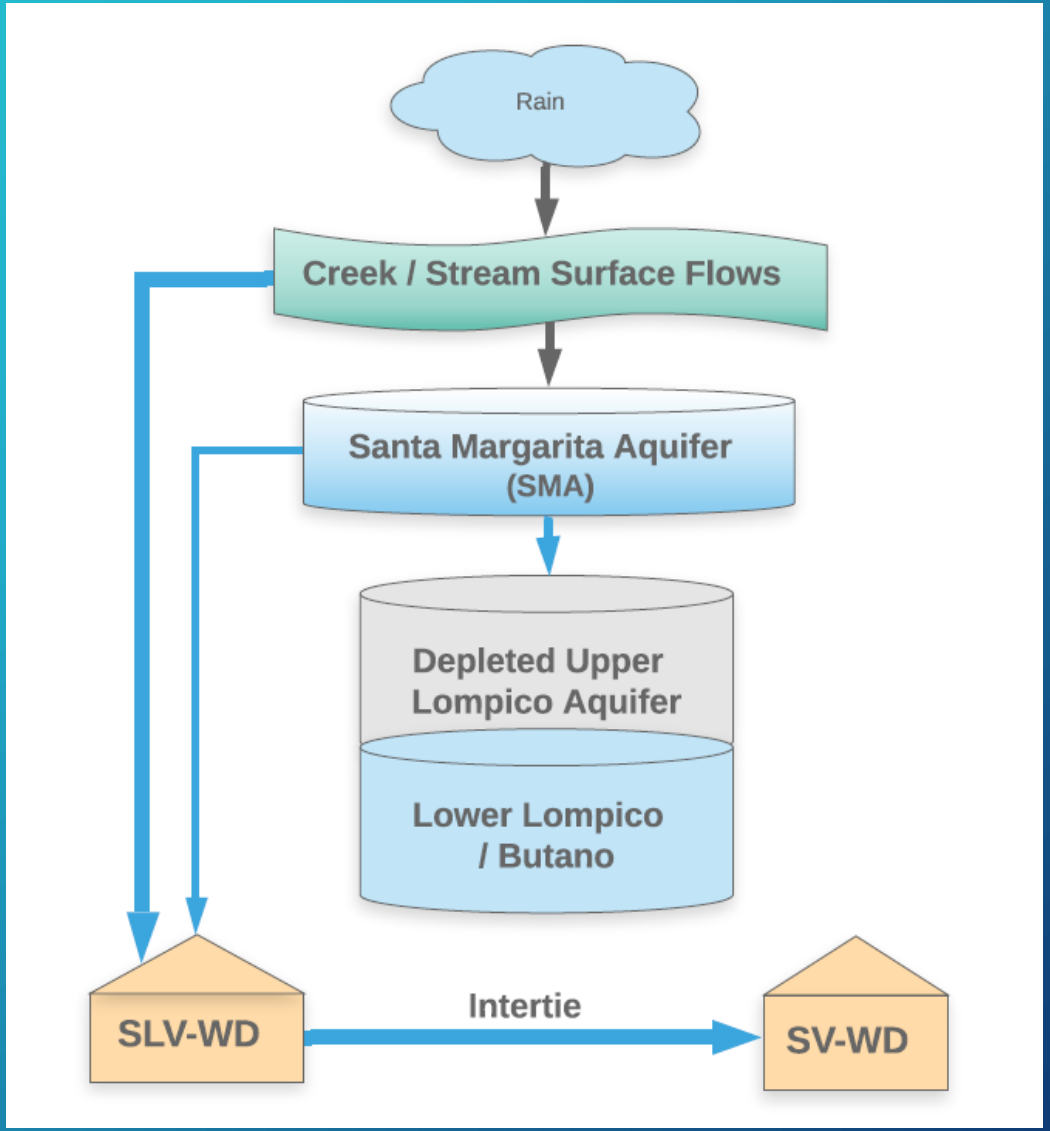
  SVWD uses the Lompico and Butano aquifers



As proposed in conjunctive use programs:

When extra surface water is available, send it via the interties to the SVWD and SLVWD areas that normally pump Lompico water.

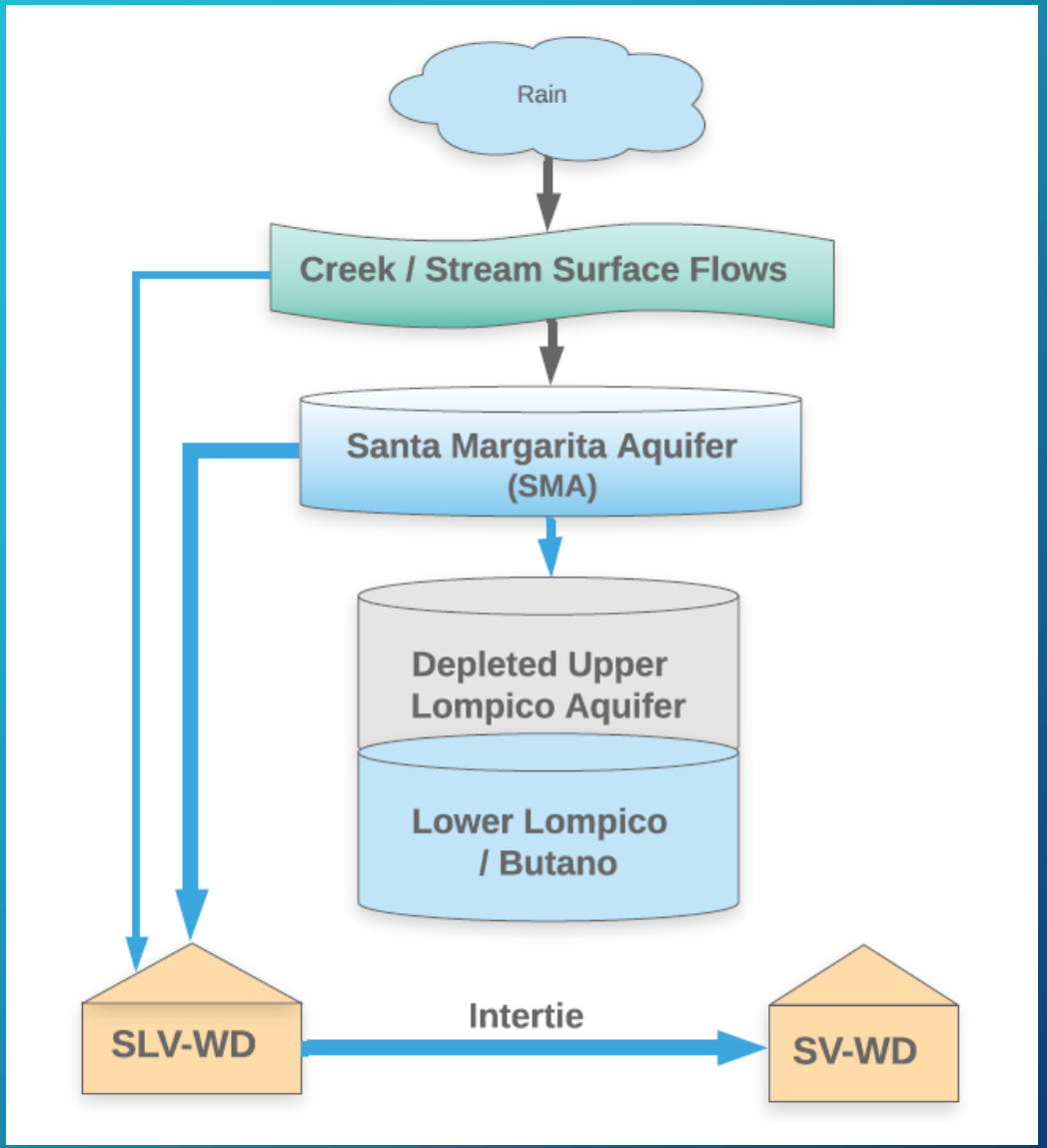
This rests the Lompico wells and allows the aquifer to get In-Lieu recharged



When surplus surface water is not available, but when it makes sense to still do so:

We now pump extra SMA water and again send that to the SVWD and SLVWD areas that normally pump Lompico water

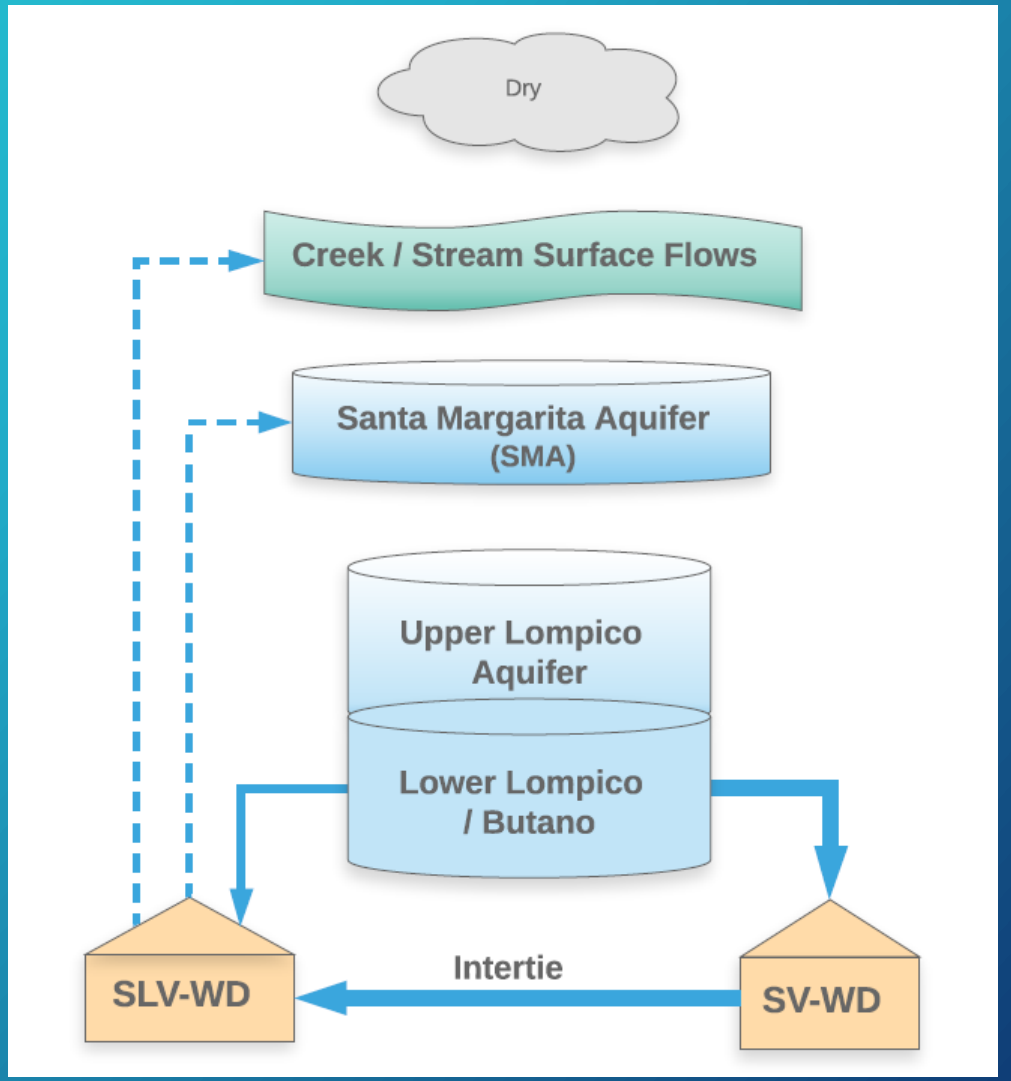
This additionally rests the Lompico wells and allows further recharge



In drought years:

Reverse water intertie flow: Pump water from the Lompico Aquifer back to areas that otherwise use SMA or surface waters

This allows surface and SMA water sources to rest their pumping activities during critical drought periods, to assist with base flows



Potential Benefits

- Lompico water storage rises faster due to using both excess surface and SMA water transfers during wetter years, so ready for droughts sooner
- Provides higher Lompico Aquifer levels that support heavier SLVWD and SVWD usage of Lompico wells through longer drought periods
- Higher on average Lompico Aquifer levels provide greater late season base flow contributions to SLR, benefitting GDEs and SCWD
- With the reverse transfer scenario could also provide some extra SLR base flow for SCWD and GDEs during critical periods
- Reverse transfers can also provide SLVWD extra support during serious droughts when their heavy reliance on surface and SMA may not be reliable
- SCWD for now gets to still hold on to the Loch Lomond Reservoir supply due SLVWD, instead of possibly losing some of it to SVWD via SLVWD transfers

Potential Benefits - continued

Lower capitol costs than several other proposals:

- Much of the infrastructure for conjunctive transfers for In-Lieu recharge already exist
- No costly injection wells need be constructed
- A new treatment plant for SLVWD's water share of Loch Lomond water is not required
- An expensive plant to clean recycled water drinking water is not needed

Potential Benefits - continued

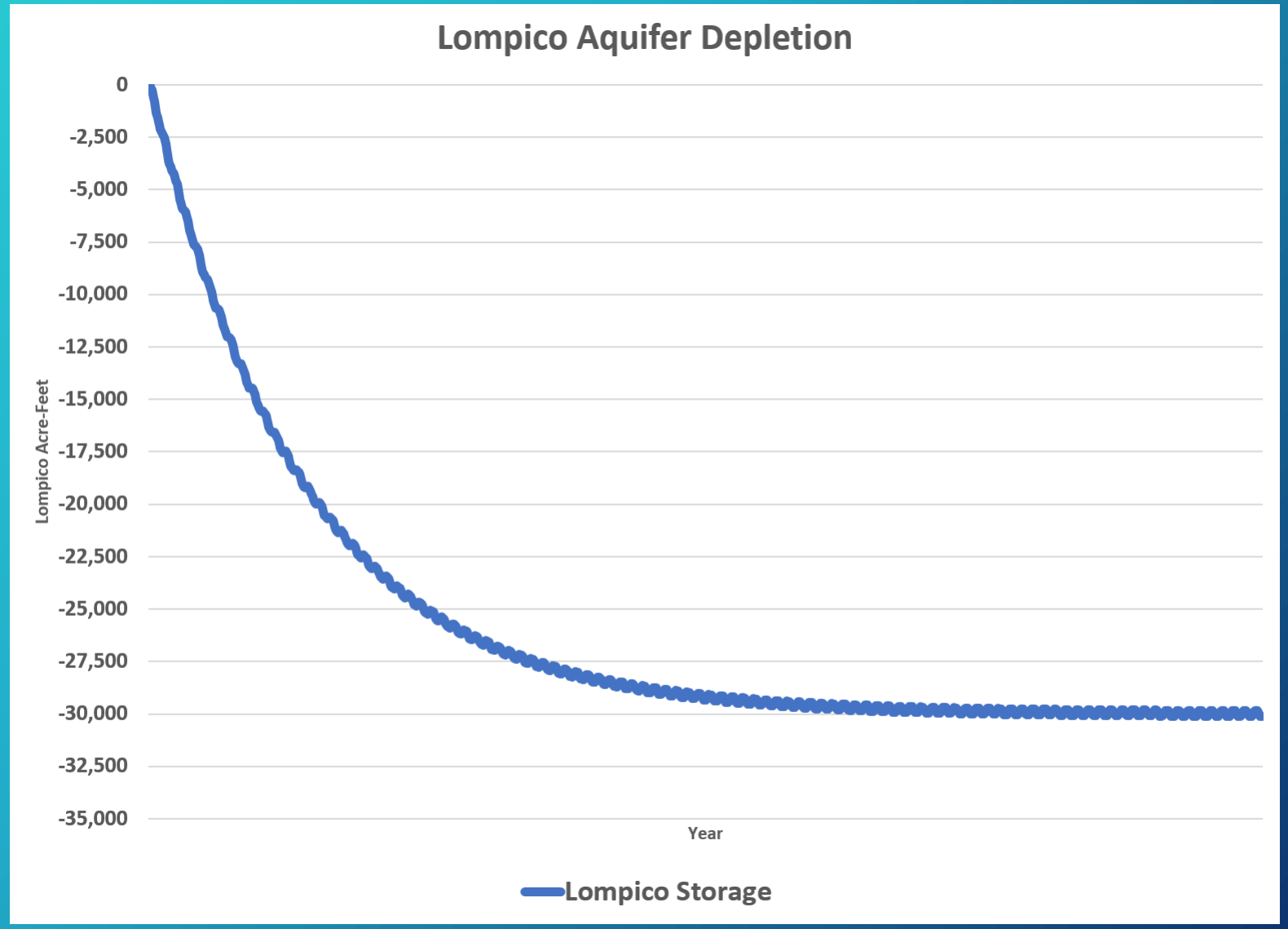
Lower recurring costs than several other proposals:

- Conjunctive operational costs are comparable with current water production costs
- Costly injection wells need not be maintained and powered
- Injected well water does not have to be cleaned twice, both before and after injection
- Recycled water does not have to be cleaned to drinking water standards

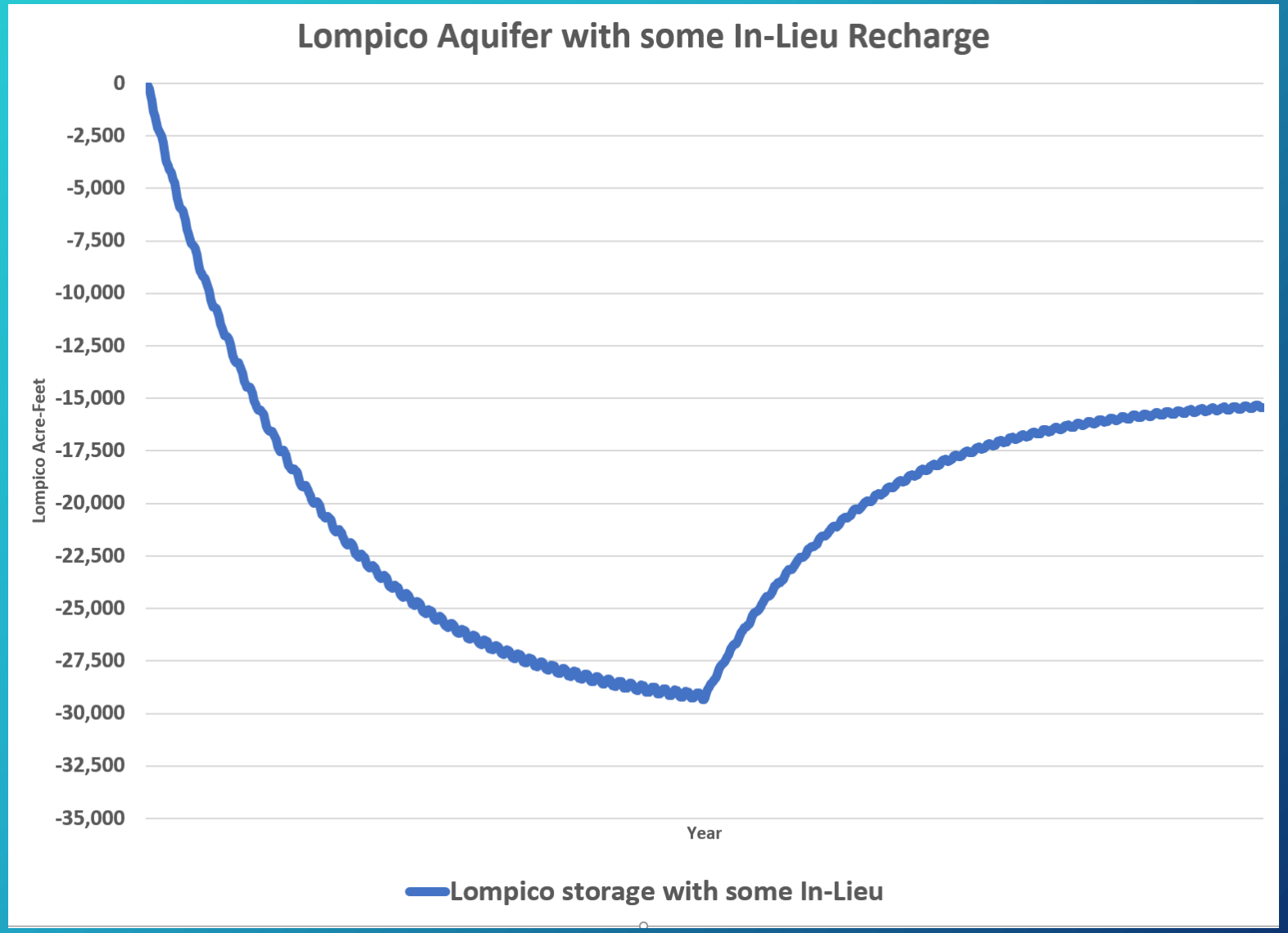
Lompico Aquifer Storage Level and Base Flow Analysis

In this section we will use a simplistic first order Excel hydrological model to check approximately what storage and base flow results might be achieved, and look at some representative hydrographs

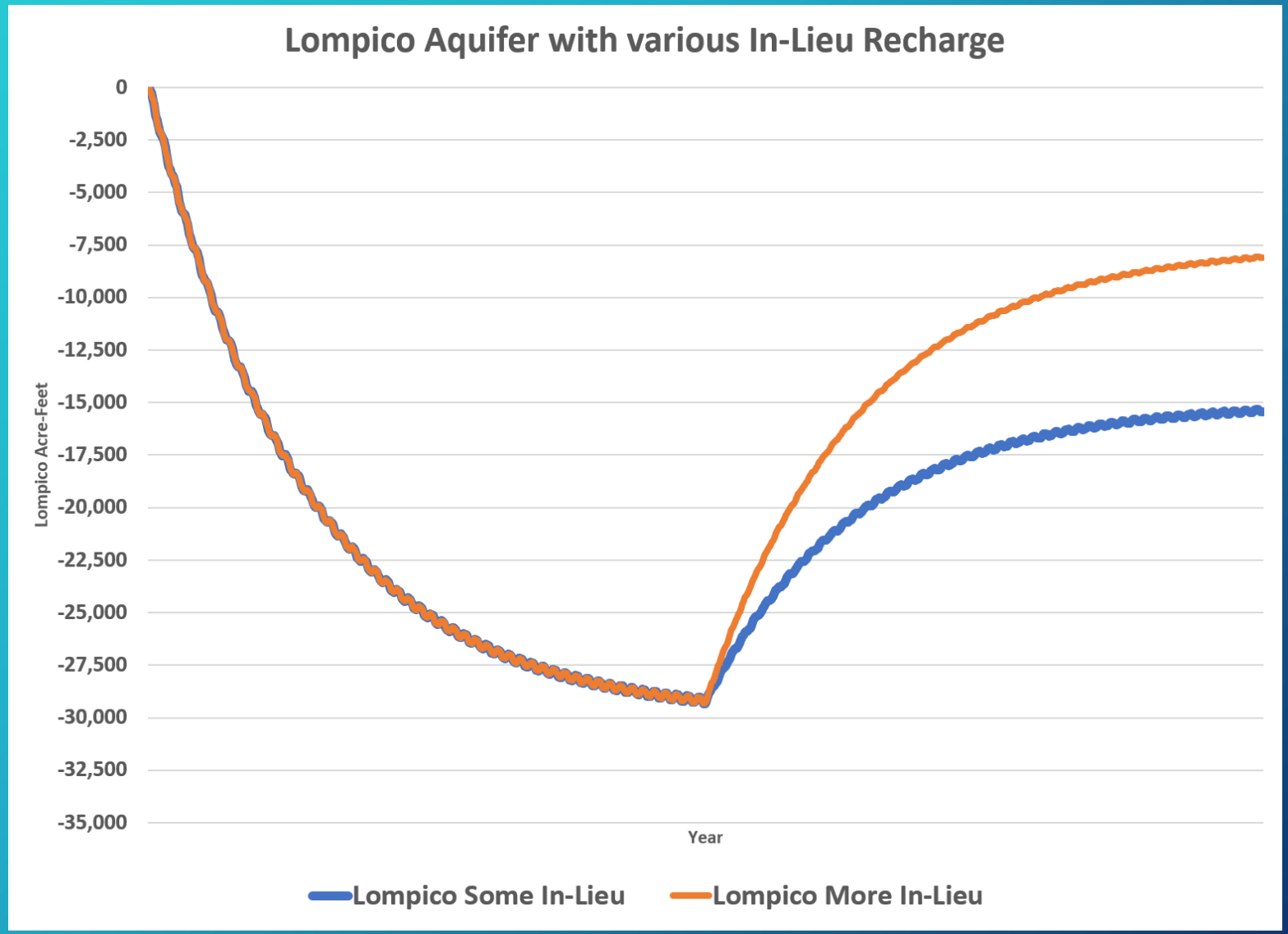
- Simplified model of Lompico Aquifer storage losses
- Note Lompico Aquifer storage levels eventually stabilize
- The stability results from lower water level causing interconnected water sources to divert replenishing water flows in towards the depleted area
- Those flows no longer flow where they used to



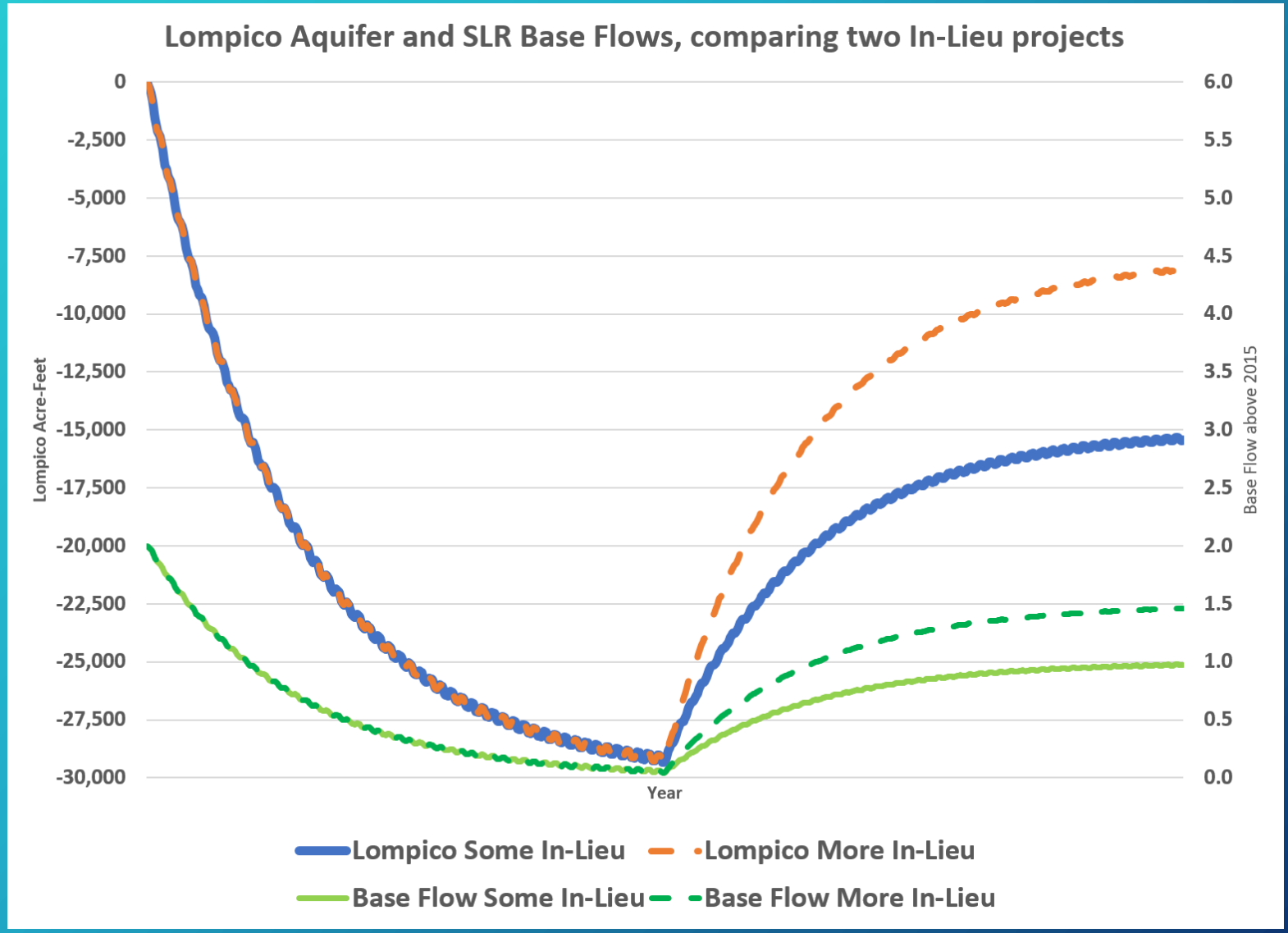
- Plot showing initially the typical Lompico water storage decline
- Then on the right, the effect that an In-Lieu recharge project might have on those storage levels



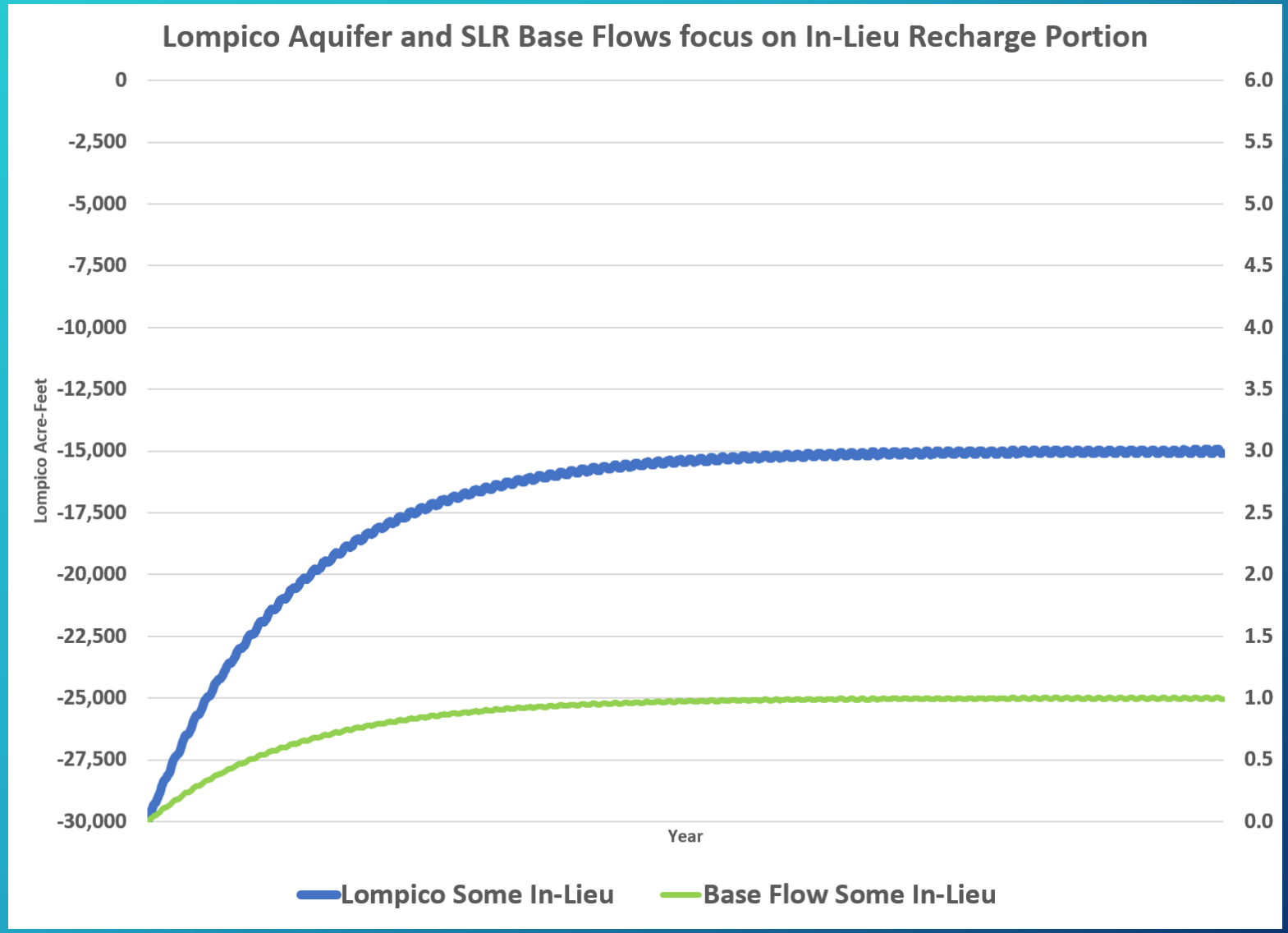
- Chart comparing two versions of Lompico Aquifer In-Lieu projects
- Note that a higher recharge rate stabilizes at higher storage levels



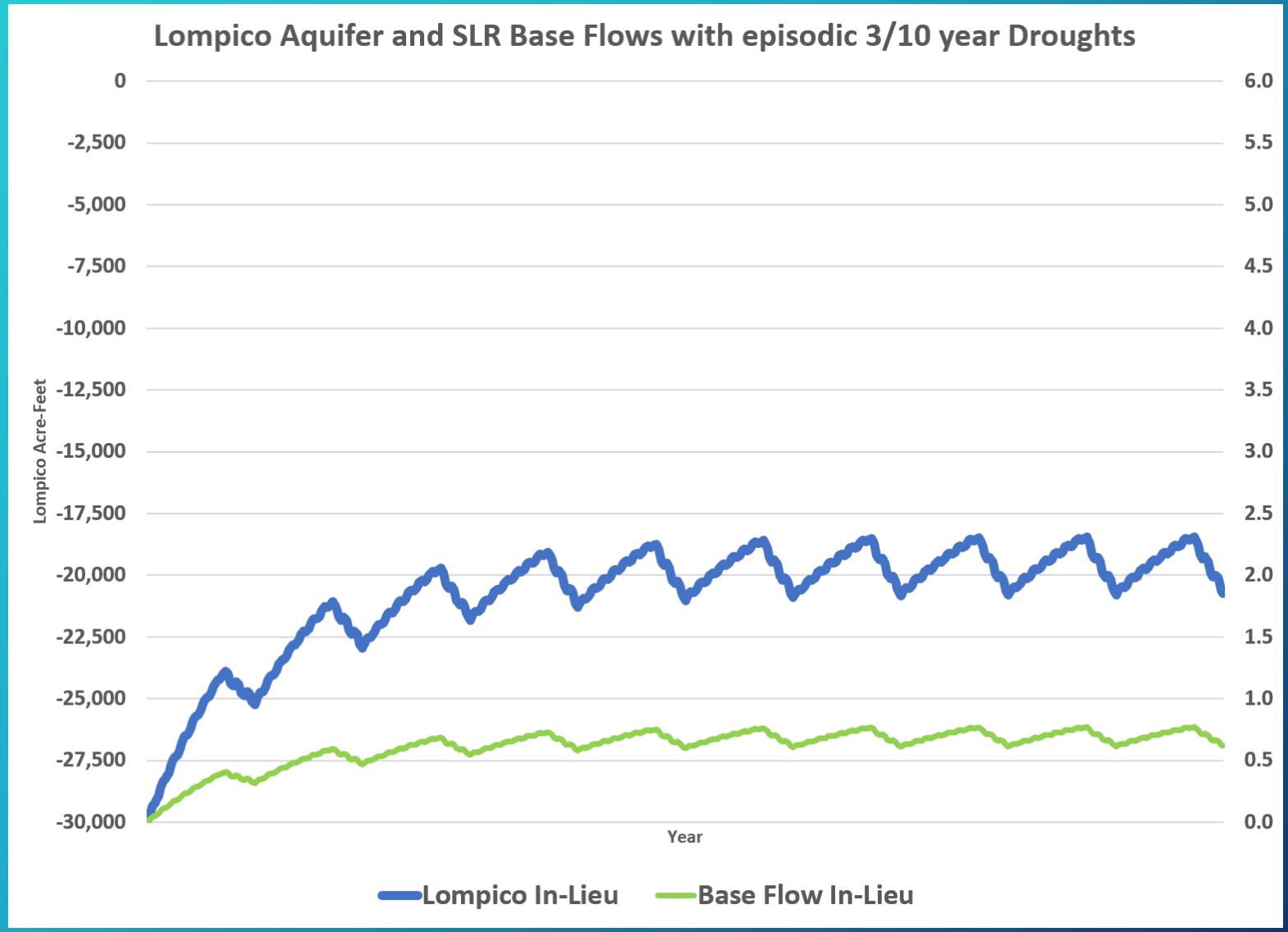
- Those same two In-Lieu projects now showing resultant base flow changes
- Lompico storage levels are both read against the left vertical axis
- Green estimated base flow changes are read against right vertical axis
- Note that higher storage levels allow higher base flow contributions



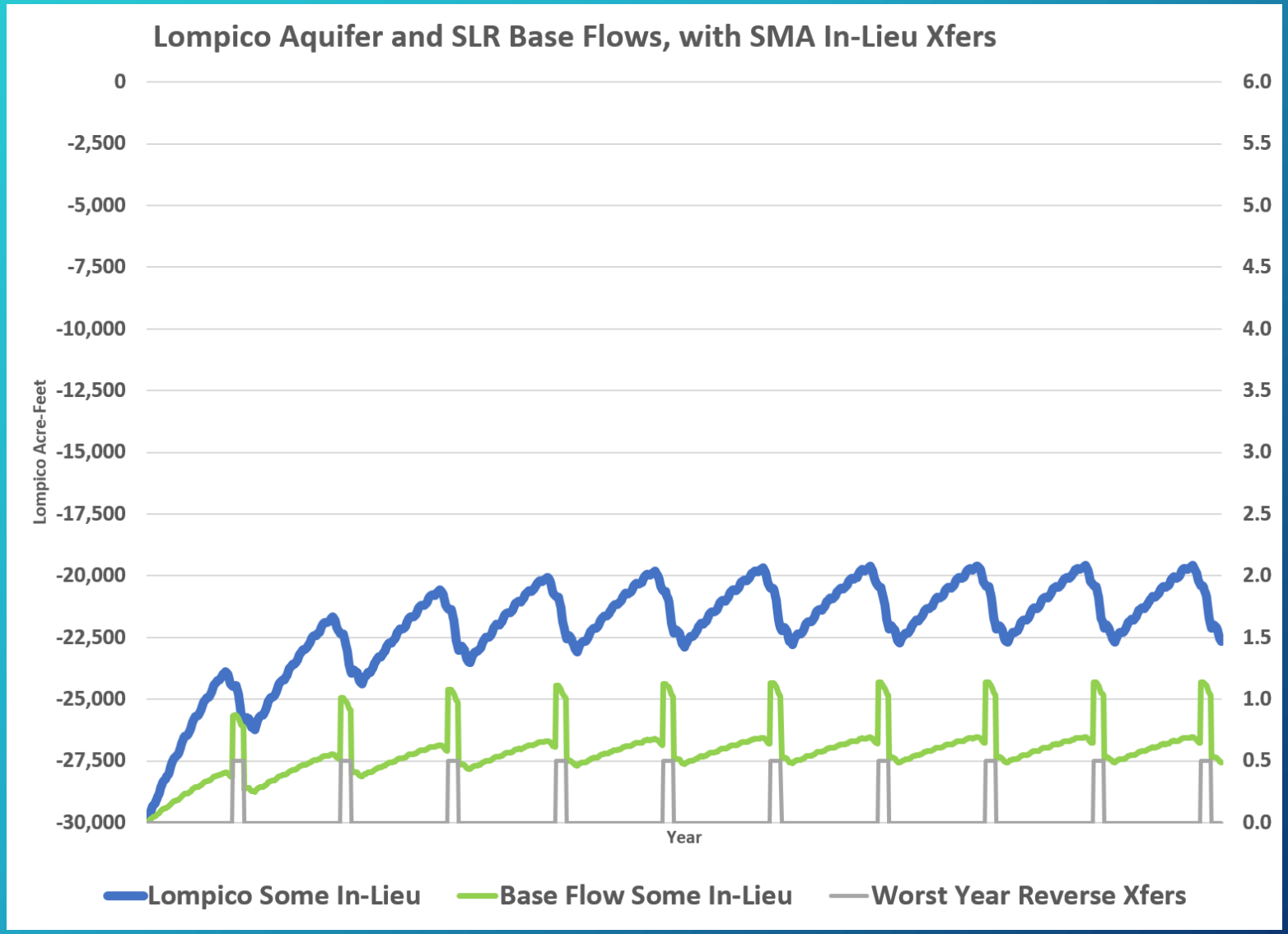
- Focusing from point where one In-Lieu recharge project begins



- Example of In-Lieu project responding to regularly occurring droughts of 3 years out of every 10
- (If only life could be so predictable ☺)



- Advanced In-Lieu project responds to 2nd year of droughts with one year of reverse In-Lieu transfers
- Grey plot shows where conjunctive transfers are reversed: pumping the Lompico wells extra and resting surface or SMA sources
- Green plot shows higher average base flow level, plus increases of base flow when resting SLVWD surface water diversions



What next?

- The board needs to decide if it would like to direct staff to have this proposal investigated as a possible management action to be included in the GSP (Groundwater Sustainability Plan)