Adjustable Parameters

Presented by Allan Wylie, IDWR

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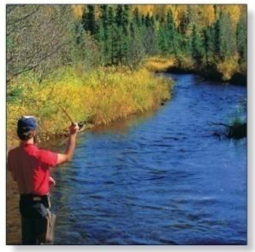


Outline

- Adjustable parameters
  - Anything estimated
- The “Model”
- Flow diagram

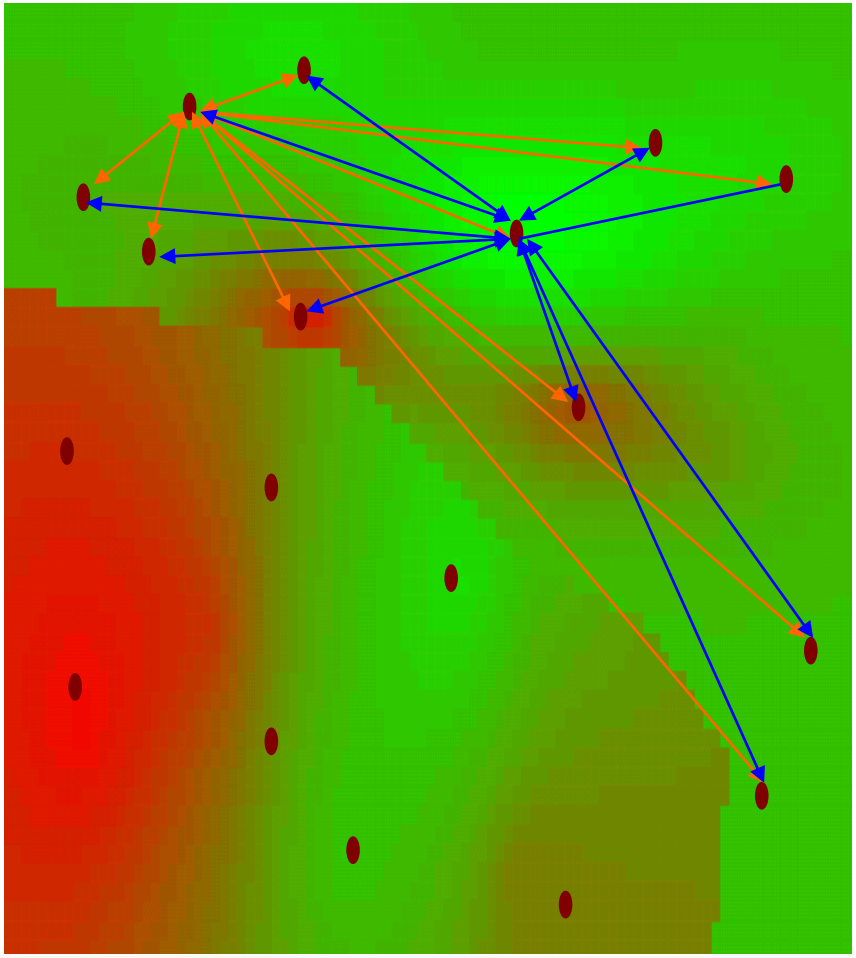
Adjustable Parameters

- Physical properties
  - Hydraulic conductivity and transmissivity
  - Specific yield and storage coefficient
  - Riverbed conductance
  - Drain conductance
- Input into groundwater flow model
  - MODFLOW input files

Adjustable Parameters

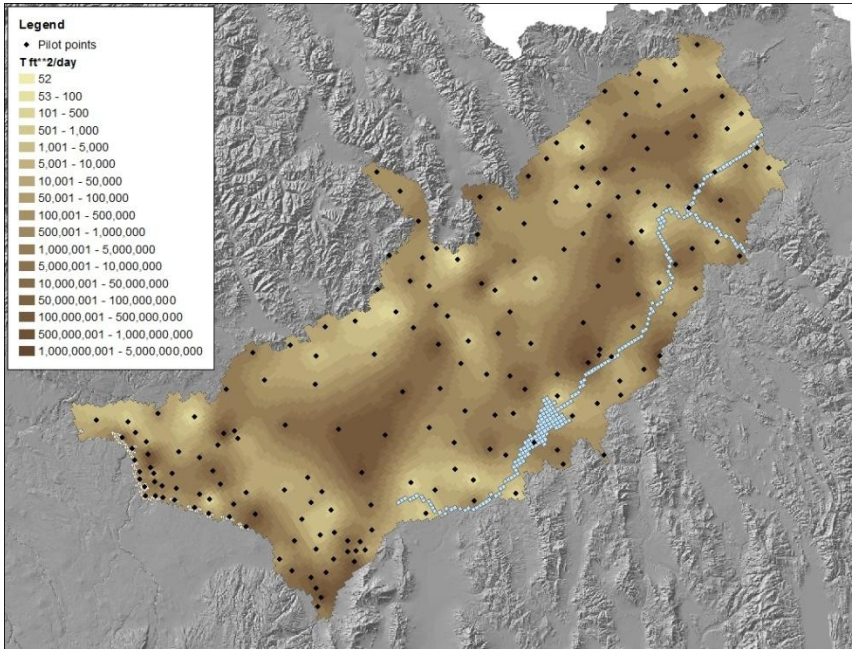
- Components of the water budget
  - Recharge on non-irrigated land
  - Tributary underflow
  - Irrigation entity efficiency
- Input to recharge program
  - Recharge program output is input to MODFLOW
  - Recharge and well files

Pilot Points



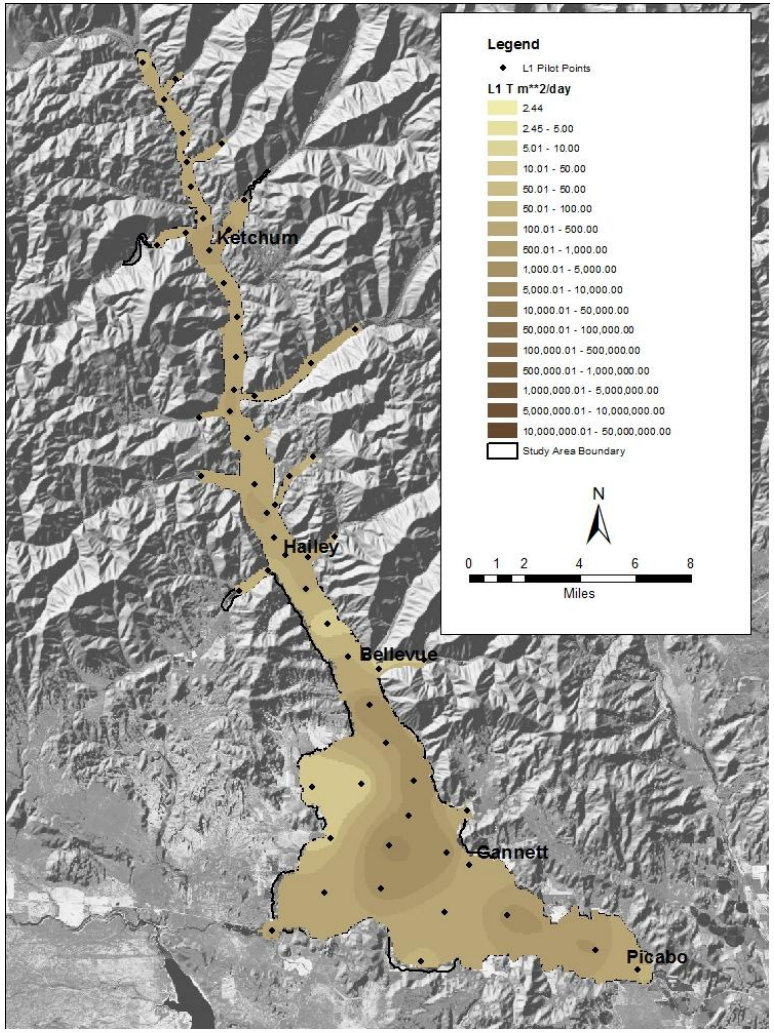
- Estimate hydraulic conductivity (K) or spacific yield (SY) at pilot points
- Interpolate values between pilot points

Pilot Points



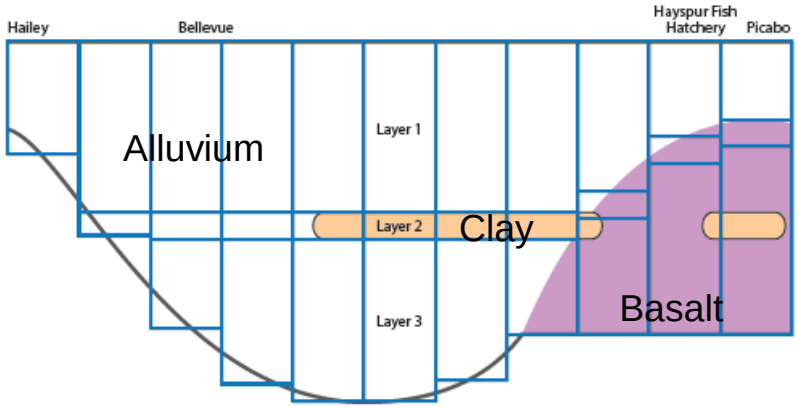
- PEST adjusts pilot point value and interpolates values for cells between pilot points

Pilot Points



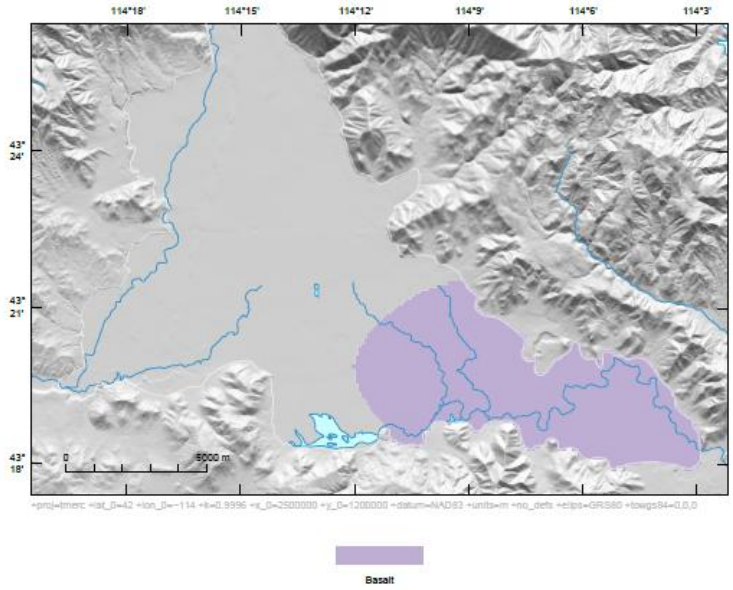
- Pilot Points are assigned to a layer
- Layer 1, 2 and 3 can have the same northing and easting
- Water level observations area an important calibration target
  - 76 wells
  - 162 total observations
  - 2.1 observations per well

Pilot Points



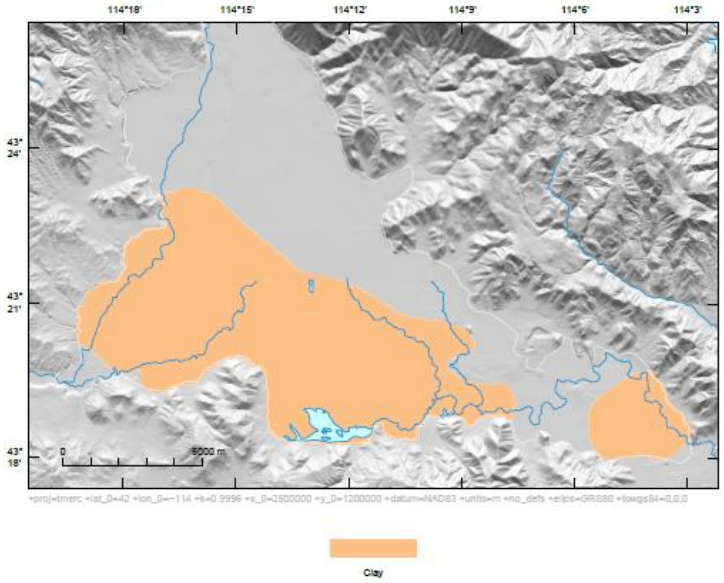
- Pilot Points can be in different zones
- Preferred value = same as other pilot points in same sediment type and same layer

Pilot Points



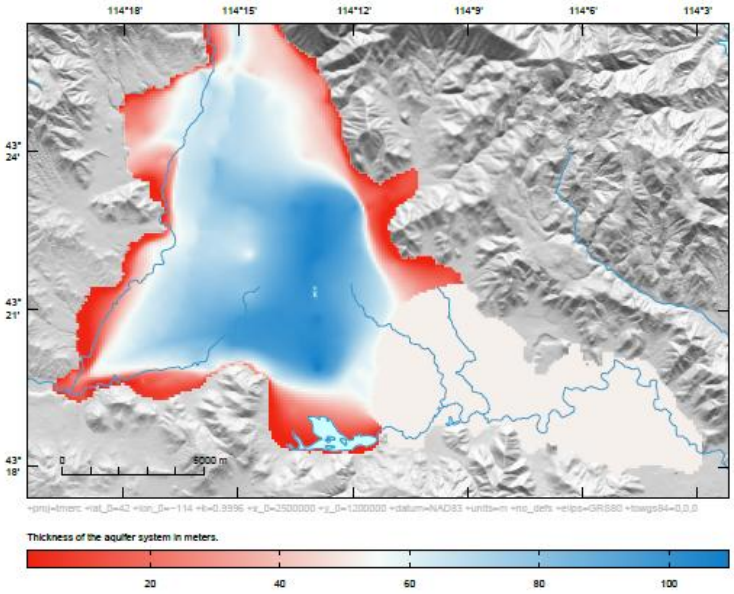
- Can have basalt Pilot Points

Pilot Points



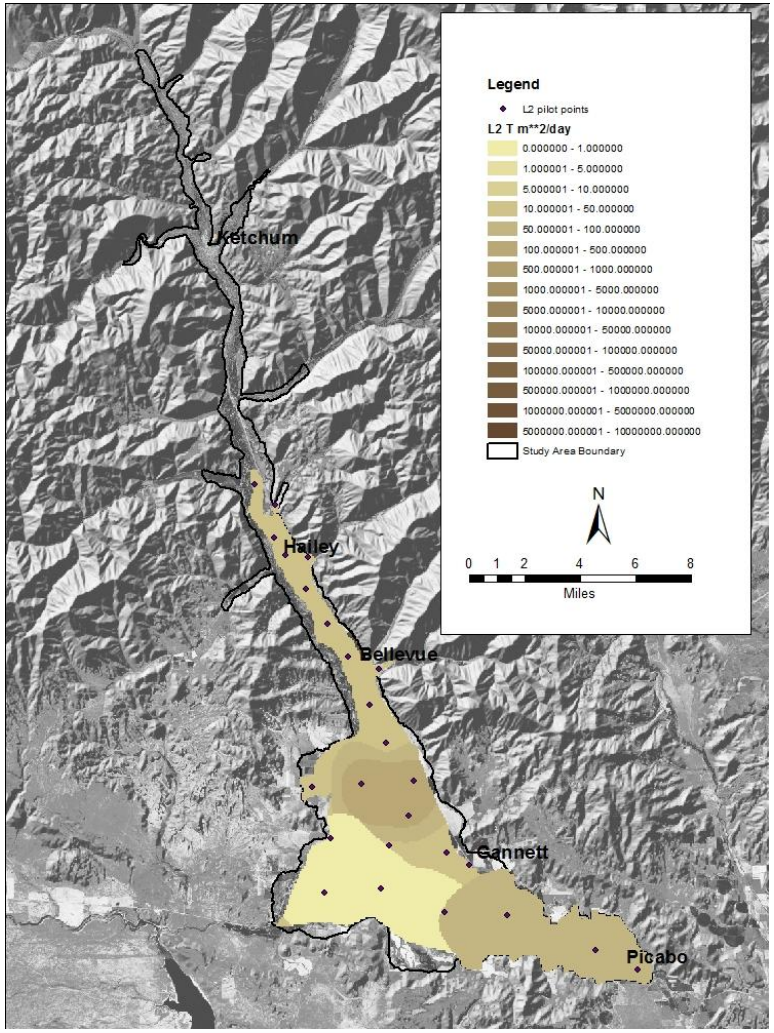
- Can have aquitard Pilot Points

Pilot Points



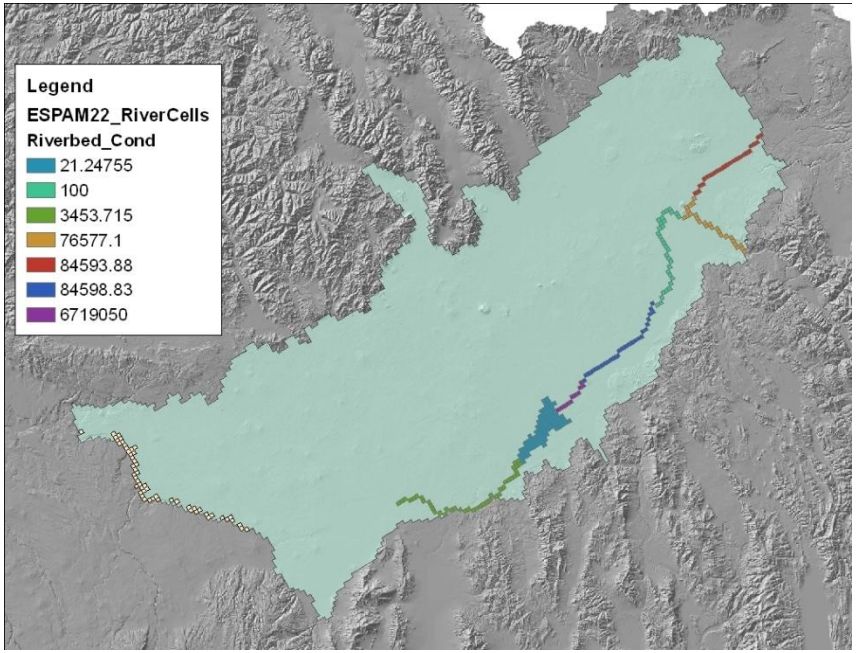
- Can have alluvial sediment Pilot Points

Pilot Points



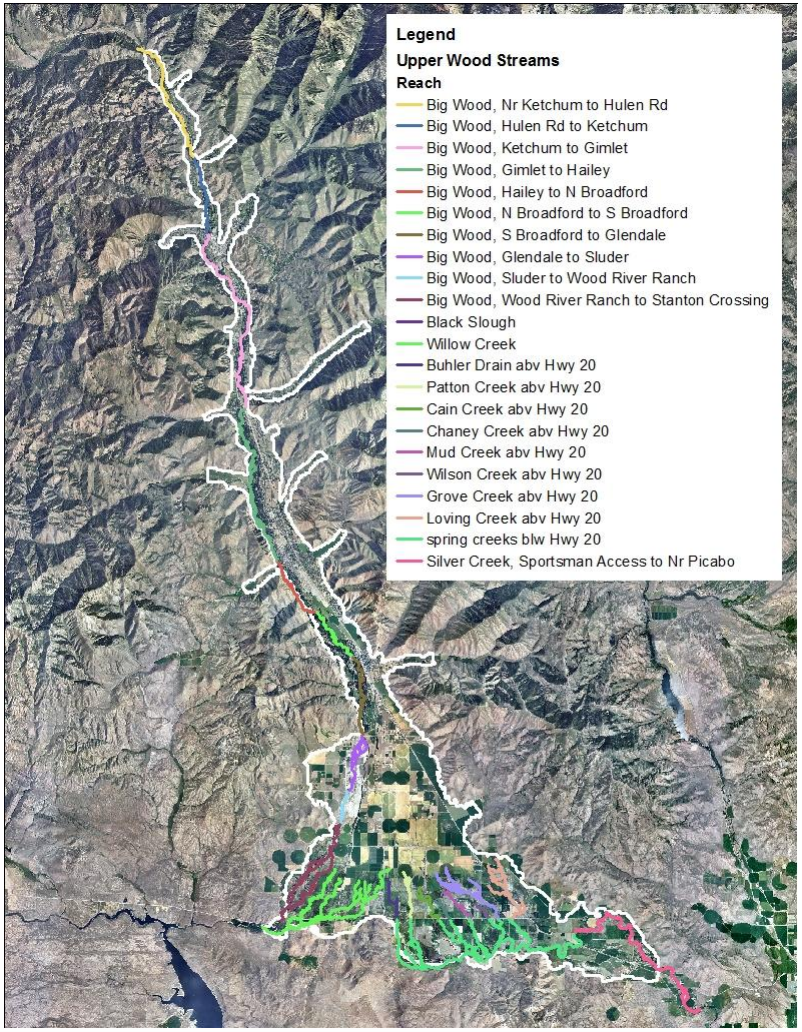
- Pilot Points are assigned to a layer
- Pilot Points can be assigned to zones
  - Sand and gravel aquifer
  - Confining layer
  - Basalt

Riverbed Conductance (RBC)



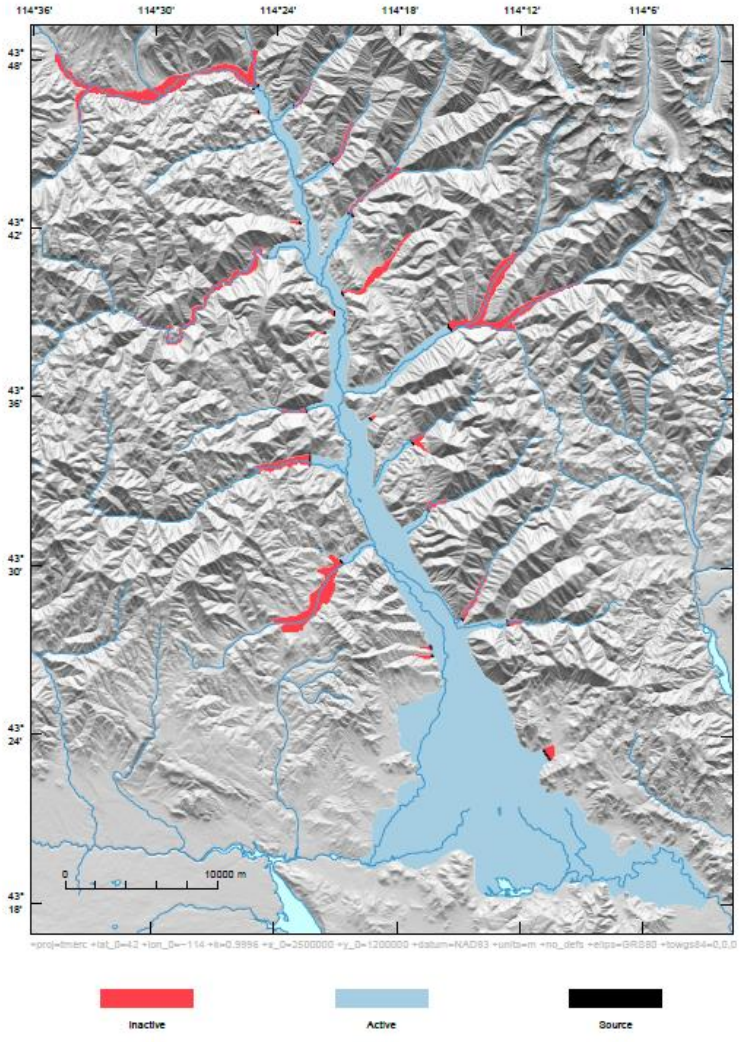
- Adjust RBC by reach

Riverbed Conductance (RBC)



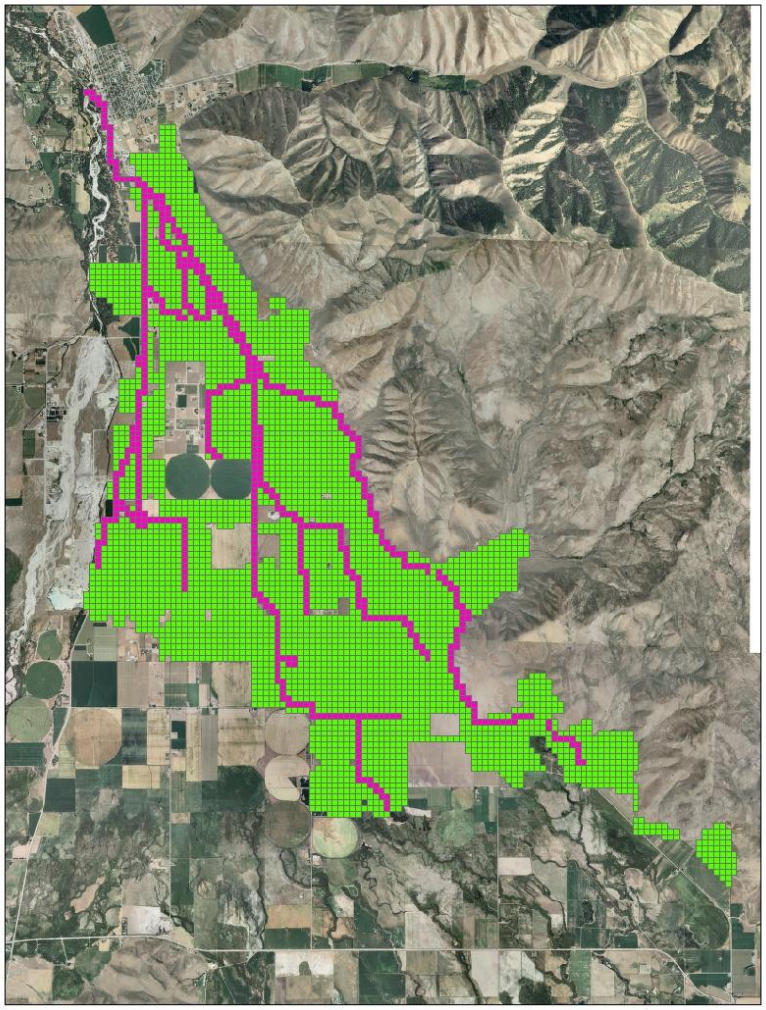
- Wood River Valley Model Reaches
- Wood River Reaches in valley have preferred value
  - Same as neighbors
- Silver Creek Reaches
  - Preferred value same as neighbors

Tributary valley inflow (TRB)



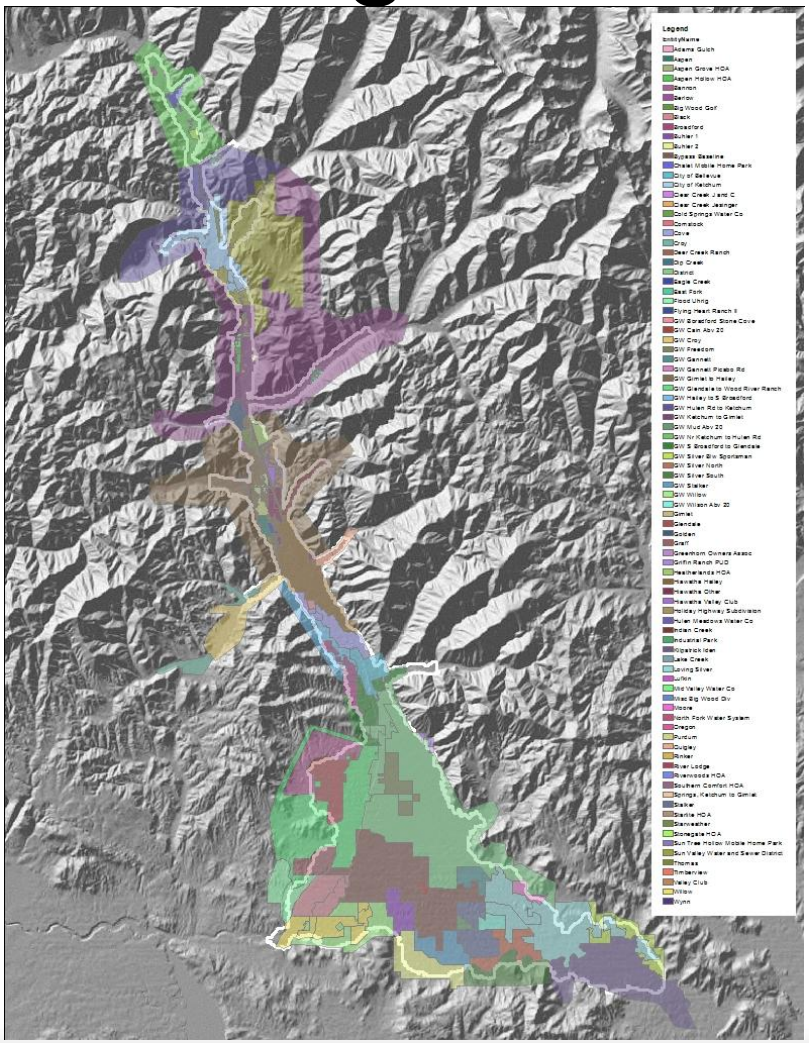
- Adjust TRB by tributary valley
- Preferred value = starting estimate

Irrigation entity efficiency

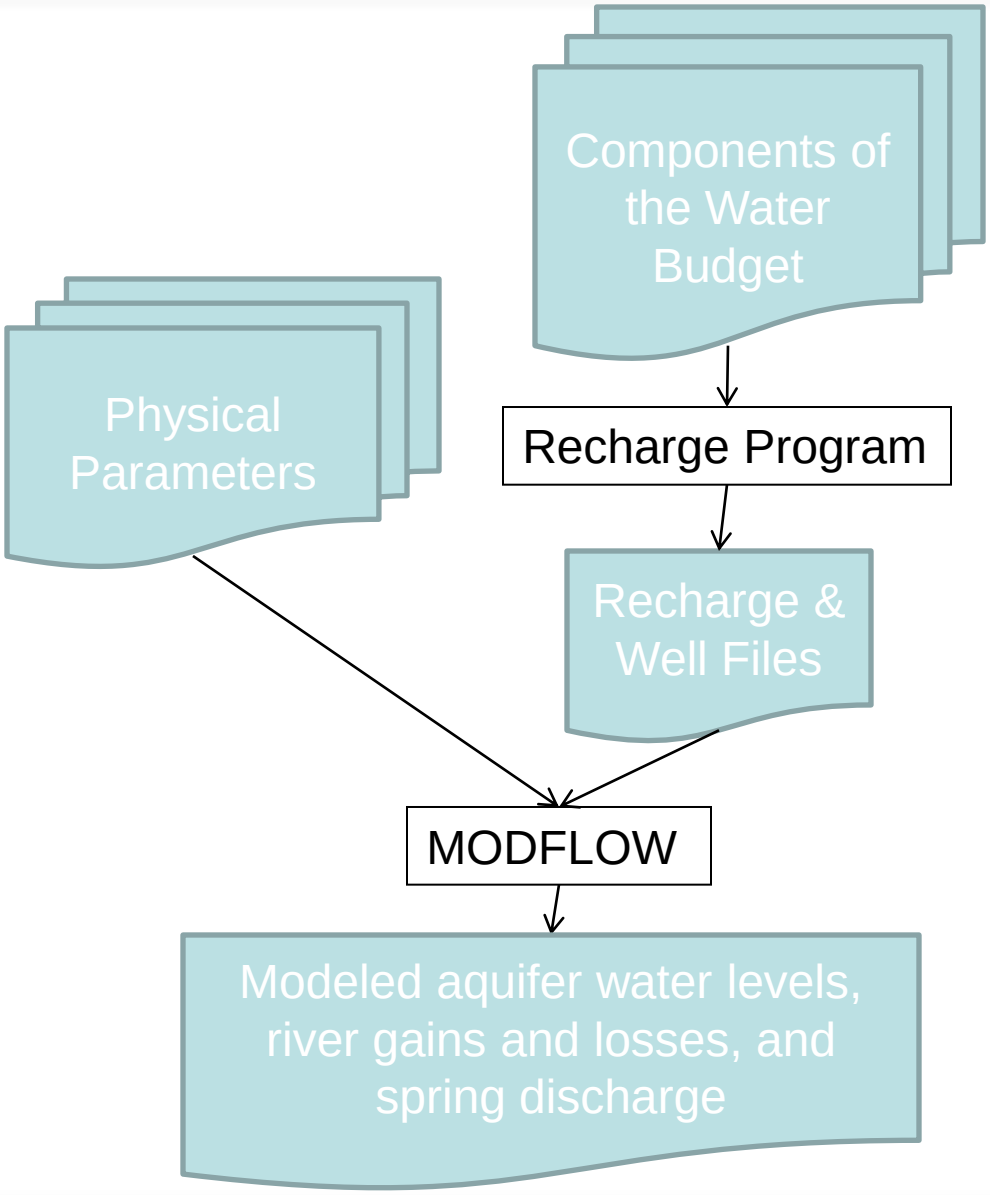


- Adjust by entity
- Assign inefficiency (seepage) to layer 1
- 80% efficiency = 20% of headgate delivery & groundwater pumping applied as recharge to layer 1

Irrigation entity efficiency



- Adjust by entity
- Lots of entities
- Group HOAs in valley together
  - Preferred value same as other HOAs
- Group agricultural entities in triangle together
  - Preferred value same as other agricultural entities
- Other ideas?

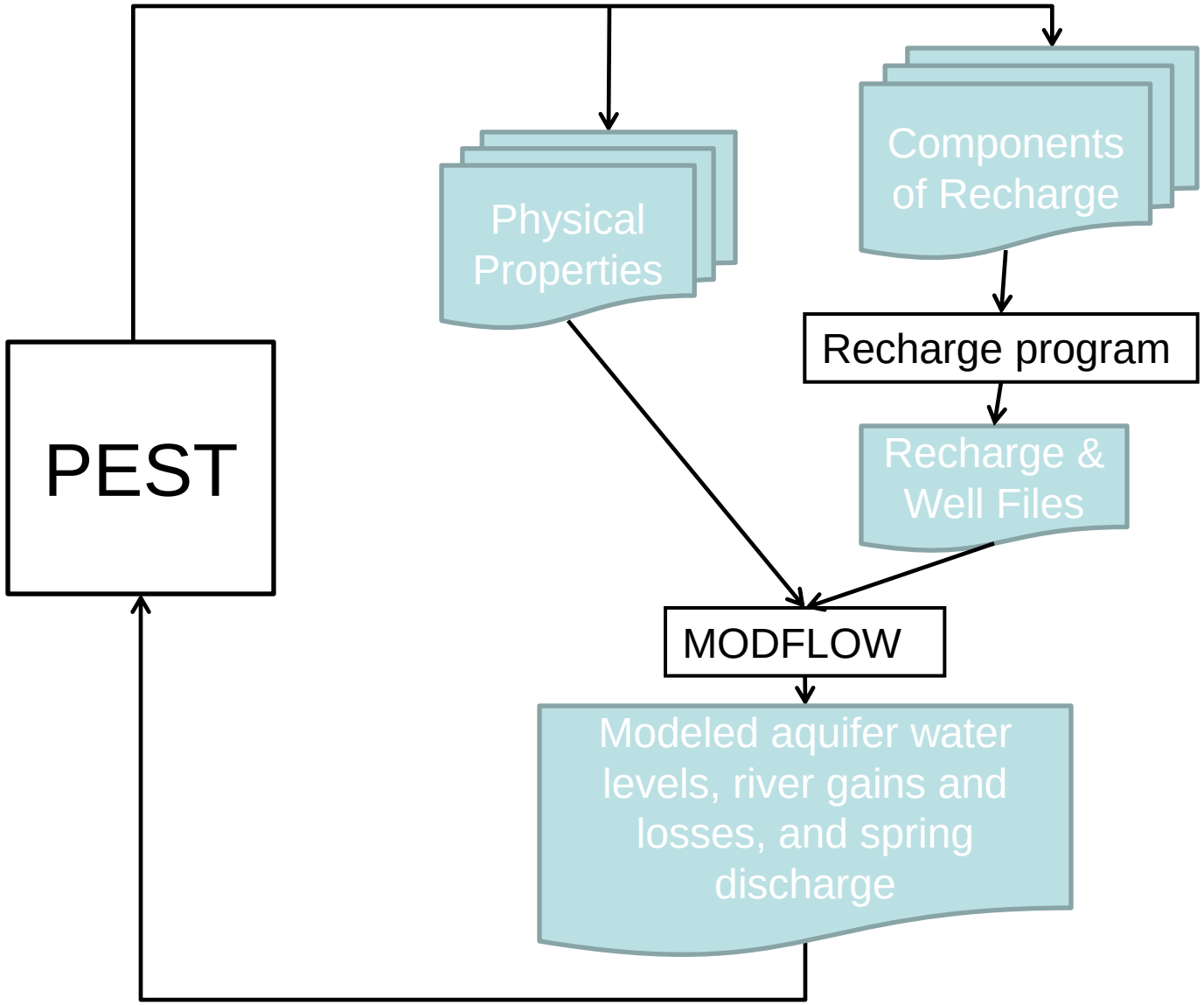

Components of the Water Budget
Physical Parameters
Recharge Program
Recharge & Well Files
MODFLOW
Modeled aquifer water levels, river gains and losses, and spring discharge

The Steady State Wood River Model Batch File

- **rem delete intermediate files**
- del rch?.ref
- del hk?.ref
- del *.hds
- del *.bud
- del wrv_ss_adj.fhb
- **rem**
- **rem multiply recharge array by warping array**
- twoarray<twoarray.in
- striphead<StripHeadRch.in
- **rem**
- **rem adjust tributary underflow**
- adjfhb<adjfhb.in
- **rem**
- **rem build modflow transmissivity arrays**
- fac2real<L1Fac2Real.in
- striphead<StripHeadL1.in
- fac2real<L2Fac2Real.in
- striphead<StripHeadL2.in
- fac2real<L3Fac2Real.in
- striphead<StripHeadL1.in
- **rem**
- **rem run modflow**
- mfusg wrv_ss_test.nam
- **rem**
- **rem read model output**
- **rem model generated heads**
- mod2obs<mod2obs.in
- **rem river gains**
- bud2smp<b2s_BigRch.in
- smpstat<smpstat.in
- **rem seepage run reaches**
- bud2smp<b2s_ReachGn.in
- **rem calculate ratios**
- smpstat<smpstat2.in
- ratio2<Ro_nKeHai.in
- ratio2<Ro_HaiStan.in
- ratio2<Ro_SprCr.in
- **rem discharge from model**
- bud2smp<b2s_Drain.in

Calibration Tool

- PEST
  - Compares model output with observations
    - River aquifer interactions
    - Spring discharge
    - Water levels in wells
  - Objective is to minimize difference between modeled and observed values
  - Prepares input files
    - MODFLOW
    - Recharge Program


Physical Properties
Components of Recharge
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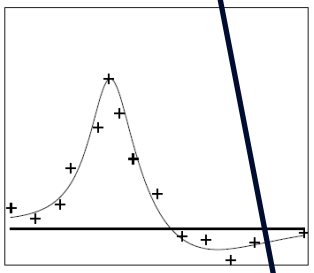
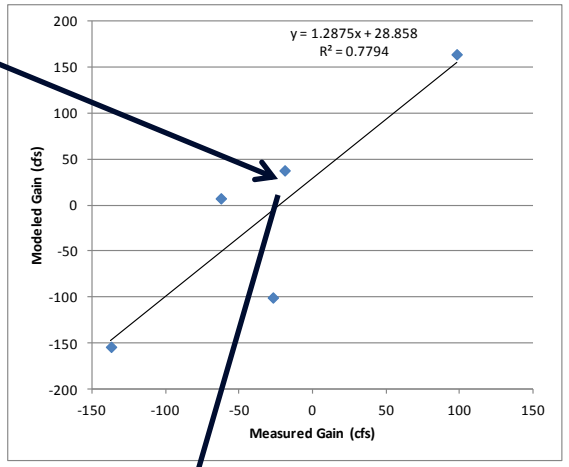
Modeled aquifer water levels, river gains and losses, and spring discharge

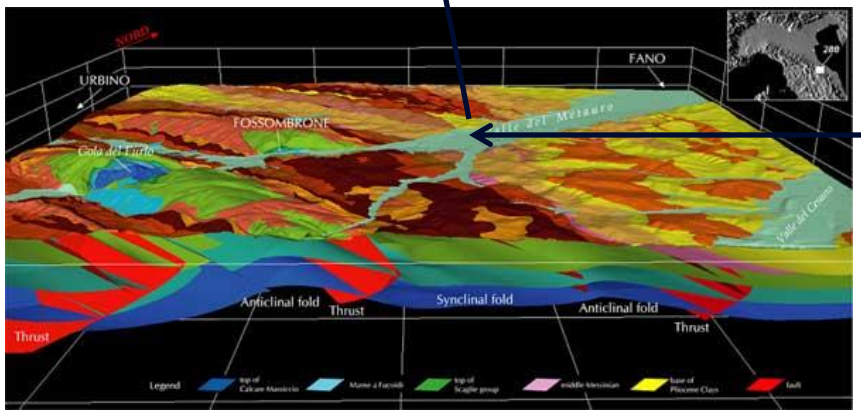
PEST

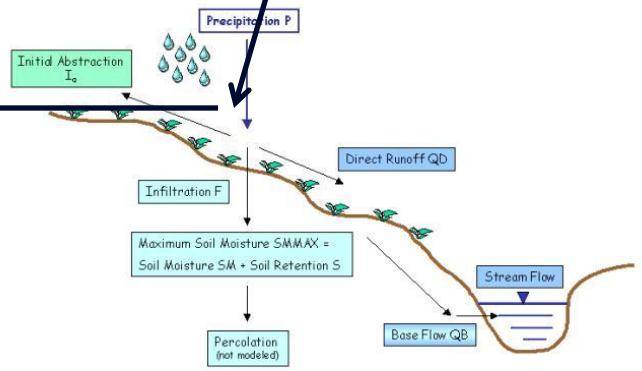
Model-Independent Parameter Estimation

User Manual: 5th Edition

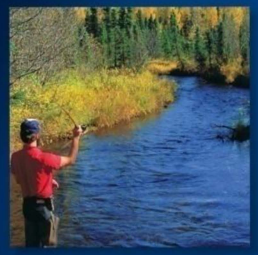








IDAHO Department of Water Resources



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