Adjustable Parameters

Presented by Allan Wylie, IDWR
Date August 12, 2014
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 specific 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?
Recharge Program

Physical Parameters

Components of the Water Budget

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
Recharge program

Physical Properties

Components of Recharge

Recharge & Well Files

MODEFLOW

Modeled aquifer water levels, river gains and losses, and spring discharge
End