Groundwater Model Development

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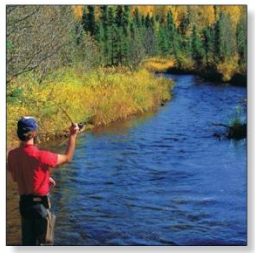
Outline

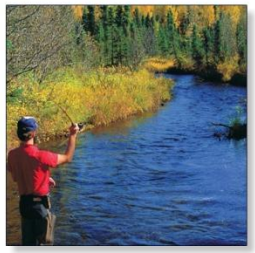
- Model Purpose
- Select Computer Code
- Discretize
  - Time
  - Space
- Water Budget
  - Inflows
  - Outflows
- Populate Model
  - Water Budget
  - Physical Properties
- Test-Change-Test-Change…

Ground Water Model Purpose



- Contaminant transport
- Water supply
- Surface water – groundwater interaction
- Scientific investigation

Ground Water Model Purpose



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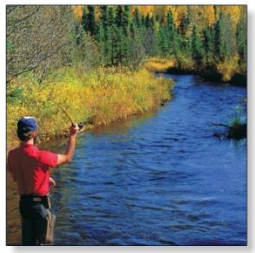
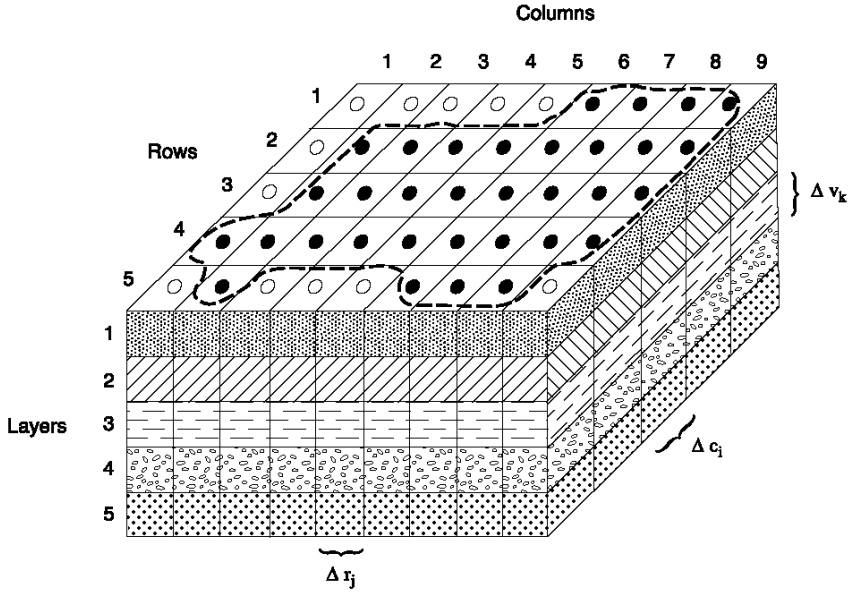
Model Code



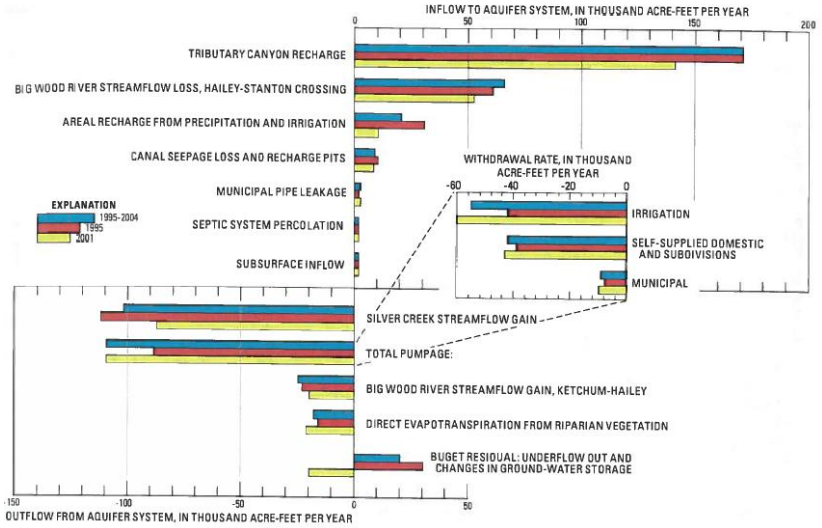
- USGS MODFLOW
  - Free from USGS
  - Used since 1988
  - Widely accepted

Discretize



- Time
  - Annual
  - 6 month
  - 3 month
  - 1 month
  - Daily
- Space
  - 1 mile x 1 mile
  - ½ mile x ½ mile
  - ¼ mile x ¼ mile

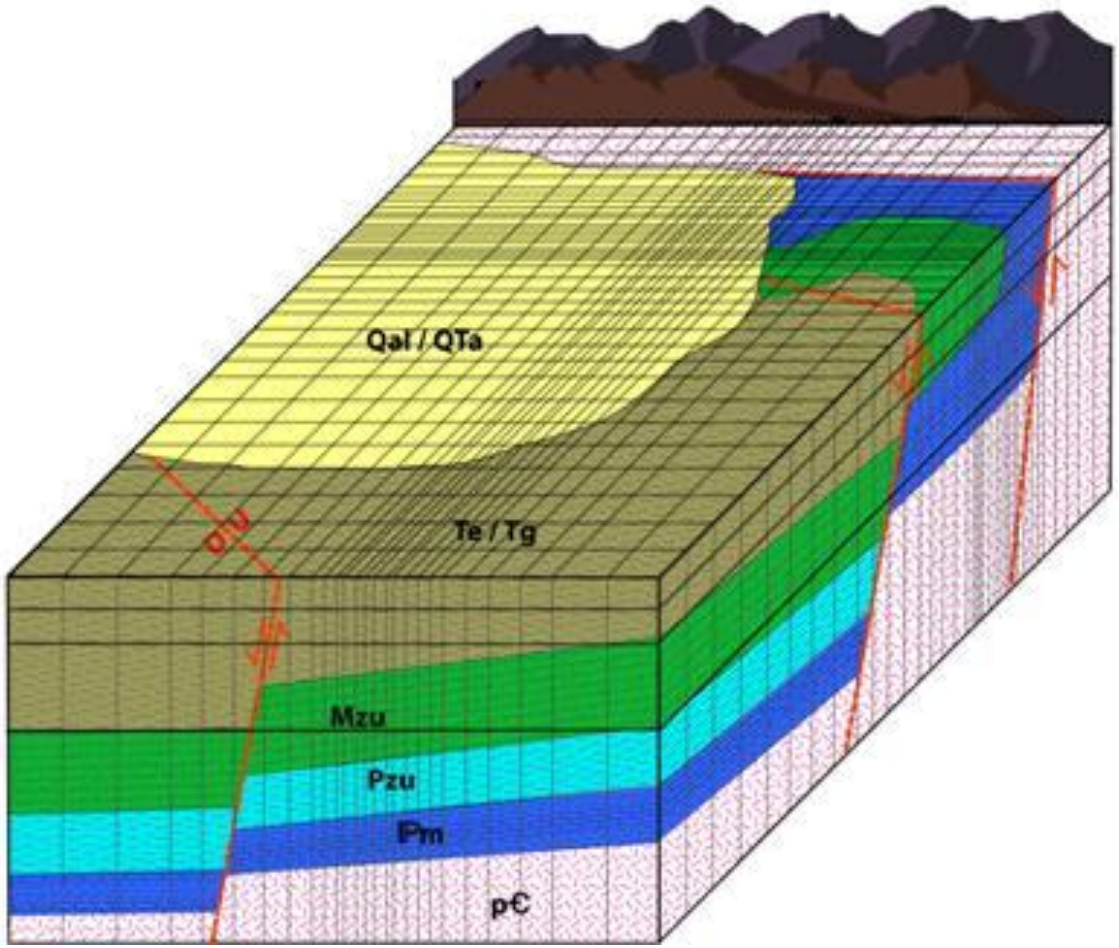
Water Budget



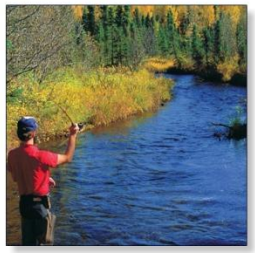
From Bartolino (2009)

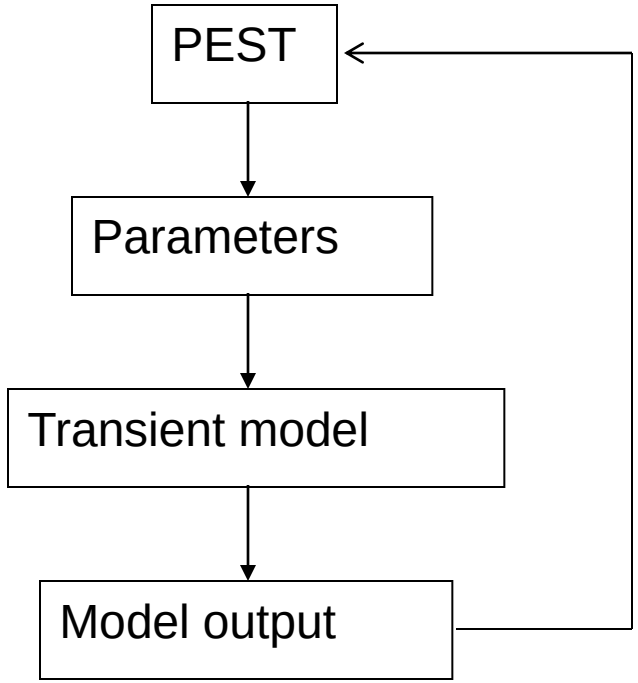
- Catalog all aquifer inflow and outflow
  - Agricultural
  - Municipal
  - Industrial
  - Natural
    - Tributary basin
    - Precipitation
    - Wood River outflow
    - Silver Creek outflow

Populate Model

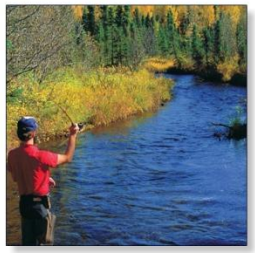


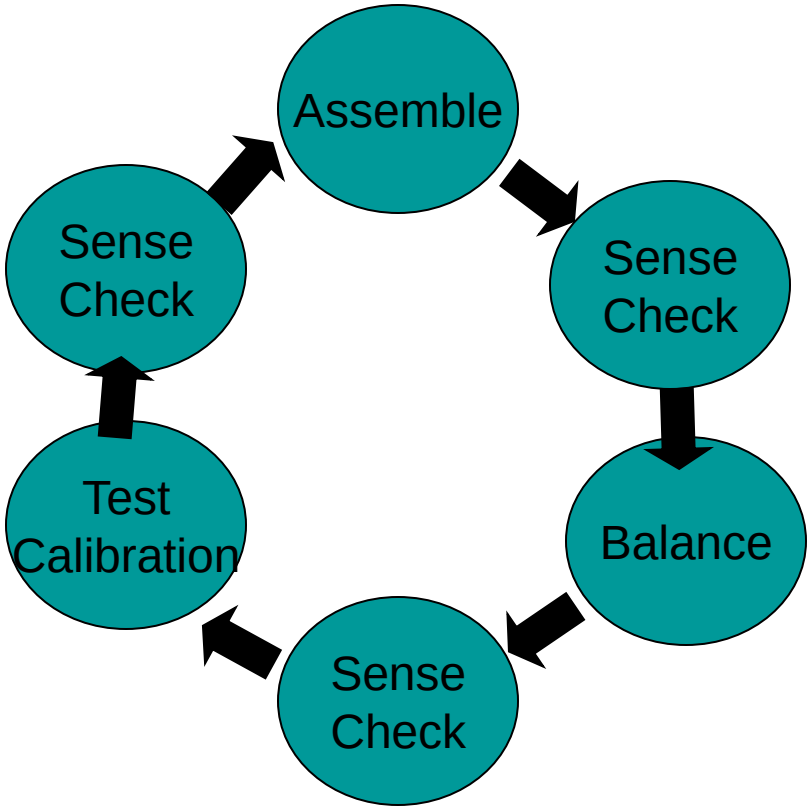
Automated Parameter Estimation



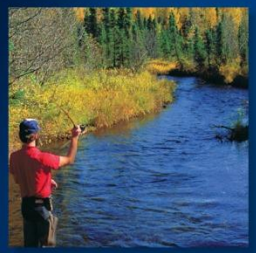


Assemble & Test Budget

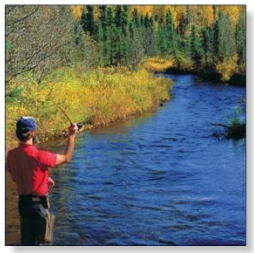


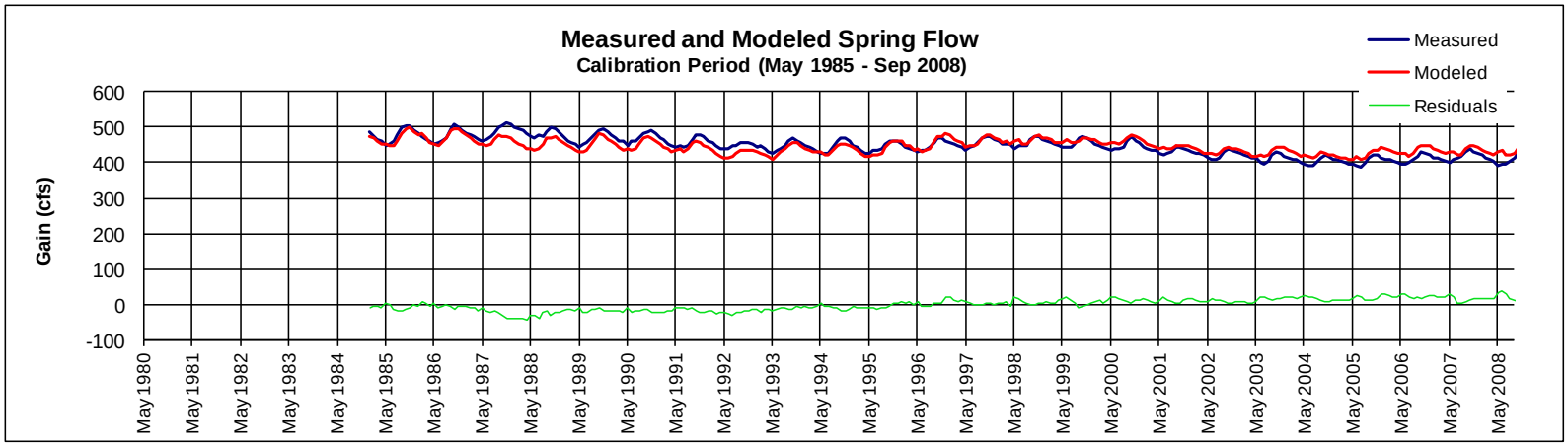


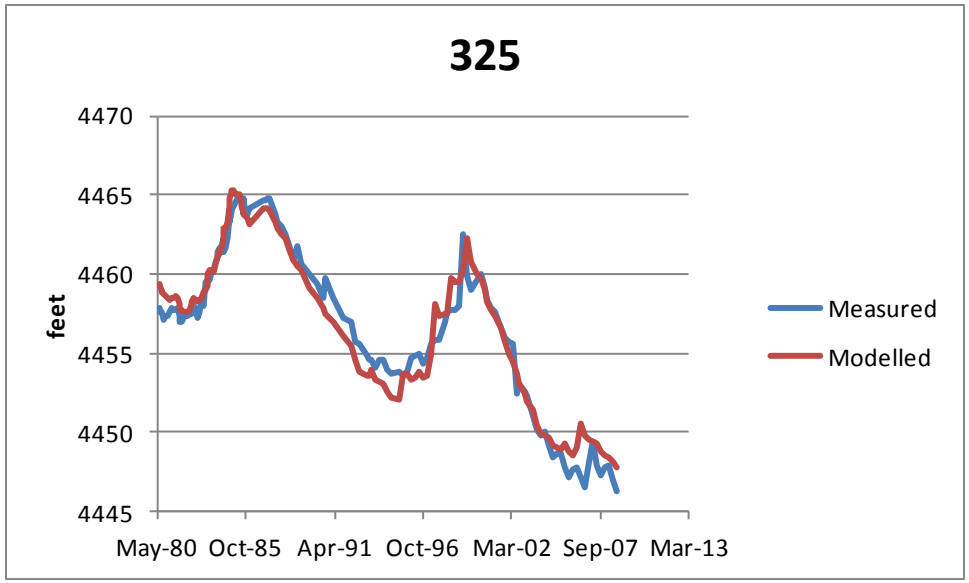
IDAHO Department of Water Resources



End




Measured and Modeled Spring Flow
Calibration Period (May 1985 - Sep 2008)
Measured
Modeled
Residuals
Gain (cfs)
600
500
400
300
200
100
0
-100
May1980
May1981
May1982
May1983
May1984
May1985
May1986
May1987
May1988
May1989
May1990
May1991
May1992
May1993
May1994
May1995
May1996
May1997
May1998
May1999
May2000
May2001
May2002
May2003
May2004
May2005
May2006
May2007
May2008


325
feet
4470
4465
4460
4455
4450
4445
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled