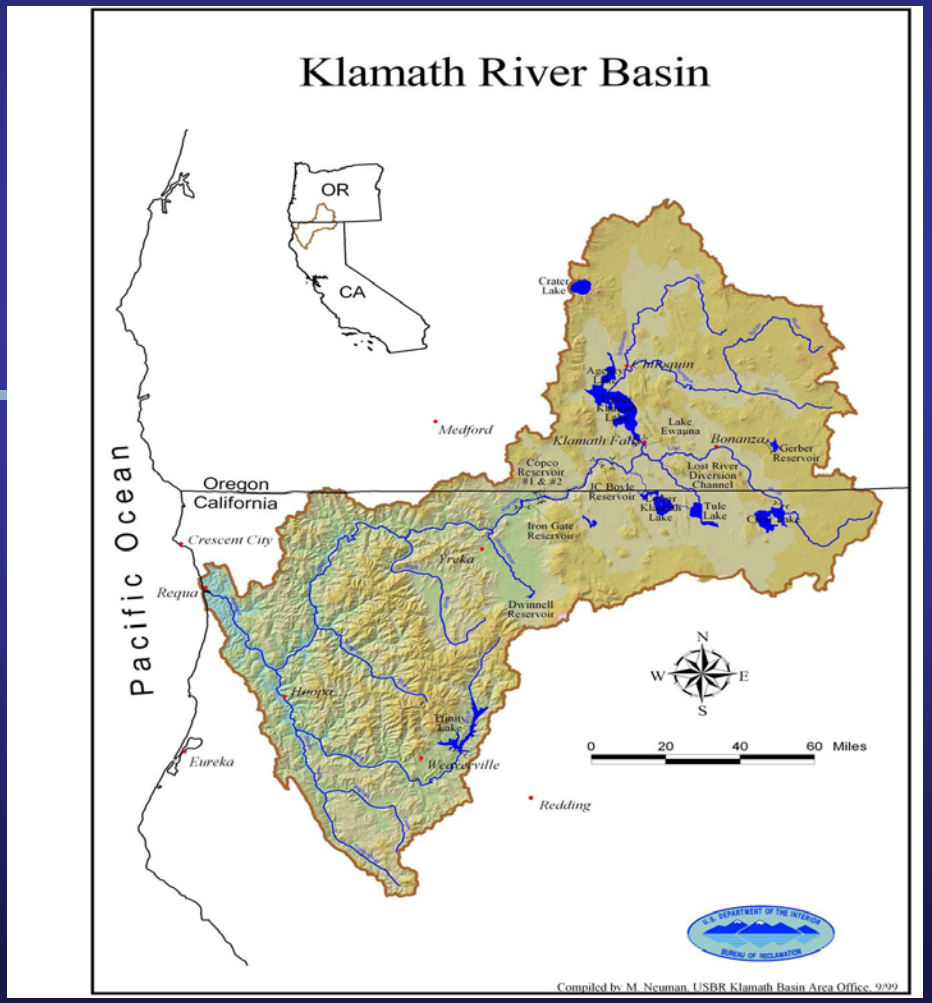
Groundwater Simulation and Management Models for the Upper Klamath Basin

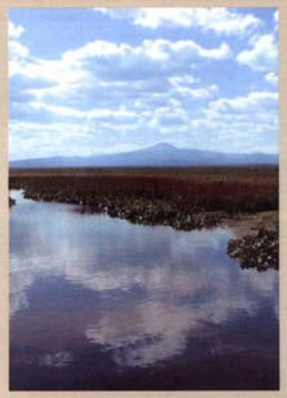


Ivan Gall
Groundwater Section Manager

USGS
science for a changing world

Prepared in cooperation with the Oregon Water Resources Department

Ground-Water Hydrology of the Upper Klamath Basin, Oregon and California



Scientific Investigations Report 2007–5050

U.S. Department of the Interior
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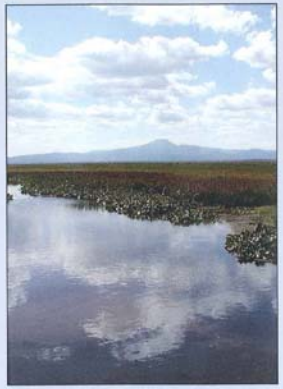
Groundwater Simulation and Management Models for the Upper Klamath Basin, Oregon and California



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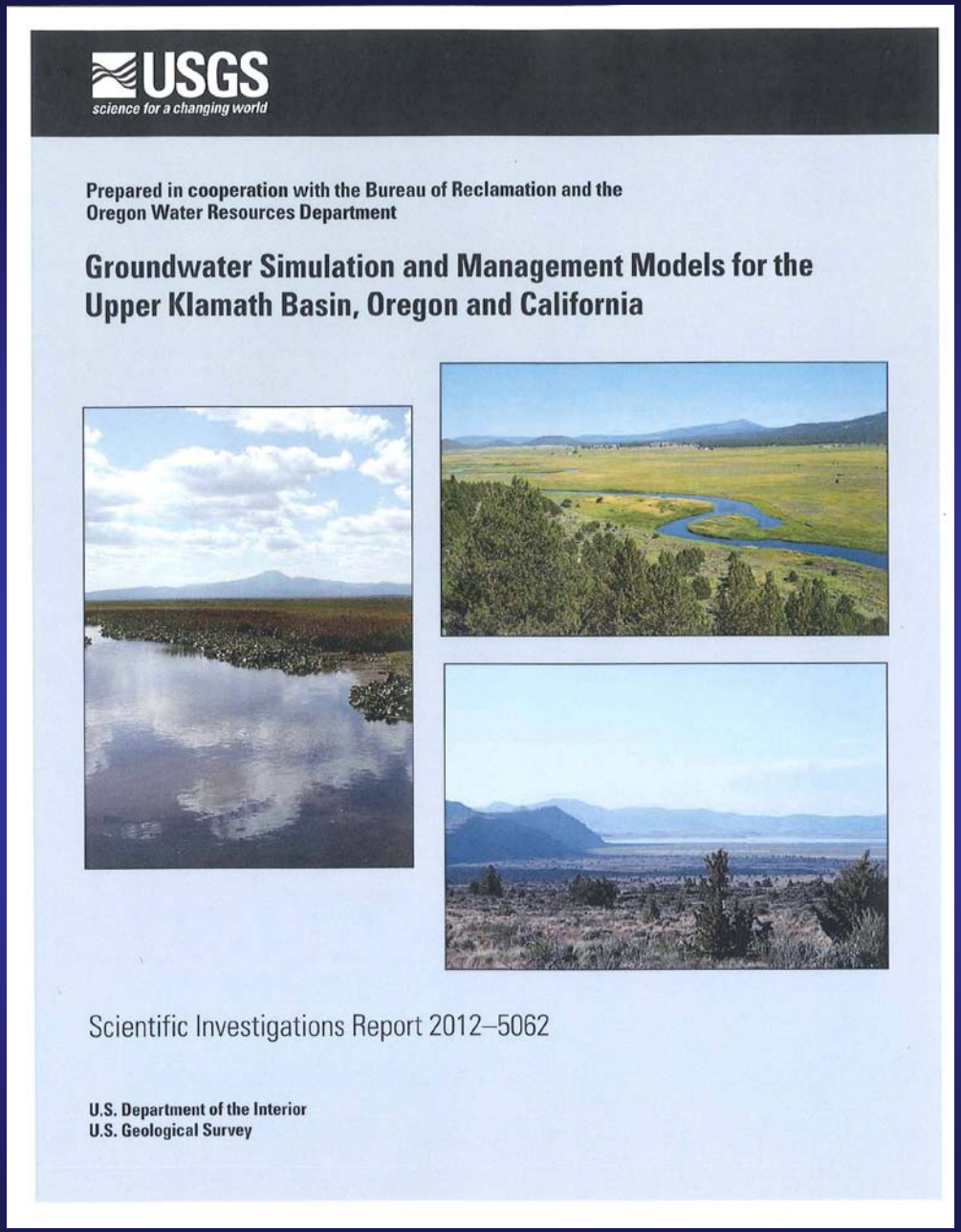


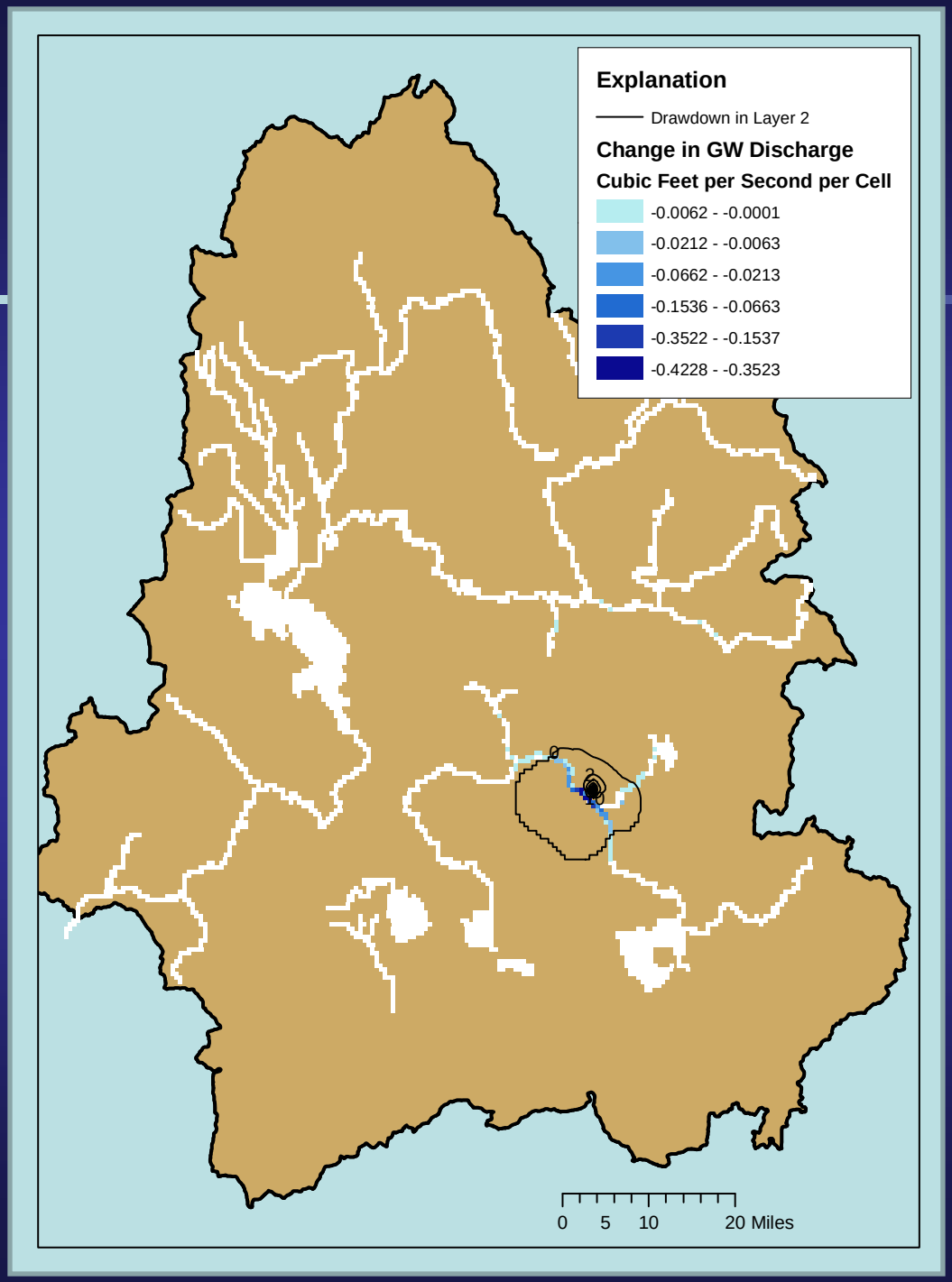
Contents Include:

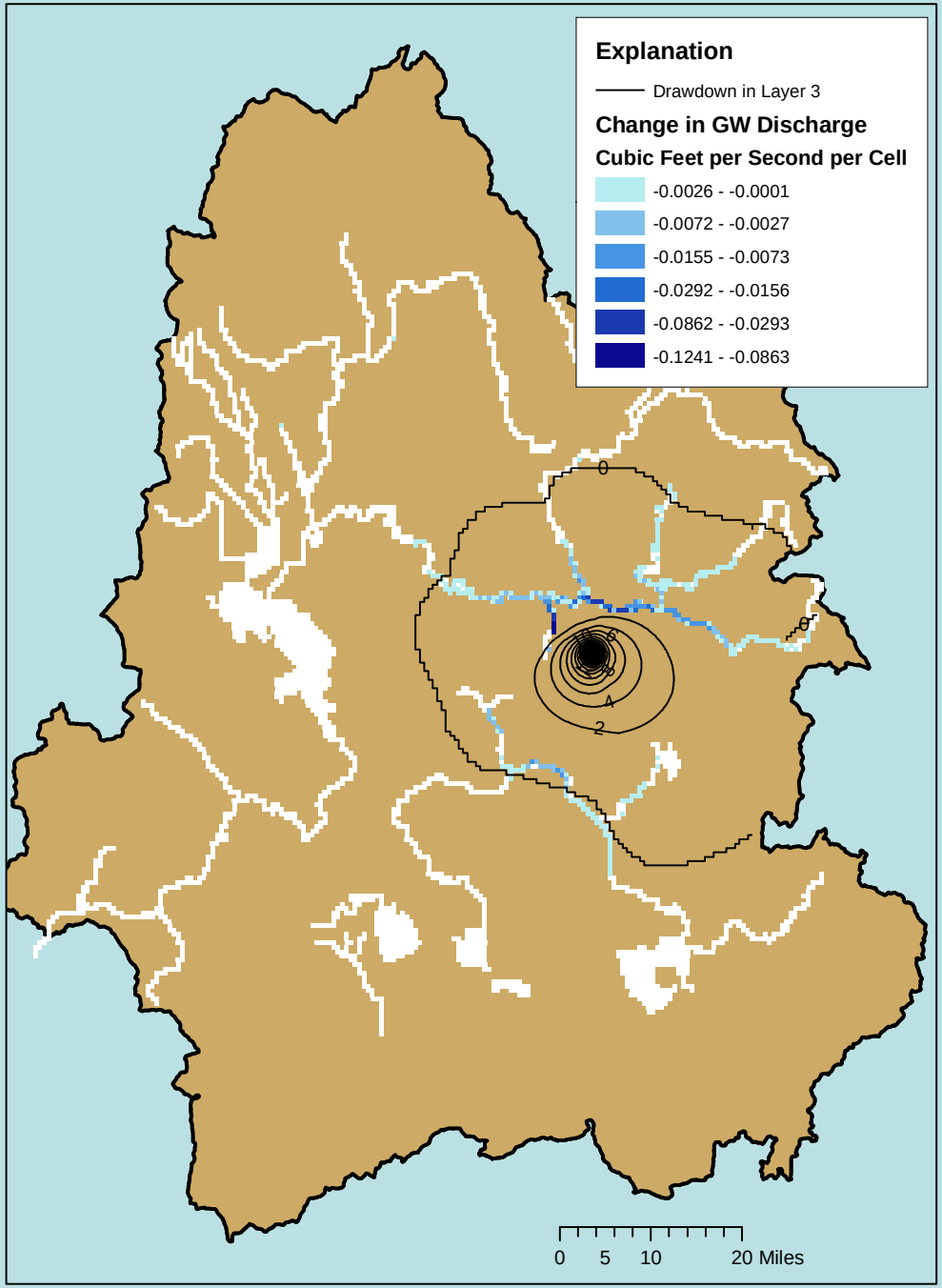
Groundwater Flow Model

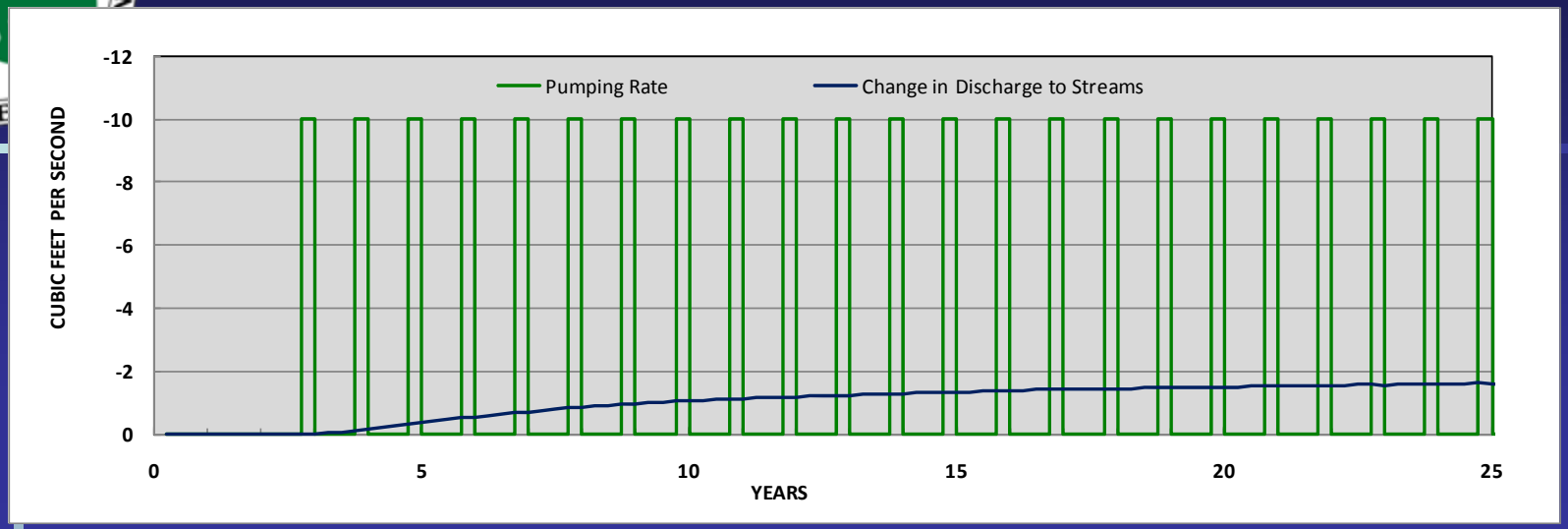
- Model Description
- Model Calibration

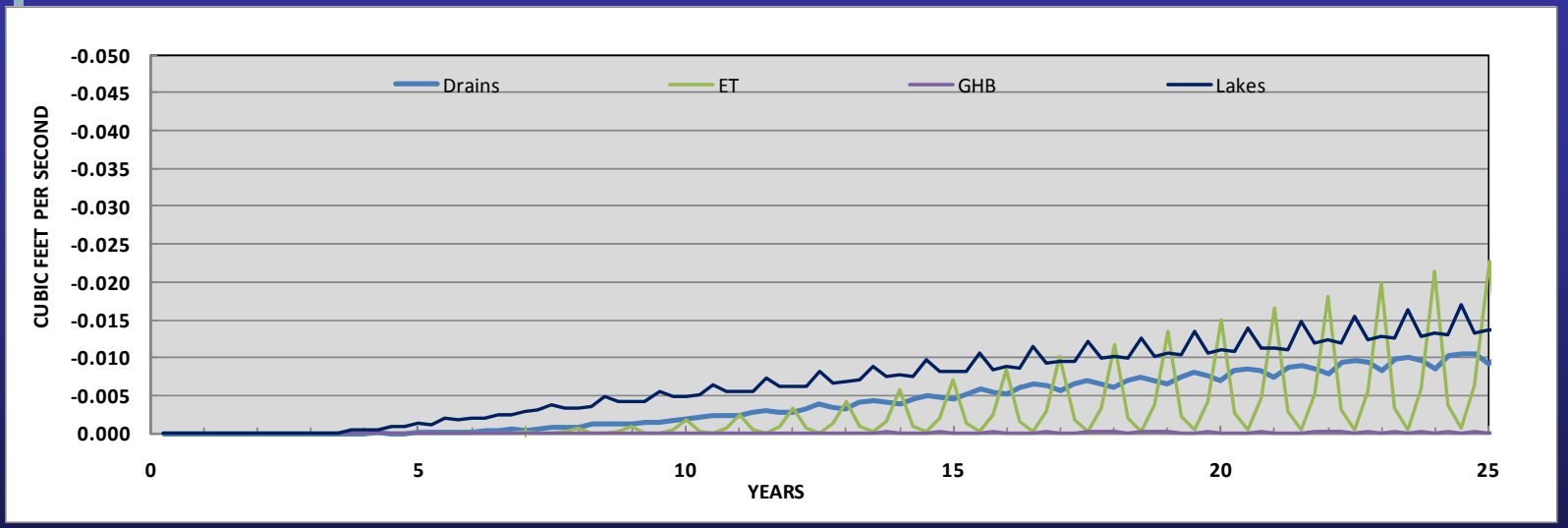
Groundwater Management Model

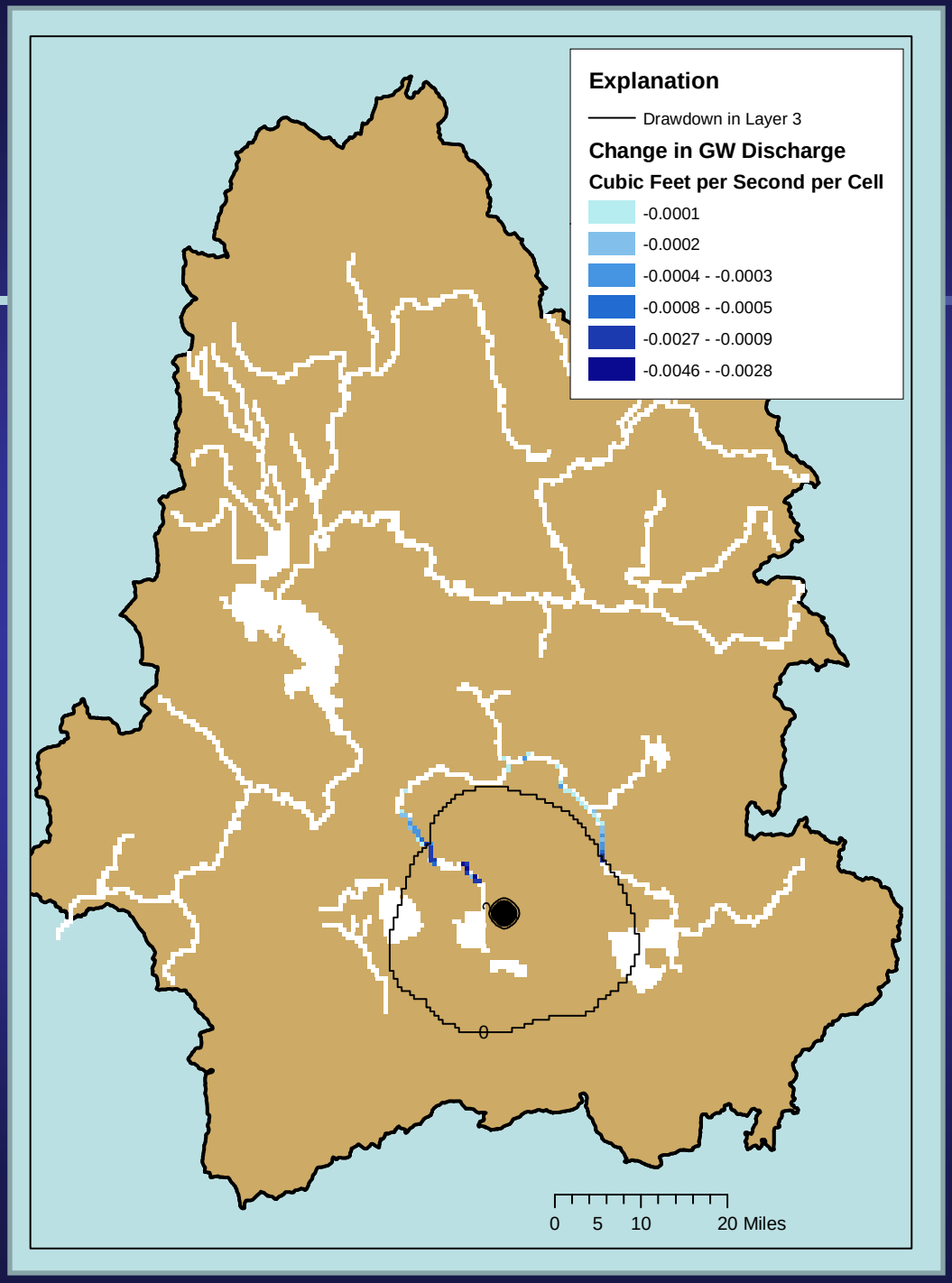
- Simulation Analysis
- Evaluation of Alternatives

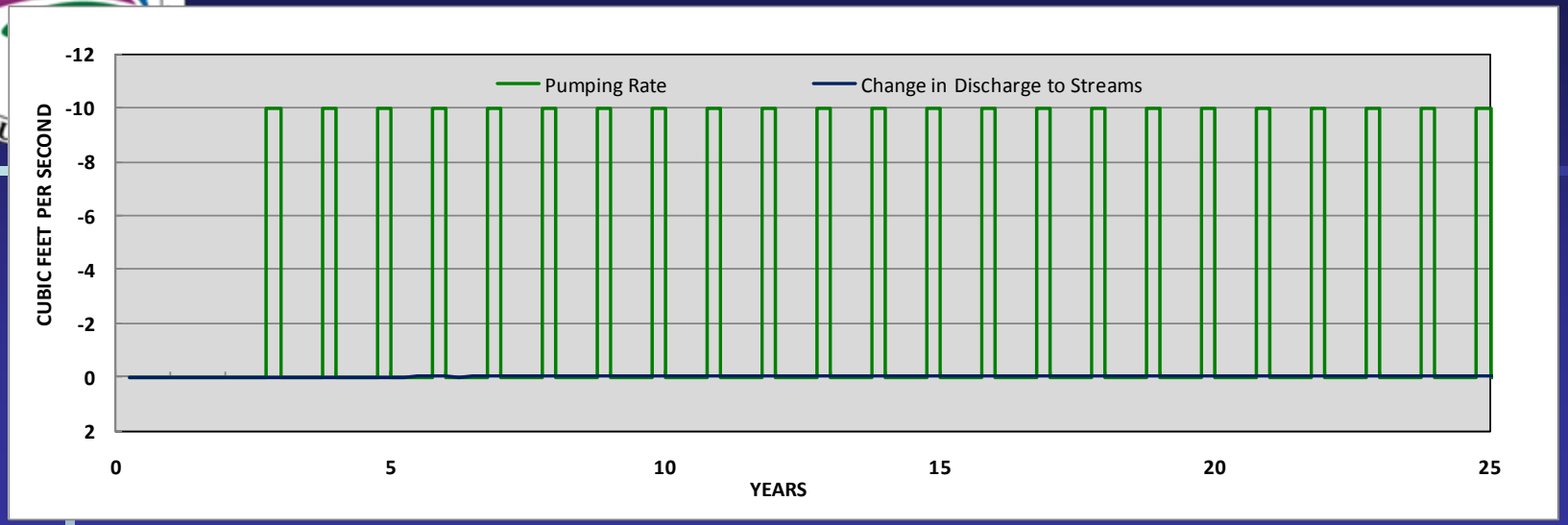

Explanation
Drawdown in Layer 2
Change in GW Discharge
Cubic Feet per Second per Cell
-0.0062 - -0.0001
-0.0212 - -0.0063
-0.0662 - -0.0213
-0.1536 - -0.0663
-0.3522 - -0.1537
-0.4228 - -0.3523
0
2
0 5 10 20 Miles

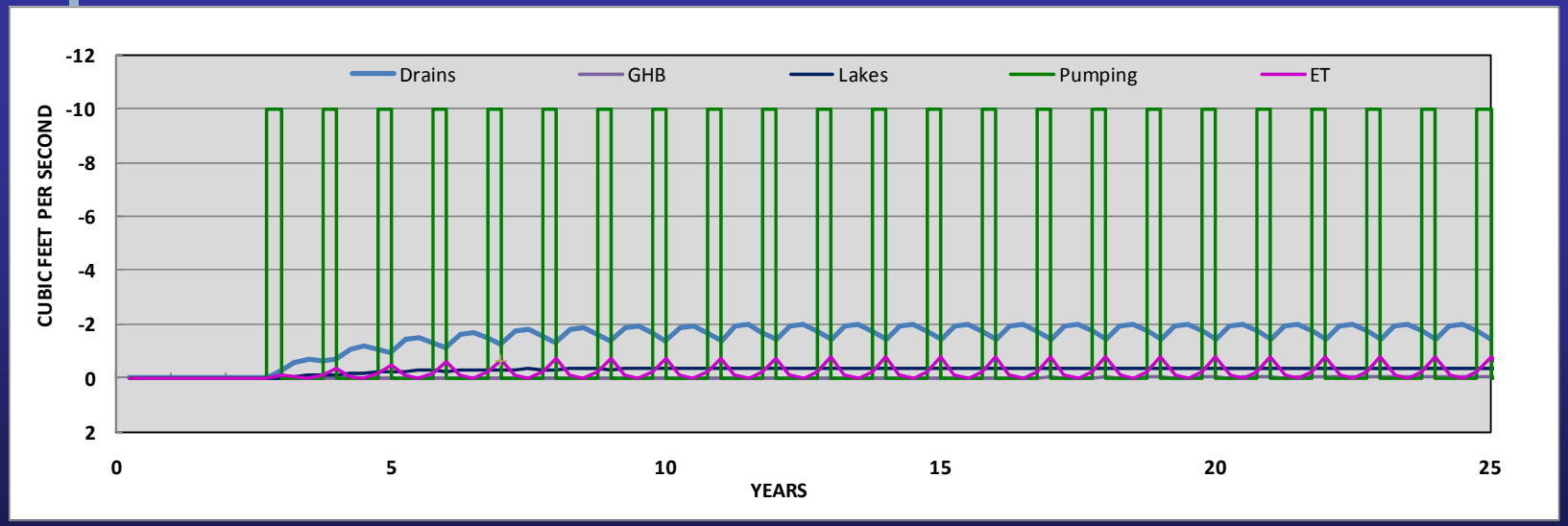

Explanation
Drawdown in Layer 3
Change in GW Discharge
Cubic Feet per Second per Cell
-0.0026 - -0.0001
-0.0072 - -0.0027
-0.0155 - -0.0073
-0.0292 - -0.0156
-0.0862 - -0.0293
-0.1241 - -0.0863
0
6
8
4
2
0 5 10 20 Miles

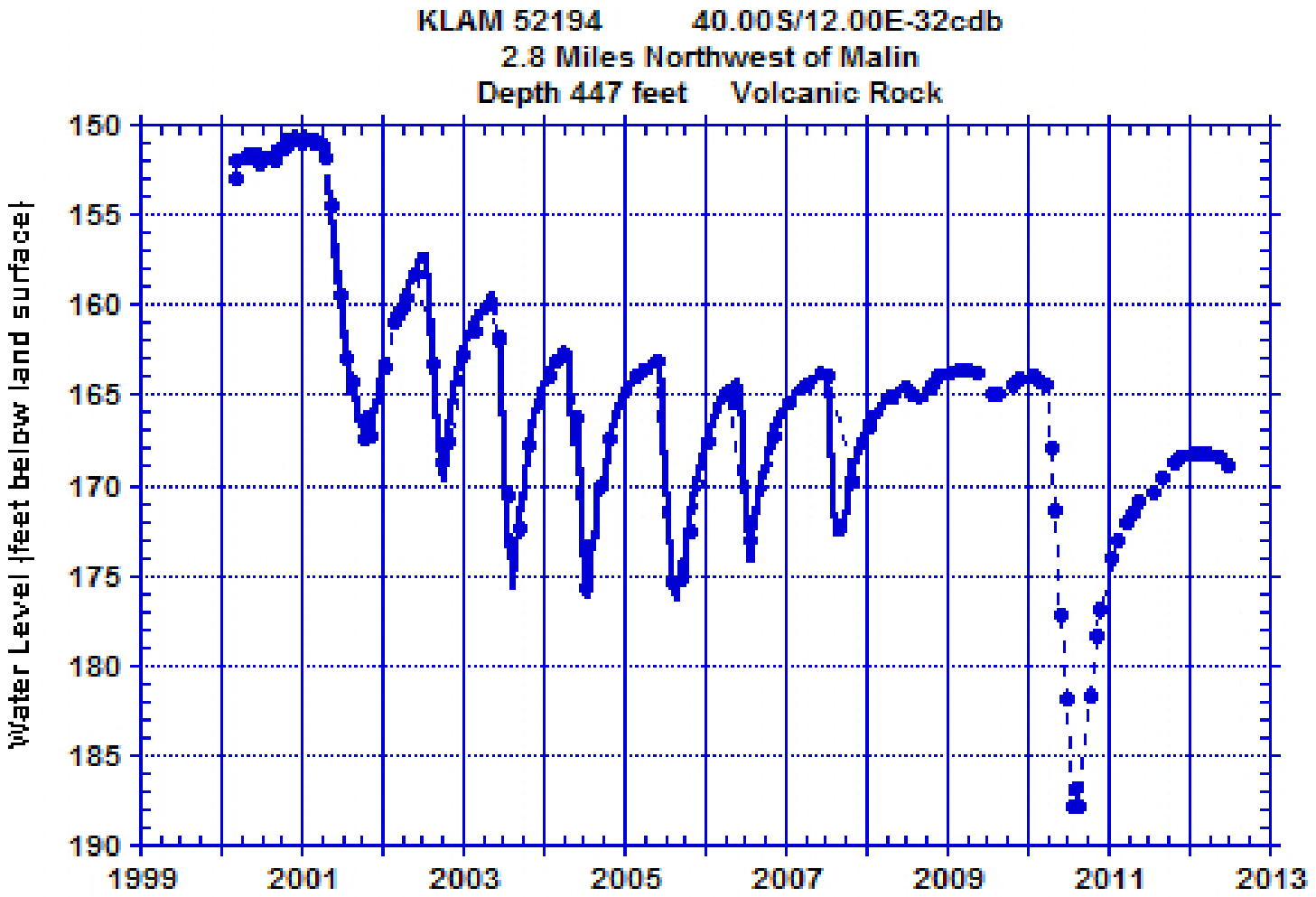

Pumping Rate
Change in Discharge to Streams
CUBIC FEET PER SECOND
-12
-10
-8
-6
-4
-2
0
0
5
10
15
20
25
YEARS


Drains
ET
GHB
Lakes
CUBIC FEET PER SECOND
-0.050
-0.045
-0.040
-0.035
-0.030
-0.025
-0.020
-0.015
-0.010
-0.005
0.000
0
5
10
15
20
25
YEARS


Explanation
Drawdown in Layer 3
Change in GW Discharge
Cubic Feet per Second per Cell
-0.0001
-0.0002
-0.0004 - -0.0003
-0.0008 - -0.0005
-0.0027 - -0.0009
-0.0046 - -0.0028
0
0 5 10 20 Miles


Pumping Rate
Change in Discharge to Streams
CUBIC FEET PER SECOND
-12
-10
-8
-6
-4
-2
0
2
0
5
10
15
20
25
YEARS


Drains
GHB
Lakes
Pumping
ET
CUBIC FEET PER SECOND
-12
-10
-8
-6
-4
-2
0
2
0
5
10
15
20
25
YEARS


KLAM 52194 40.00S/12.00E-32cdb
2.8 Miles Northwest of Malin
Depth 447 feet Volcanic Rock
Water Level (feet below land surface)
150
155
160
165
170
175
180
185
190
1999
2001
2003
2005
2007
2009
2011
2013

Report Conclusions

- Aquifer water levels controlled by climate and pumping
- Impacts to surface water in the basin varies with pumping location
- Project area GW use results in diminished discharge to agricultural drains
- Recent results suggest that 40,000 – 50,000 acre-feet could be pumped intermittently during project shortages

What's next…

- Model simulations to evaluate water management strategies
- USGS is continuing optimization simulations for KWAPA
- Water level and water use monitoring will help validate basin response to climate and pumping
- Stay engaged with local water users to help with water management strategies

The Hydrology and Model reports are available online at:

- http://pubs.water.usgs.gov/sir20075050
- http://pubs.usgs.gov/sir/2012/5062