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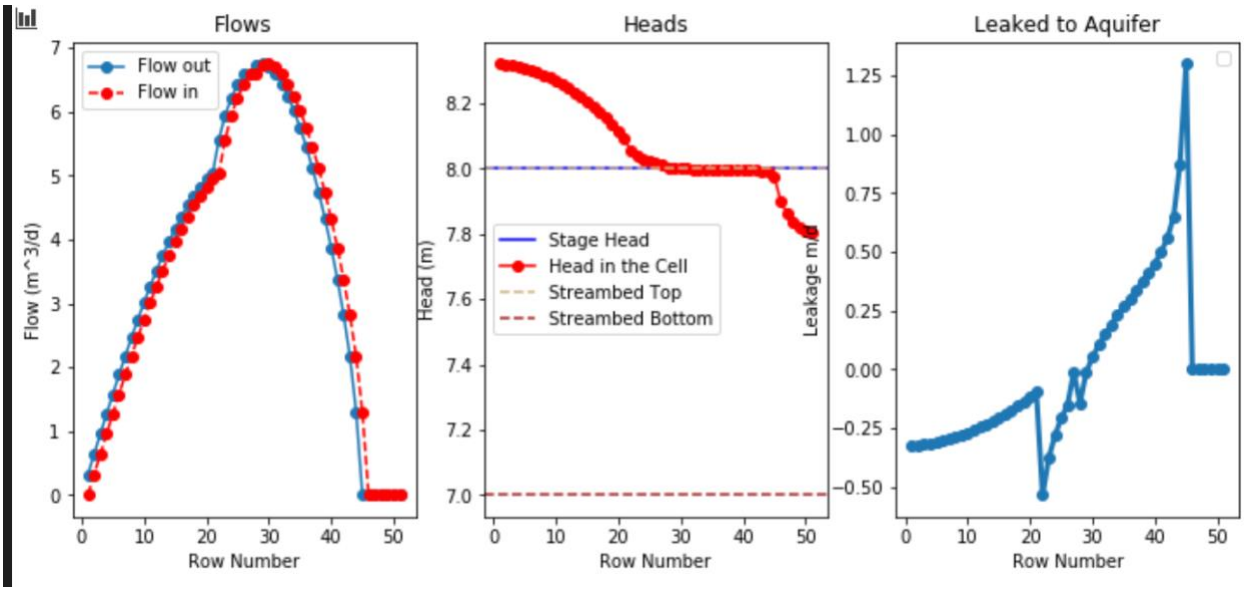
HWRS 482

April 5, 2021

Challenge

a) Use these figures to describe the nature (direction/magnitude) of stream/aquifer exchange along the stream. In particular, explain why the leakage changes magnitude or direction where these values change.

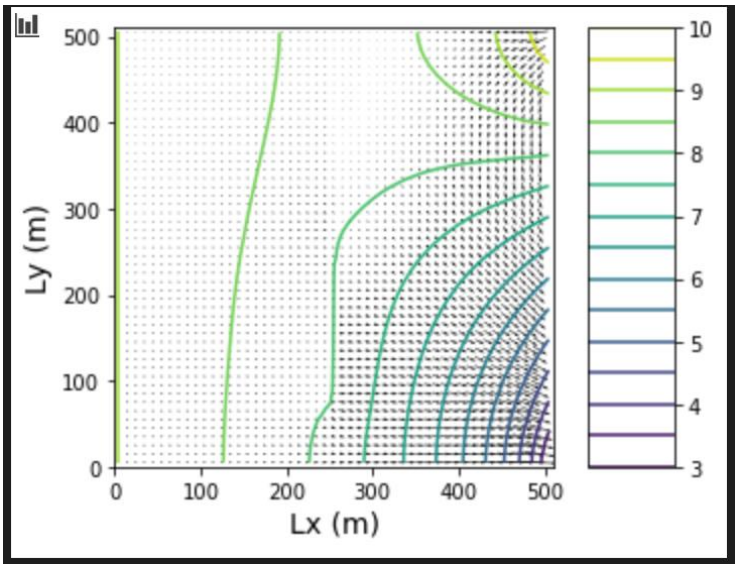
The ‘flows’ graph indicates gaining and declining of the river showing a zero or below zero flow at a row number around 45. From row numbers 10-30 there is a positive slope and then from 30-45 it is a negative slope and shows the flow of the river is declining but the head is still above the streambed. Using the ‘heads’ figure, when the head is above the streambed top, the river is gaining and when it goes below that line, the river is losing water. Using the ‘leaked to aquifer’ graph, it shows that from 0-20, the values are mostly negative so the river is gaining from the aquifer and then goes positive indicating that the flow and head decreases which is because the water from the river is leaking to the aquifer.



b) Use the head distribution to describe the movement of water across the boundaries and into/out of the stream.

Looking at the graph below, it shows that barely any water is coming from the left boundary and almost all of it is coming from the right boundary. The graph shows that lower right corner has

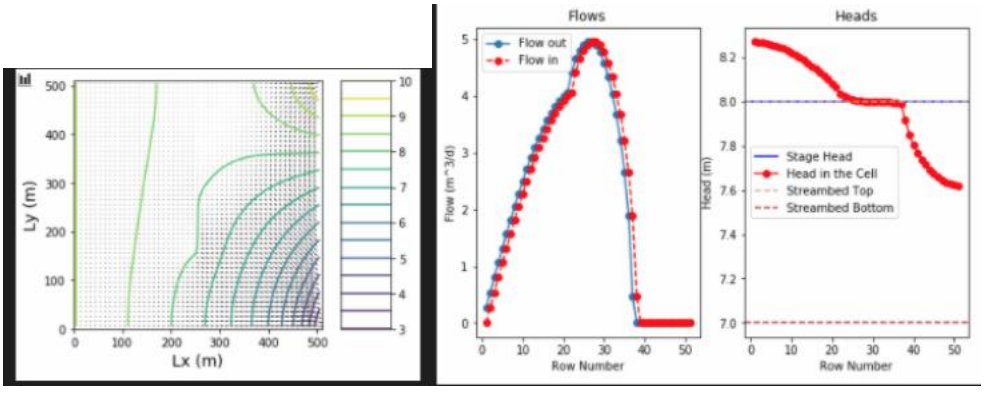
less flow than the upper right corner. The left boundary is interesting because it seems that it is at a constant flow? (not quite sure what is happening on the left side)



c) Choose two things to explore (e.g. impact of streambed K or inflow into the river or recharge rate). Produce a plot for each to compare to the base plots and use the plots to explain the impact of the hydrologic change.

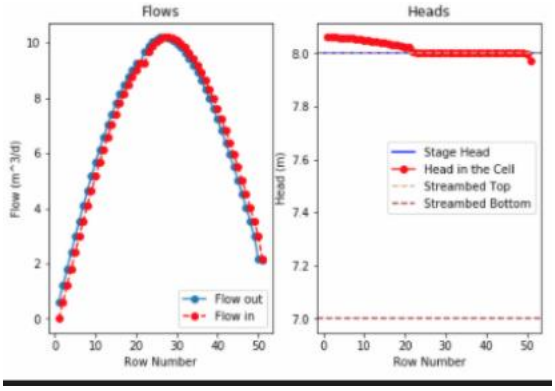
Change 1: increase recharge rate (changed to 1e-5 m/day)

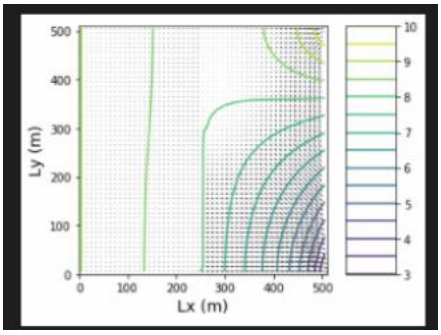
With this change, the flow becomes steeper in the negative direction and the head also drops lower than when the recharge is smaller.



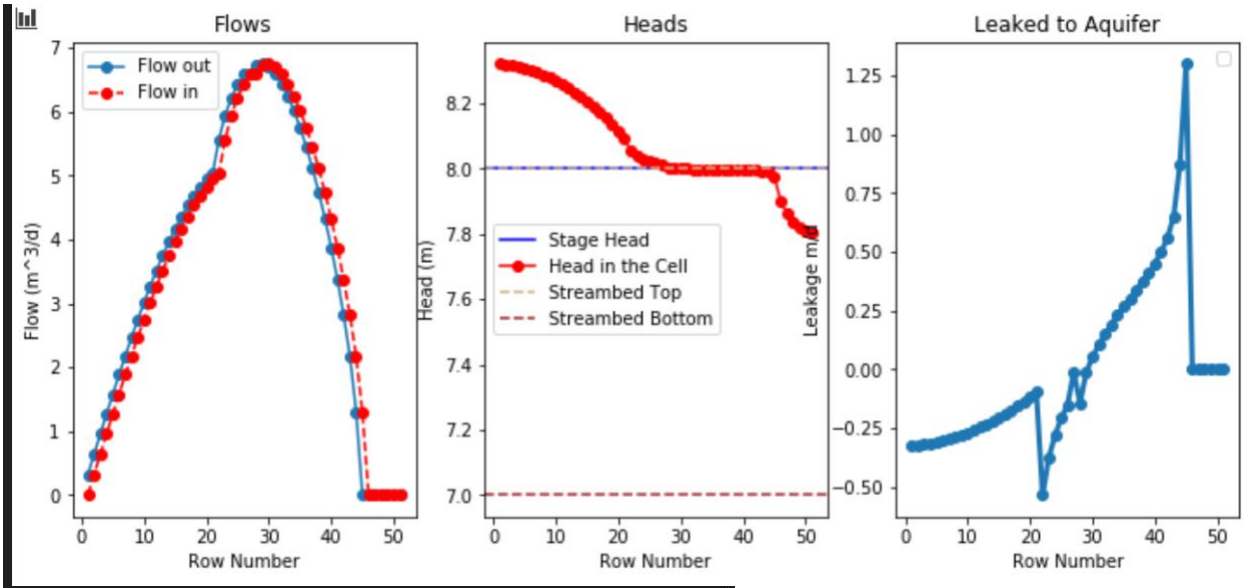
Change 2: K of stream bottom (changed to 10)

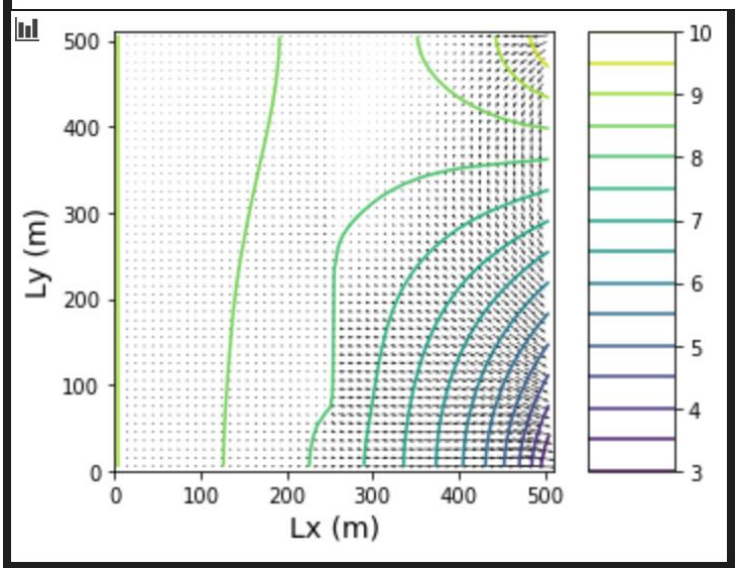
With a larger hydraulic conductivity value, the flow graph has a more even curve than when the K value was 1 and the head values fluctuate way less than the original graphs. Since the K value is greater, it is easier for water to flow so there is less effort for water to move through the streambed.





Original Figures:


Flows
Flow out
Flow in
Flow (m^3/d)
Row Number
Heads
Stage Head
Head in the Cell
Streambed Top
Streambed Bottom
Head (m)
Row Number
Leaked to Aquifer
Row Number


Ly (m)
Lx (m)