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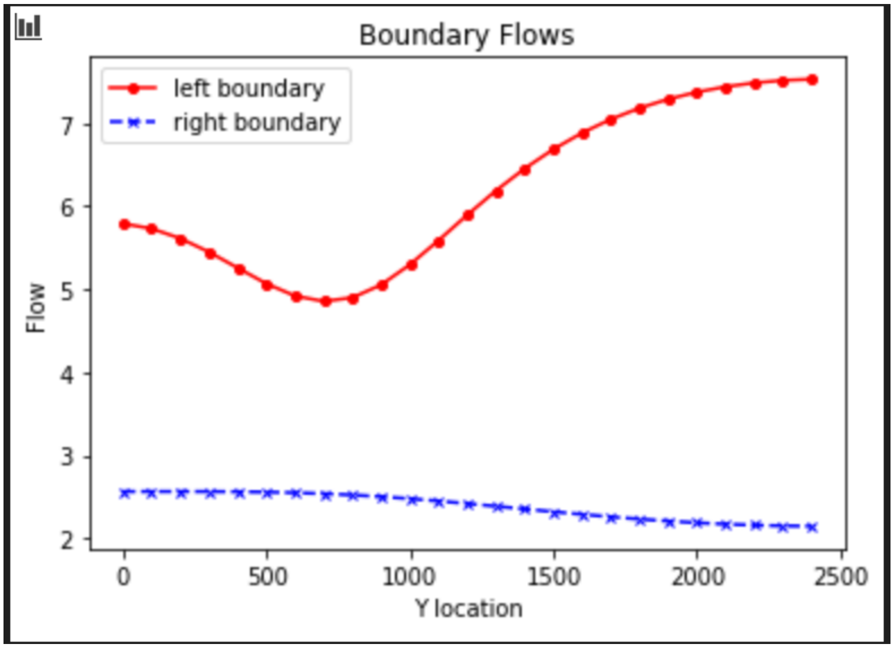
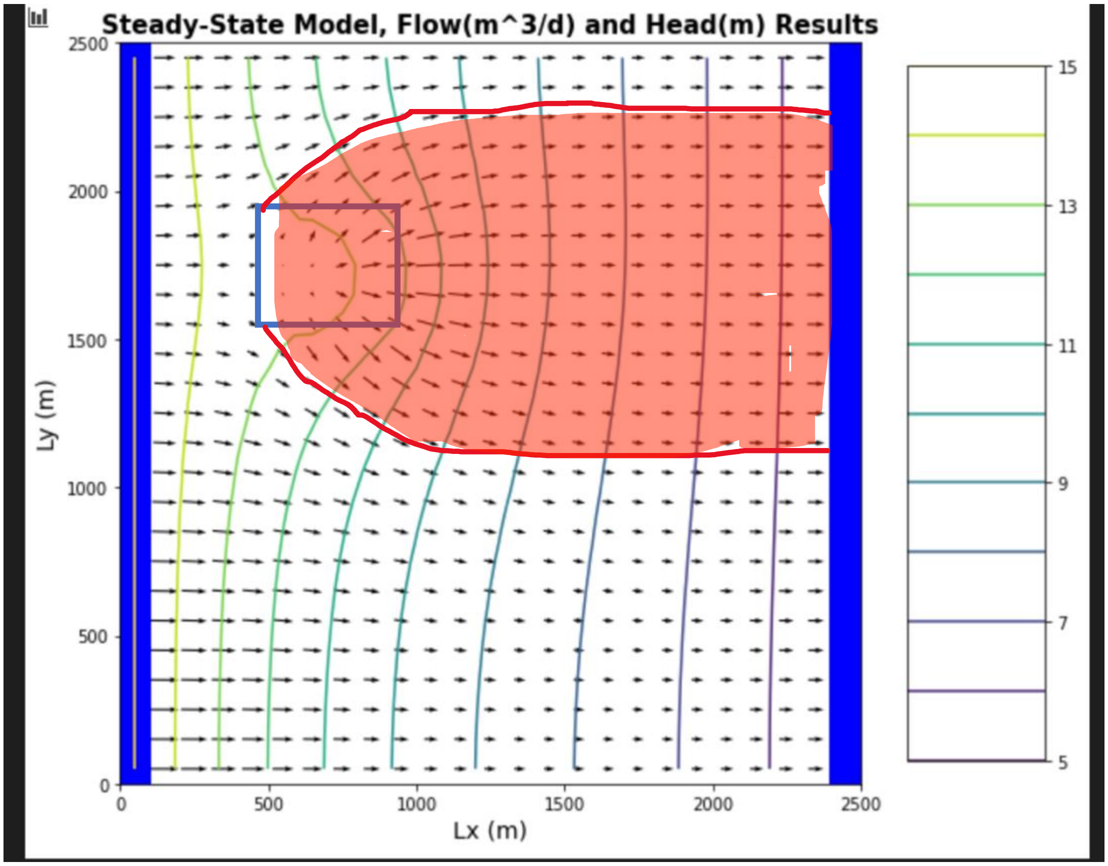
HWRS 482

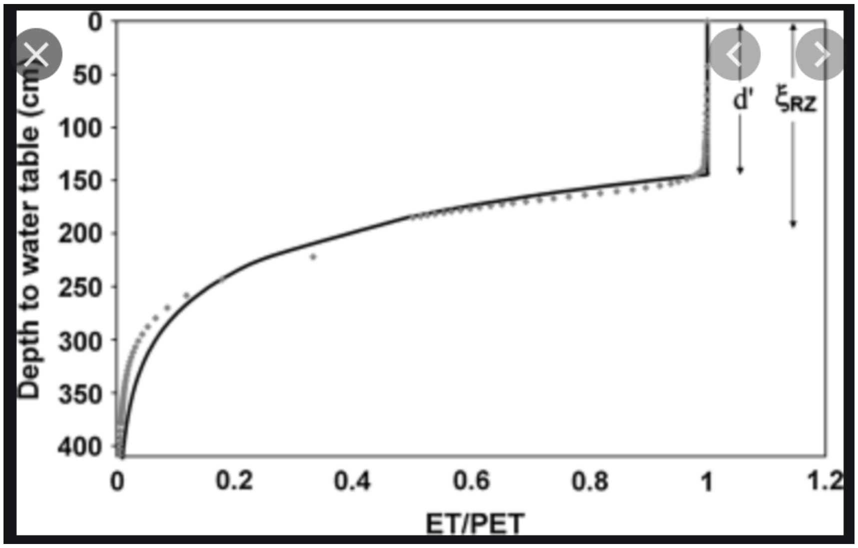
February 22, 2021

The Challenge

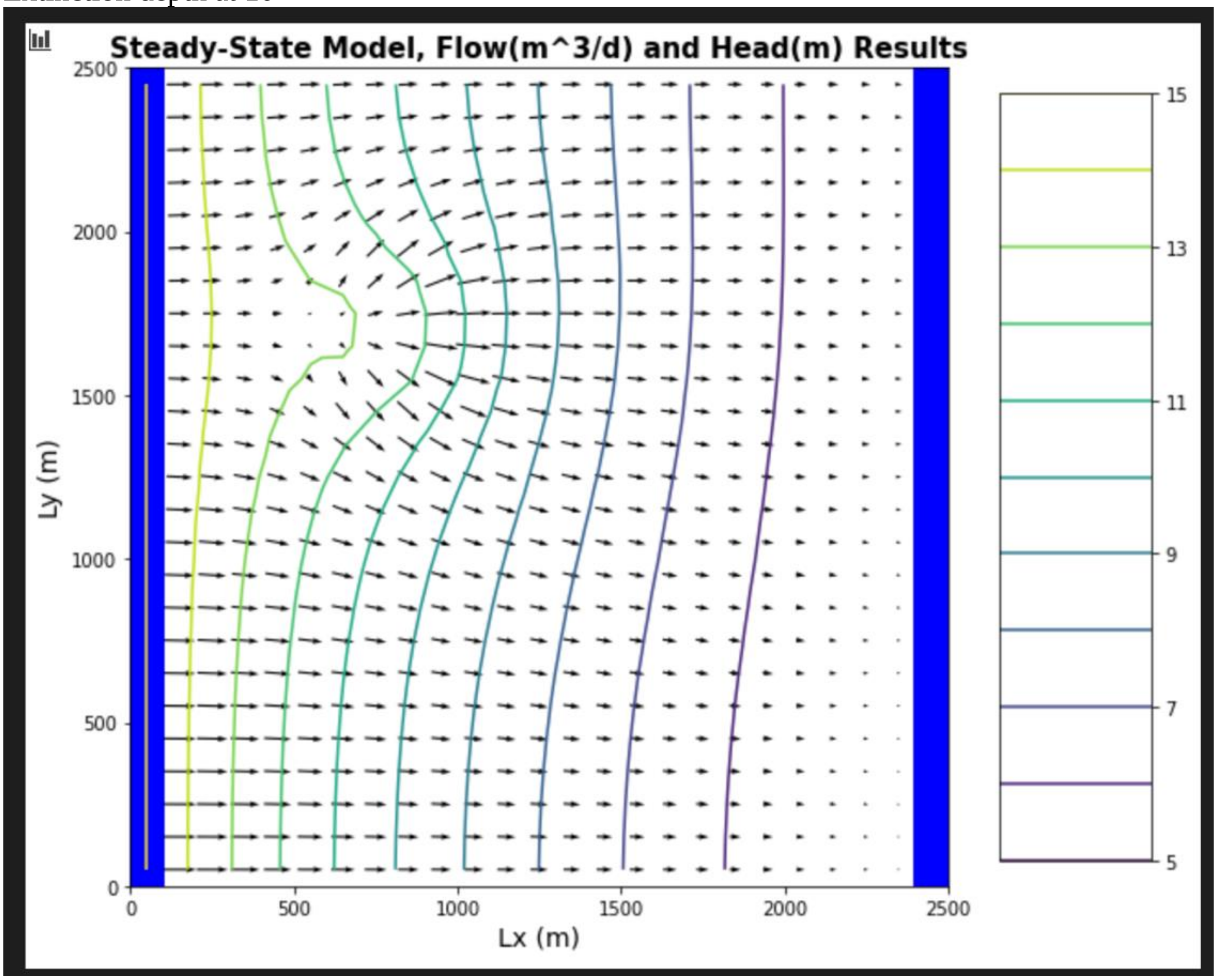




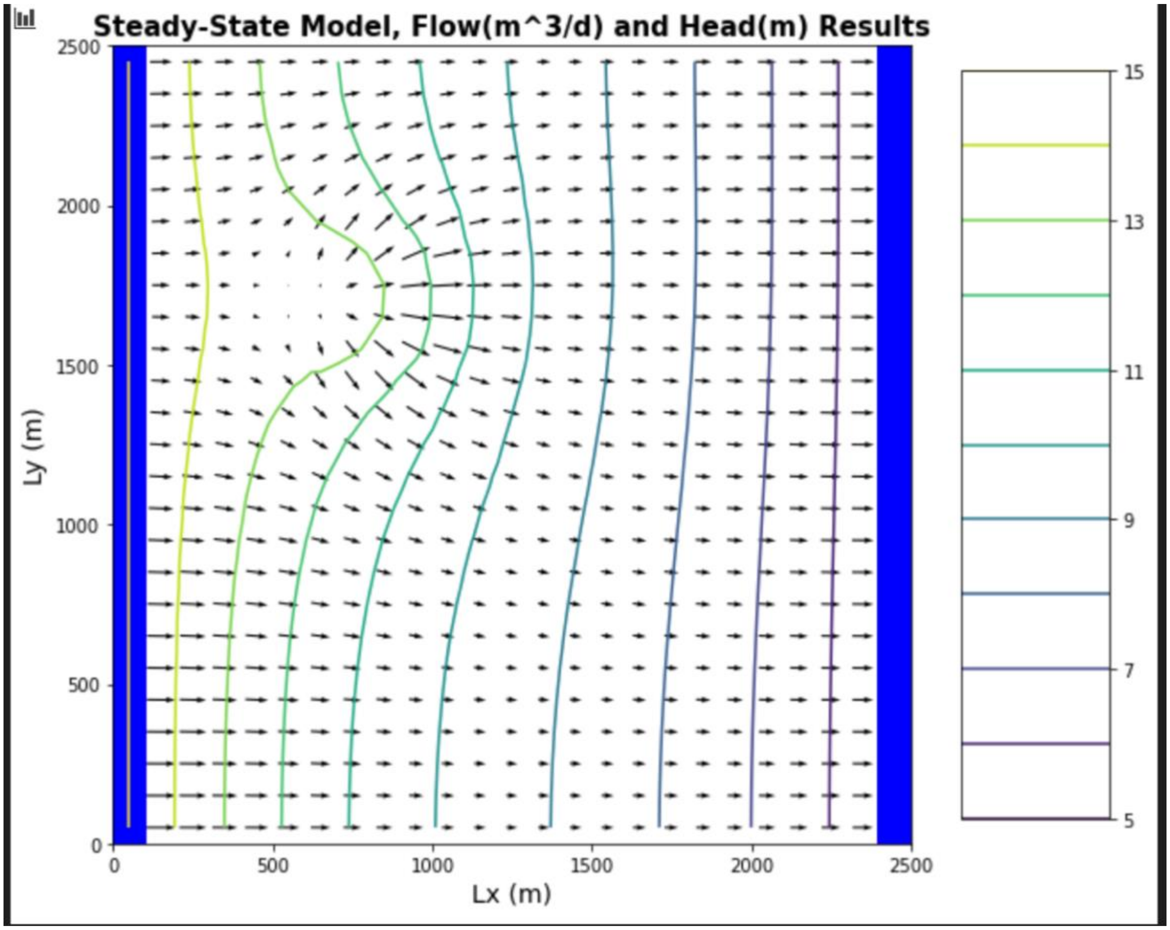
1. Extinction Depth is the depth to which the roots of plants extend below land surface. The larger the extinction depth, the smaller the area of recharge is, and for a smaller extinction depth, the area gets larger, which can be shown by the image captures below of the flow and head graphs. So, when the extinction depth is larger, the recharge is smaller because the roots are reaching further down in the ground. Also, from the boundary flow graph, we can see that there is more of a drop in recharge coming from the left boundary where the localized area is. (me)



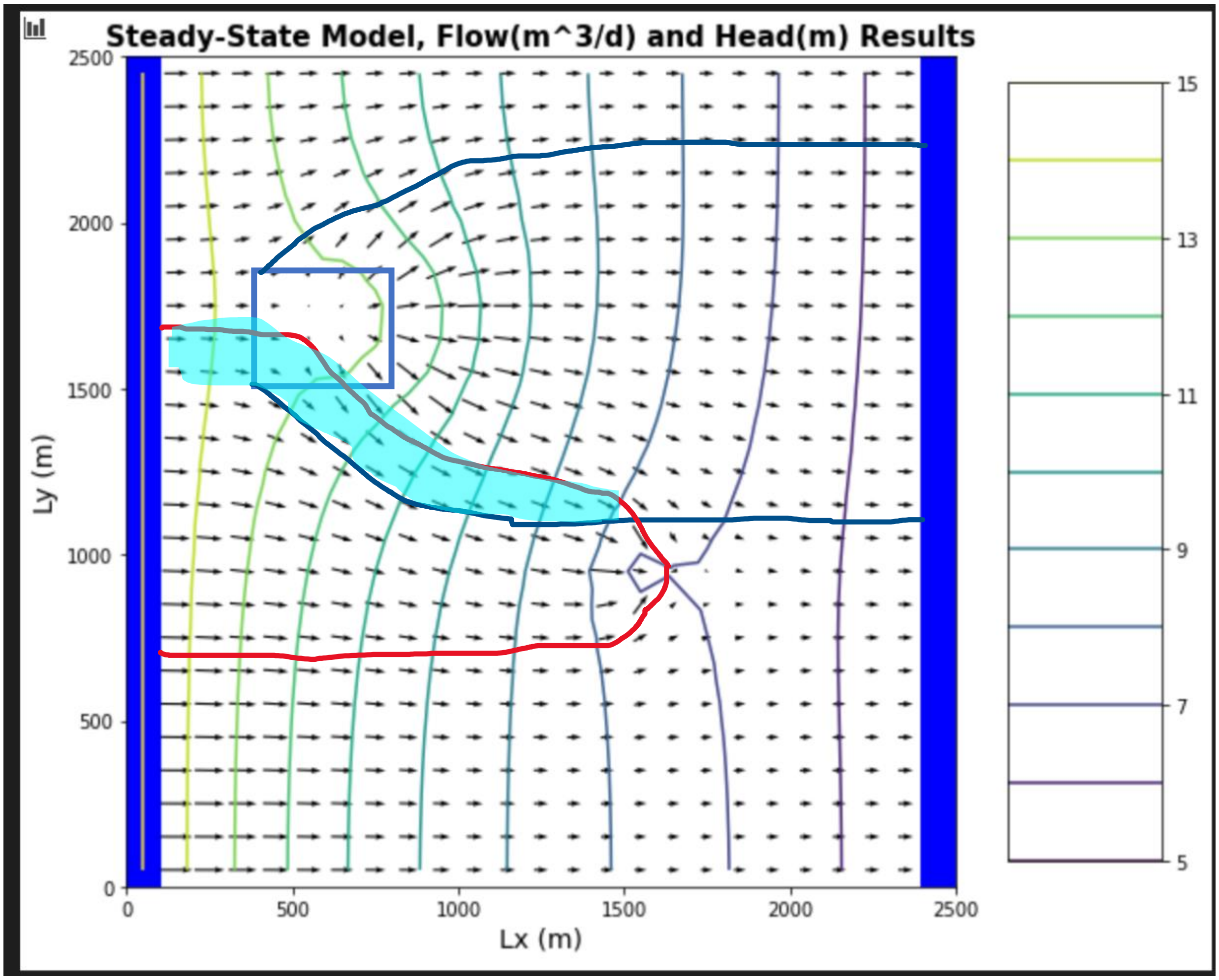
Extinction depth at 10

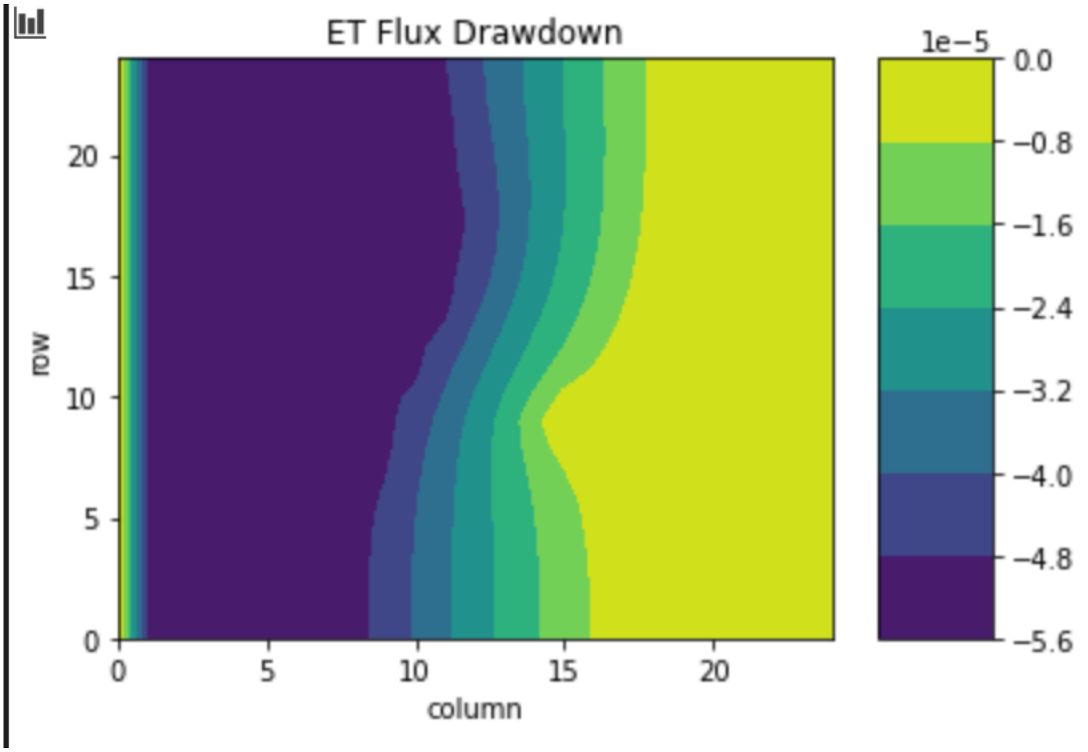


Extinction depth at 1→ at 0 modflow does not run



2. MODFLOW represents ET by the extinction value. MODFLOW demonstrates the ET as an array and adds the ET zone with the background ET, where it assigns an ET value for the ET zone. MODFLOW treats the ET as less recharge and reducing the inputs. My understanding of ET in the real world is that water is evaporated from soil and by transpiration of plants that get transferred to the atmosphere. And below the surface, ET can happen through the plant roots. Root depth and distribution vary from plant to plant and therefore can have different ET values. (Danielle)


Steady-State Model, Flow(m^3/d) and Head(m) Results
Ly (m)
Lx (m)
0
500
1000
1500
2000
2500
15
13
11
9
7
5



3. When the pumping of the well is added, the zone effected by recharge would change. The well could be acting as extinction depth, which would be close to the extinction depth at 10 above, which means that the recharge would be decreased. Potentially, the area round the well would have less ET because the water table decreases exponentially toward the cone of depression. The effects of capture by the well would be decreased because of the ET.

   Qin=Qout

   In:

   Recharge=5e-4 m/day(flux)

   Out:

   ET=5e-5 m/day(flux?)

   Well=20 m^3/day (Q)

   (Jason)