DYNAMIC SURFACE WATER-GROUNDWATER INTERACTIONS AND NITROGEN CYCLING IN A TIDALLY INFLUENCED RIVER

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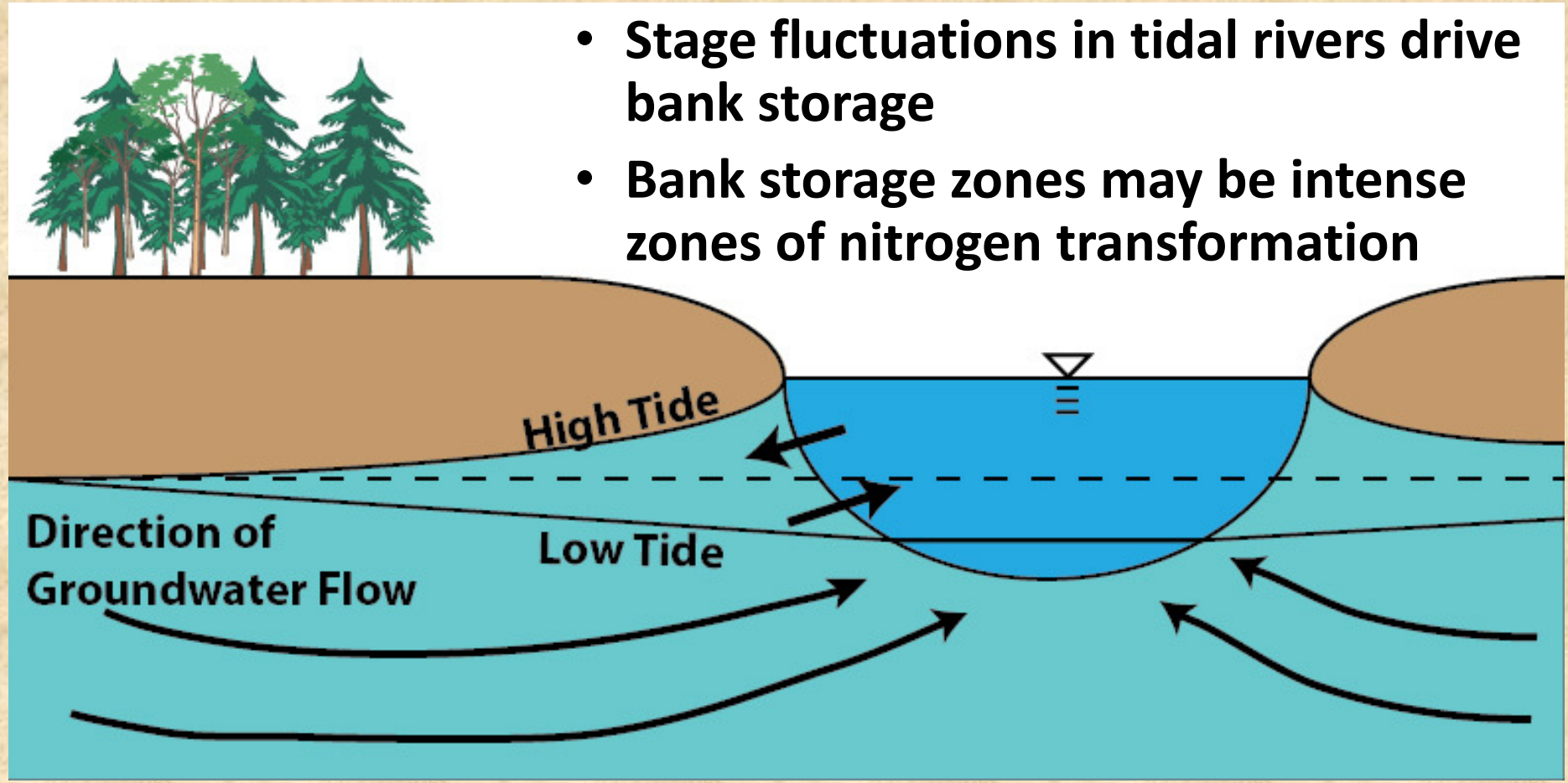
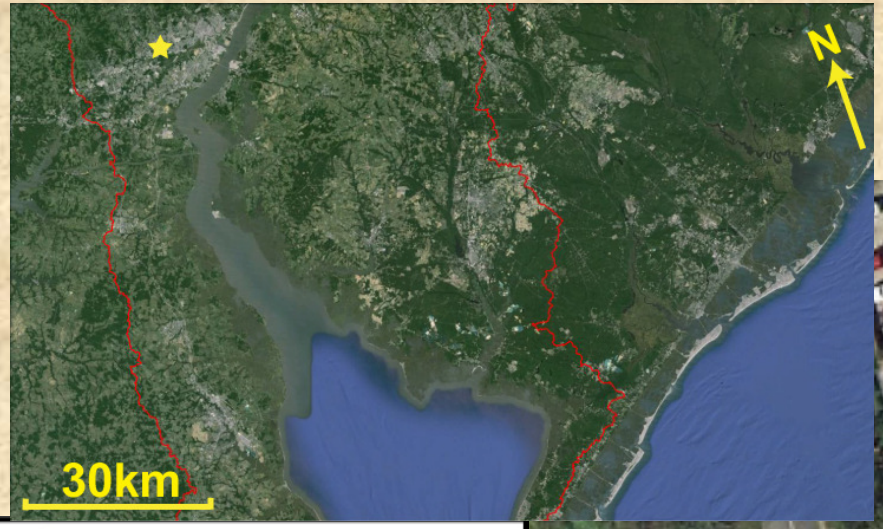
Conceptual Model

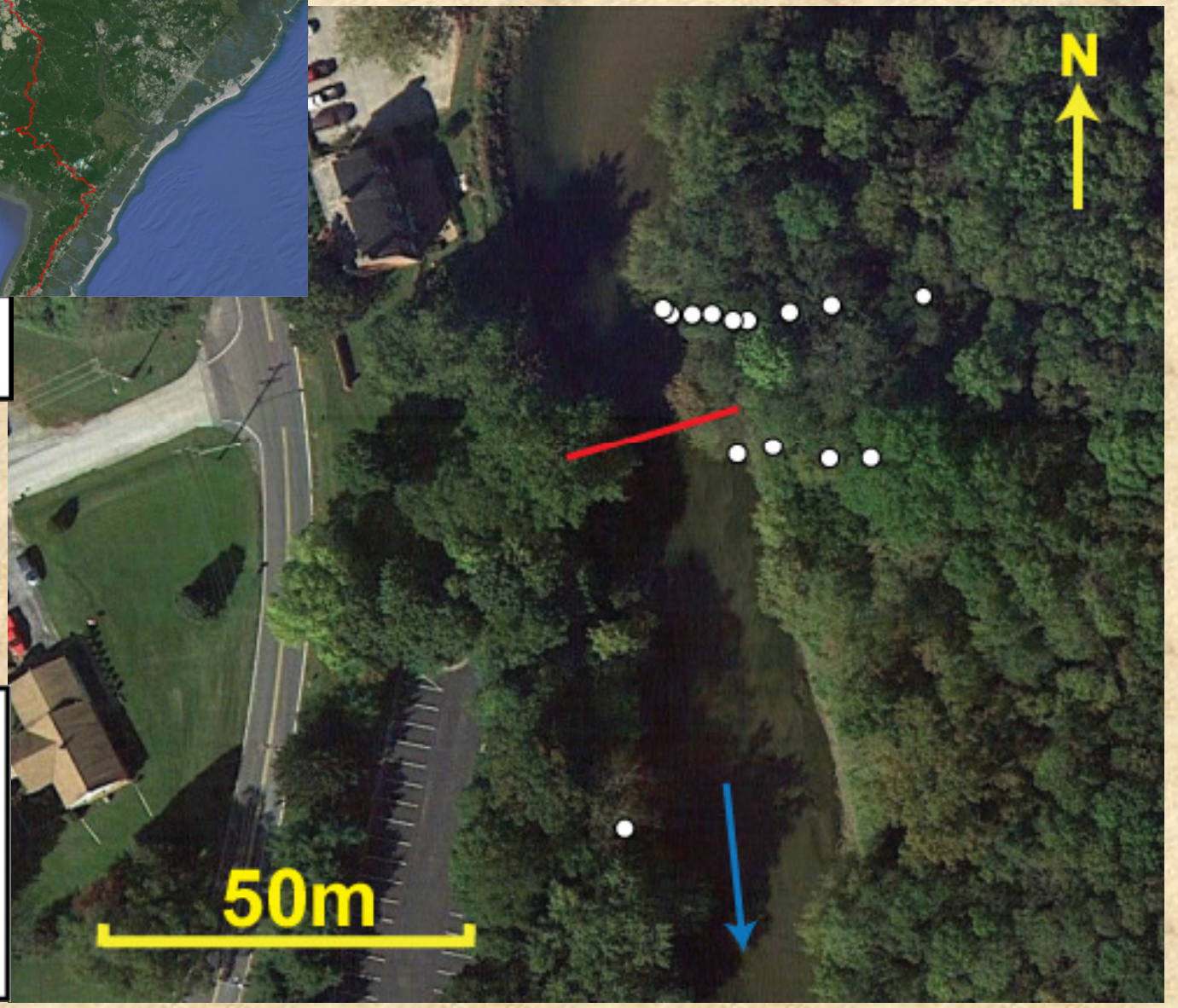
- **Stage fluctuations in tidal rivers drive bank storage**
- **Bank storage zones may be intense zones of nitrogen transformation**



Field Site

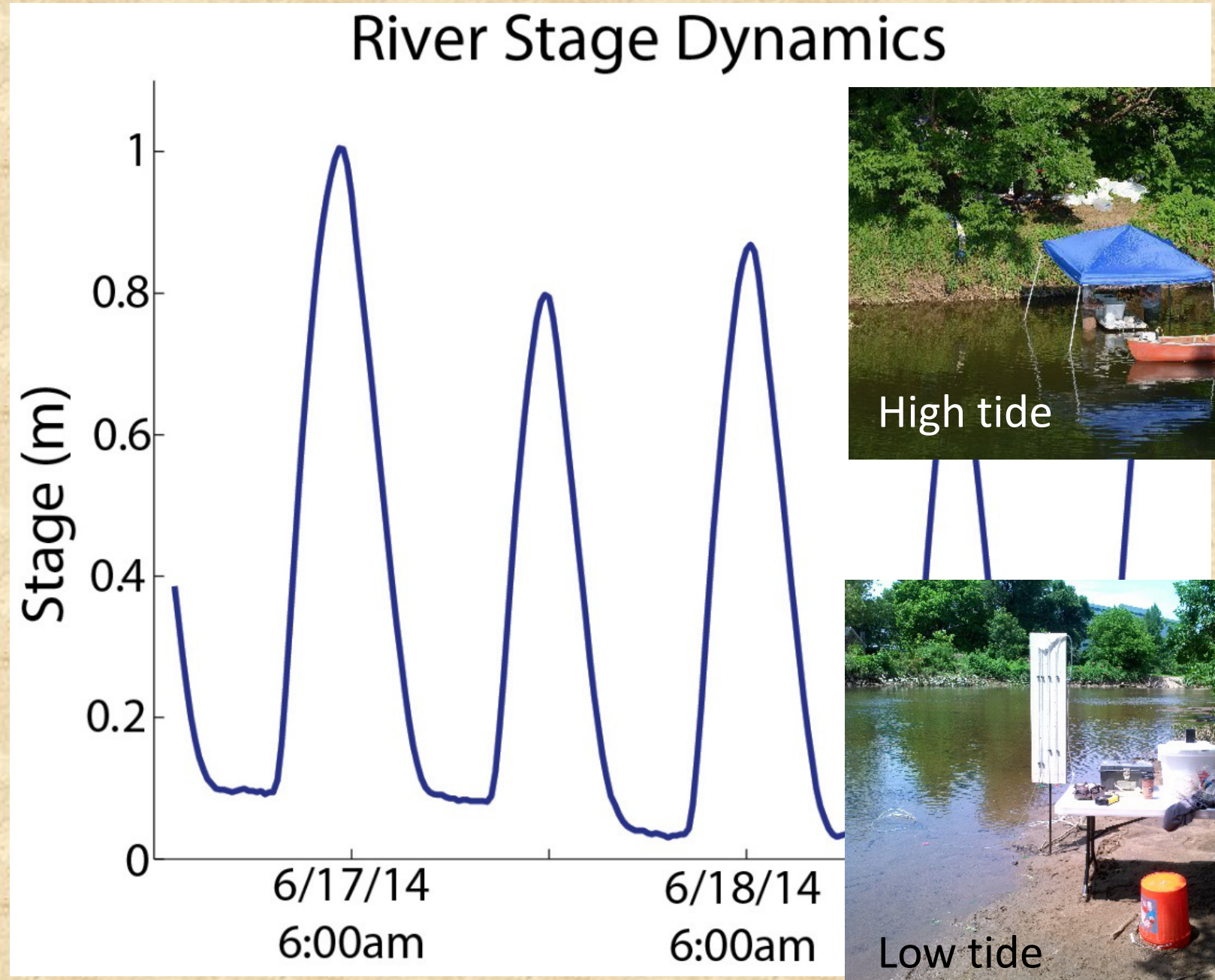


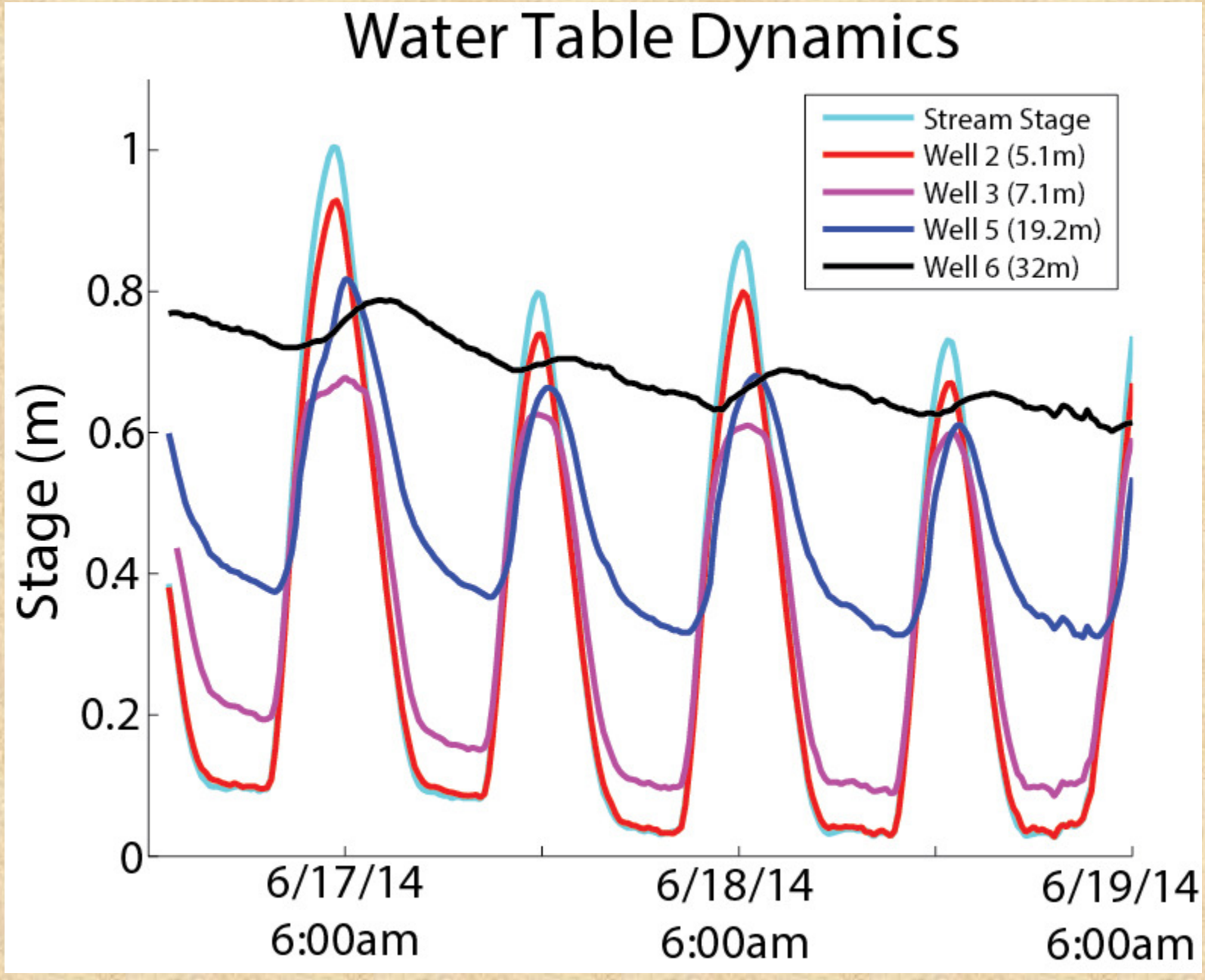
Field Site
Watershed Boundary



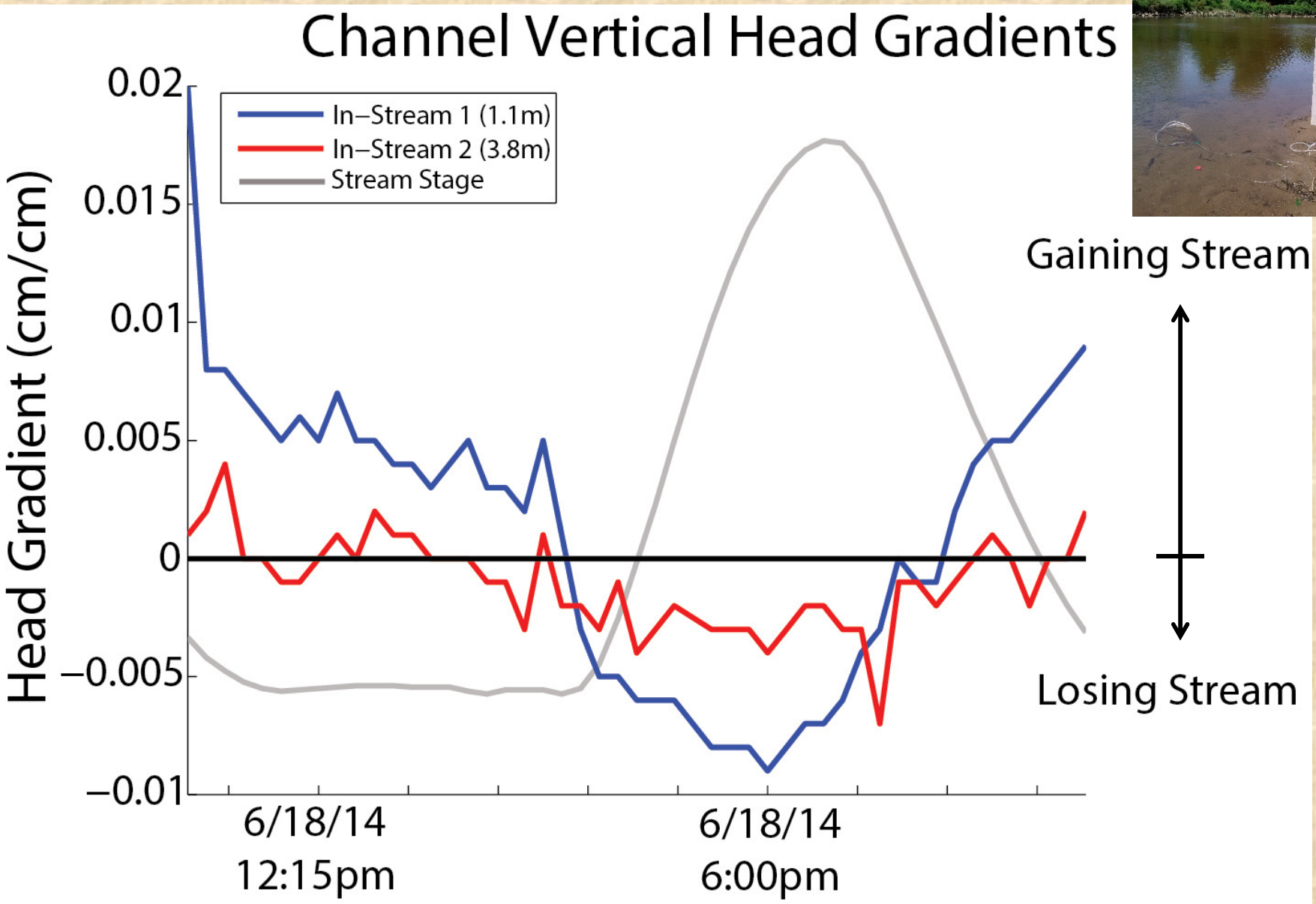
ADCP Transect
Direction of Stream Flow
Piezometer or Sampling Port

River Stage Dynamics

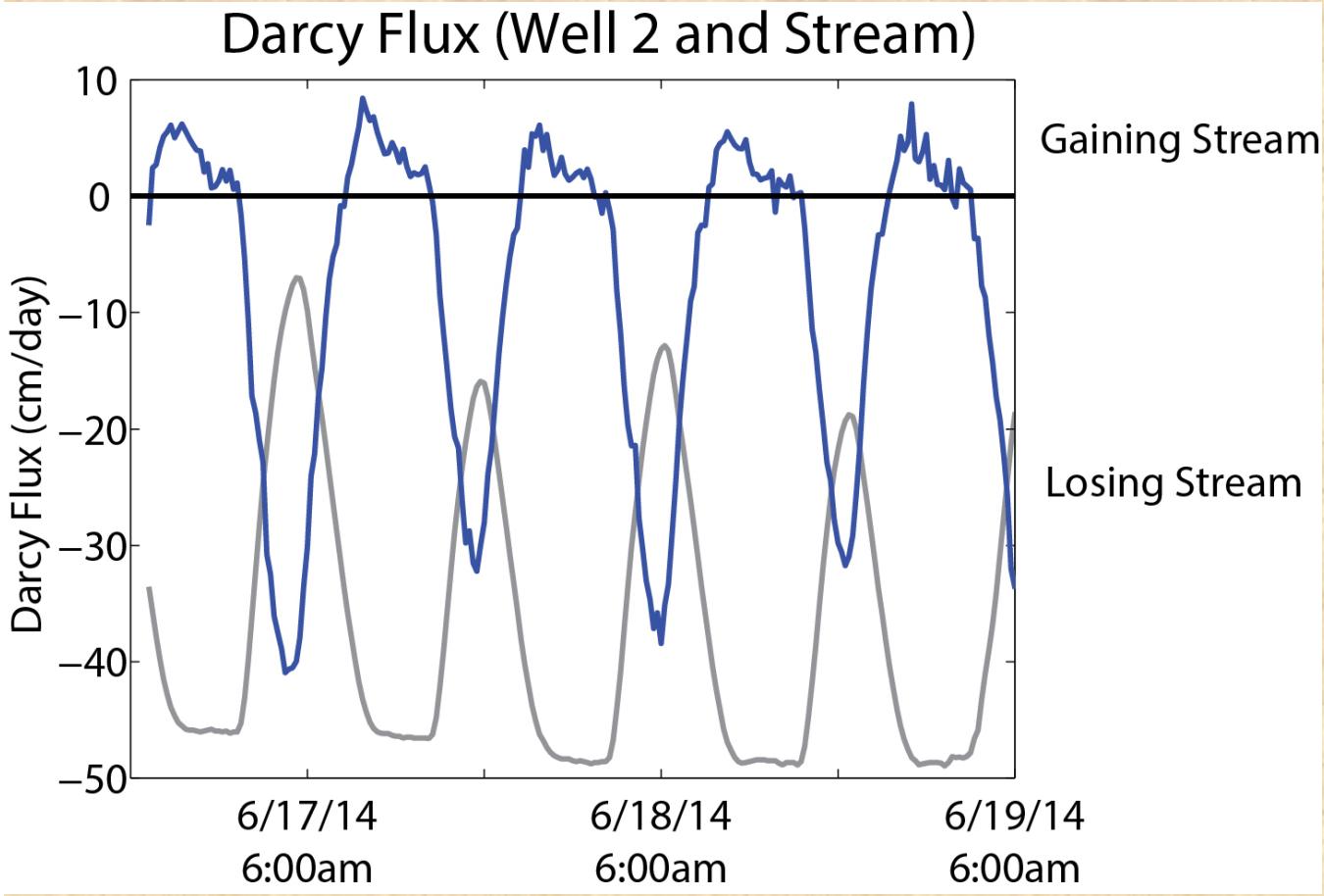



Water Table Dynamics
Stream Stage
Well 2 (5.1m)
Well 3 (7.1m)
Well 5 (19.2m)
Well 6 (32m)
Stage (m)
1
0.8
0.6
0.4
0.2
0
6/17/14
6:00am
6/18/14
6:00am
6/19/14
6:00am

Channel Vertical Head Gradients



Tidal Surface Water-Groundwater Exchange

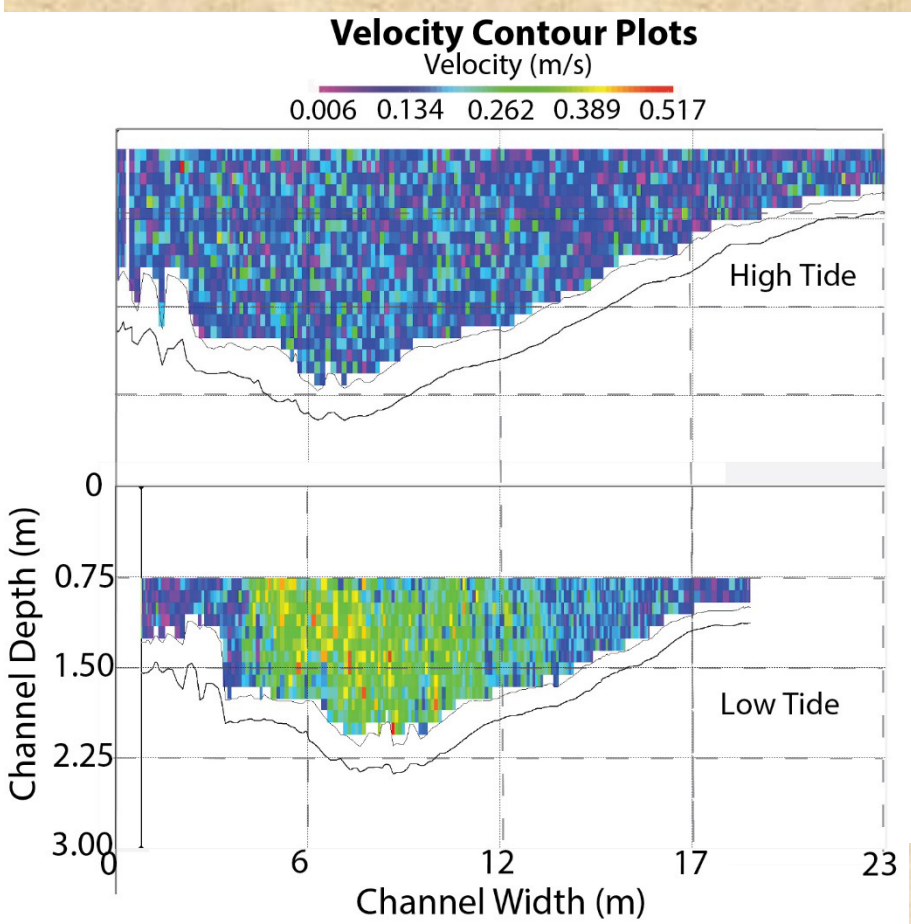


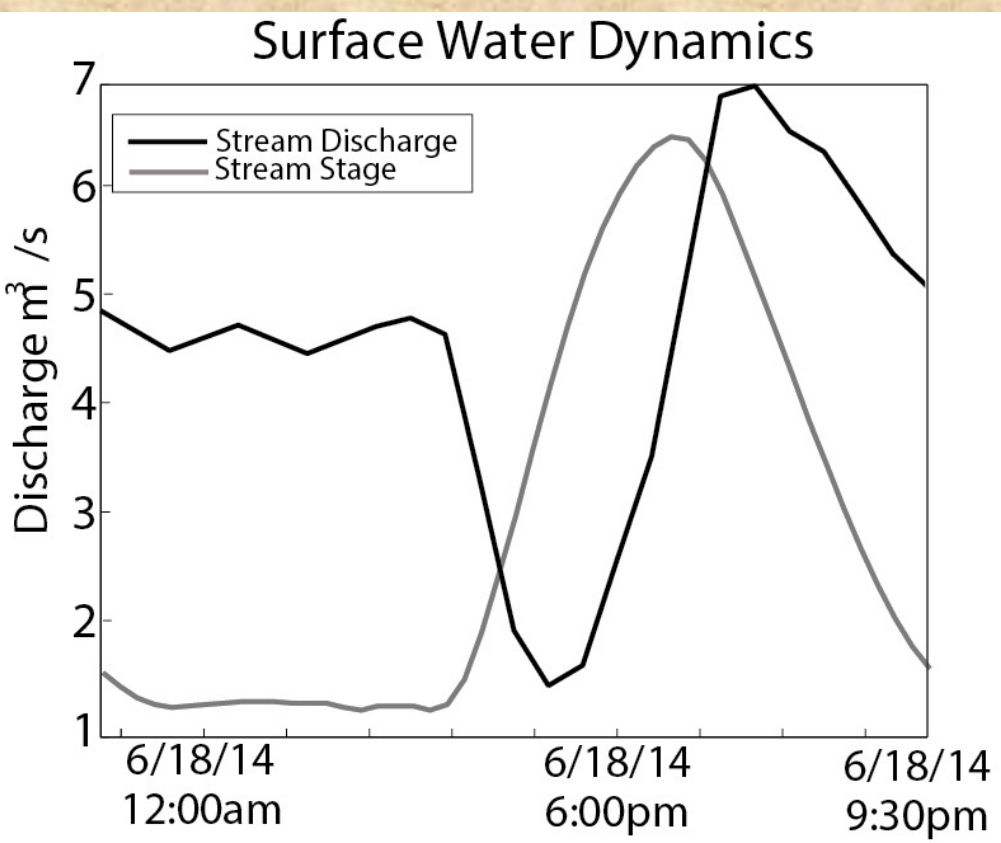
Average Tidal Exchange over 1 cycle = .02m^3

Percent of River Discharge = 0.4%

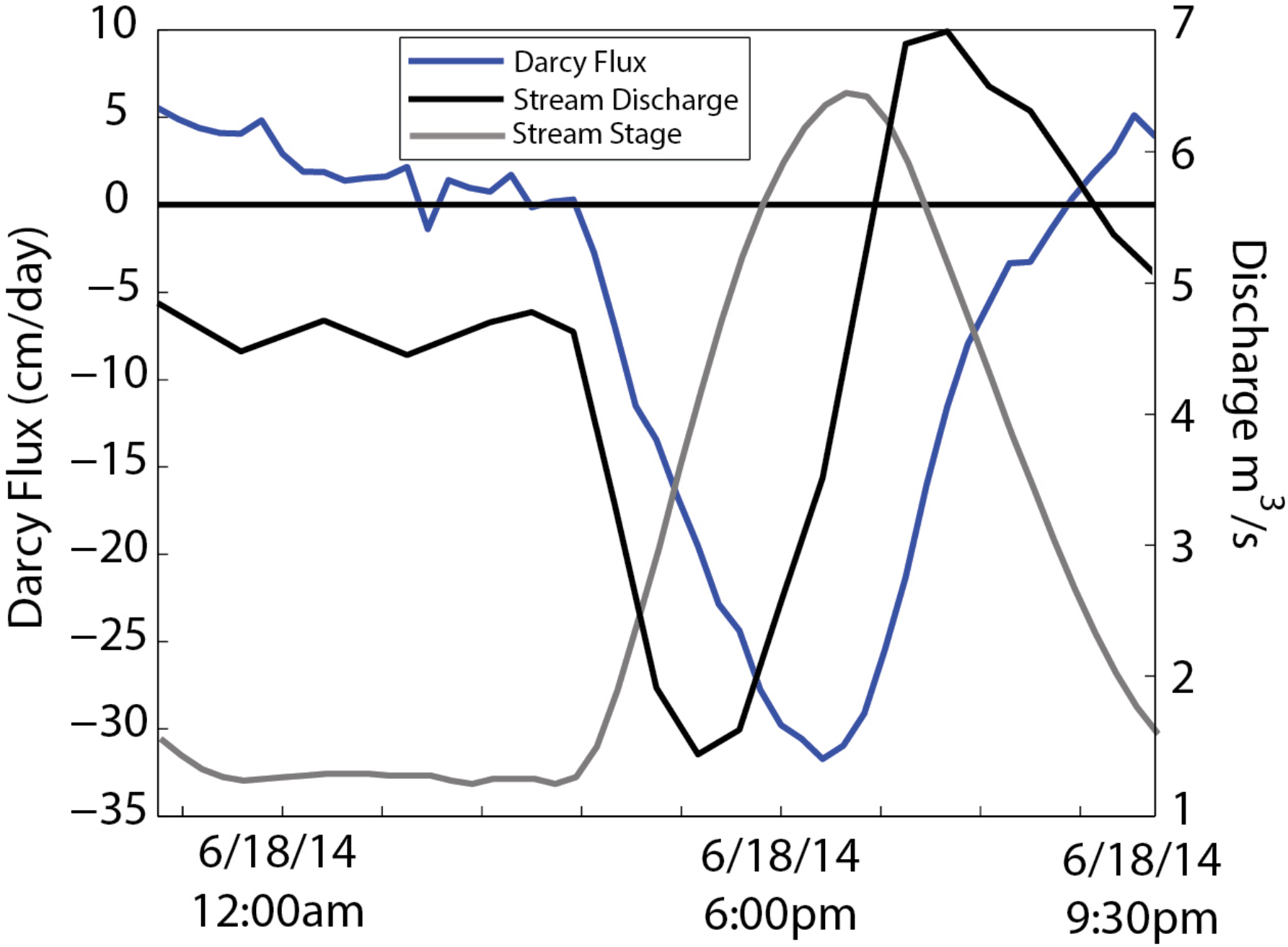
K = .000269m/s

River Discharge

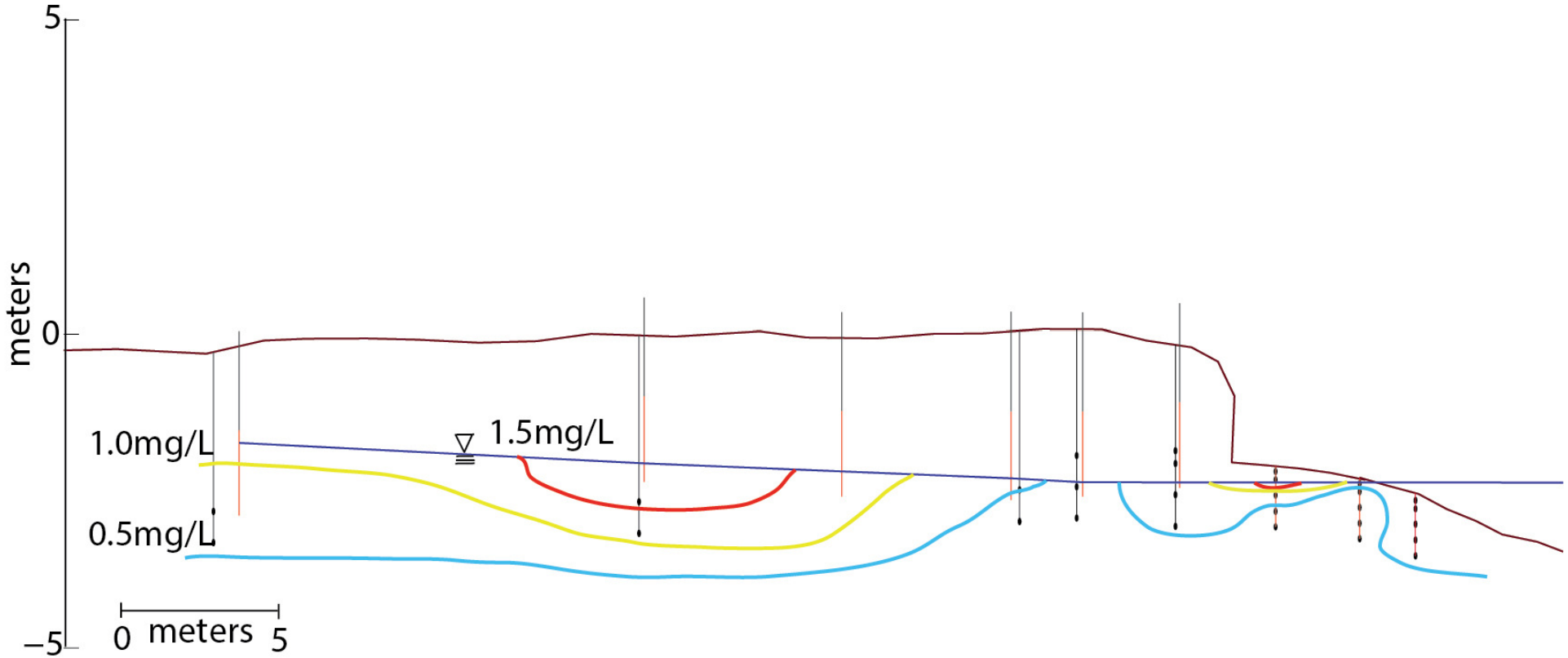




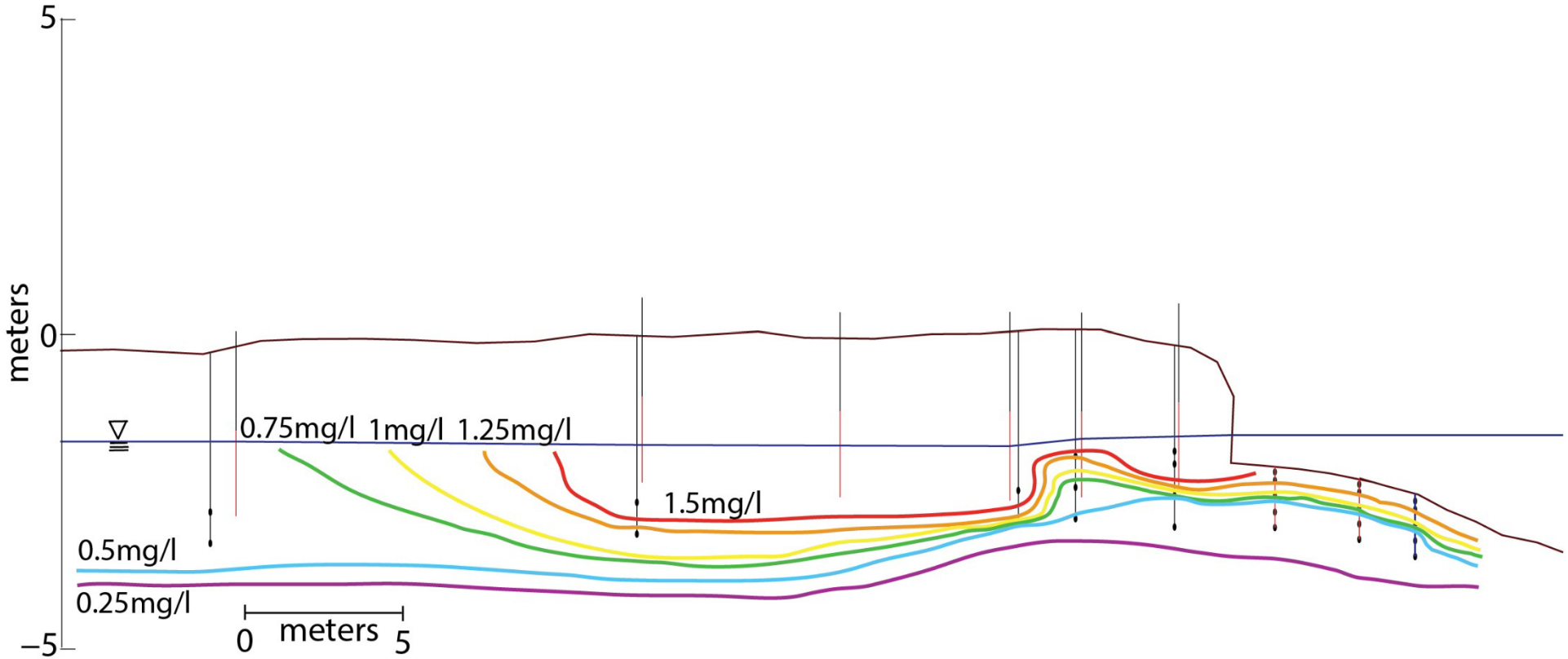
Surface Water- Groundwater Interactions



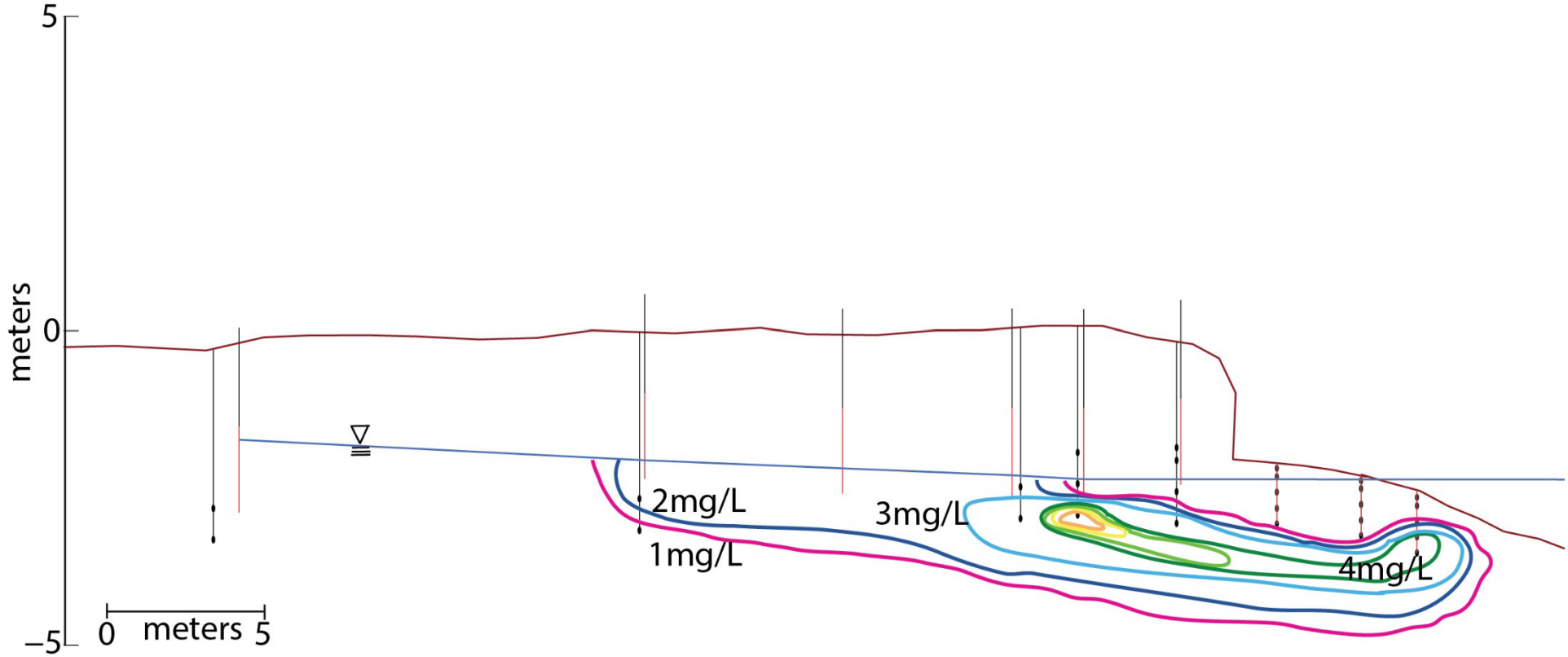
Low Tide DO



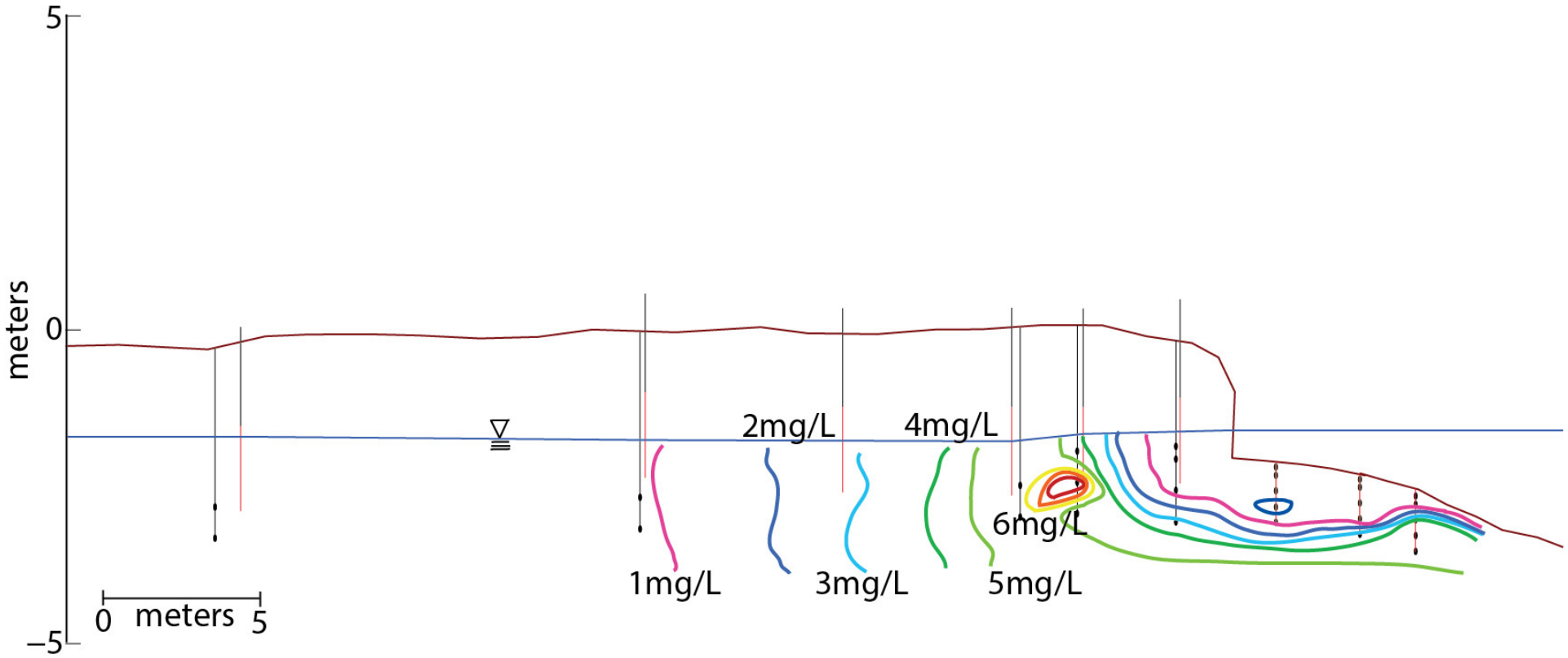
High Tide DO

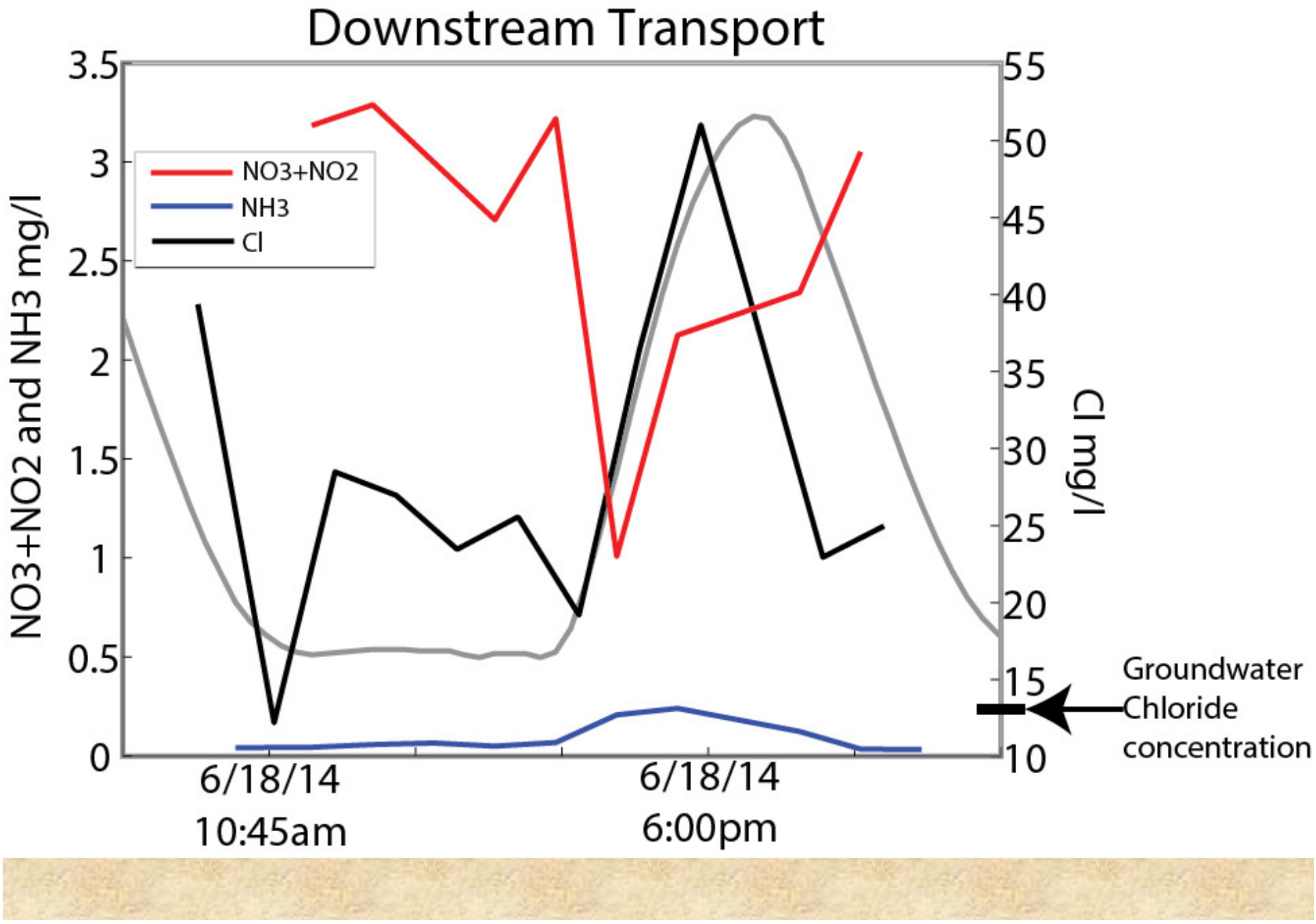


Low Tide NO3+NO2



High Tide NO3+NO2




Downstream Transport
NO3+NO2
NH3
Cl
NO3+NO2 and NH3 mg/l
Cl mg/l
3.5
3
2.5
2
1.5
1
0.5
0
55
50
45
40
35
30
25
20
15
10
6/18/14
10:45am
6/18/14
6:00pm
Groundwater
Chloride
concentration

Conclusions

- Low river discharge corresponds with reversals in surface water-groundwater exchange. Peak aquifer discharge is at times of intermediate stream discharge.
- Tidal rivers are dynamic environments for nutrient cycling
- DO and nitrate vary with tides near water table and streambed due to surface water-groundwater exchange

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