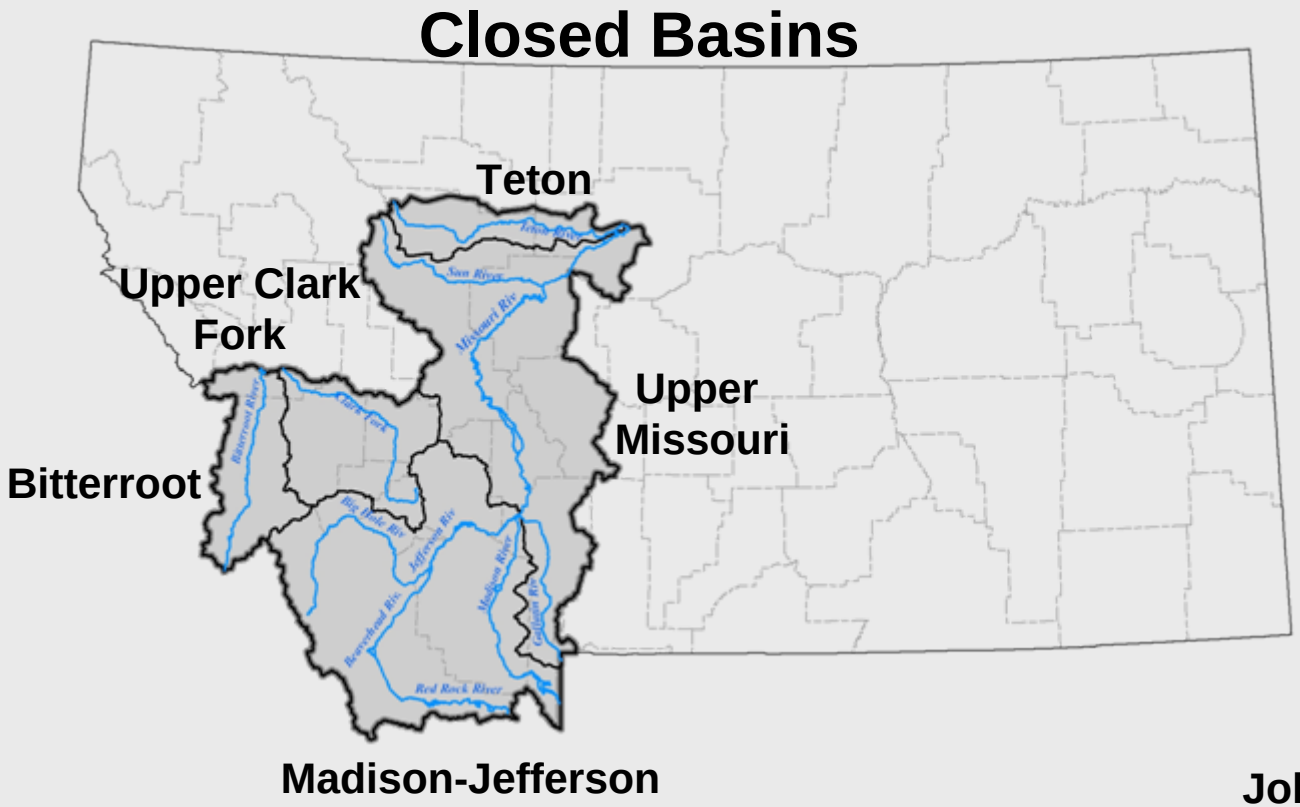
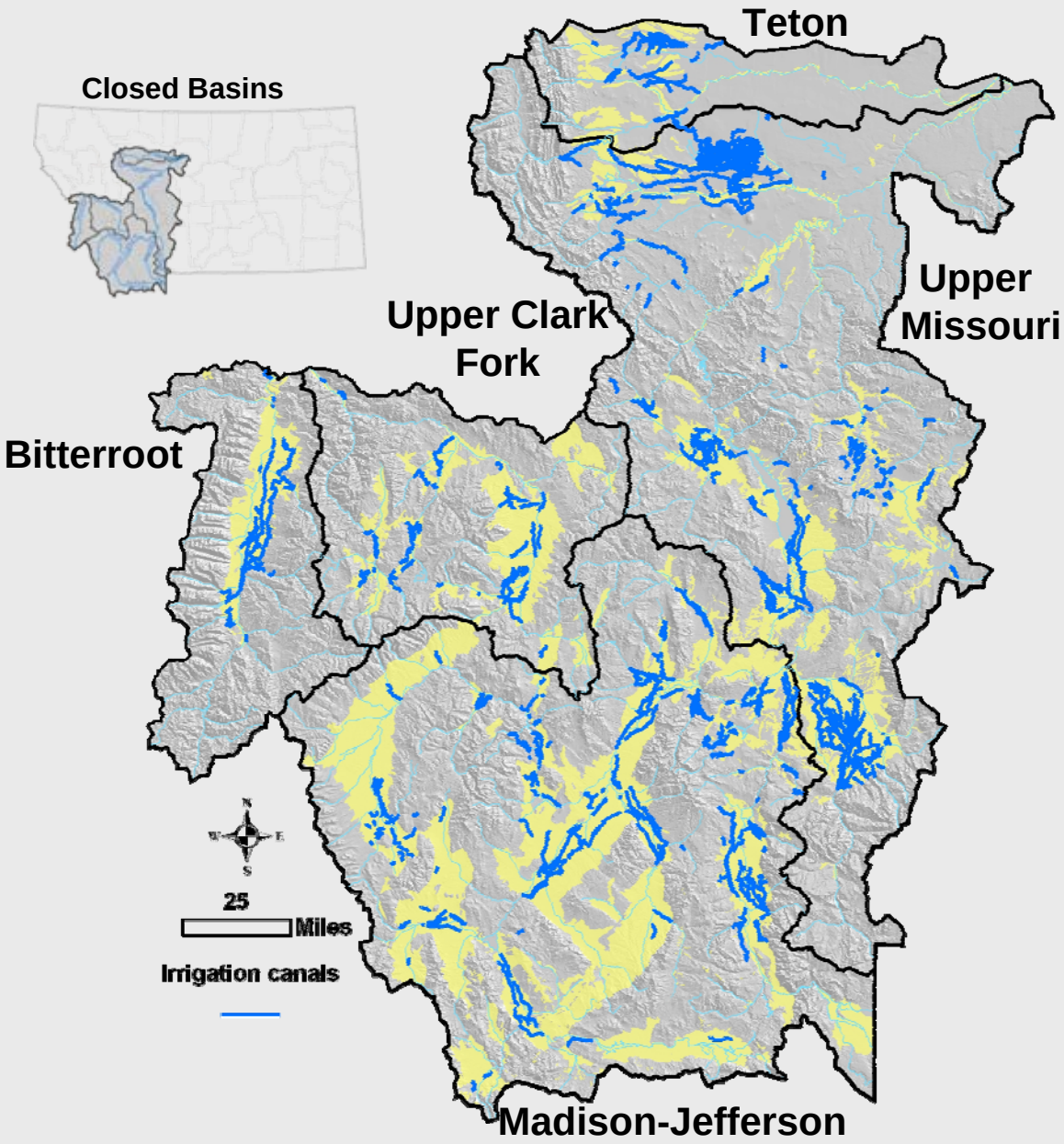
Irrigation loses from a ground-water point of view

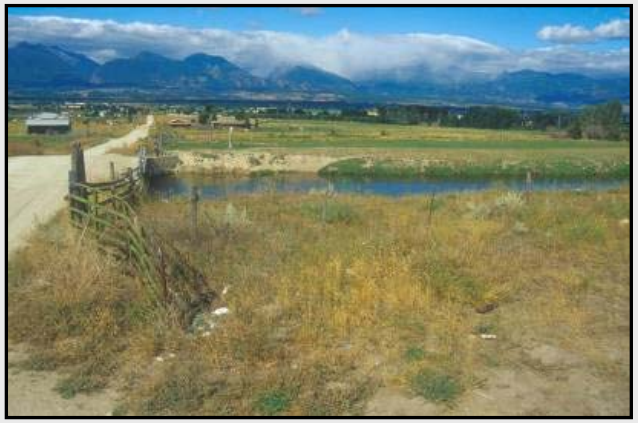


John LaFave
Montana Bureau of Mines and Geology
Presented to:
Water Policy Interim Committee
June, 10, 2008

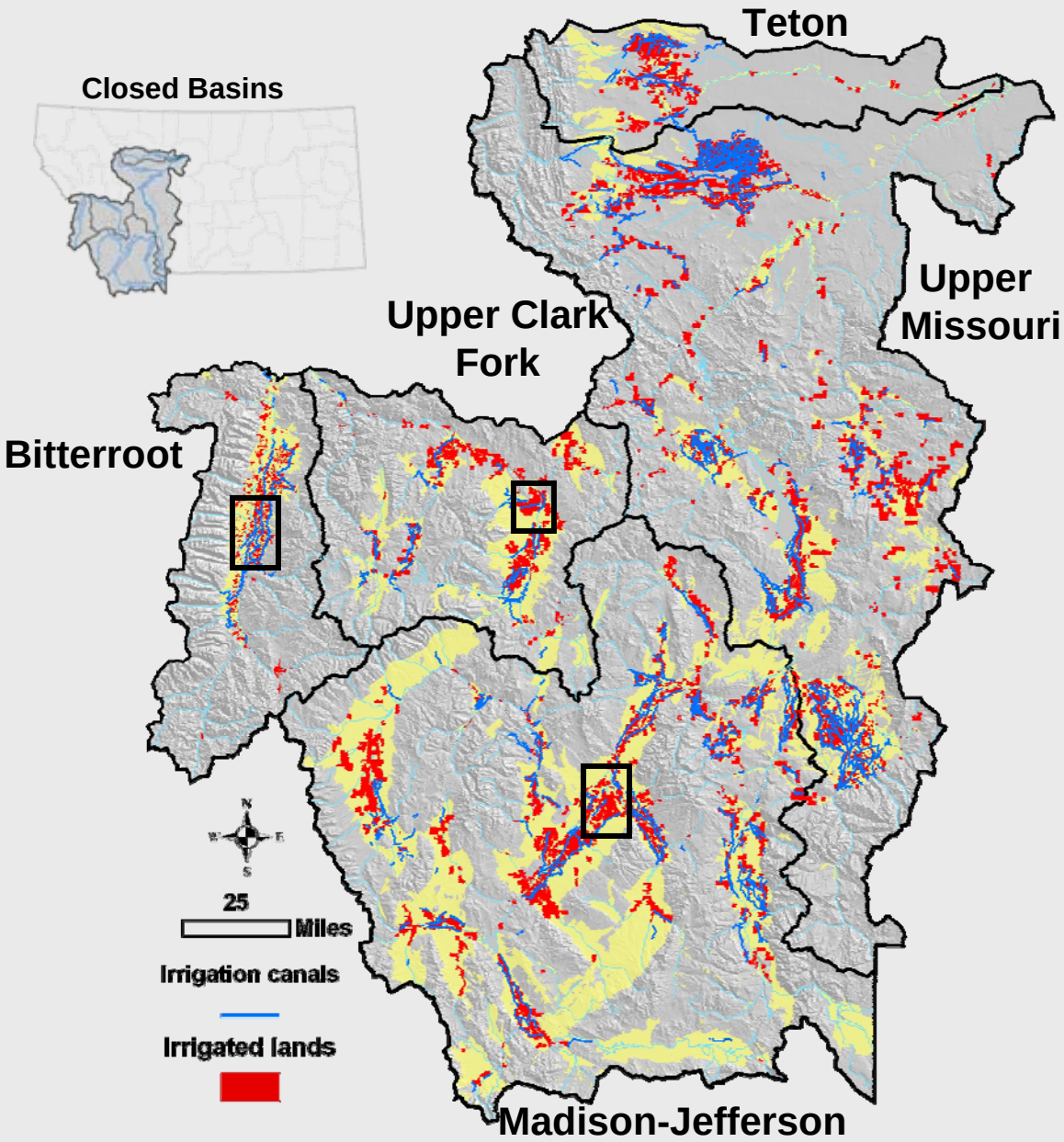
…or, artificial recharge in Montana



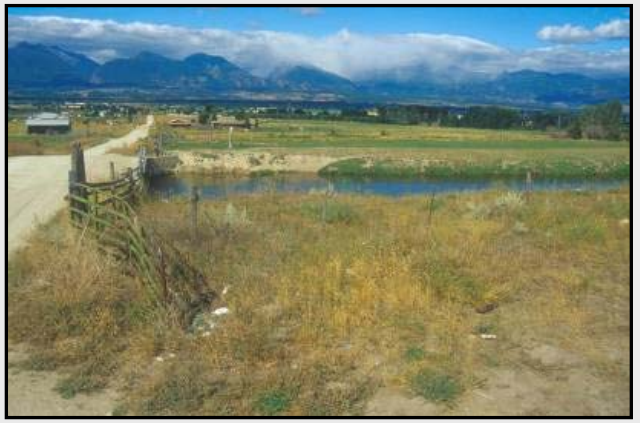
3,000+ mi of canals



…or, artificial recharge in Montana



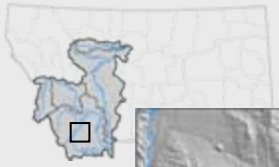
3,000+ mi of canals

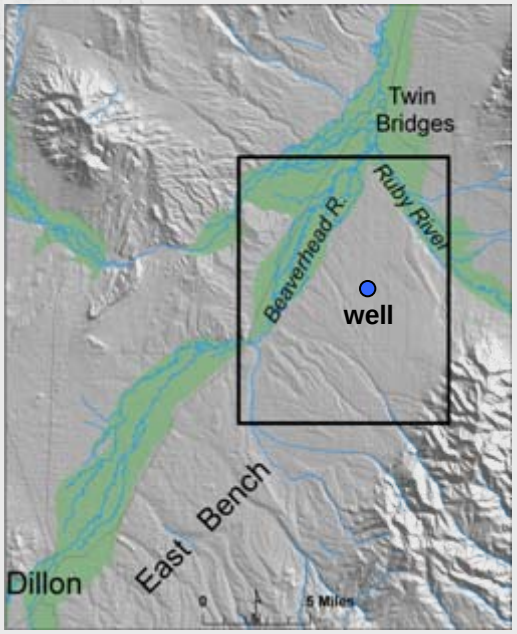


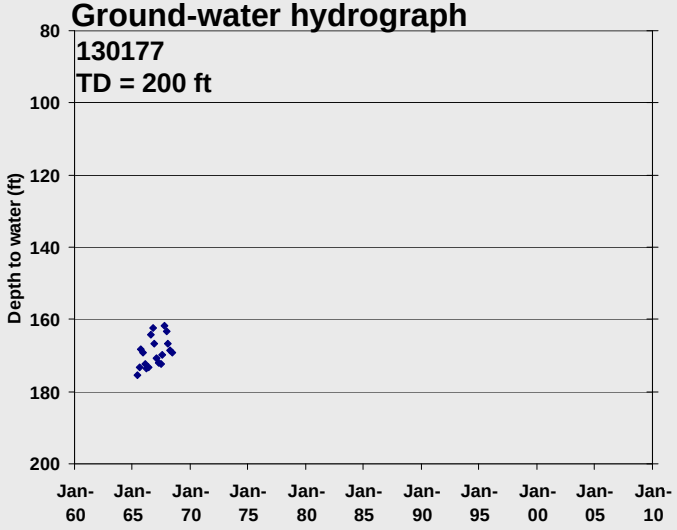
divert 5 million acre-ft/yr

to irrigate 950,000+ acres

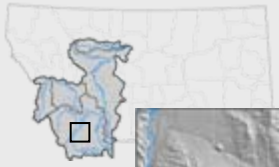
Lower Beaverhead
East Bench Canal

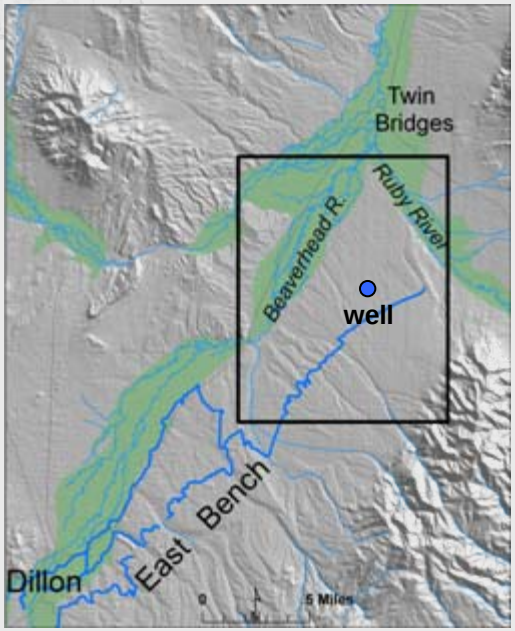


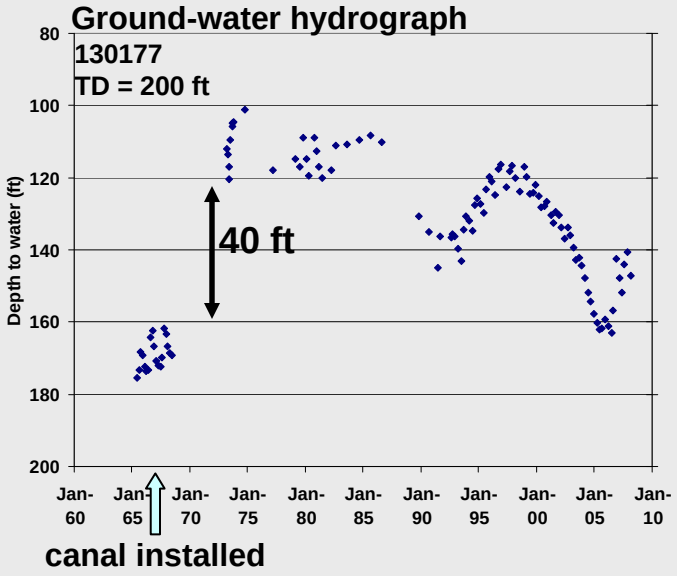


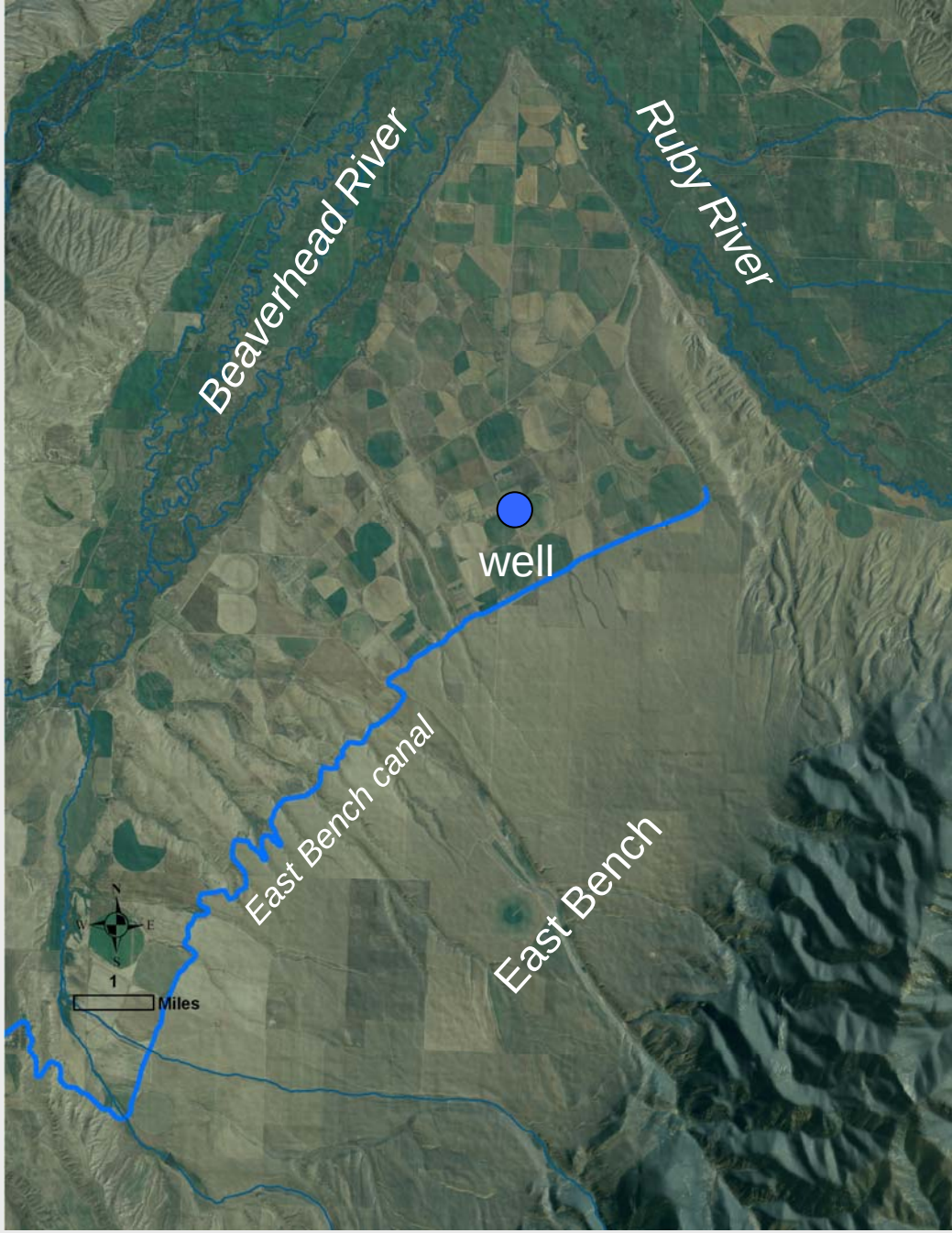


Lower Beaverhead East Bench Canal

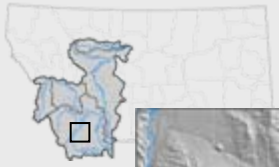


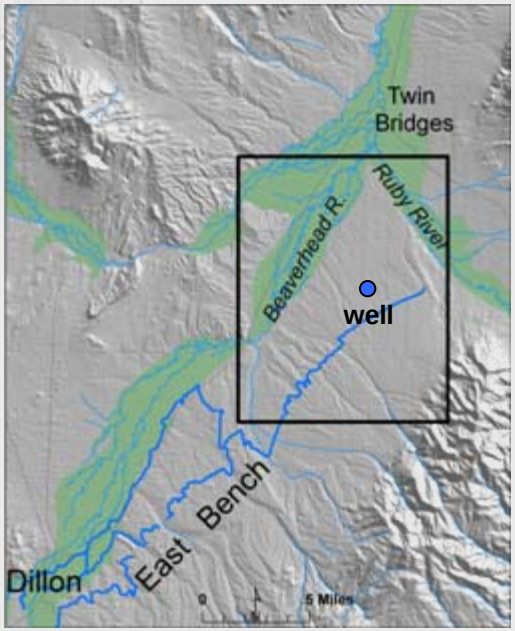


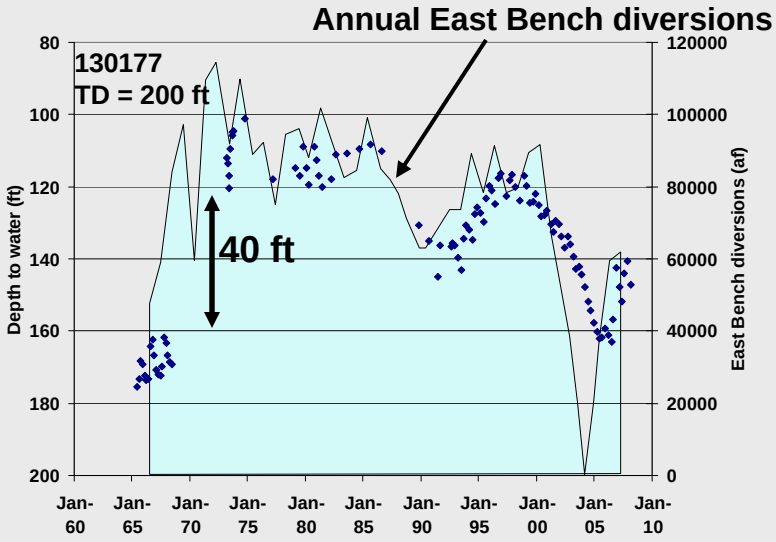


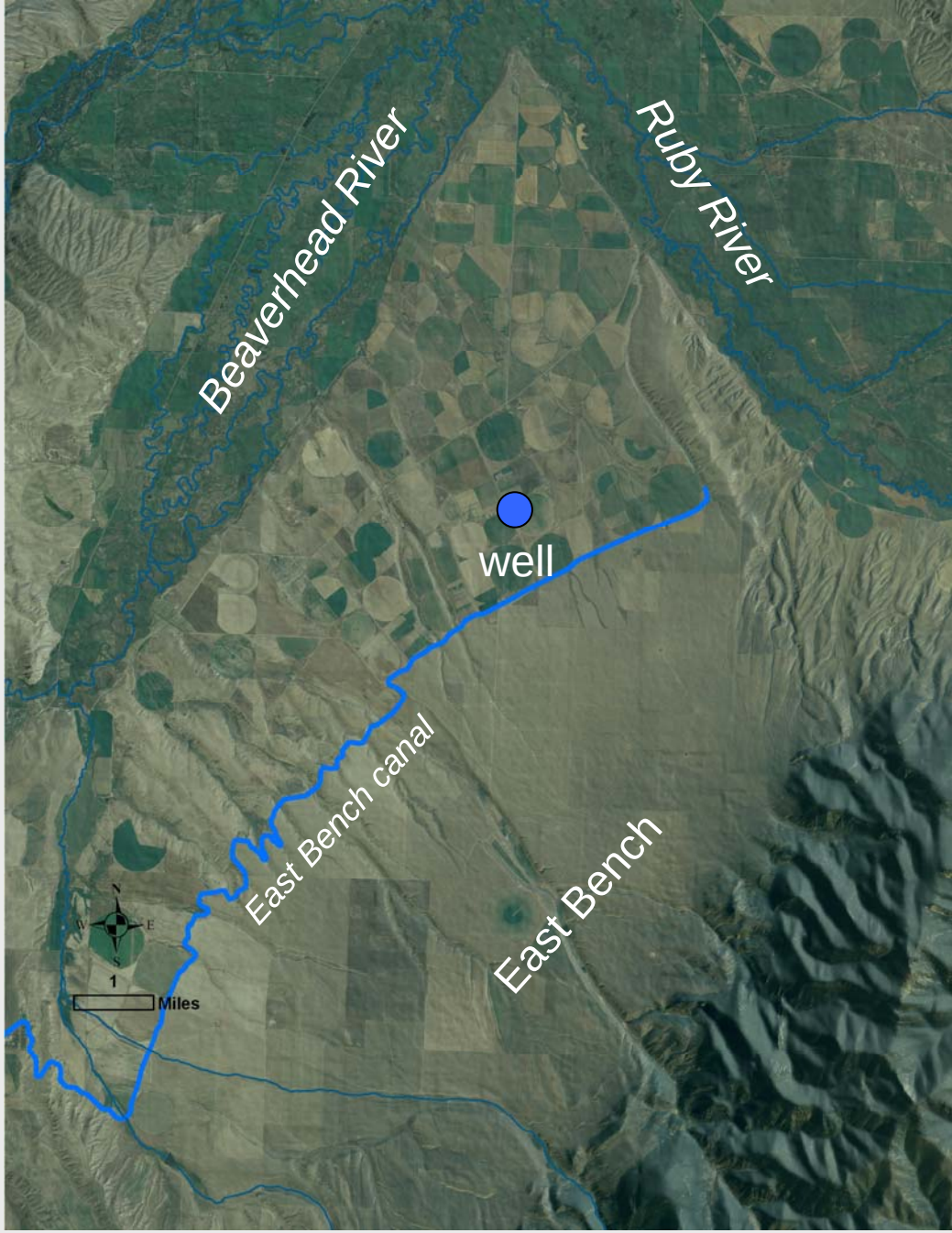


Lower Beaverhead East Bench Canal

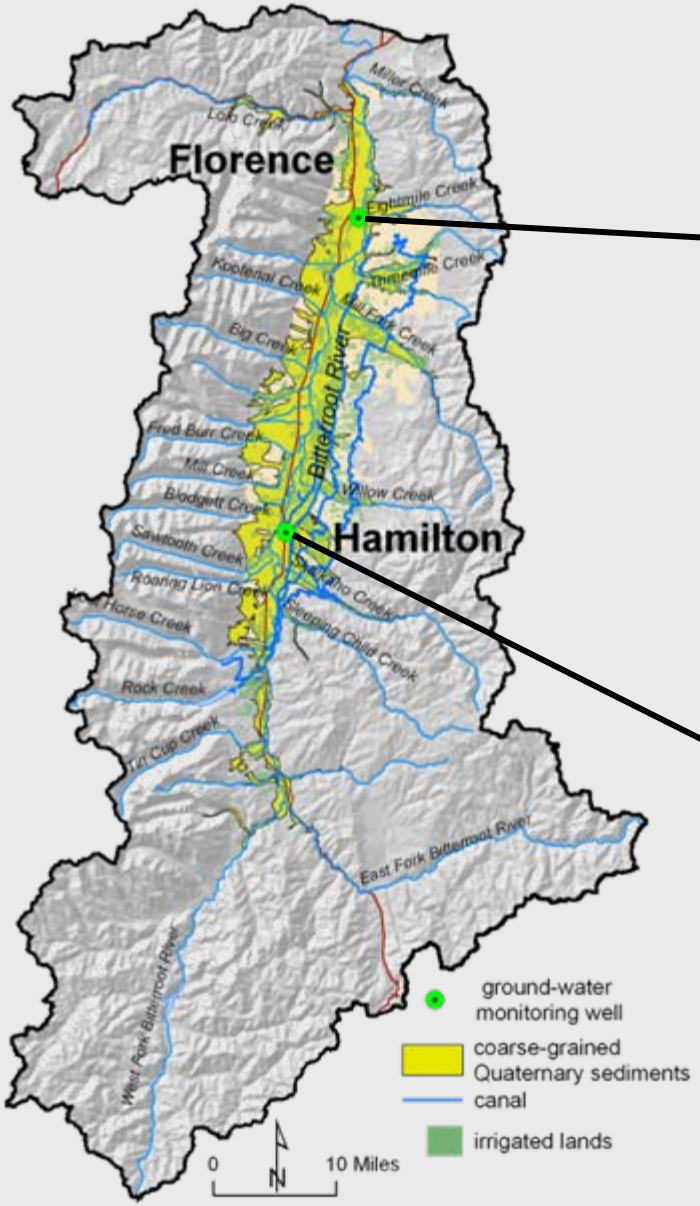


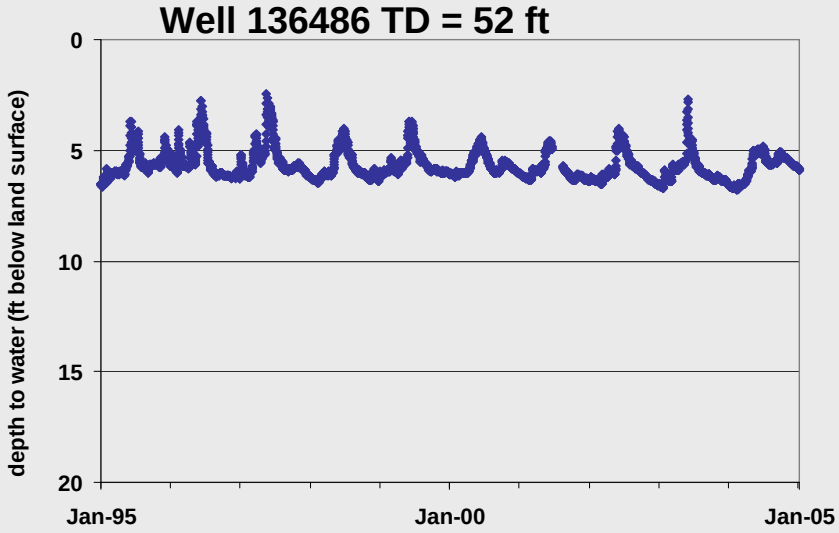


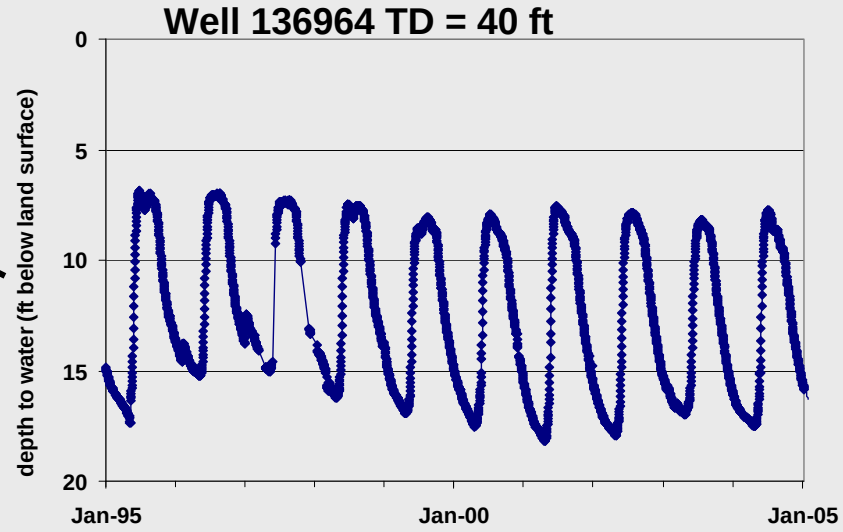




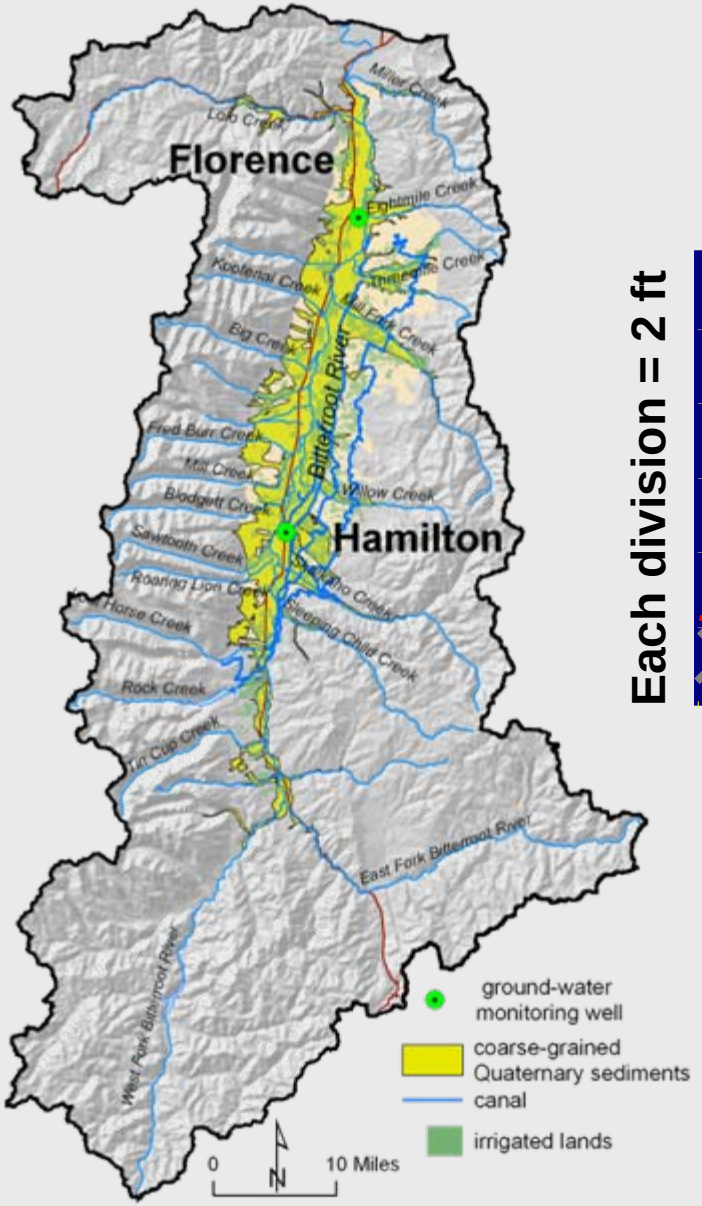
Bitterroot Basin Irrigation Recharge



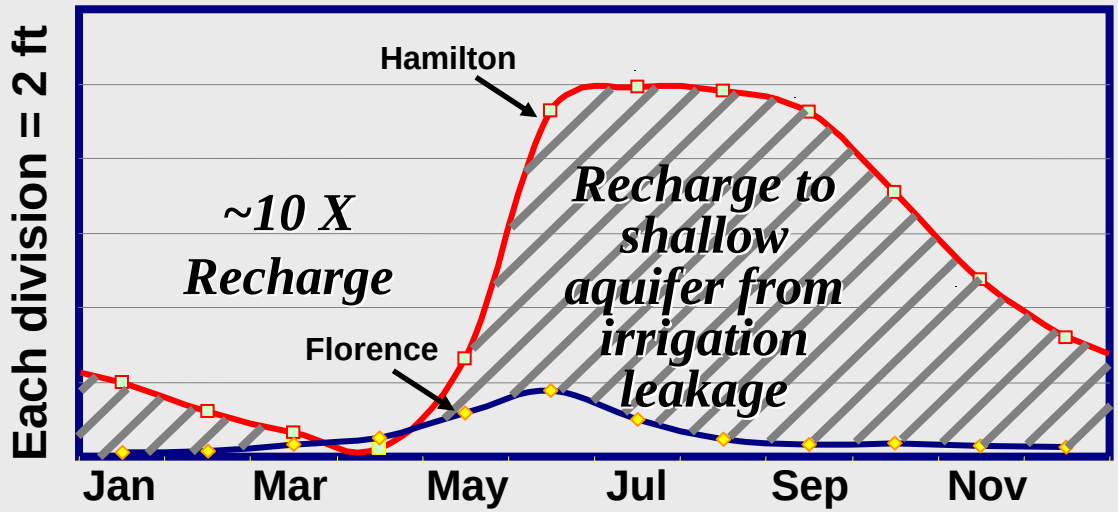




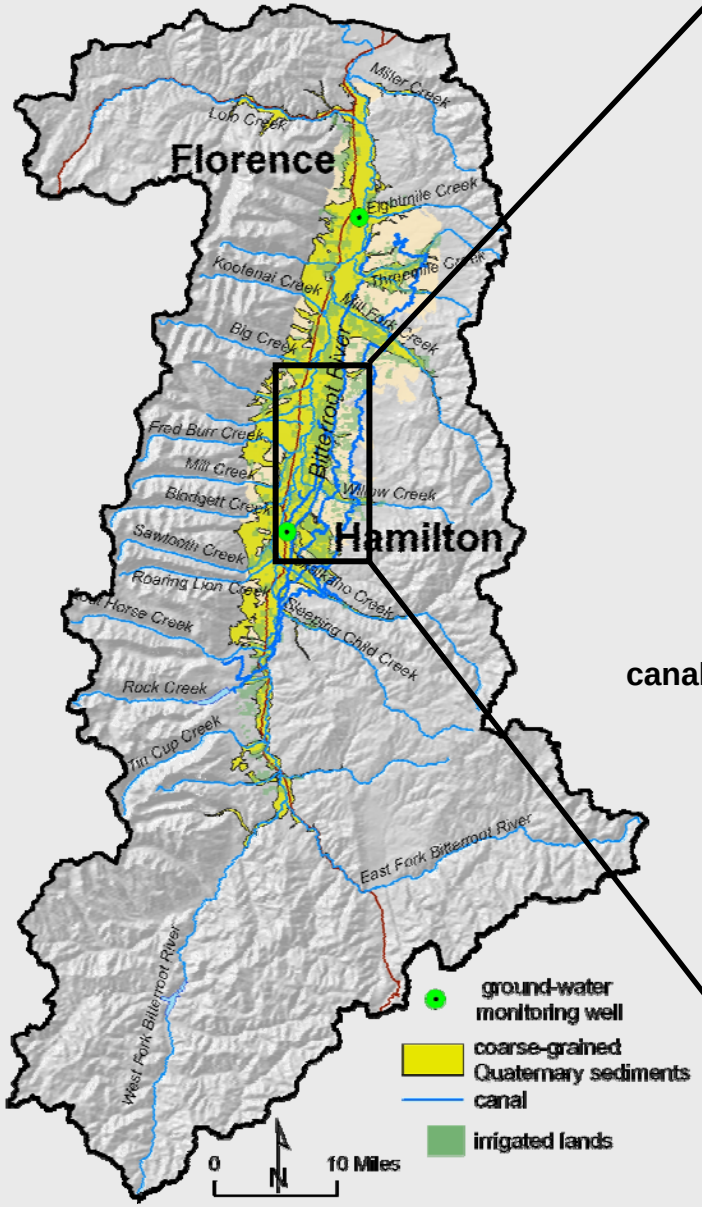
Bitterroot Basin Irrigation Recharge

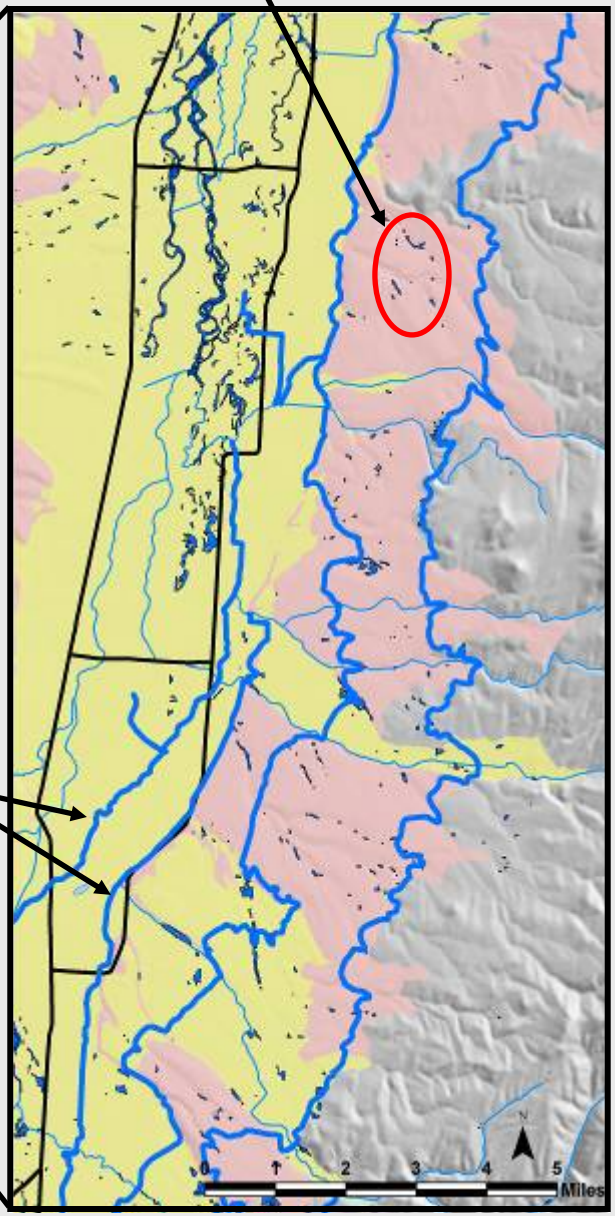


Average monthly water levels



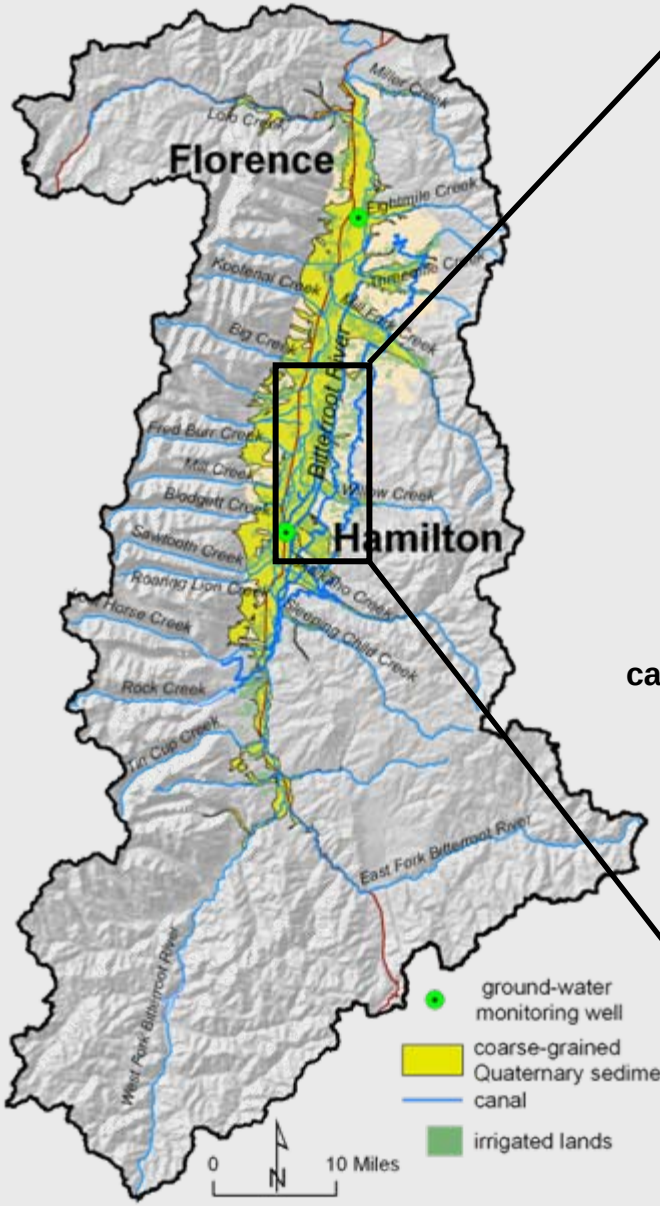
Bitterroot Basin Irrigation Recharge



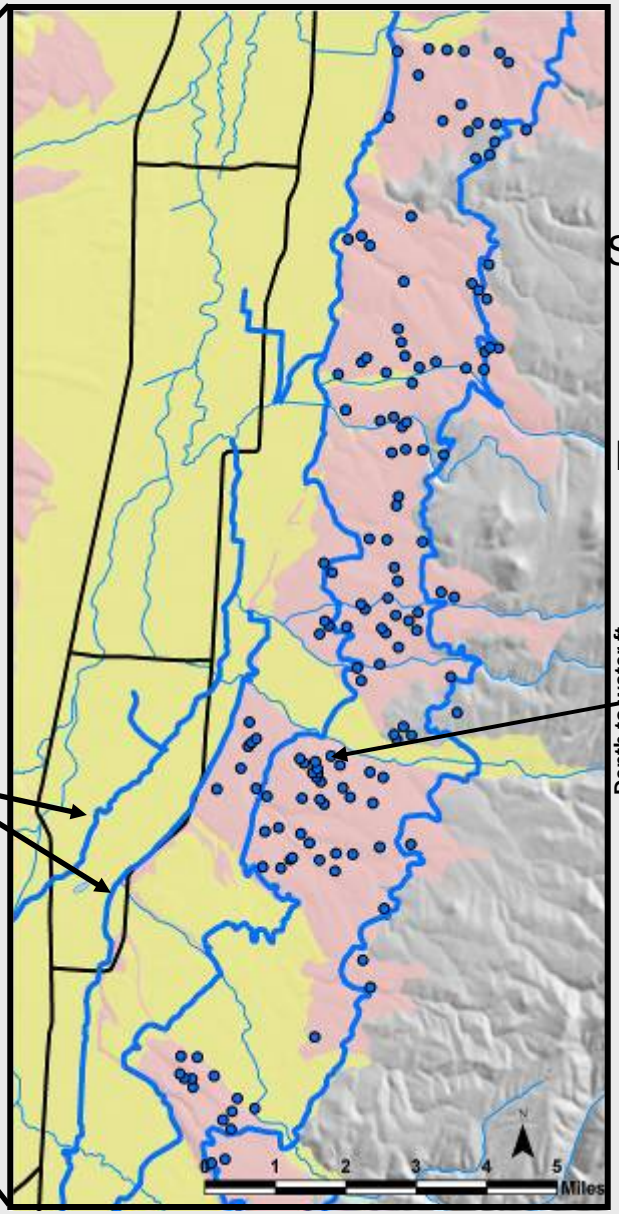


Wetlands on upland benches, downgradient from canals
Irrigation supported

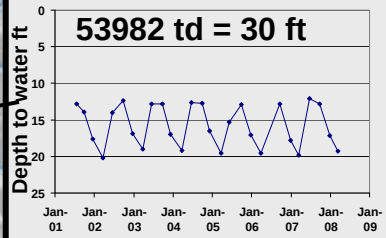
Bitterroot Basin Irrigation Recharge



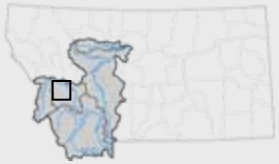
Shallow domestic wells

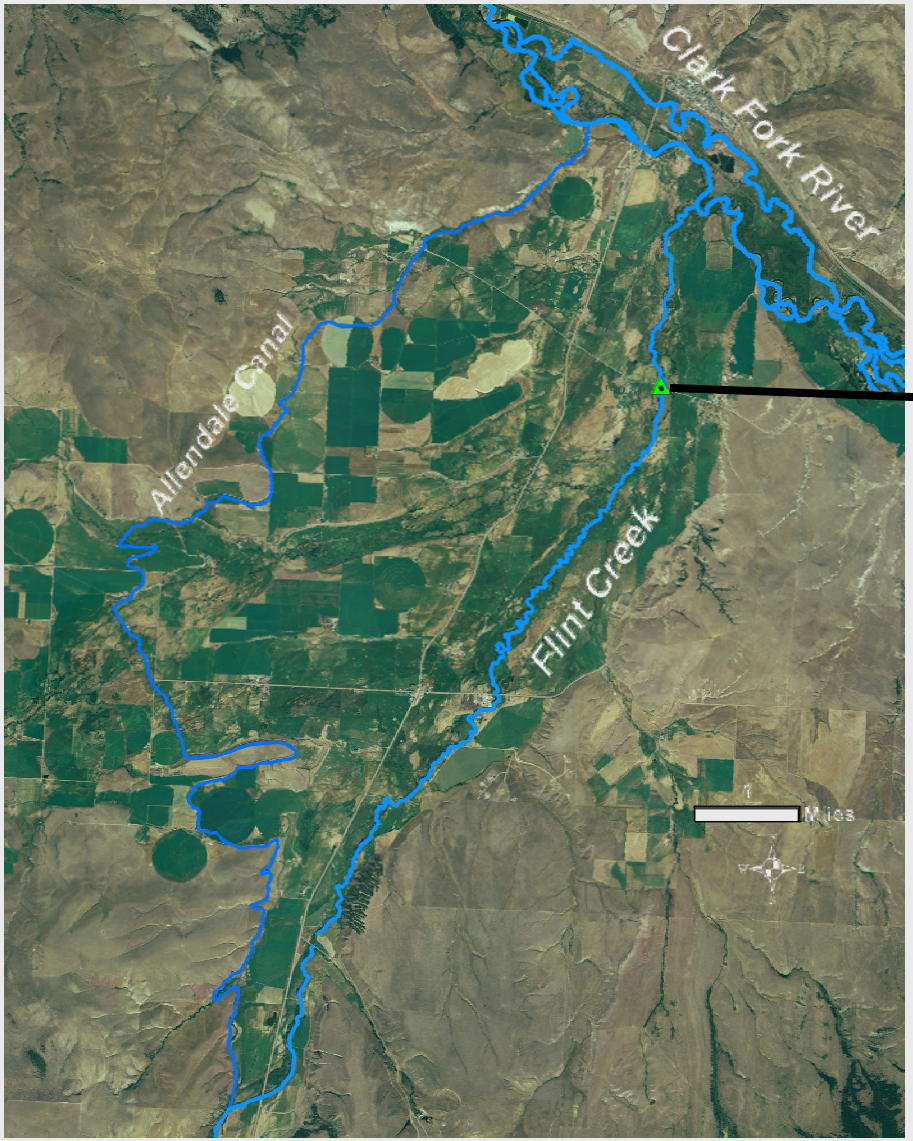


Shallow aquifers on upland benches, downgradient from canals
Irrigation supported



Flint Creek
Return Flows





Average daily flows, Flint Ck 1990 -2007

- Return flows contribute 40-50 cfs in Oct.
- (Voeller and Warren, 1997)

Summary

- Irrigation returns affect shallow ground water
  - Loses support: aquifers, wet lands, stream flow
  - Impacts are observable
- Conditions created by irrigation returns are “normal” but “not natural” (Kendy, 2006)
- Long-term monitoring shows the magnitude
  - Seasonal variation and long-term tends
- Increase efficiency (flood-sprinkler, canal lining)
  - reduce: aquifer recharge, late season flows, wetlands