Ground Water Investigation Program
Bitterroot Valley

Bitterroot River, Woodside Crossing, April 26, 2012
Bitterroot Valley, Hamilton to Florence: wells in 1900
Bitterroot Valley, Hamilton to Florence: wells in 1950
Bitterroot Valley, Hamilton to Florence: wells in 2012
Florence Area

Data Collection
- Groundwater and surface water elevations
- Surface water flows
- Ditch loss
- Water Chemistry
Reported Well Use

- Domestic: 87%
- Public Water: 3%
- Other: 5%
- Irrigation: 4%
- Unused: 1%

Florence Area
Well Completions
Florence Area

Number of well completions per year
Cumulative number of well completions
Eightmile Drainage

1954

2009
Eightmile Creek Drainage
Threemile Creek Drainage
Water Budget Components

Consumptive use (acre-feet)
(all diversions, precipitation subtracted from monthly estimates)

Eightmile Creek

- Pivot: 145
- Flood: 75
- Sprinkler: 600
- Domestic: 890

Threemile Creek

- Pivot: 190
- Flood: 4470
- Sprinkler: 4640
- Domestic: 1190
Threemile Creek

Groundwater Flow
Eightmile versus Threemile hydrogeology

Aquifer properties
- Eightmile Creek: Lower yield wells – more drawdown
  BUT
  Limited well interference
  Stream depletion more localized, BUT
  Creek may be disconnected part of the year

- Threemile: Depletion of more than one stream possible
  Less likely to extend SD outside immediate area

Land use
- Eightmile Creek: Transition from agriculture to domestic
  Limited recharge from canals, less from irrigation

- Threemile: Canal loss and irrigation return flow important
Pumping Scenarios in Eightmile Creek
Eightmile Creek Depletion

Depletion Rate (gpm) vs. Time (Jan-12 to Jul-21)

- Depletion Rate:
  - 600 gpd all year
  - 10 gpm for 8 hours/day, 90 days per year

- Hydraulic Conductivity:
  - 10 feet per day

- Depletion Area:
  - 1,000 feet from stream
Eightmile Creek Depletion

Depletion Rate (gpm)

2,640 feet from stream

600 gpd all year
10 gpm for 8 hours/day, 90 days per year

Hydraulic Conductivity = 10 feet per day
Pumping Scenarios in Threemile Creek
Depletion Rate (gpm)

- 1,000 feet from stream
- 2,640 feet from stream

- 600 gpd all year
- 10 gpm for 8 hours/day, 90 days per year

Hydraulic Conductivity = 100 feet per day
Stream segments depleted by pumping

- 1000 feet
- 2640 feet
Stream segments depleted by pumping

- 1000 feet
- 2640 feet
Summary

• Hydrogeologic conditions much different between nearby drainages
  local data are very important

• Depletion rates and timing vary with distance from a stream

• Stream depletion models benefit considerably with improved hydrology data

• Additional data collection in Eightmile Creek
Shallow Aquifer Investigation
Stevensville Area

Purpose
Examine the feasibility of supplementing surface water irrigation supplies with groundwater.

• Existing information
• Collect groundwater and surface water elevation data
• Water Budget
• Groundwater Flow Model
Groundwater / Surface Water Interaction

Gaining stream/ditch
Streams/ditches gain water from inflow of groundwater

Loosing stream/ditch
Streams/ditches lose water to groundwater
Connected system

Disconnected system

Bank Storage
Stream levels higher than groundwater
Varies seasonally
Groundwater flow and pumping near a stream

Cross Section View

Pumping a well will create a cone of depression

stream/ditch

Water table
If pumping near a stream lowers the water table to a level lower than the stream, then water may be induced from the stream into the subsurface.

Continued pumping ...
Hamilton

Subdivisions

Septic System Density