The Problematic Nature of Curtailment

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Hydrologically, What Makes Conjunctive Management so Difficult?

• “A problem Well Stated is a Problem Half Solved” Charles Kettering (engineer)

• Objective: Describe hydrologic complications that impede conjunctive management and curtailment

• Eastern Snake River Plain as example
Hydraulically Connected Surface and Ground Water

Streams gain water when the stream stage is below the surrounding water table.

*Gaining Stream*

Streams lose water to the aquifer when stream stage is higher than the water table.

*Losing Stream*

Streams are perched when the stream beds are well above the water table.

*Perched Stream*

Seepage Not Impacted by Ground Water Pumping

Illustrations from: USGS Ground water and surface water a single resource
Complication 1: A gallon consumptively used from ground water is a gallon that will not appear in streams.
Principle 1: A gallon consumptively used from ground water is a gallon that will not appear in streams.

Consequence: NO IMPACT on surface water means no ground water pumping.
Complication #2: Impacts do not follow flow lines
Only one fourth of curtailed pumping benefits reach with water shortage.
Curtailment Less Effective At Farther Wells

Only 1/10 of curtailed pumping benefits reach with water shortage
Consequences of Complication #2

• Every GW pumper impacts all connected surface water to a small degree (administratively awkward)

• Curtail 10 cfs to create 1 cfs of benefit? (Curtailment inefficiency)

• Some de minimis level of impact?
Complication #3: *Effects are delayed and dampened*

Lag and dampening increase with increased distance.
Distance Effect on Lag and Dampening for Buhl to KSprings (four month pumping event)
Consequences of Complication #3

• Rate curtailment ≥ rate of benefit
• Today’s problems result from yesterday’s (and last year’s) actions
• Can’t go back in time to change what we did yesterday
• Preemptive Curtailment
  – If effects are sometime in the future, do we know there will be a water shortage at that time?
Other Complications

• “Trust me I’m a hydrologic modeler”
• Uncertainty and evolving knowledge
“A Problem Well Stated is a Problem Half Solved”

Charles Kettering (engineer)

• Alternative problem statements
  – Curtailment is so inefficient that it is ineffective in providing relief to injured surface water users and useful only as a punishment
  – Prior appropriation is hydrologically incompatible with conjunctive management
  – ??????
More information?

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