

Conversion from Flood to Sprinkler Water Supply Impacts

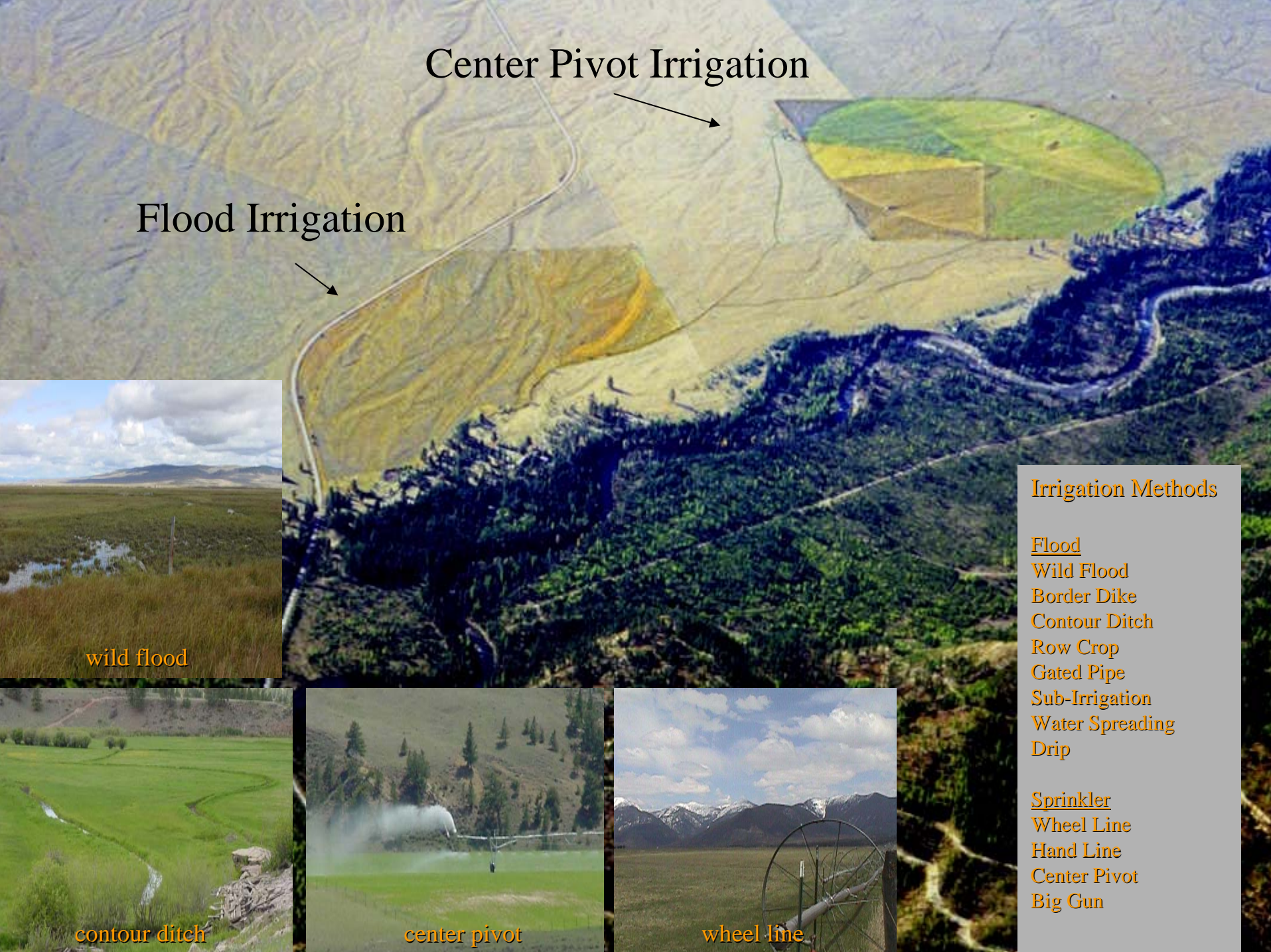


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Water Management Bureau

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Center Pivot Irrigation

Flood Irrigation



wild flood



contour ditch



center pivot



wheel line

Irrigation Methods

Flood

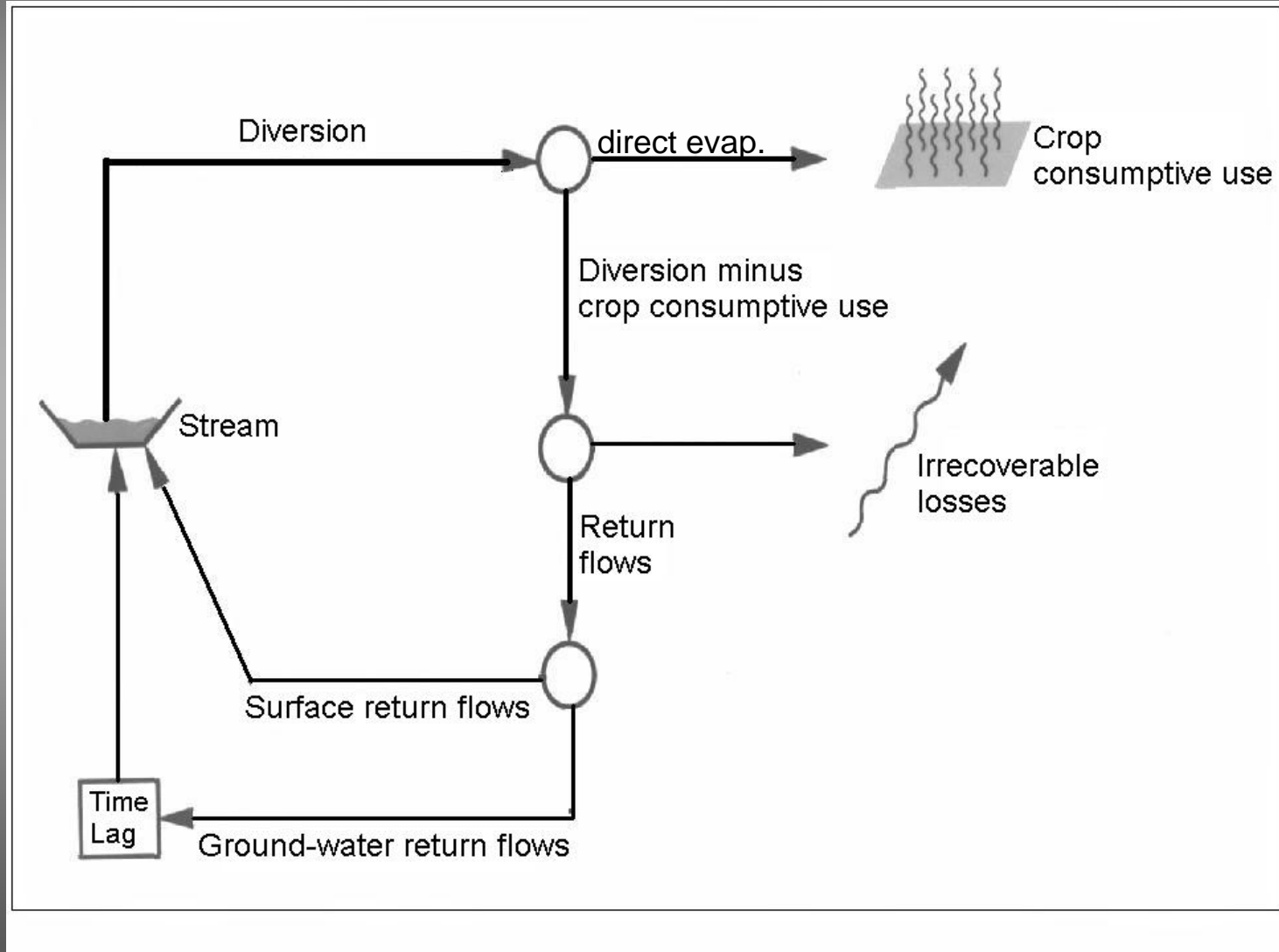
- Wild Flood
- Border Dike
- Contour Ditch
- Row Crop
- Gated Pipe
- Sub-Irrigation
- Water Spreading
- Drip

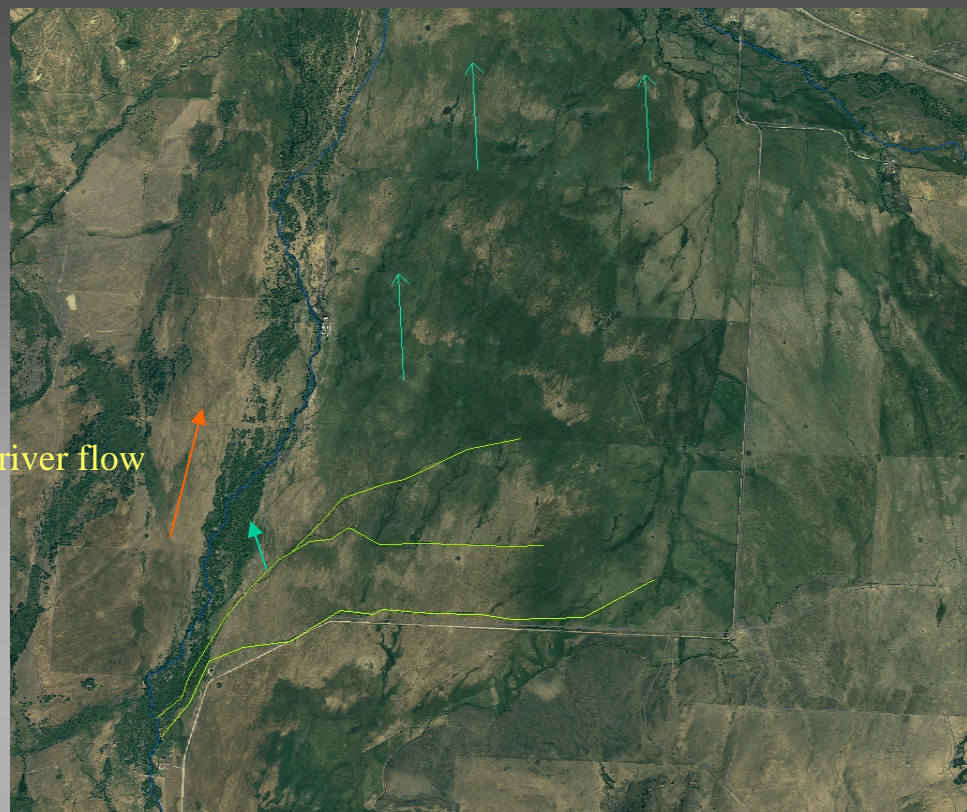
Sprinkler

- Wheel Line
- Hand Line
- Center Pivot
- Big Gun

How is water supply impacted by irrigation?

- Evapotranspiration (ET) a.k.a. Consumptive Use
evaporation (soil, air) and transpiration (plant use)

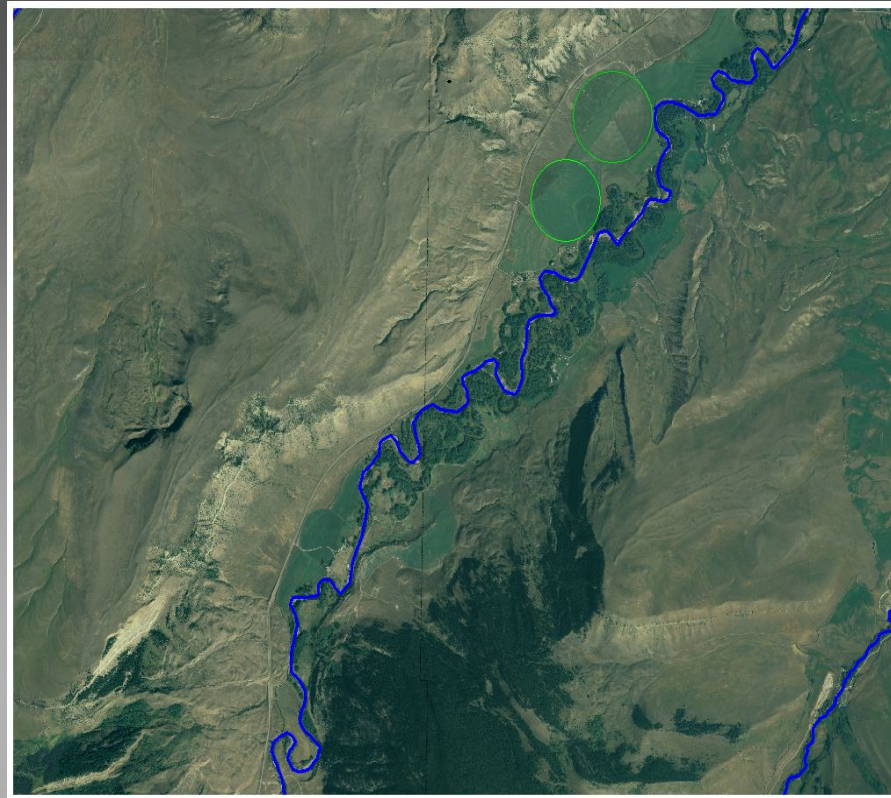




Flood irrigation = 25 to 60% efficient



Requires more diversionary water
Results in more return flow



Sprinkler irrigation = 60 to 85% efficient



Less diversion required
Less return flow

Increase in yield equals increase in ET (irrecoverable losses)

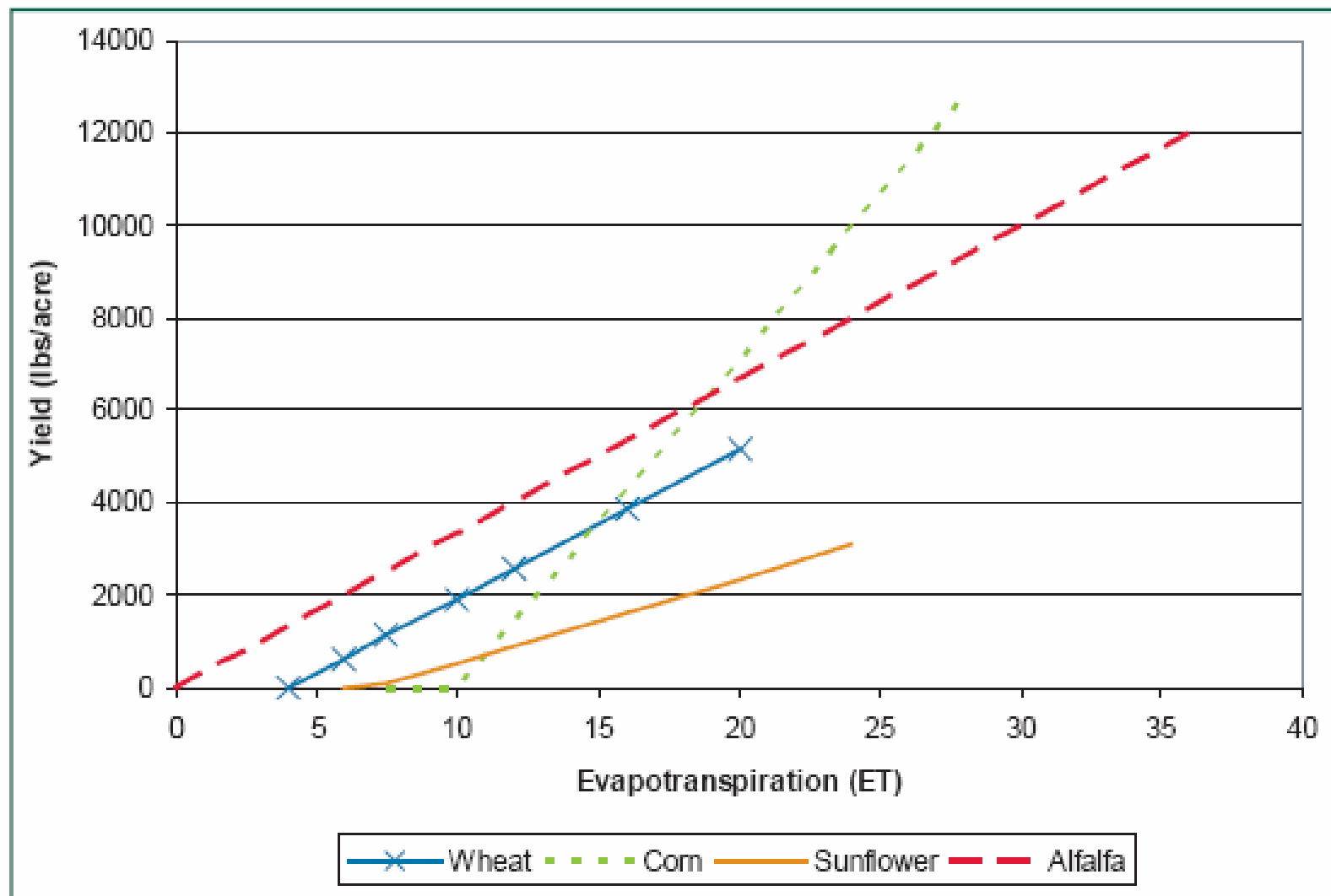


Figure 1. Crop yield and seasonal evapotranspiration relationships.

Can consumptive use increase with conversion to sprinkler irrigation? Yes.

Acre for Acre

Increases Production (yield)

- better distribution of water (amounts to an expansion of acres)
- extends season: ability to divert from source during low-flow periods
- crop conversion: grass hay to alfalfa (more cuttings)
- change in place of use: many applications for water right changes take poor flood irrigated land out of production and replace it with productive sprinkler-irrigated land

Expansion of Acres

What typically happens when a flooded field is converted to sprinkler?

1997



Photos courtesy of Scott Irvin

What typically happens when a flooded field is converted to sprinkler?

1997



2005

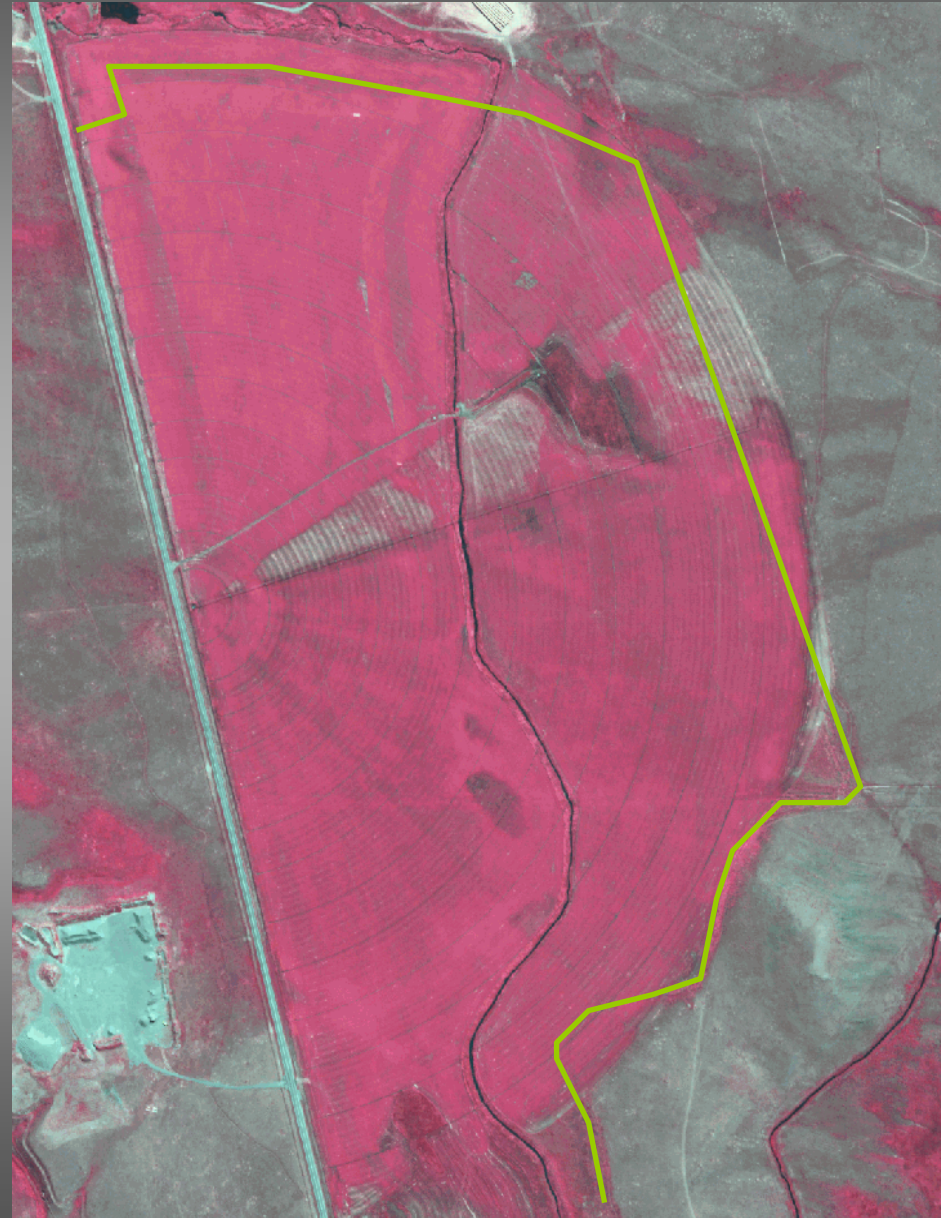


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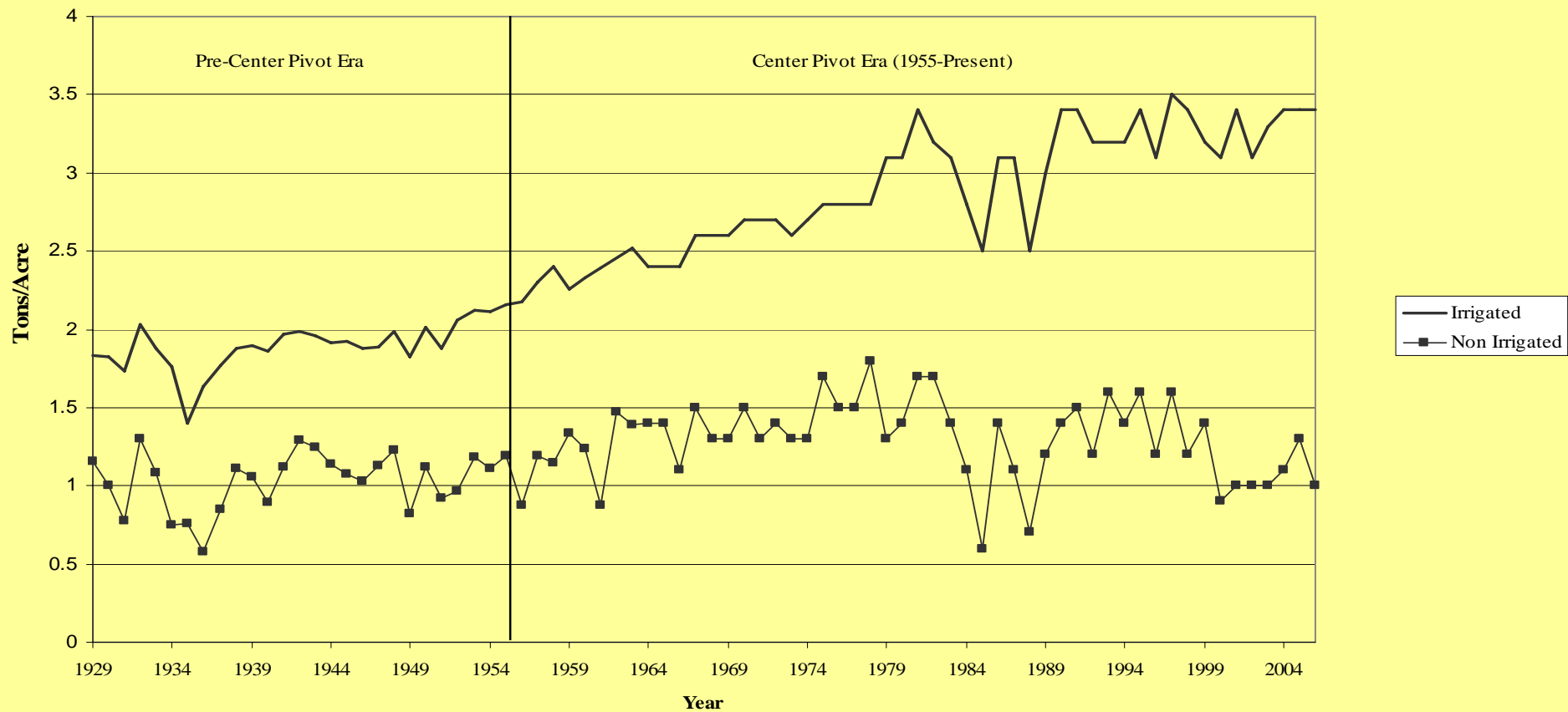
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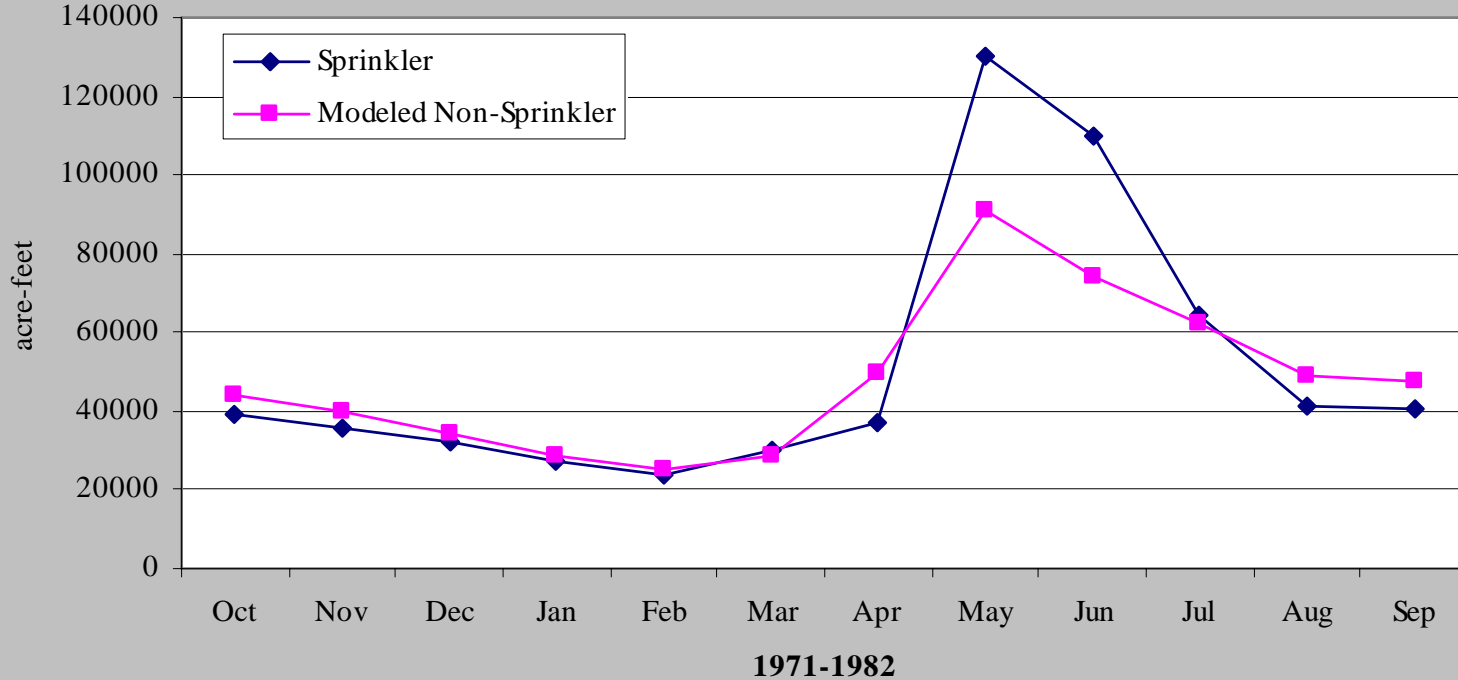
Montana State Yields (Alfalfa)



*USDA, National Agriculture Statistics Service
Montana Field Office*

Salt River Synthetic Streamflow Analysis

Wyoming Water Research Center U of W



Salt River Study, Wyoming (Wyoming Water Research Center 1985)

- > May and June mean monthly flows increased, mean annual peak flows increased.
- > Fall monthly flows decreased, winter baseflow depletions
- > Declines in Salt River during August and September attributed to crop use (15%)

Potential Advantages

- Increases production
- Decrease labor costs
- Decrease Ag chemical application
- Water quality improvements
- Fisheries
- Water quantity increases (early season)
 - add to downstream storage
 - channel maintenance



Potential Disadvantages

- Water quantity reductions (late-season)
- Downstream producers water availability reduced or eliminated.
- Fisheries
- Water Quality (temperature increases)



Management Objective

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- Not simple, lots of variables