Conversion from Flood to Sprinkler
Water Supply Impacts

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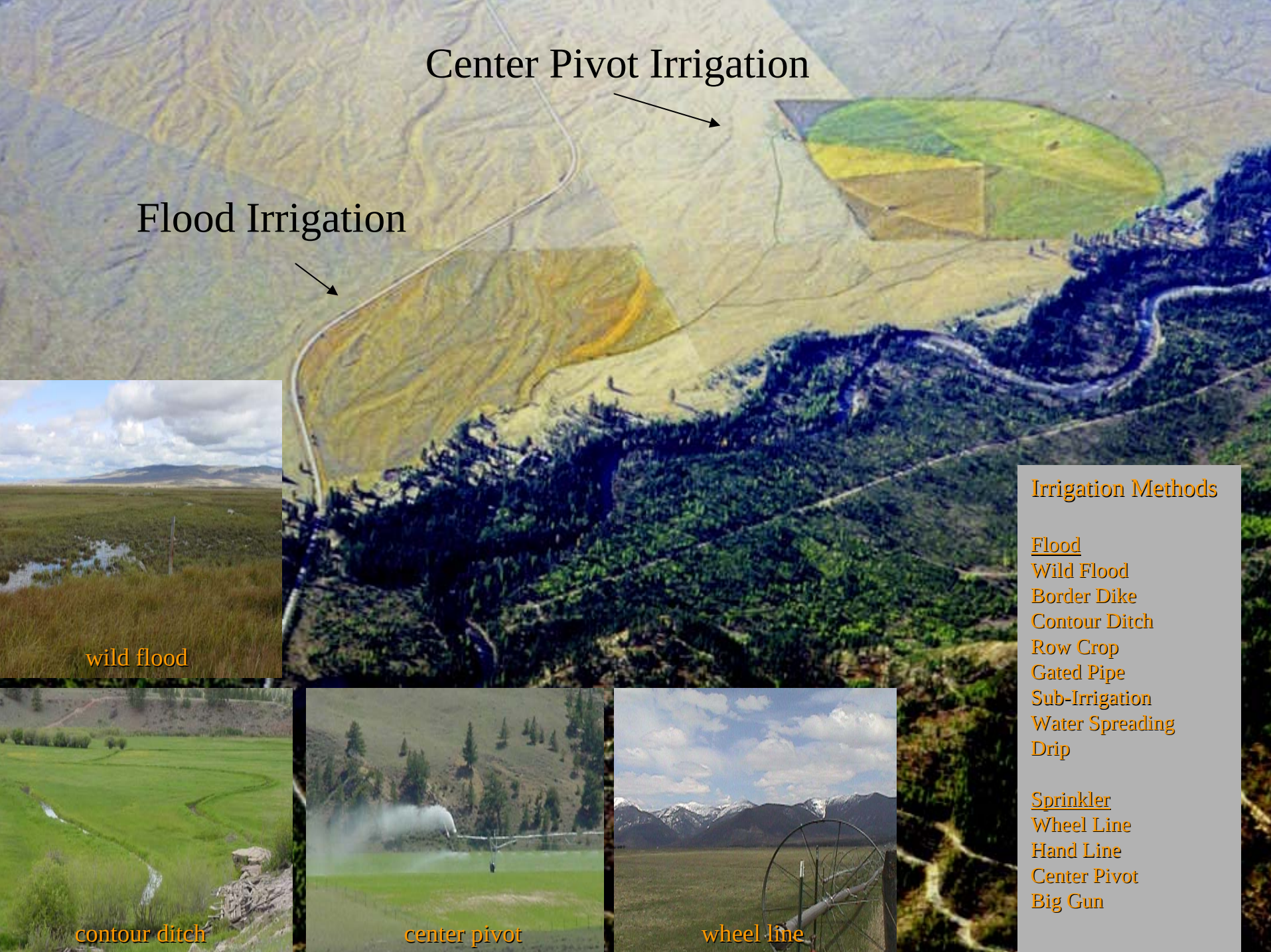


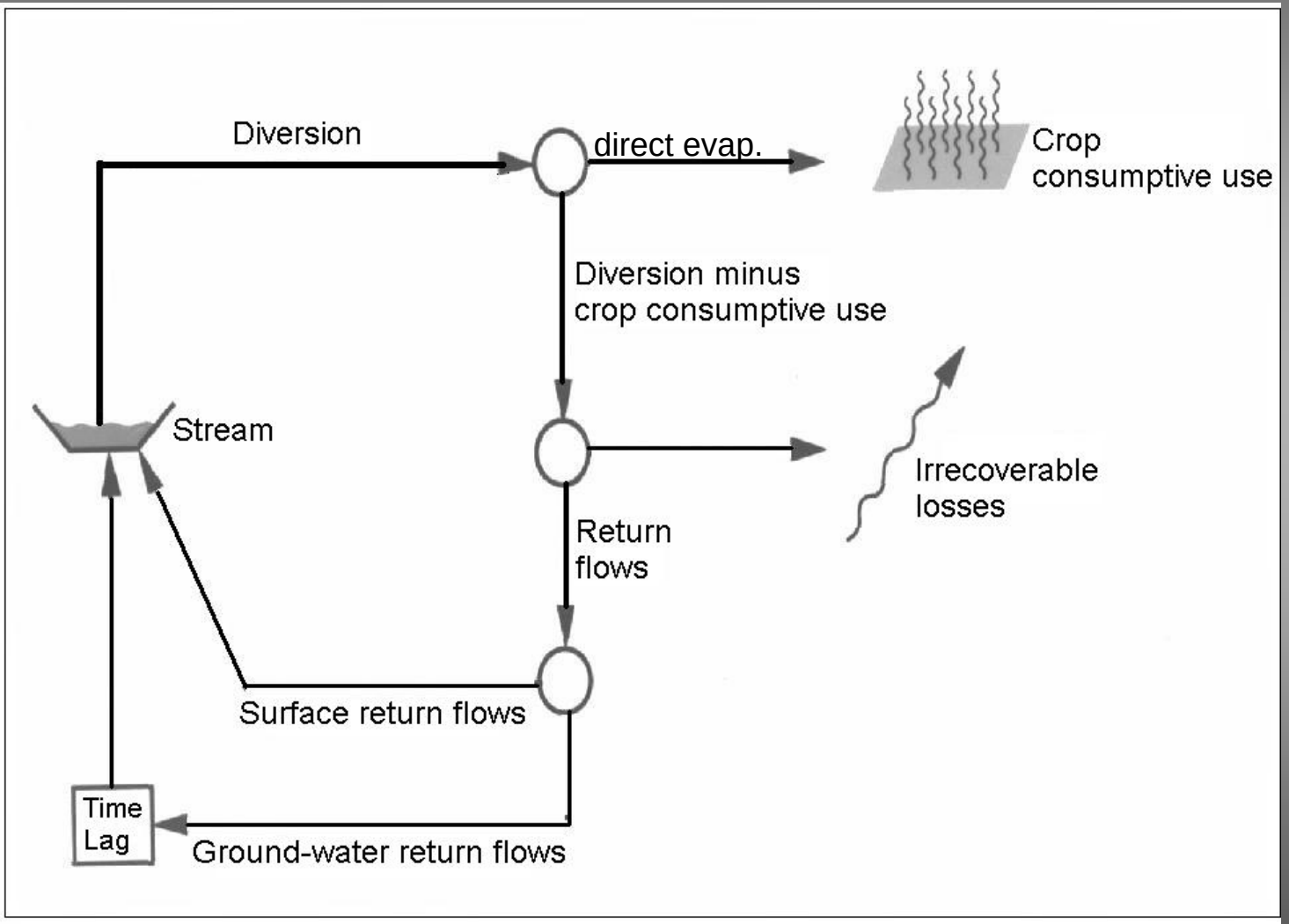
Irrigation Methods

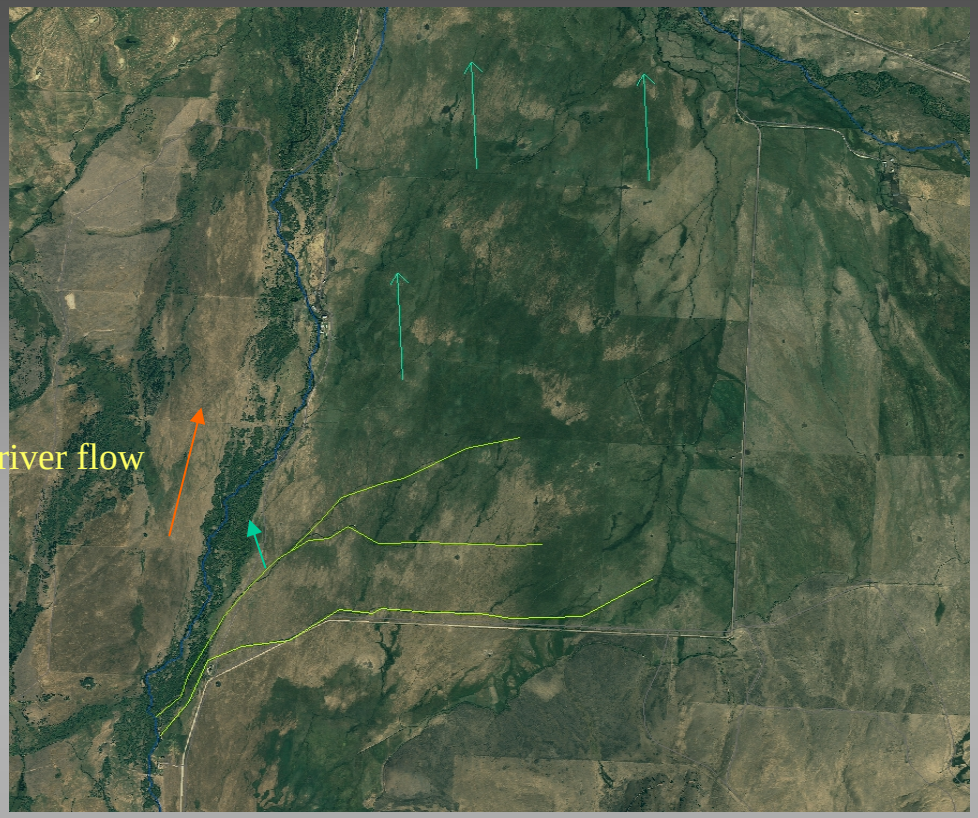
Flood
Wild Flood
Border Dike
Contour Ditch
Row Crop
Gated Pipe
Sub-Irrigation
Water Spreading
Drip

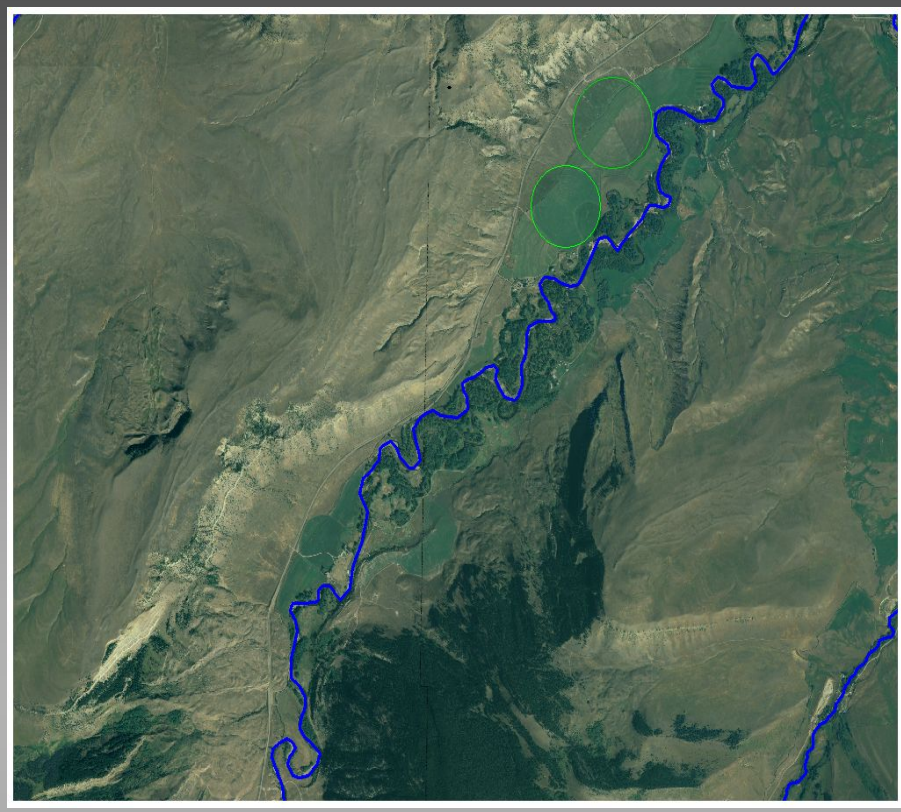
Sprinkler
Wheel Line
Hand Line
Center Pivot
Big Gun

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

Sprinkler irrigation = 60 to 85% efficient

Requires more diversionary water
Results in more return flow

Less diversion required
Less return flow

Increase in yield equals increase in ET (irrecoverable losses)

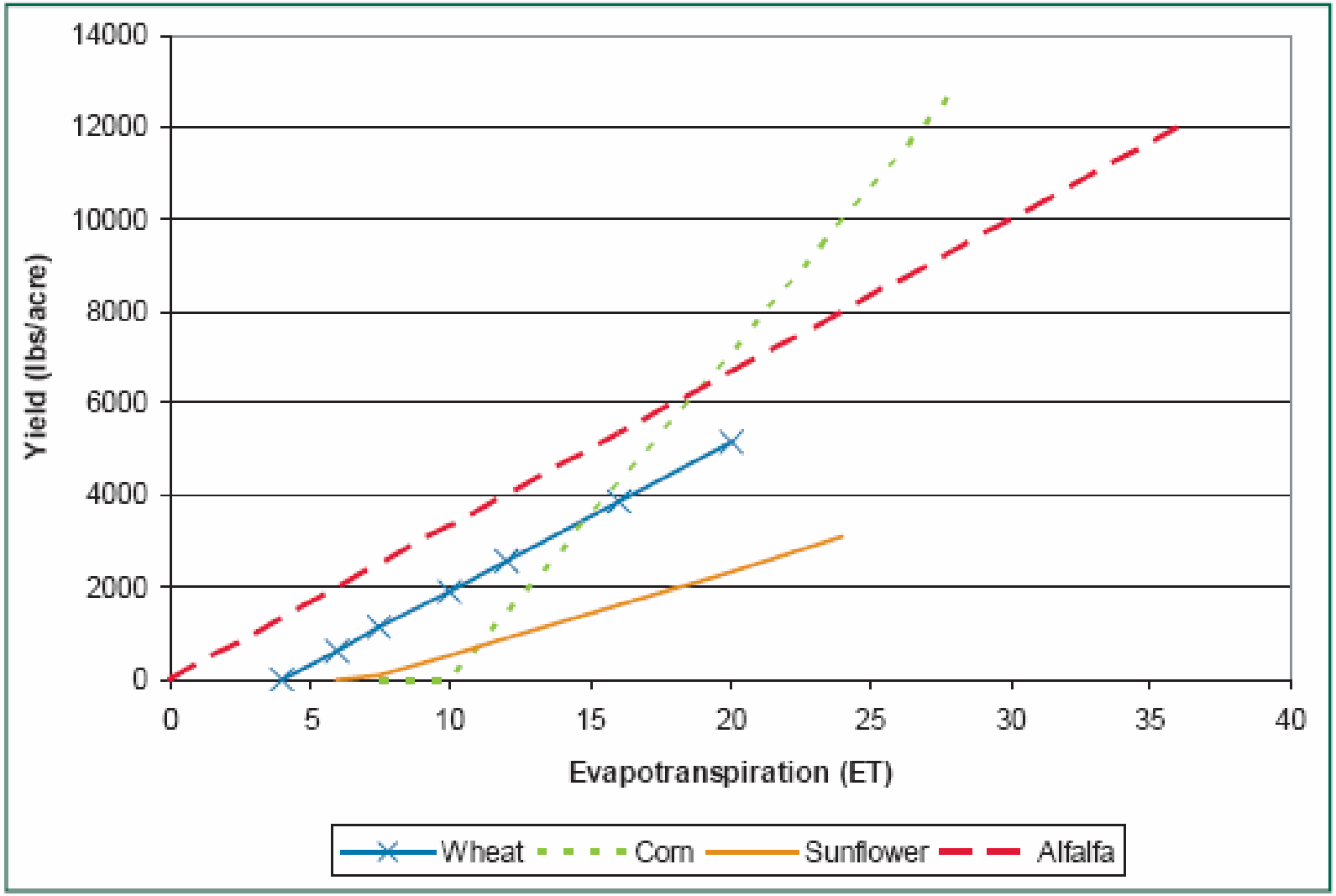


Figure 1. Crop yield and seasonal evapotranspiration relationships.

From: Agronomy News, Colorado State University Extension, April 2007, Volume 26

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?

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2005

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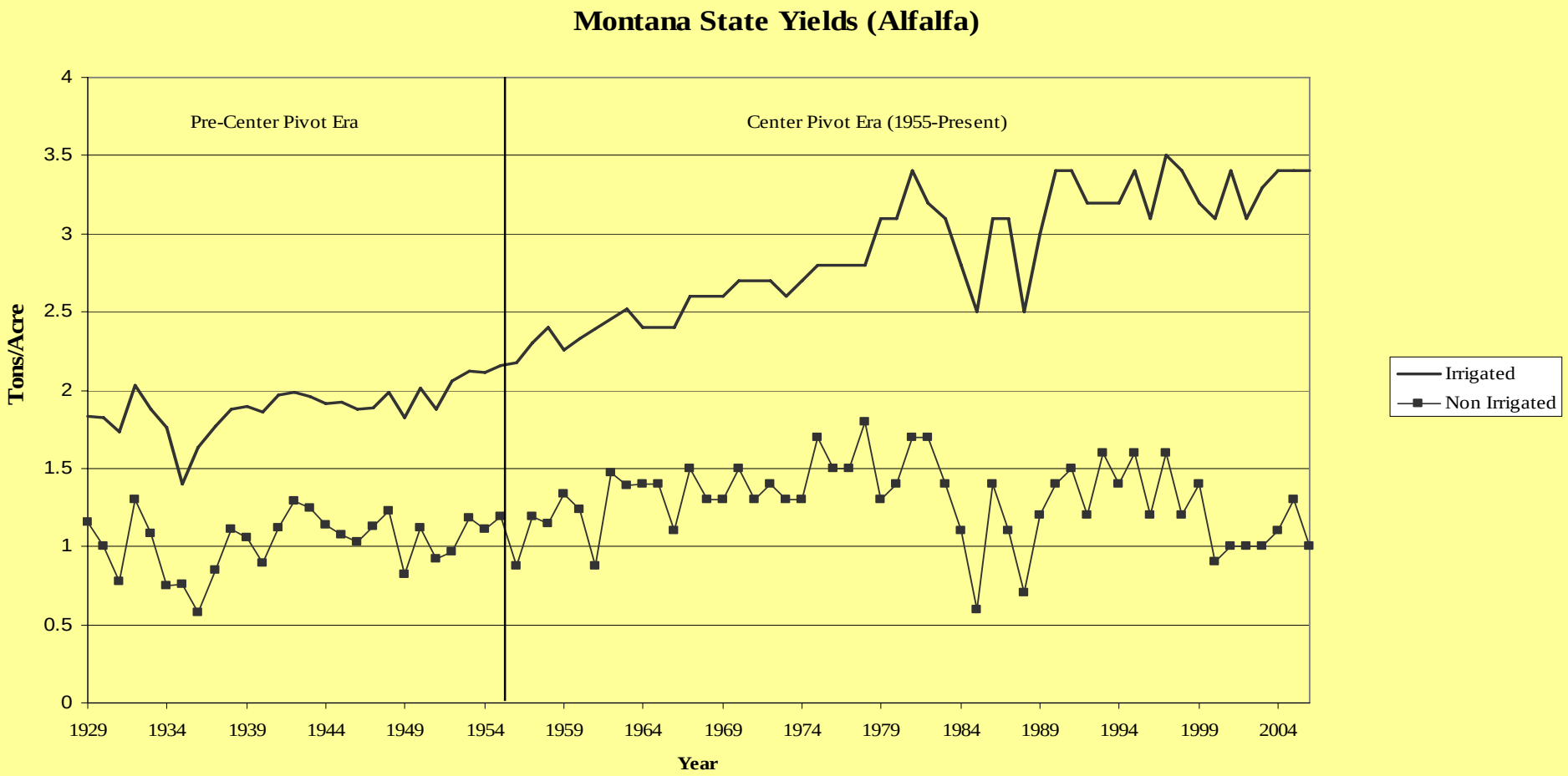
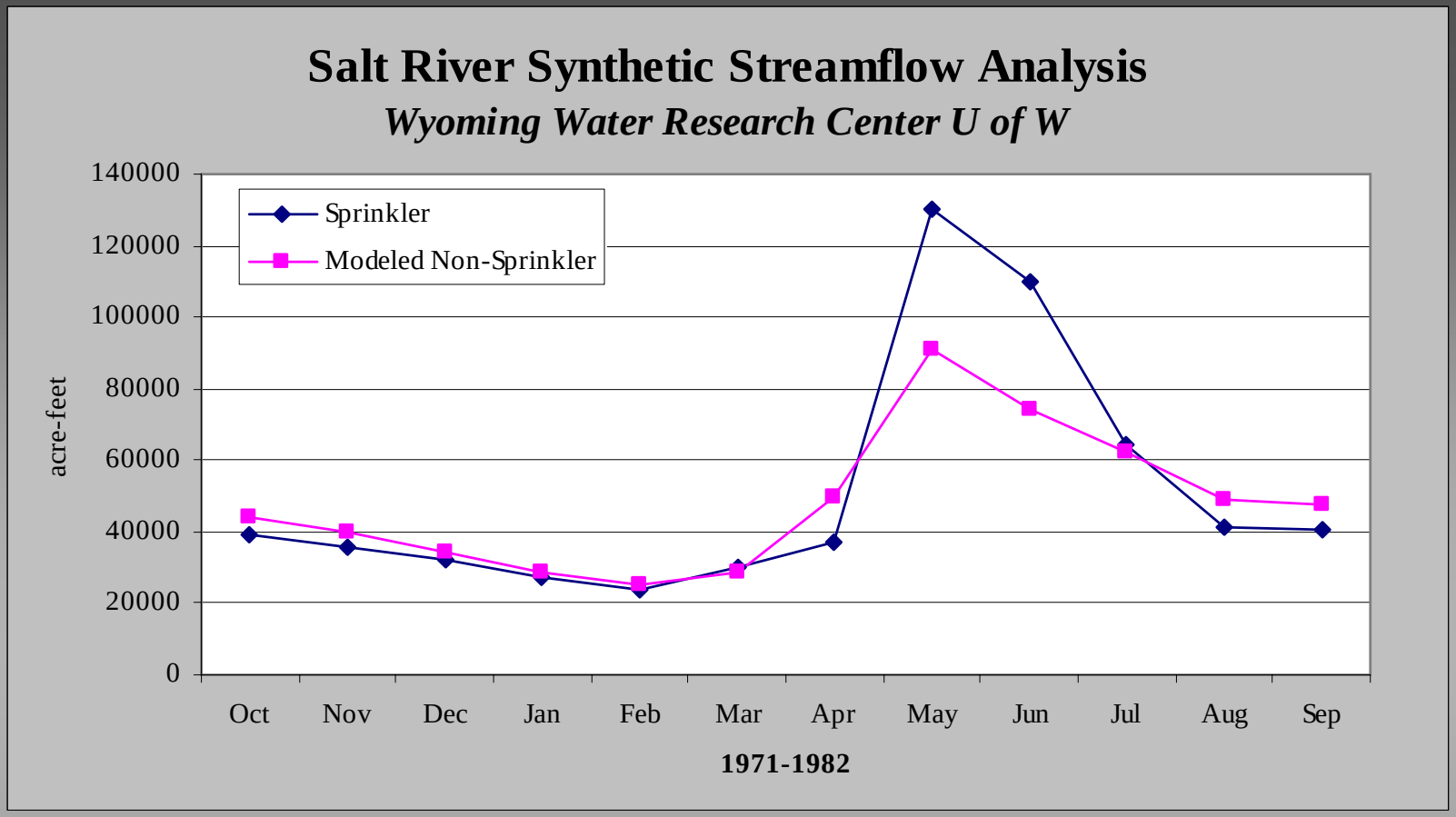


USDA, National Agriculture Statistics Service
Montana Field Office



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.
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Water Quality (temperature increases)

Management Objective

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- Not simple, lots of variables