CONSERVATION
Our Purpose.
Our Passion.

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Helping People Help the Land.

NRCS Activities Fostering Water Conservation

Walt Delp, PE
State Conservation Engineer
AR, Natural Resources Conservation Service

State Water Plan

* Arkansas is a water rich state
* 50” of rainfall per year.
* 8.7 MAFY of excess surface water
* Groundwater supplies will experience an 8 MAFY gap by 2050.
* Agriculture uses 80% of the water in the state.
* The L’Anguille, Bayou Macon, and Boeuff will have total gap.

Typical Farming Practices of the Past

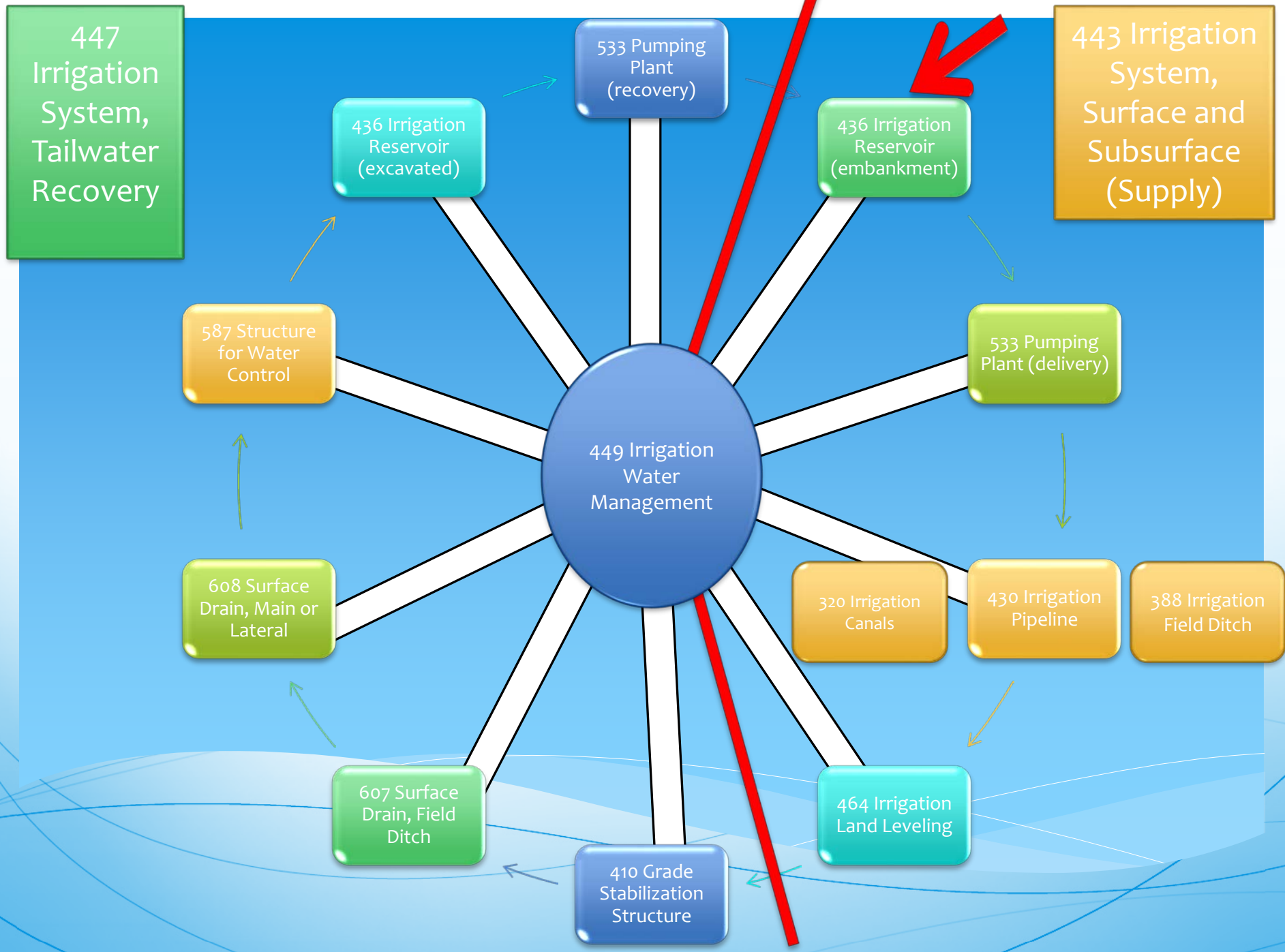
Runoff From End of Field

Systems are Key

* Complete irrigation systems are essential to correcting the strain on the ground water supply and reducing nutrient runoff.
* A system approach is the key to successfully reducing nutrient and sediment runoff.
* Encourage Surface Water Use

Impacting Water Quantity

* Efficiency in Supply
  * Items such as polypipe, surge valves, and land leveling can decrease water use by 10 to 40%
* Surface water and tail water recovery systems
  * Plan for 25%-50% of water supplied through tail water recovery
  * Off Site delivery of water (irrigation diversion projects)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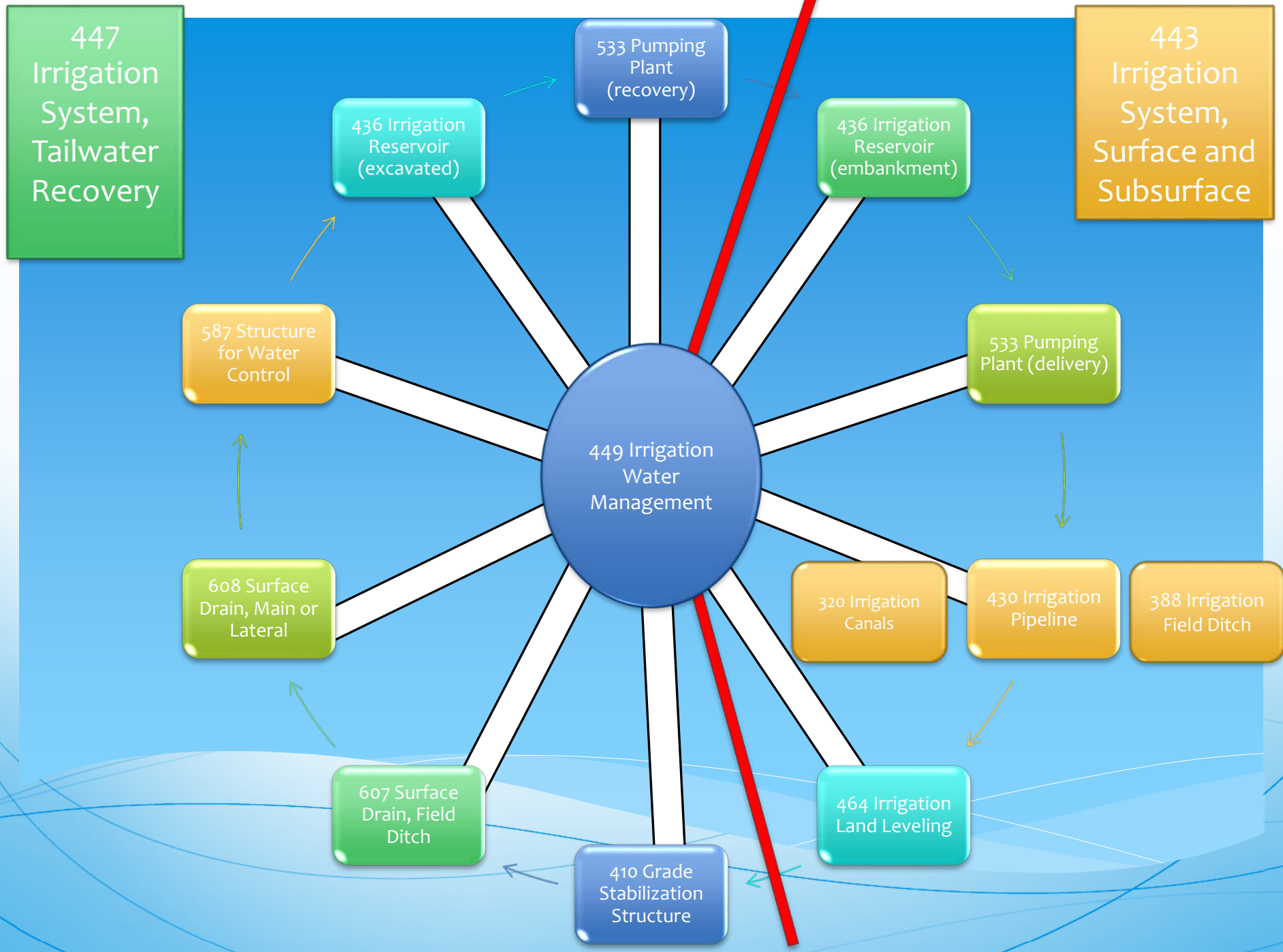
Pumping Plant

Pipeline

Irrigation Canal

Poly Pipe

Land Leveling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8 -- Surface Drainage Field Ditch

Field ditches collect excess irrigation water from a field and direct it into a surface drainage, main or lateral (9) before collecting in an irrigation regulating reservoir (4) in order to reuse the water for irrigation at a later time.

4 -- Irrigation Regulating Reservoir
Regulating reservoirs collect and store water for a relatively short period of time. They provide a temporary pumping pool for pumping plants (3).

5 -- Structure for Water Control These structures convey water, control the direction or rate of flow and maintain a desired surface elevation to create adequate pumping pool levels for pumping plants (3). They can also be used for water quality control, such as sediment reduction, temperature regulation and as an outlet for excess water during heavy rainfall events.

6 -- Grade Stabilization Structure
These structures stabilize the slopes of field (8) or lateral (9) ditches and control erosion as they allow water to flow off the fields into the ditches for collection and reuse on agricultural fields.

Structure for Water Control

3 -- Pumping Plant

Pumping plants pump water from the regulating reservoirs (4) into the storage reservoir (1) and then to the fields through pipelines (2) or from the regulating reservoirs directly to the field through pipelines.

NRCS Irrigation Water Management (IWM) Plans

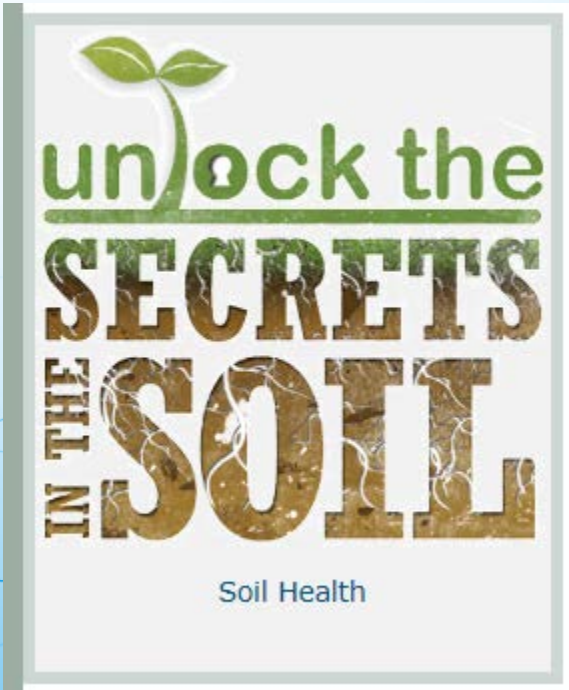
- IWM is the software of the computer system
- IWM is putting the right amount of water in the right place, at the right rate, at the right time.
- IWM requires a complete inventory, evaluation and scheduling of water delivery.

Irrigation Water Management Details

* Scheduling the irrigation
* Records of irrigation rates and volumes
* Soil Moisture
* Weather Data
* Plan for reduction in water usage

Irrigation Water Management Details

* Computerized Hole Selection
* Soil Moisture Sensors
* On Site Weather Station
* Surge Valves
* Soil Health



Irrigation pipelines and Poly-Pipe

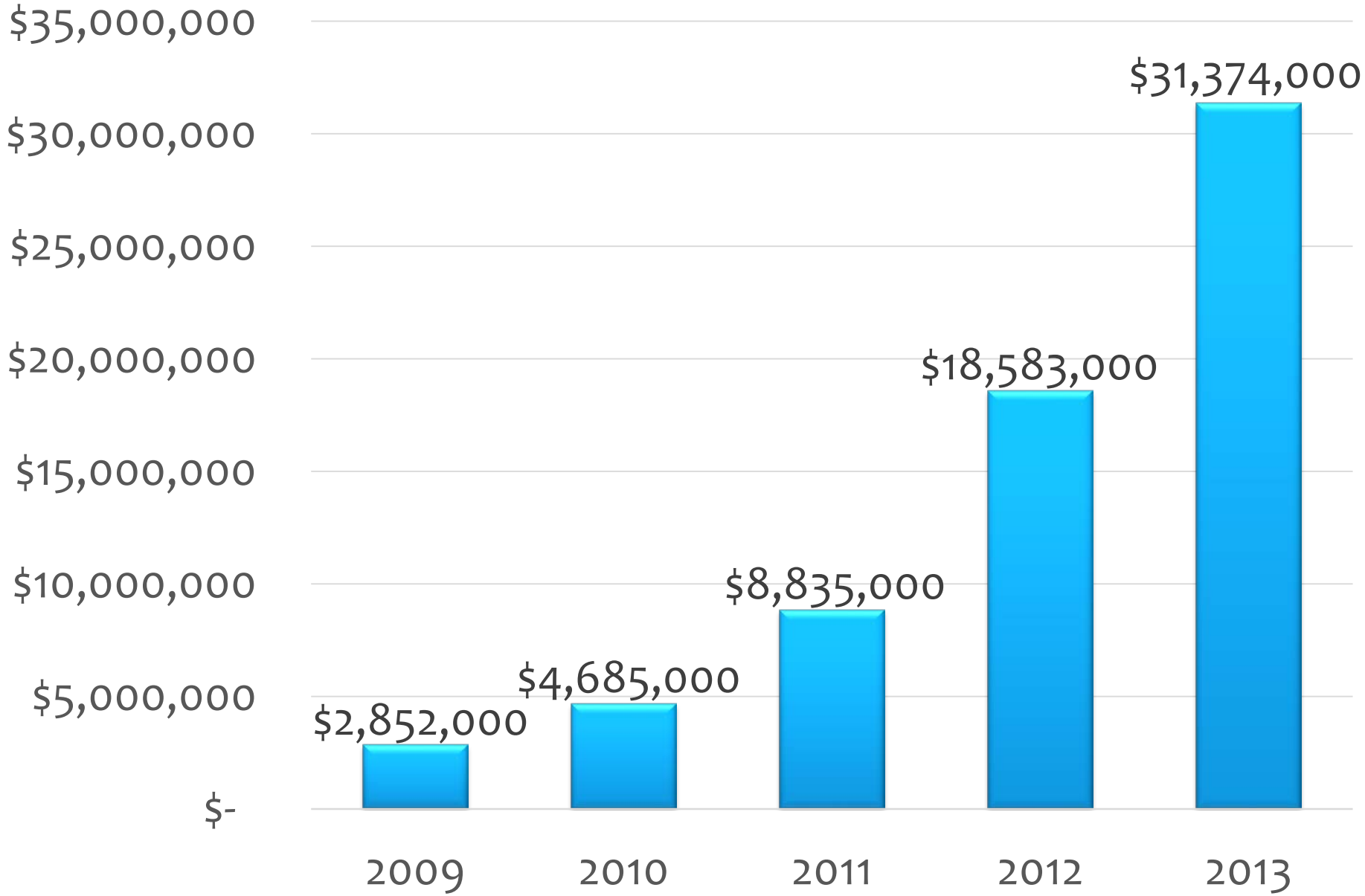
Irrigation Water Management Details

* Electronic Flow Meters
* Centralized Data Collection and Monitoring
* Remote Controls on Pumps

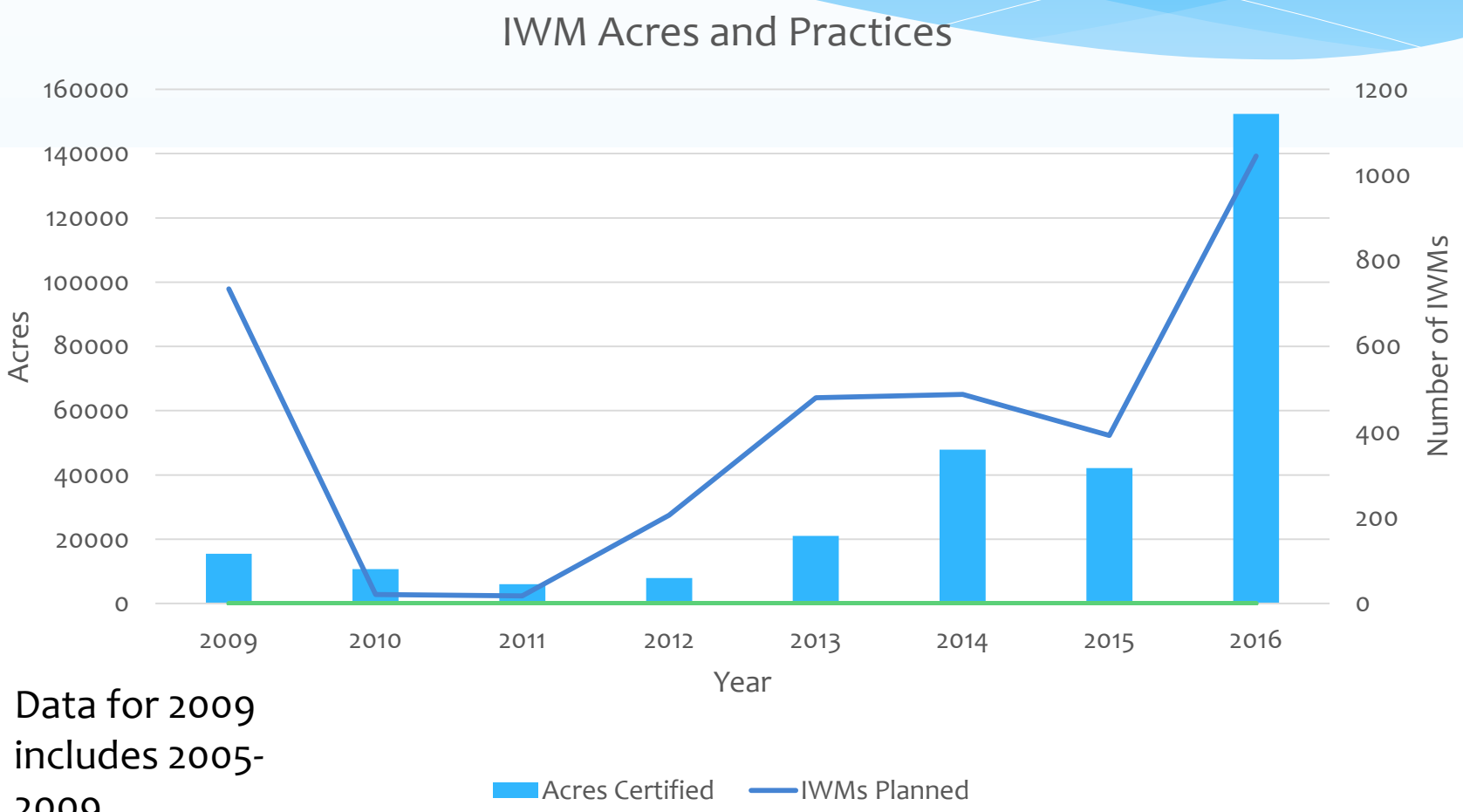
Activities and Funding

* General Environmental Quality Incentives Program (EQIP)
* Mississippi River Basin Initiative (MRBI)
* Regional Conservationist Partnership Program
* Climate Smart Initiative

Irrigation Practice Funding

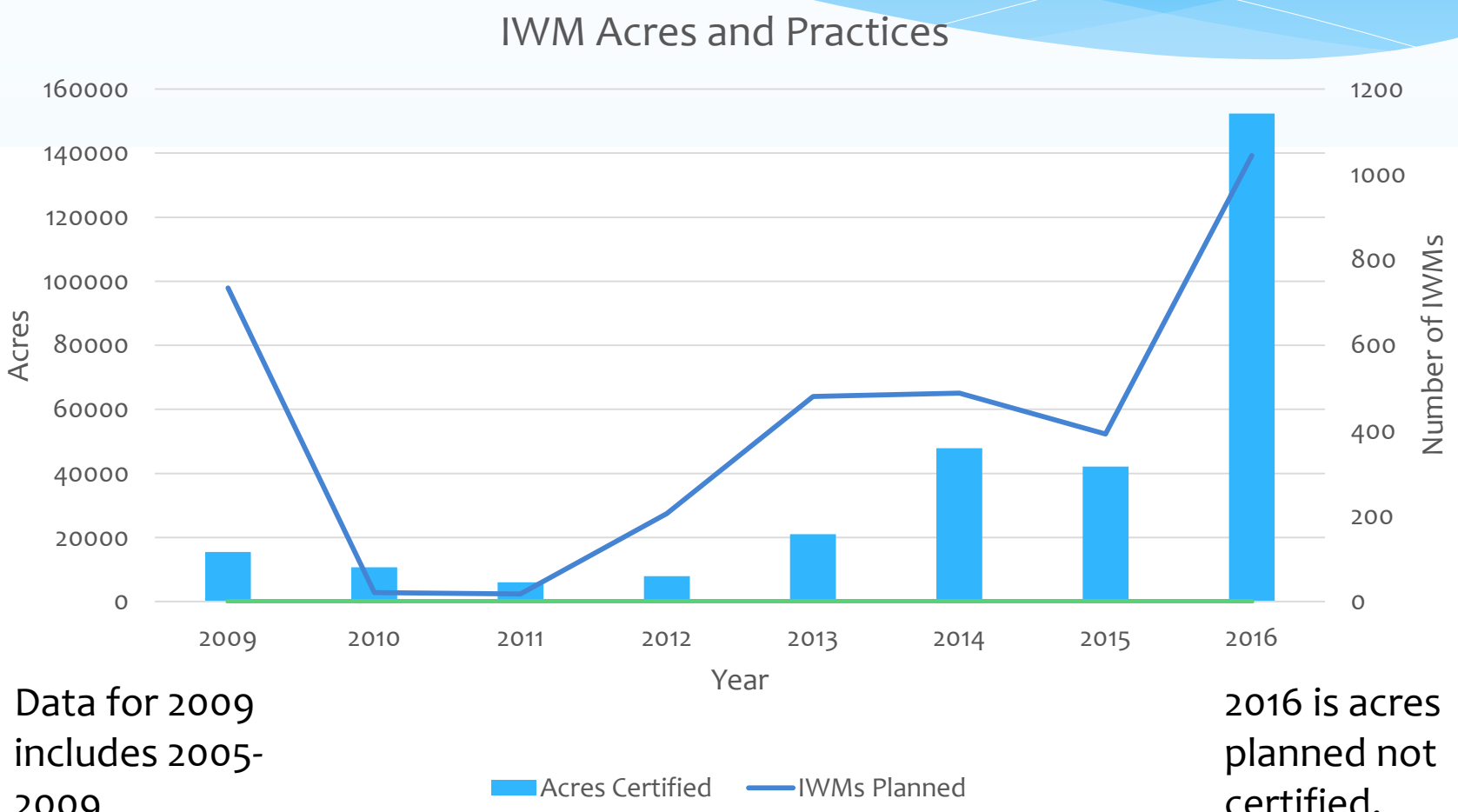


Overall EQIP IWM



Data for 2009 includes 2005-2009

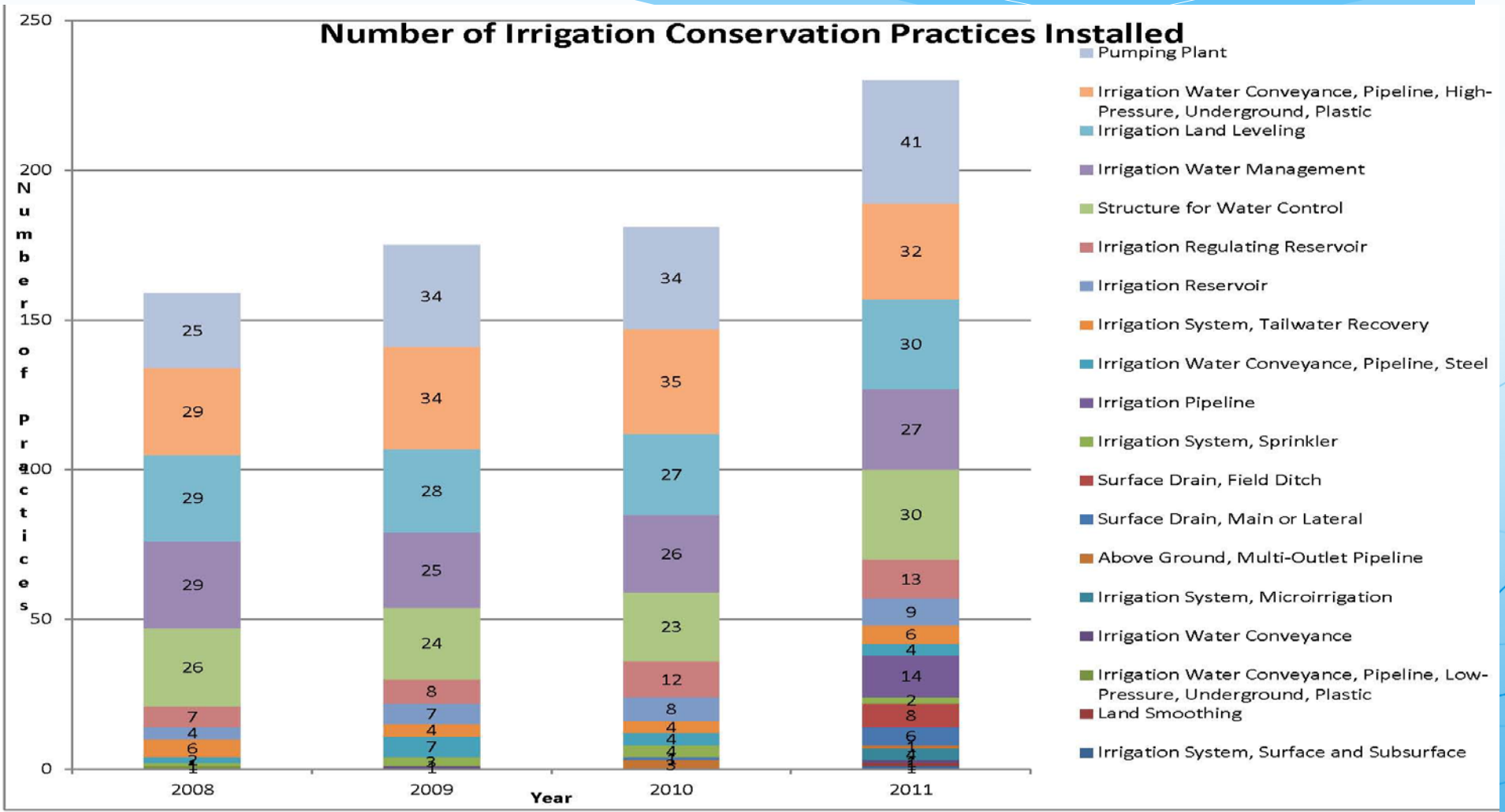
Overall EQIP IWM



Data for 2009 includes 2005-2009

2016 is acres planned not certified.

Irrigation Practices Installed Using NRCS Programs




MORRIS FARM
Established 1892
The Arkansas Rice Industry Began on this Farm
1897 – W. H. Fuller, Brother in Law of John Morris, 3
led.
1901 – John Morris, 30 acres failed.
1902 – John Morris, 5 acres yielded 320 bushels.
1903 – Emma Mor
ons Elmer and Mir
ded 904 bushels
1904 – W.H. Fuller,
Oldest family owned r

Morris Farm Success Story

* Morris Farm produced the first rice crop in the state in 1902 in Lonoke Co.
* 1320 acres of irrigated rice, corn, and soybeans
* 1 well and 1, 50 acre reservoir supply water
* EQIP funding completed the conversion to surface water.
* Practices included pumps, pipeline, water control structures and irrigation storage reservoir.

RCPP

* Rice Stewardship RCPP
  * USA Rice and Ducks Unlimited
  * Focused on Management Practices
  * 188 IWM Plans for approximately $900,000
  * Funded additional Technical Assistance

Climate Smart

* USDA Secretary of Agriculture, Tom Vilsack's Climate Smart Agriculture and Forestry Initiative
* $2.5 M to Arkansas through EQIP
* Three building blocks
  * Soil Health (reduced tillage, cover crops)
  * Nitrogen Stewardship (Nutrient Management)
  * Irrigation Water Management (Alternative Wetting and Drying)

Climate Smart

* Approximately 8% of agricultural production of GHG is linked to rice production.
* Typical Rice production has continuously flooded paddies. This flood produces anaerobic conditions which causes methane gas to form.
* An alternative to a continuously flooded rice is to stop irrigating for a time to allow a portion of the field to dry to a muddy condition. This allows the top few inches of the soil to become aerobic which prevents methane from forming.
* This method of irrigation water management is called alternative wetting and drying or intermittent flooding.

Climate Smart

* AWD has the added benefit of reducing the amount of overall water used and reduced energy cost by timely capture of seasonal rainfall.

* AWD is a Win-Win-Win. Reduced cost for farmer, reduced water use, and reduced Green House Gas production.

Isbell Farms

* Isbell Farms produced rice for the last 55 years.
* All land is zero grade and most has used alternative wetting and drying.
* AWD is an accepted protocol for carbon trading.

Additional Technical Assistance

* Agreement with ANRC to hire 1 Irrigation Specialist and 4 Technicians
* Technicians have been trained
* Met with 141 farmers
* Assisted with 210 IWM Plans for 33,400 acres of irrigated cropland

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Arkansas Conservation Partnership

NRCS Natural Resources Conservation Service

ARKANSAS NATURAL RESOURCES COMMISSION

AACD

RC&D

UNIVERSITY OF ARKANSAS PINE BLUFF
Education with a Personal Touch

ARKANSAS FORESTRY COMMISSION

UofA UNIVERSITY OF ARKANSAS DIVISION OF AGRICULTURE

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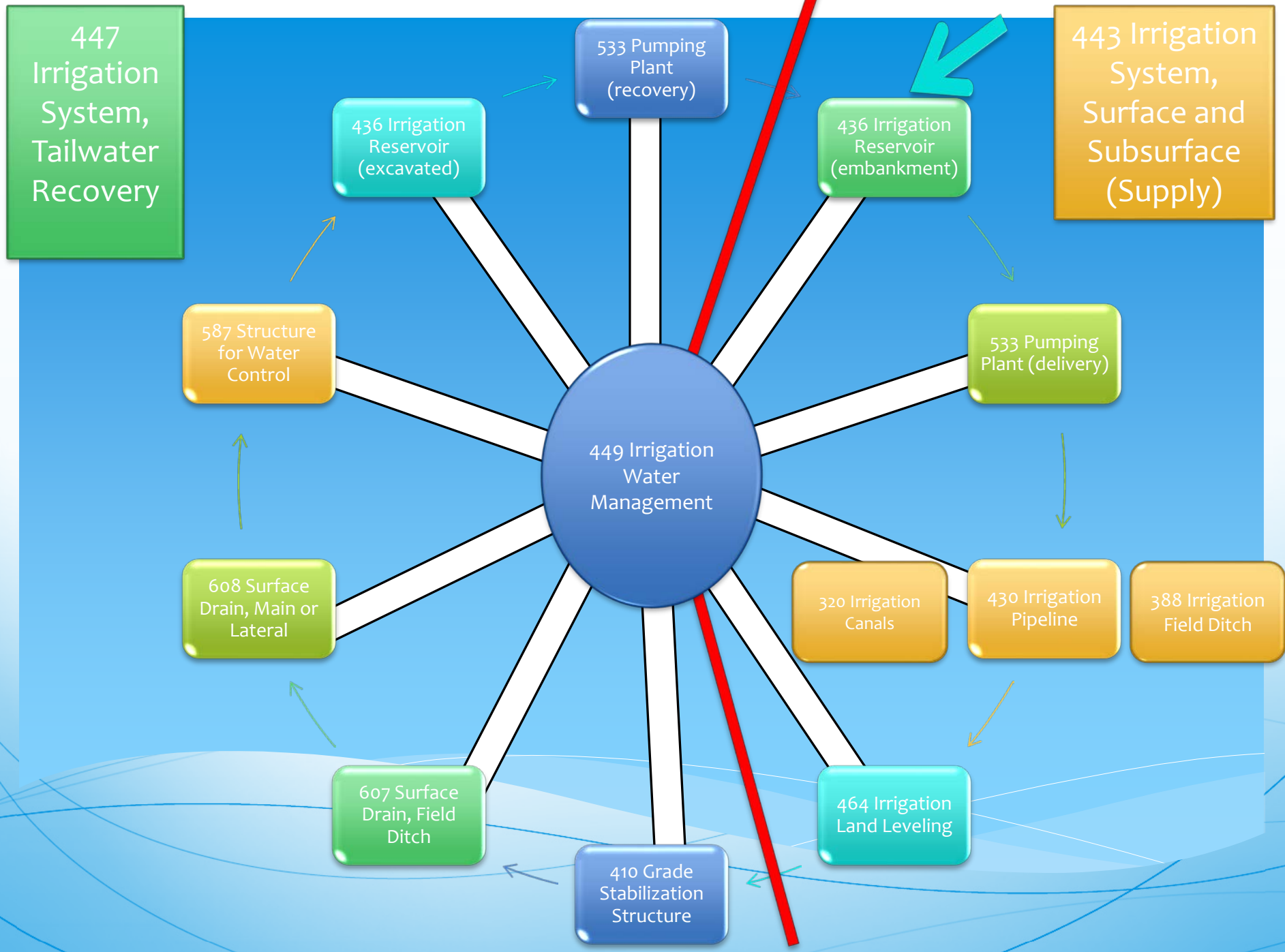
Benefits to Water Quality

* Every drop of water which does not runoff is a drop which does not carry nutrients and sediment.
* Tailwater Recovery Systems can equal 100% capture.
* Land leveling has been shown to decrease erosion by 60%
* Grade stabilization structures drop the water from the field into the reservoir and prevent erosion.

Other Benefits

* Energy – reduced lift
* Wildlife – maintain water for waterfowl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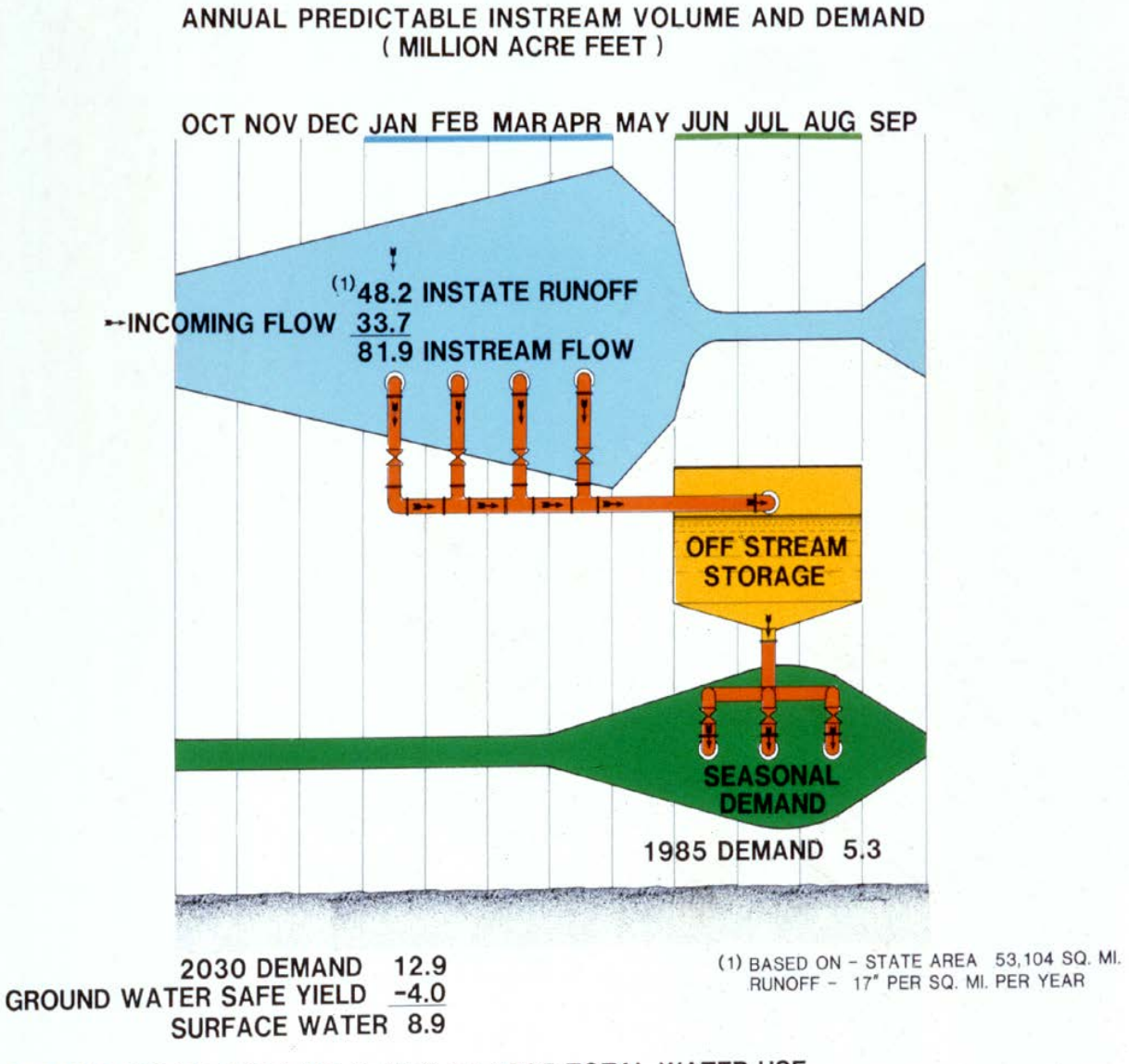
436 – Irrigation Reservoirs CPS

* Purpose
  * Store water
  * Improve Water Use Efficiency on irrigated land
  * Provide storage for tailwater recovery and reuse
  * Provide irrigation runoff retention time to increase breakdown of chemical contaminants
  * Reduce energy use



Significant amounts of water runs off or is wasted.

Let's store the runoff from during the non-growing season and use it during the summer.

How Much Surface Water Must We Use

* Sustainable use is 42%
* Increase delivery efficiency by 25%
* Leaves 33 % for surface water.
* In some cases, wells are dry and we need 100% surface water.

Rules of Thumb Numbers

* There is 17” per acre of runoff available to be captured.
* Plan for about 8” of surface water captured.
* Plan for 25%-50% of water supplied through tail water recovery

Quick Calculation of Water Needs

* Current Year's Crop Rotation
  * 160 ac of Rice
  * 120 ac of Soybeans

  * 160 ac * 30 in = 4800 ac in or 400 ac ft
  * 120 ac * 13.7 in (just use 14 in) = 1680 ac in or 140 ac ft
  * 540 ac ft of water for the growing season

Determine How Big of Reservoir Could be built for tail water recovery?

* 400 acre drainage area
* 8” x 400 acres / 12” per foot
* 267 Ac-Ft
* Assume 8 foot deep
* 267/8 = 33 acres

How many acres can I water from a 40 acre reservoir?

* Assume a Rice and Bean rotation
* 40 acres x 8 ft deep = 320 Ac.Ft.
* 30” of water needed for Rice
* 14” of water needed for Beans
* Avg = 22 inches per acre
* 320 Ac.Ft. x 12 inches/ft /22 inches = 175 acres.

How many acres can I water from a 40 acre reservoir?

* A real rough estimate is surface acres x 4

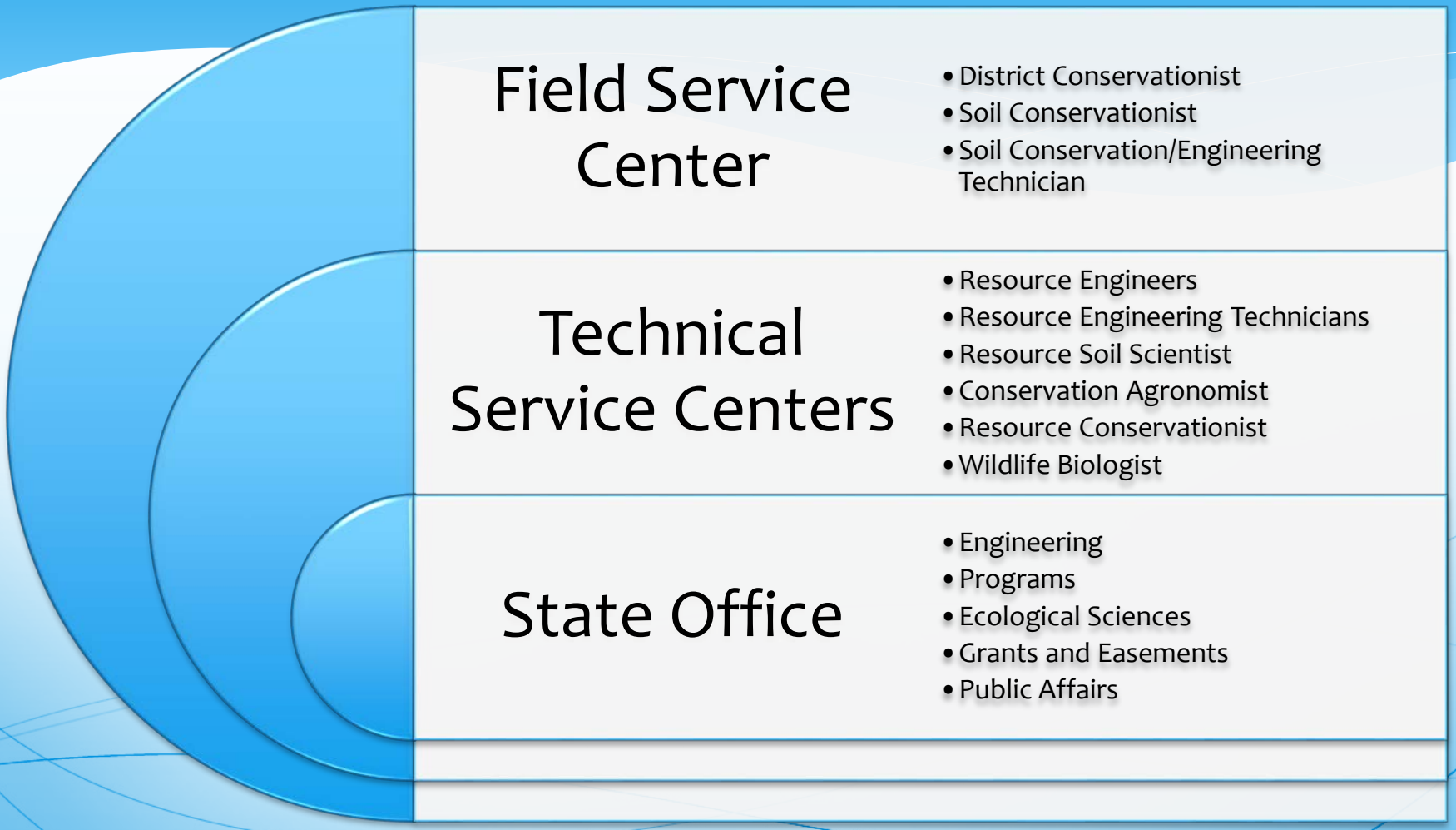
The real question is probably how many acres can you get the farmer to give up.

Water Quality Benefits Related to Irrigation Practices

SCS became the Natural Resources Conservation Service (NRCS) in 1994

- Soil Quality
- Water Quantity
- Water Quality
- Air Quality
- Plant Condition
- Fish and Wildlife
- Domestic Animals
- Energy

Technical Assistance



Programs that have impacted Water Quantity and Water Quality

* Environmental Quality Incentives Program
* Mississippi River Basin Initiative

Conclusion

* Water Conservation in irrigation will positively impact water quantity and water quality.
* Irrigated agriculture can be sustainable through conservation and use of additional surface water.

Mississippi River Valley Alluvial Aquifer

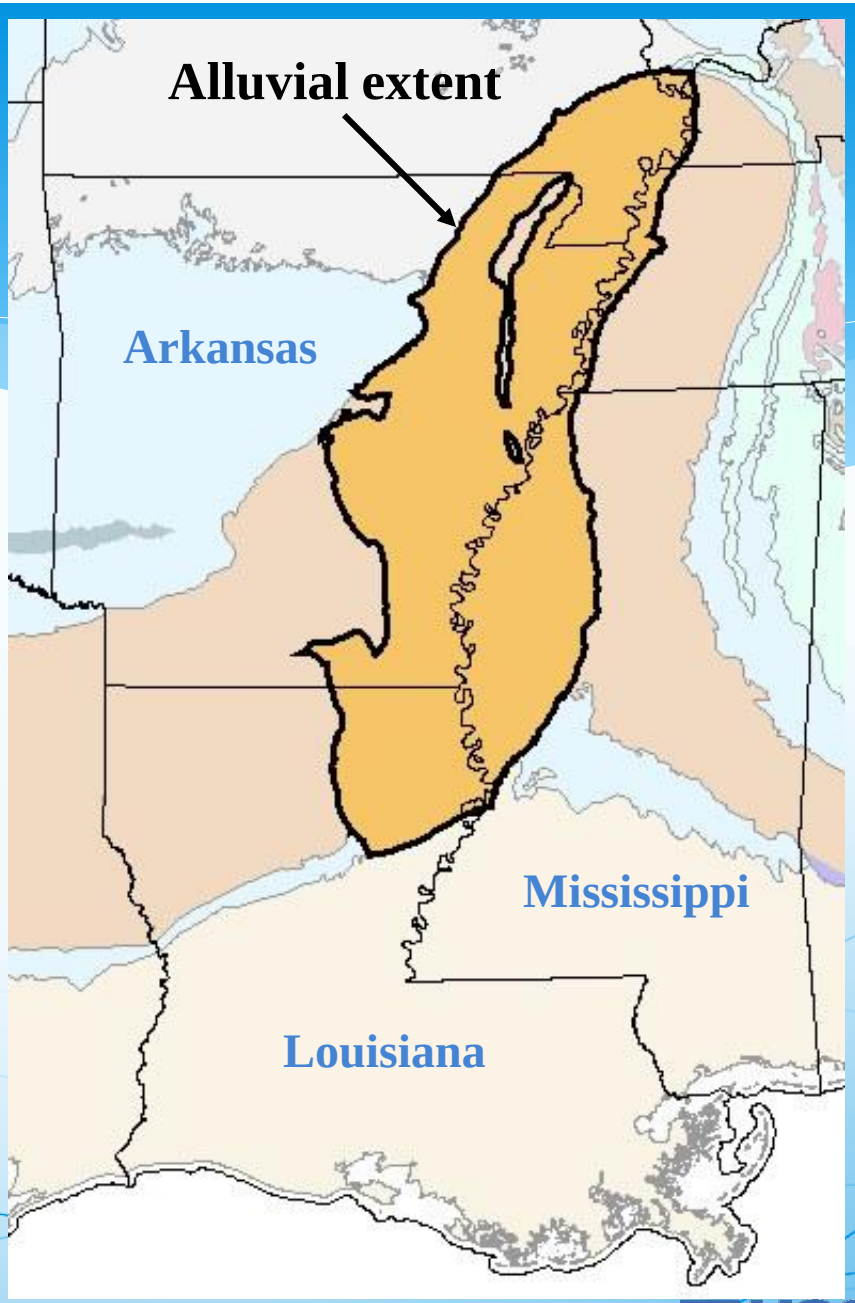
Wells 50-150 ft deep,

300-2,500 gpm production

sand and gravel composition

7,049 MGD withdraw annually

Only 42.4% is sustainable



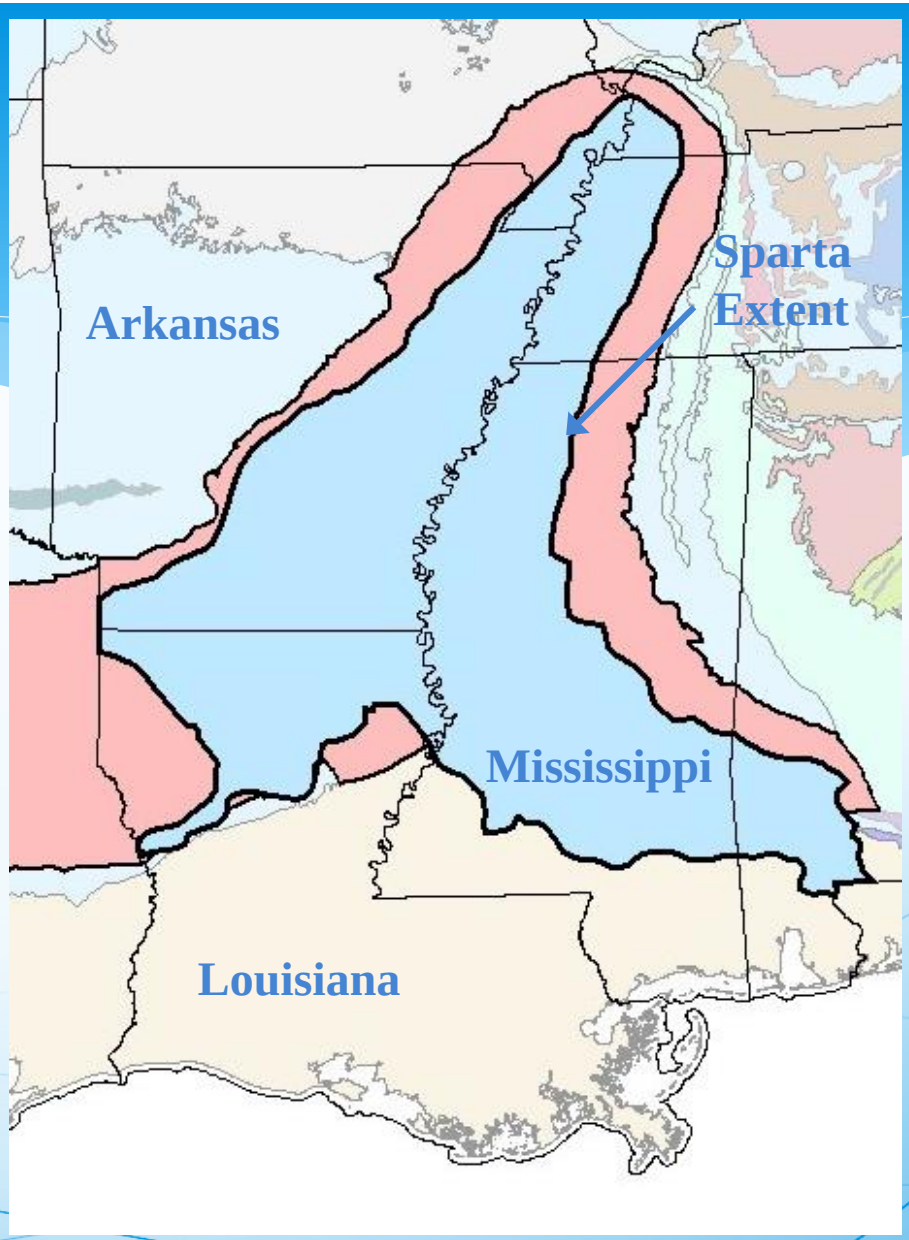
USGS
science for a changing world

Sparta/Memphis Aquifer

100-1,000 feet deep
100-500 gpm
Sand, silt and clay composition

187 MGD withdrawn annually

Only 46.5% is sustainable



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Irrigated Agriculture's Impact on Water

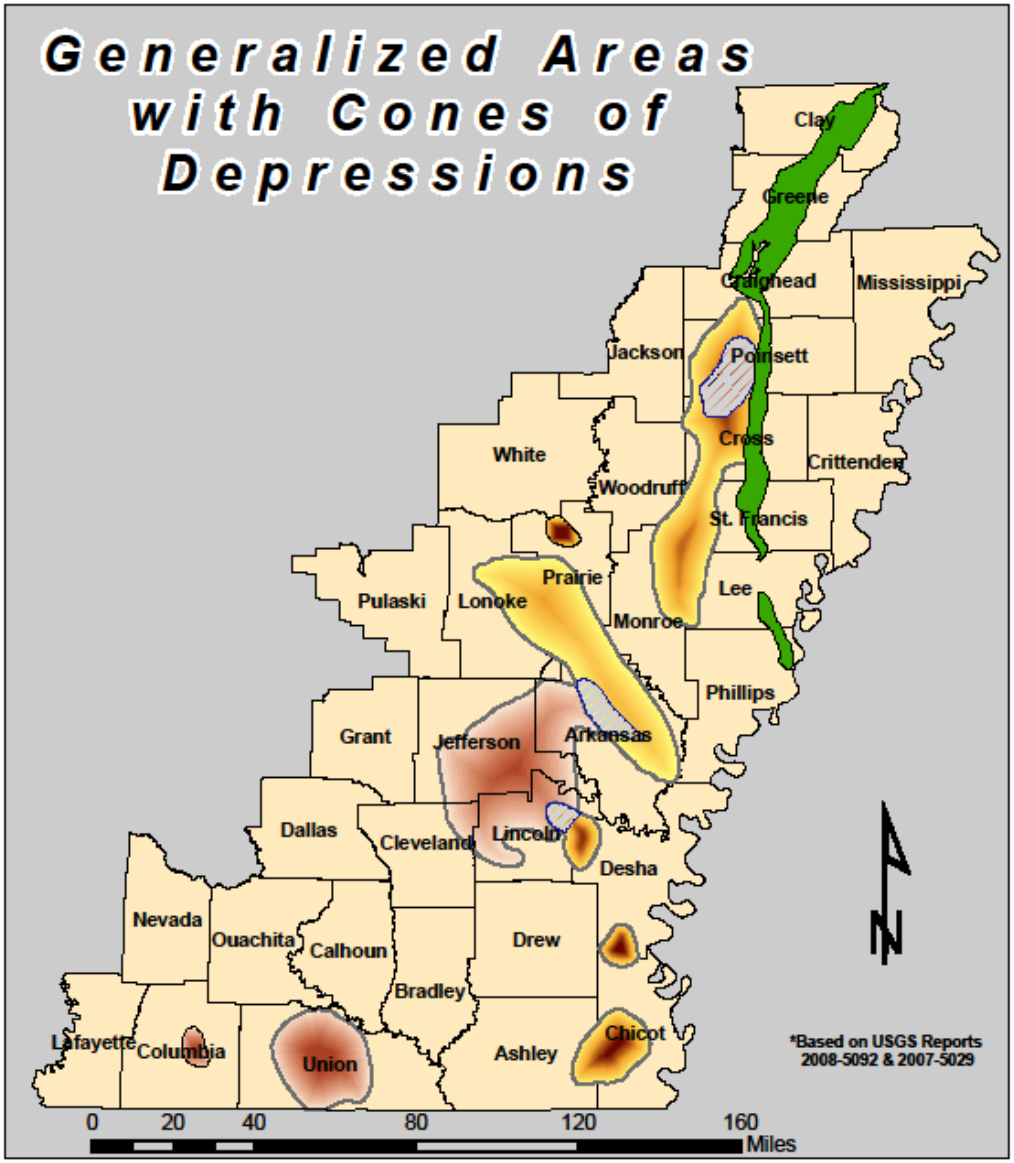


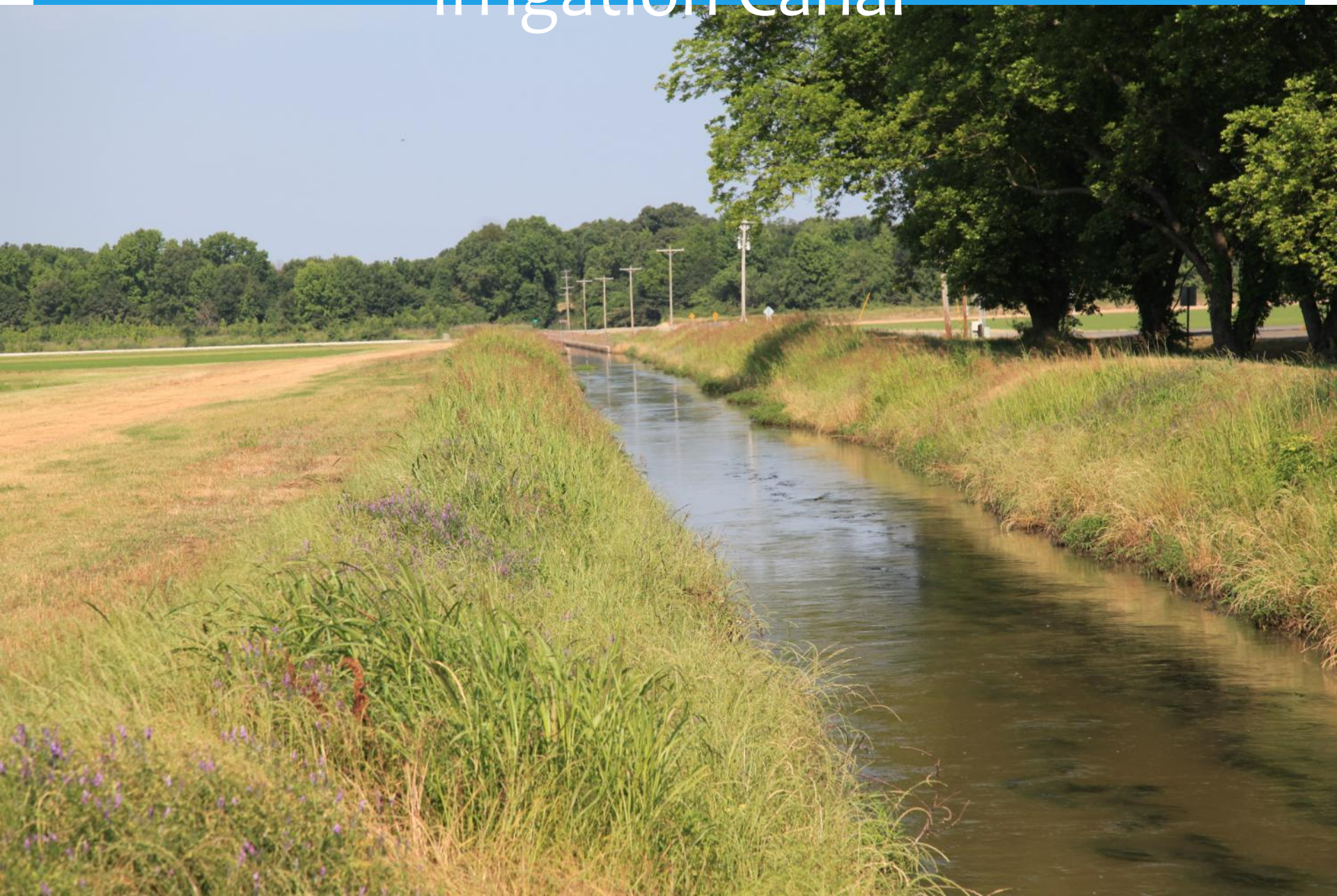
Fig. 2

Pumping Plants in Point Remove

Galla Creek Intake Canal

Irrigation Canal

Irrigation Canal



Pumping Plant

Discharge to a Land Leveled Rice Field