The Benefits and Potential for Well Fields in the Mississippi Delta
Location: Mississippi Delta

• Mississippi Delta Consists of roughly 4.2 million acres within the Mississippi River Valley Alluvial Aquifer (MRVA)
• The 2012 Census of Agriculture data states there are 2.9 million acres of harvested cropland in the Mississippi Delta
• Approximately 1.9 million acres are irrigated
Location: Mississippi Delta

- Agriculture industry is an integral part of the Mississippi Delta Region Economy
- Water Resources are a critical part of the agriculture industry
Fall 2014
Mississippi Delta
Groundwater Levels

• Elevation shown in MSL
• Based on YMD Water Level Survey Data
• In recent decades, withdrawals from the MRVA have exceeded the aquifers natural ability to recharge, as a result there have been significant declines in groundwater levels in the MS Delta.
Hydrograph of a YMD Water Level Survey Well in the Central Delta

Sunflower - L027

Water Level Elevation (MSL)

WL Decline: 21.5 ft
1990-2012

Date

The Problem

- Net cumulative overdraft is estimated to be approximately 6.3 million acre-feet
- Approximately 70% of this cumulative deficit has occurred in the past ten years
- Annual average overdraft rate over the last decade is an estimated 400,000 acre-feet
The Problem

- Approximately 95% of irrigation used in the Mississippi Delta comes from groundwater out of the MRVA.
- Demand for irrigation in the Mississippi Delta is steadily increasing, between 2008 and 2014, irrigated acres have expanded at an average rate of more than 30,000 acres annually.
Steps Toward Developing Sustainable Water Resources

**Conservation**

- Develop and adopt conservation methods that increase irrigation efficiency and conserve groundwater resources

**New Water Supplies**

- Develop innovative systems that will increase surface water availability for agriculture water supplies
New Water Supplies

**Basin Transfers**

- Transferring water from basins with adequate water supplies to basins with inadequate water supplies

**Well Fields**

- A well field is a group of water wells installed in close proximity to one another for the purpose of irrigation supply and/or to augment stream flow for environmental or aesthetic purposes
Well Fields

Objectives

• Provide a reliable source of surface water for producers to utilize in the central delta using groundwater recharged by the Mississippi River

• Increase flows in streams and channels to improve and sustain aquatic ecosystems as well as improve aesthetics during times of low flow

• Cause no adverse affects at pumping site
Well Fields

Obstacles

• Landowner acceptance
  Well fields require specific locations coupled with willing landowners in order to be successful

• Inexpensive groundwater
  With relatively low groundwater lift distances across the Mississippi Delta Region, irrigation using groundwater is at present a relatively inexpensive reliable method

  Without reliable and consistent sources, surface water availability can be unreliable and subsequently underutilized
Friars Point Well Field

- Constructed in 2005
- 11 Groundwater Well network that pump Mississippi River recharged groundwater through underground pipe or using direct discharge into open channels which then flow into the Sunflower River
- Used nearly every year to maintain minimum stream flows in the Sunflower River to improve water quality, to protect fisheries and wildlife, and improve aesthetics in downtown Clarksdale, MS.
Friars Point Well Field

• Groundwater is first pumped into Long Lake in Coahoma County and then released by a manually operated water control structure
• Water then flows through an existing channel that joins Mill Creek
• Mill Creek joins the Sunflower River north of Clarksdale, MS
• Prior to 2005, groundwater was added to the Sunflower River from wells located in Clarksdale
Friars Point Well Field

- Sunflower River conditions are monitored daily using on-line sources for stage and flow at the towns of Clarksdale, Merigold, and Sunflower.
- “Low” flow is operationally defined as when stream flow is reduced to 50 cubic feet per second (cfs) at the town of Sunflower.
- 1 cfs = 450 gallons per minute.
Friars Point Well Field

- Typically, low flows begin in early fall after irrigation has ceased and when rainfall is minimal
- Operation of two or more wells is required most years, with a typical combined run time of about five weeks
- In 2014, operation of the well field was initiated on October 1 and stopped on October 13 when rainfall raised the river flow above 50 cfs
Big Sunflower River at Sunflower
Annual Minimum Flow

Minimum Annual Flow

Year

cfs

Potential for Additional Well Fields

- At certain locations along the Mississippi River, the aquifer and the river are connected hydro-geologically. This is apparent because the water level of wells rise and fall in concert with the height of the Mississippi River.
Potential for Additional Well Fields

• Since 2012, YMD has monitored water table depths in 45 wells at seven potential well field sites along the Mississippi River to determine the extent of the Mississippi River’s influence on the MRVA aquifer.

• Data will help identify favorable sites for well field locations.
Potential for Additional Well Fields

**Bogue Phalia**

- The Bogue Phalia watershed is approximately 370,332 acres in size
- 206,386 Groundwater irrigated acres
- Headwaters adjacent to the MS River Levee
- Offers great opportunity for well field
Questions?