

# WATER QUALITY, WATER QUANTITY AND CLIMATE CHANGE

JERI FLEMING



# WHISKEY IS FOR DRINKING; WATER IS FOR FIGHTING

- ◆ Chinatown

- ◆ 1974 about the Owens Valley water wars (sort of)

- ◆ Rango

- ◆ 2011 animated film about drought and greed

- ◆ “Water, mr. Rango, water. Without it, there's nothing but dust and decay. But with water, there's life... That's the immutable law of the desert. You control the water, and you control everything...”



# WHISKEY IS FOR DRINKING; WATER IS FOR FIGHTING

## 💧 Power v. People (1892)

- 💧 At issue control of irrigation ditch
- 💧 Ditch built by baer through power's land
- 💧 Powers (bother & sister) wanted some water rights
- 💧 Power killed mr. Baer
- 💧 Tried for murder and found guilty
- 💧 Appealed
- 💧 Holding – human blood is more precious than water, even in this thirsty land

# WATER MEASUREMENTS

- ◆ Acre-foot = 1 foot of water covering 1 acre of land
  - ◆ Approx. 325,851 gallons
- ◆ Cubic foot per second (cfs)
  - ◆ 1 cfs = 646,317 gallons per day or 1.98 acre-feet per day
- ◆ 1 million gallons per day (mgd)
  - ◆ Equals 1.55 cfs or 3.07 acre-feet per day



**Figure 5-19 - Estimated Average Annual Streamflow in 2060**

**Estimated 2060 Streamflow  
Average Annual in 2060 (AFY)**

- 5,600 - 25,000
- >25,000 - 100,000
- >100,000 - 250,000
- >250,000 - 1,000,000
- >1,000,000 - 2,500,000
- >2,500,000

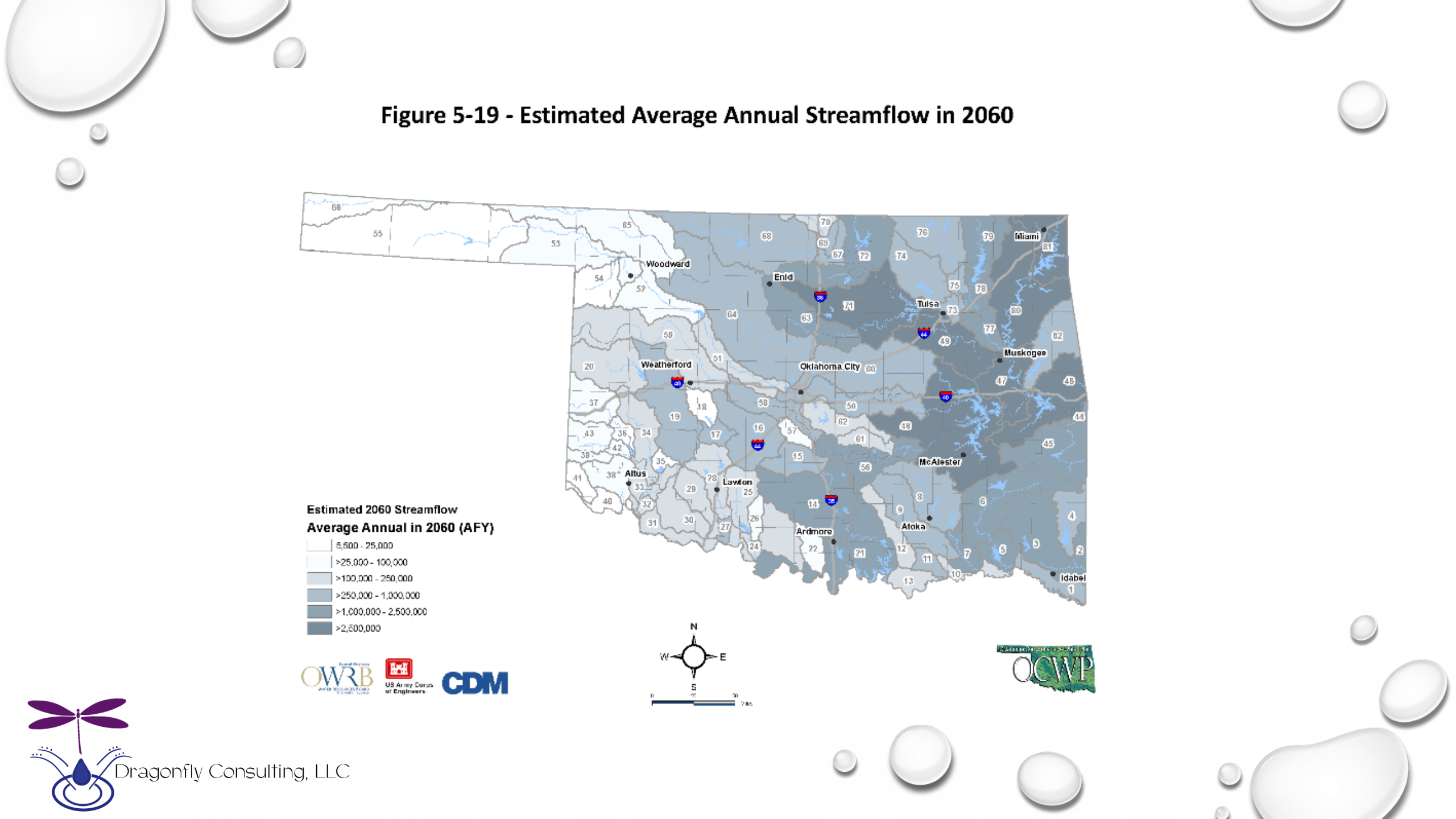
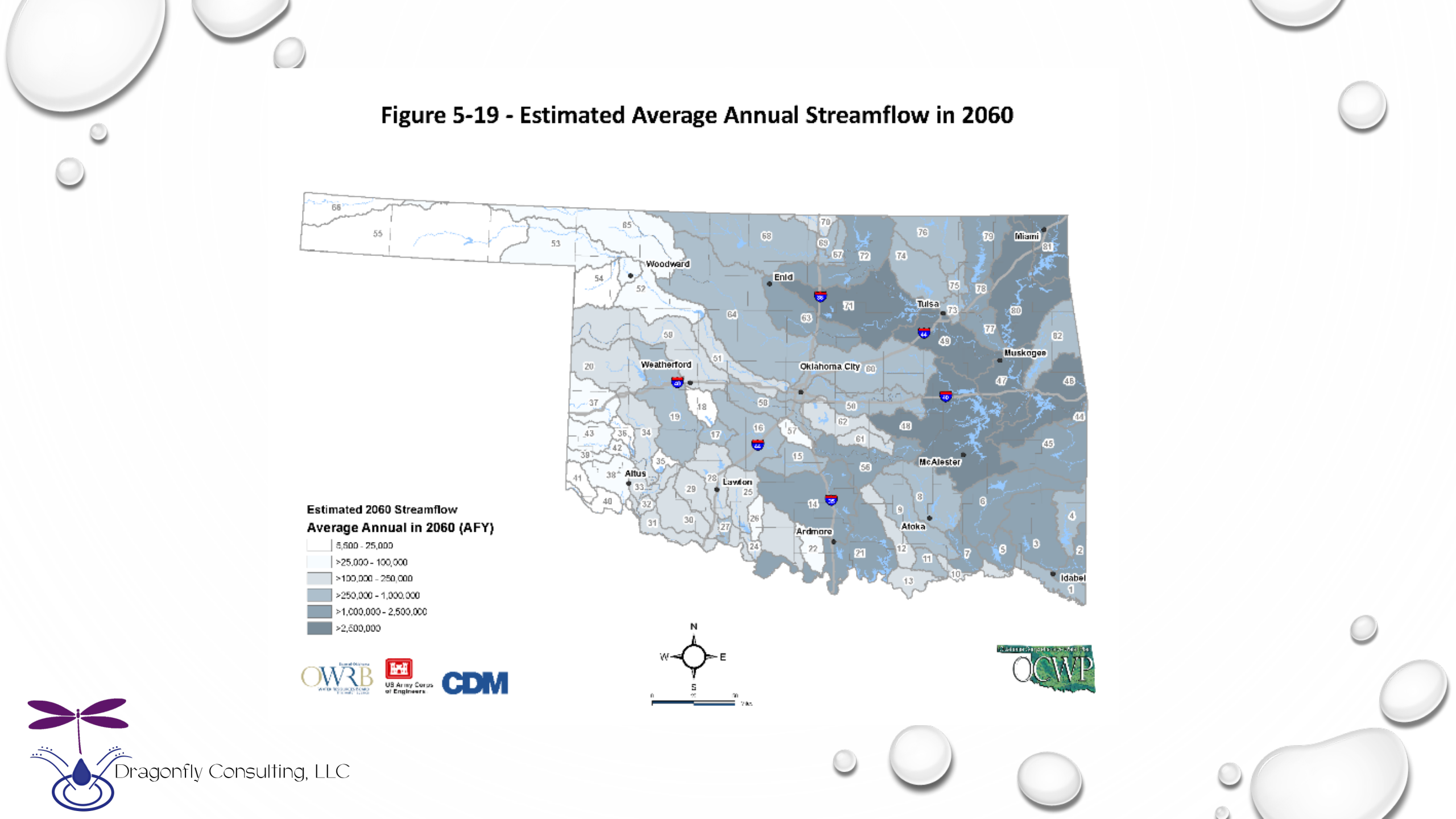
OWRB  
OKLAHOMA WATER RESOURCES BOARD

US Army Corps of Engineers

CDM

OCWP  
OKLAHOMA COUNCIL ON WATER POLICY

Dragonfly Consulting, LLC



**Figure 5-19 - Estimated Average Annual Streamflow in 2060**

**Estimated 2060 Streamflow  
Average Annual in 2060 (AFY)**

5,600 - 25,000
>25,000 - 100,000
>100,000 - 250,000
>250,000 - 1,000,000
>1,000,000 - 2,500,000
>2,500,000

OWRB  
OKLAHOMA WATER RESOURCES BOARD

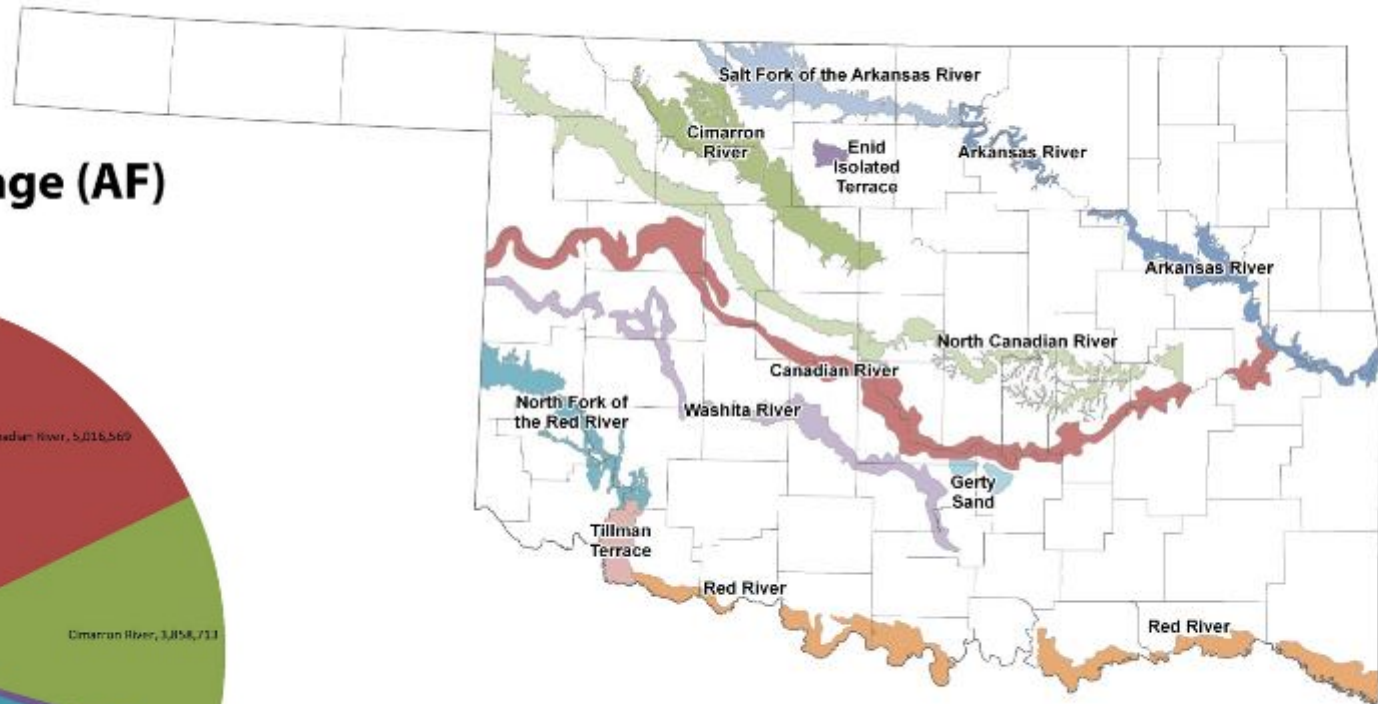
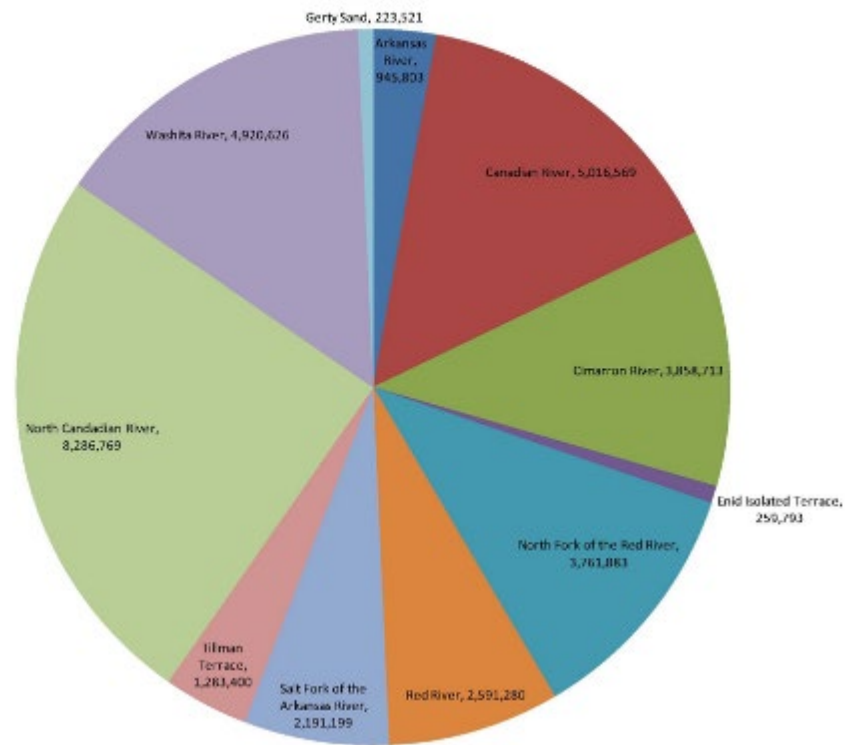
US Army Corps of Engineers

CDM

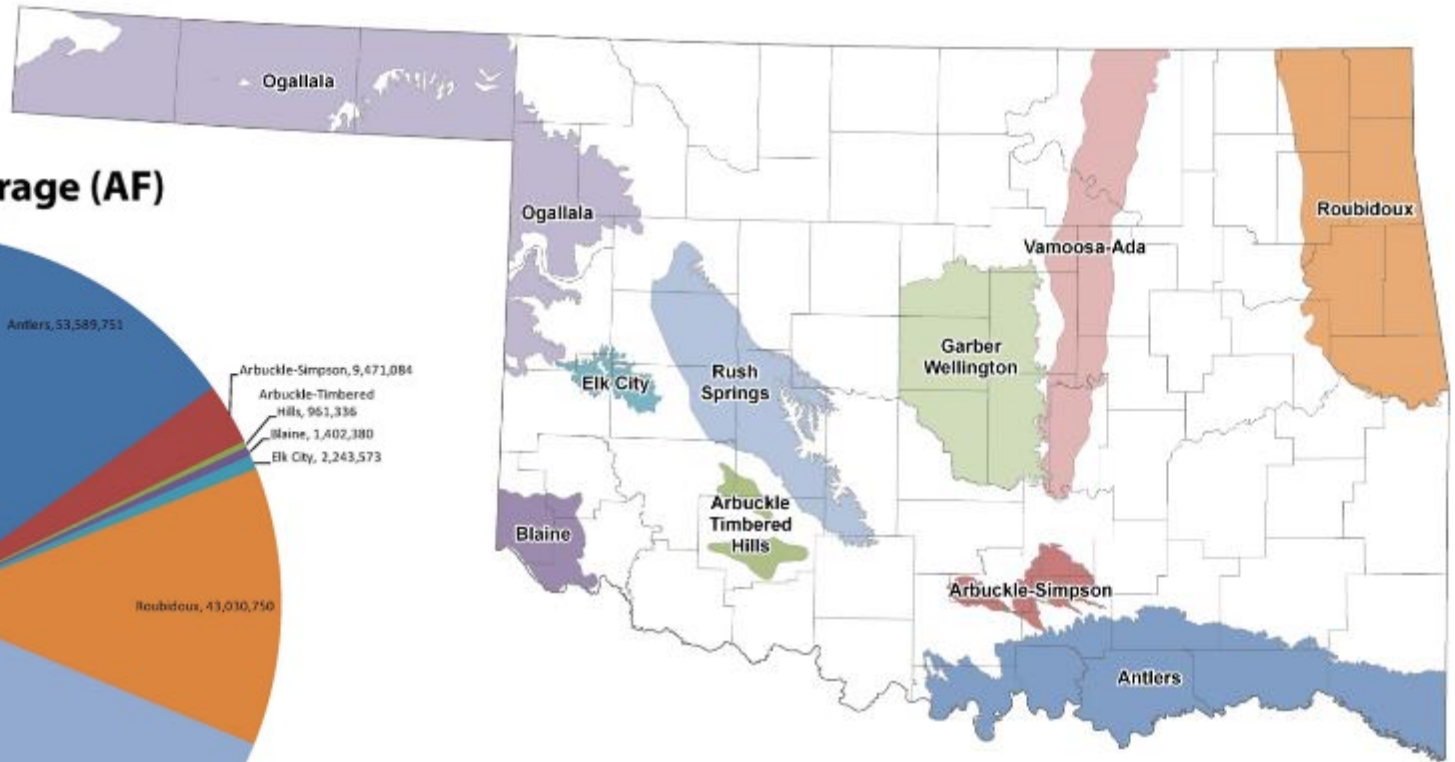
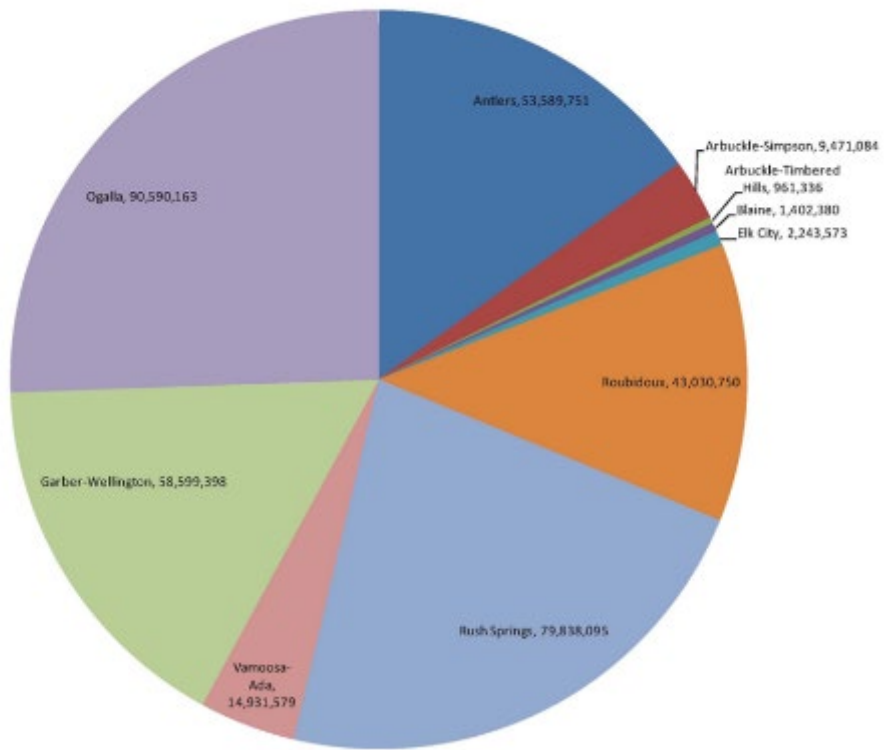
OCWP  
OKLAHOMA COUNCIL ON WATER POLICY

Dragonfly Consulting, LLC

## Estimated Total Storage (AF)



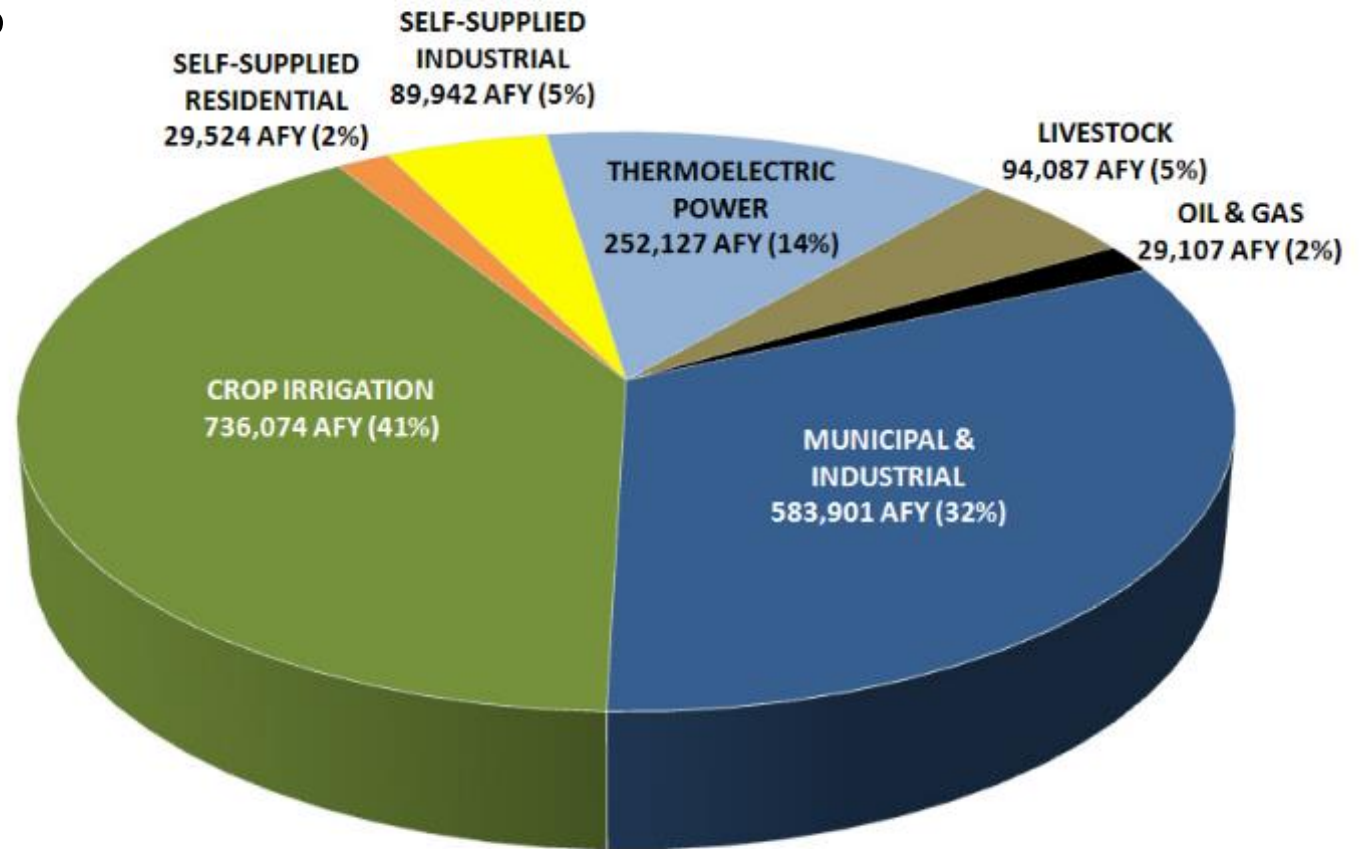
## Estimated Total Storage (AF)



# WATER USES

## 💧 CONSUMPTIVE USES

### 2007 Statewide Water Demands



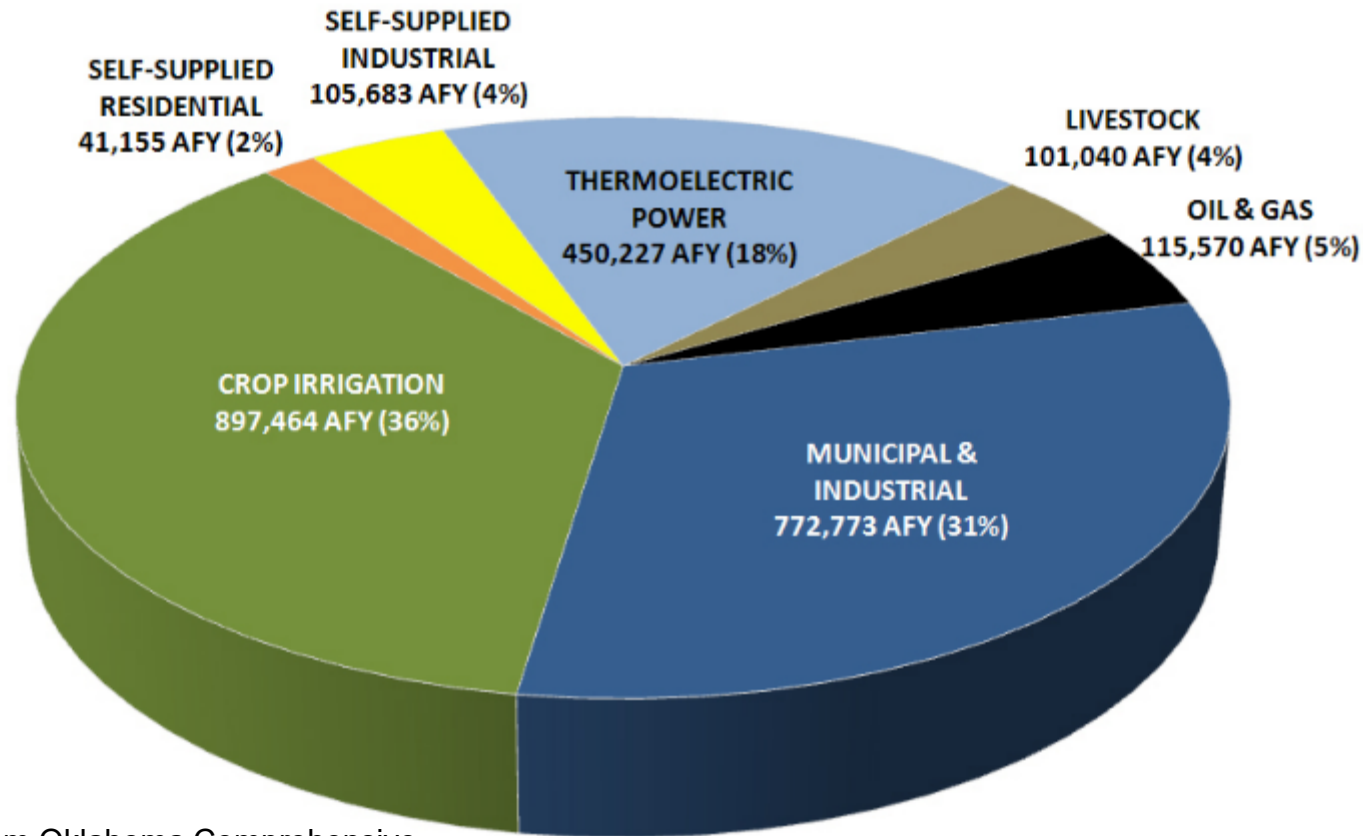
**TOTAL WATER DEMAND = 1,814,762 Acre-Feet/Year**



From Oklahoma Comprehensive  
Water Plan

Dragonfly Consulting, LLC

## 2060 Projected Statewide Water Demands



From Oklahoma Comprehensive  
Water Plan

**TOTAL PROJECTED WATER DEMAND = 2,483,912 Acre-Feet/Year**



Dragonfly Consulting, LLC

# WATER USES

## 💧 Non-consumptive uses

- 💧 Recreation (boating, fishing, swimming, etc.)
- 💧 Tourism
- 💧 Environmental flows
- 💧 Navigation
- 💧 Hydropower?

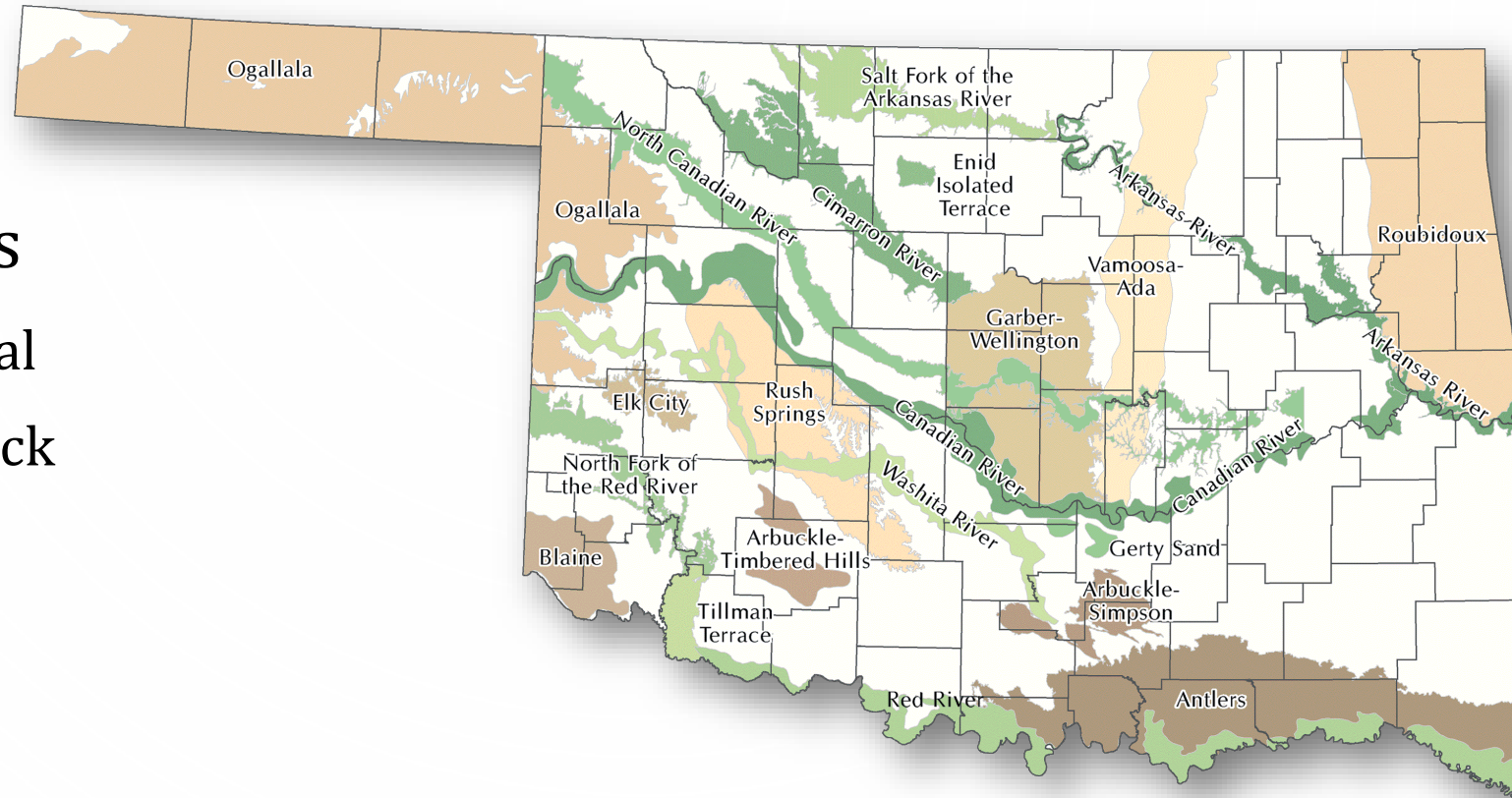


# WATER SUPPLIES

## 💧 Aquifers

💧 Alluvial

💧 Bedrock



Dragonfly Consulting, LLC

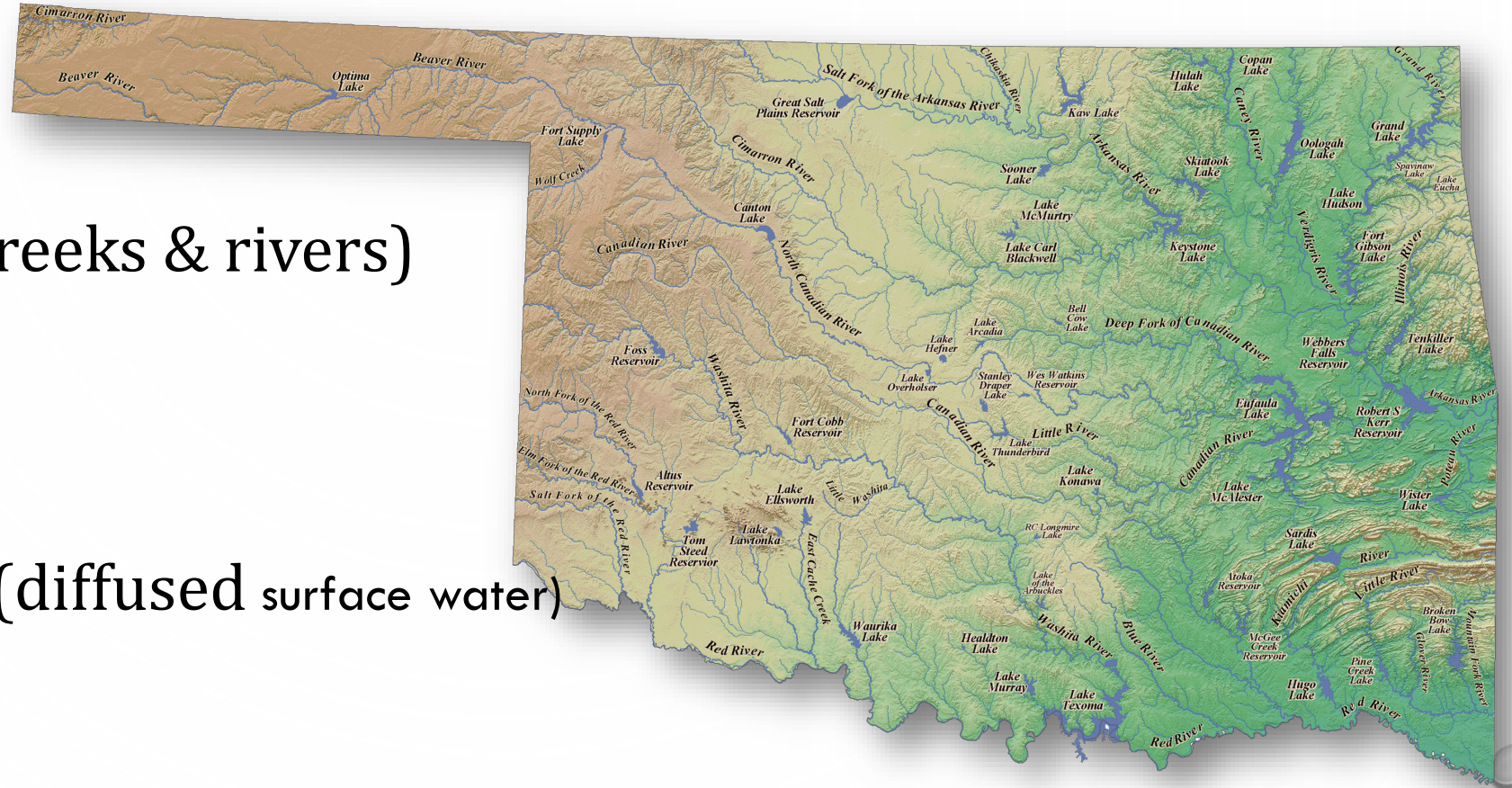
💧 Surface water

💧 Streams (creeks & rivers)

💧 Lakes

💧 Ponds

💧 Sheetflow (diffused surface water)



Dragonfly Consulting, LLC

# WHAT IS CHANGING

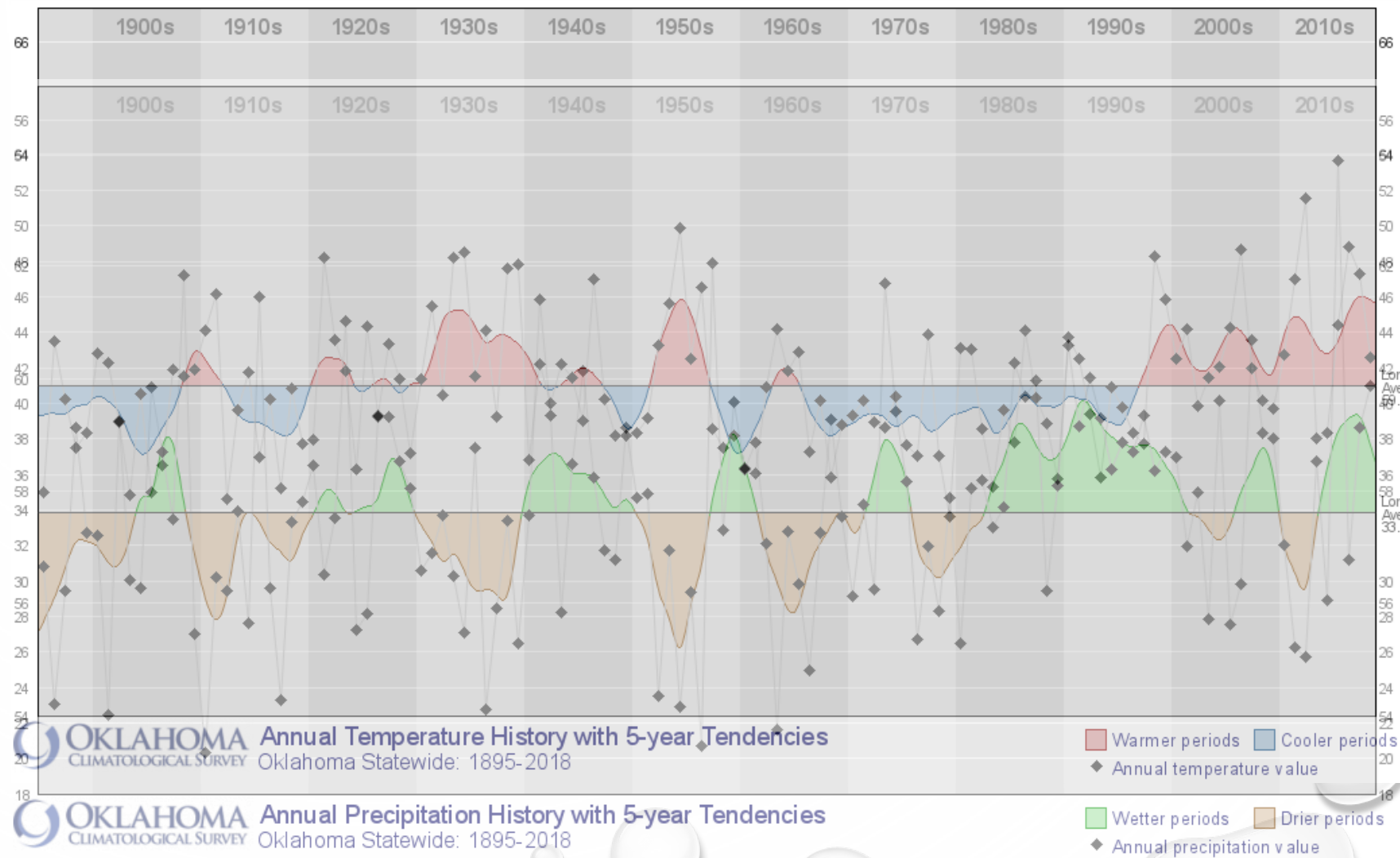


Dragonfly Consulting, LLC

# WHAT IS CHANGING

💧 TEMPERATURE

💧 RAINFALL



Dragonfly Consulting, LLC

# IMPACTS TO WATER QUALITY

## Nonpoint source pollution

- Largest uncontrolled source of water pollution
  - Include diffused sources like urban and irrigation runoff, surface mining and construction sites
- Pollutants include
  - Sediment
  - Bacteria
  - Oil and grease
  - Nutrients
  - Trash
  - Animal waste
  - Salt



# IMPACTS TO WATER QUALITY

## Changes that can affect water quality

- Land use changes
- Land management
- Amount of rainfall
- Timing of rainfall
- Education

## Climate variability can result in

- Lower dissolved oxygen
- Increased pathogens/nutrients
- Increase in invasive species
- Increase algal blooms
- Loss/change in aquatic species



<http://www.videezy.com>>Videezy.com</a>



# IMPACTS TO WATER QUANTITY



[www.wildlifedepartment.com](http://www.wildlifedepartment.com)



[ticker.mesonet.org](http://ticker.mesonet.org)



Dragonfly Consulting, LLC

# IMPACTS TO WATER QUANTITY

- 💧 Supply vs demand
- 💧 Water quality
- 💧 Consumptive vs non-consumptive
- 💧 Increased evapotranspiration
- 💧 Increased flooding
- 💧 Infrastructure needs/maintenance



Brandonrush

# THINGS TO THINK ABOUT

## 💧 Land use practices

- 💧 Agriculture

- 💧 Urban

## 💧 Water supply

## 💧 Water needs

## 💧 Water quality



USDA



# QUESTIONS

