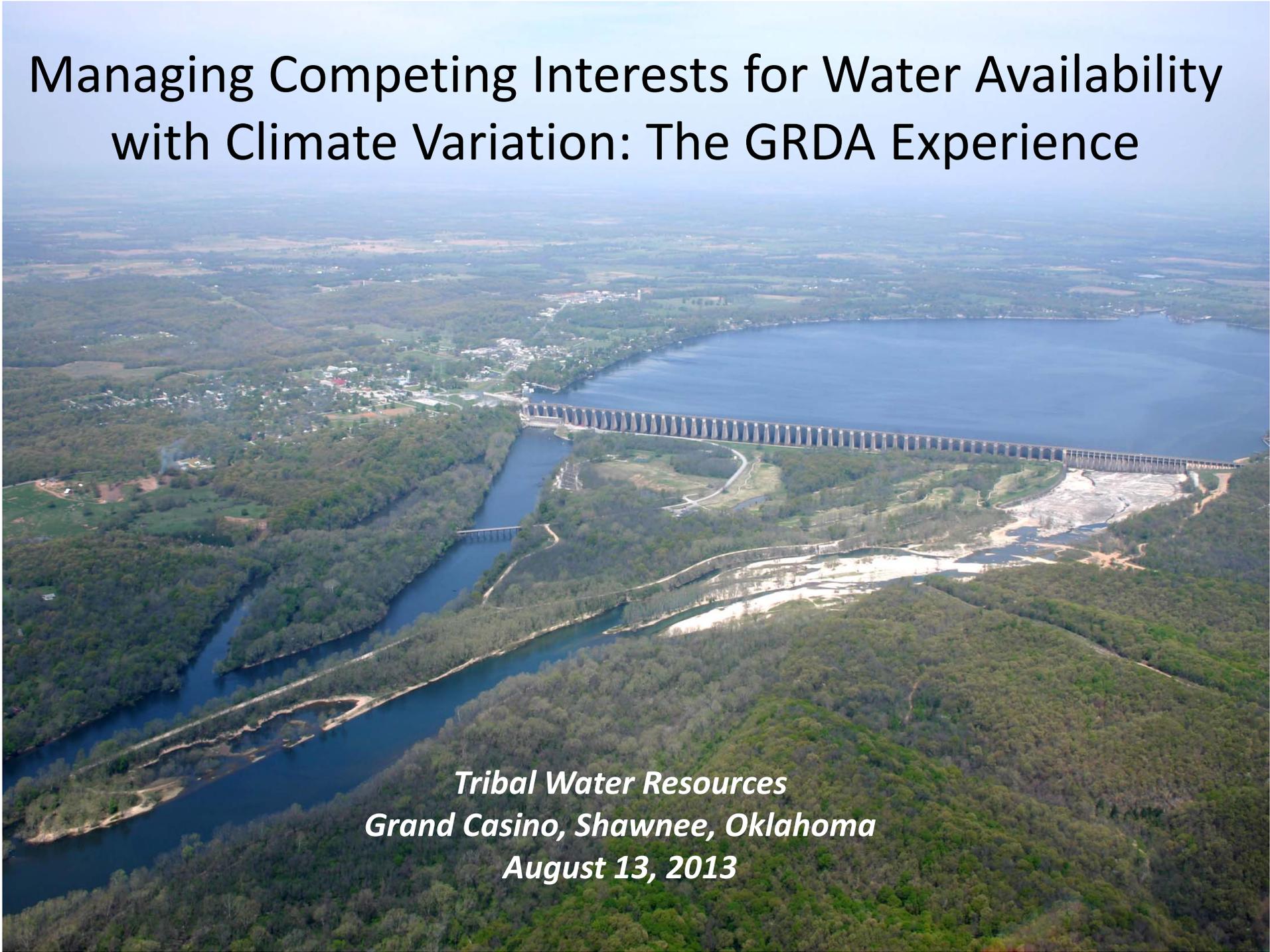


Managing Competing Interests for Water Availability with Climate Variation: The GRDA Experience

*Tribal Water Resources
Grand Casino, Shawnee, Oklahoma
August 13, 2013*



Topics of Discussion...

- What is GRDA...GRDA at a glance
- GRDA's Impact on Local Communities
- Watershed Challenges & Economic Benefits of Protecting Healthy Watersheds



GRDA at a glance ...



**Coal-Fired
Plant**
(812 MW)

**Redbud
Gas Plant**
(443 MW)



GRDA at a glance ...

- Nation's 20th largest public power utility*
- Built and manages Grand Lake,
Oklahoma's premier recreation destination.



Pensacola Dam
(120MW)

Constructed 1938-40 for \$28 million.

*Updated construction cost:
\$300+ million.*



Robert S. Kerr Dam
(114MW)

Constructed 1962-64 for \$40 million.

*Updated construction cost:
\$280+ million*



Salina Pumped Storage
(260MW)

Constructed 1968-72 for \$30 million.

Updated construction cost: \$350+ million.

*by generation, American Public Power Association 2005-06 statistical report

ECONOMIC IMPACT OF THE GRAND RIVER DAM AUTHORITY

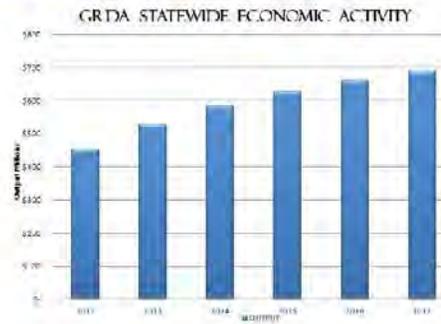
"Economic Impact of the Grand River Dam Authority"
 Published by the Oklahoma Department of Commerce, August 2012.

OKLAHOMA
 DEPARTMENT OF COMMERCE

ECONOMIC IMPACTS: \$453 MILLION DOLLARS

- Through Grand River Dam Authority's operations, the quality of life contributions of the Authority in local areas, the impacts of relatively low-cost power, tourism, and flood mitigation savings to the Grand River Dam Authority is estimated to contribute \$453 million of economic activity in Oklahoma in 2012.
- By 2017, the GRDA's contribution to the state's economy is projected to increase to \$500 million.
- Total capital expenditures in the state's economy, which include residential and industrial property, are projected to increase by \$82 million in 2012 as a result of the investments and the benefits of GRDA's activities in the state, such as tourism and the offering of lower-cost power.

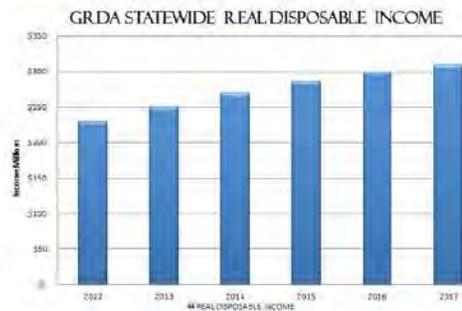
Economic Activity



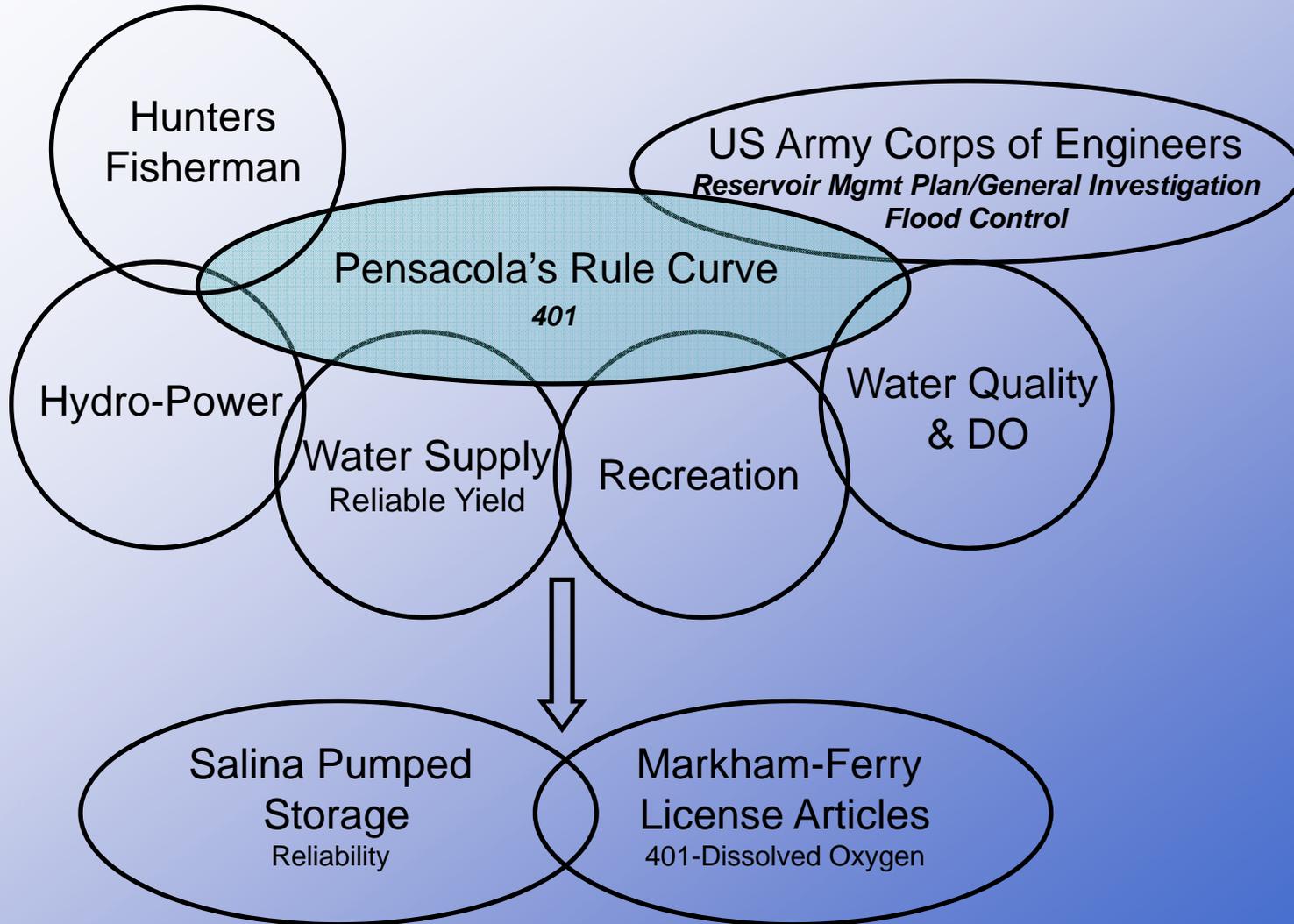
ECONOMIC IMPACTS: \$230 MILLION DOLLARS

- Through Grand River Dam Authority's operations, the quality of life contributions of the Authority in local areas, the impacts of relatively low-cost power, tourism, and flood mitigation savings to the Grand River Dam Authority is estimated to contribute \$230 million in real disposable income to Oklahoma's economy in 2012.
- By 2017, the economic impact of the Grand River Dam Authority is projected to increase to over \$300 million in real disposable income in the state.
- In 2012, the economic impact upon consumption tax revenue in the state is projected to be \$165 million. This impact is forecasted to increase to \$244 million by 2017.

Disposable Income



Competing Interests for Water



Grand Lake ...

Oklahoma's Premiere Recreational Destination...



...And At Times, Oklahoma's 3rd Largest City!!!

Grand Lake ...

Oklahoma's Premiere Recreational Destination...



...And At Times, Oklahoma's 3rd Largest City!!!

Grand Lake ...

Oklahoma's Premiere Recreational Destination...

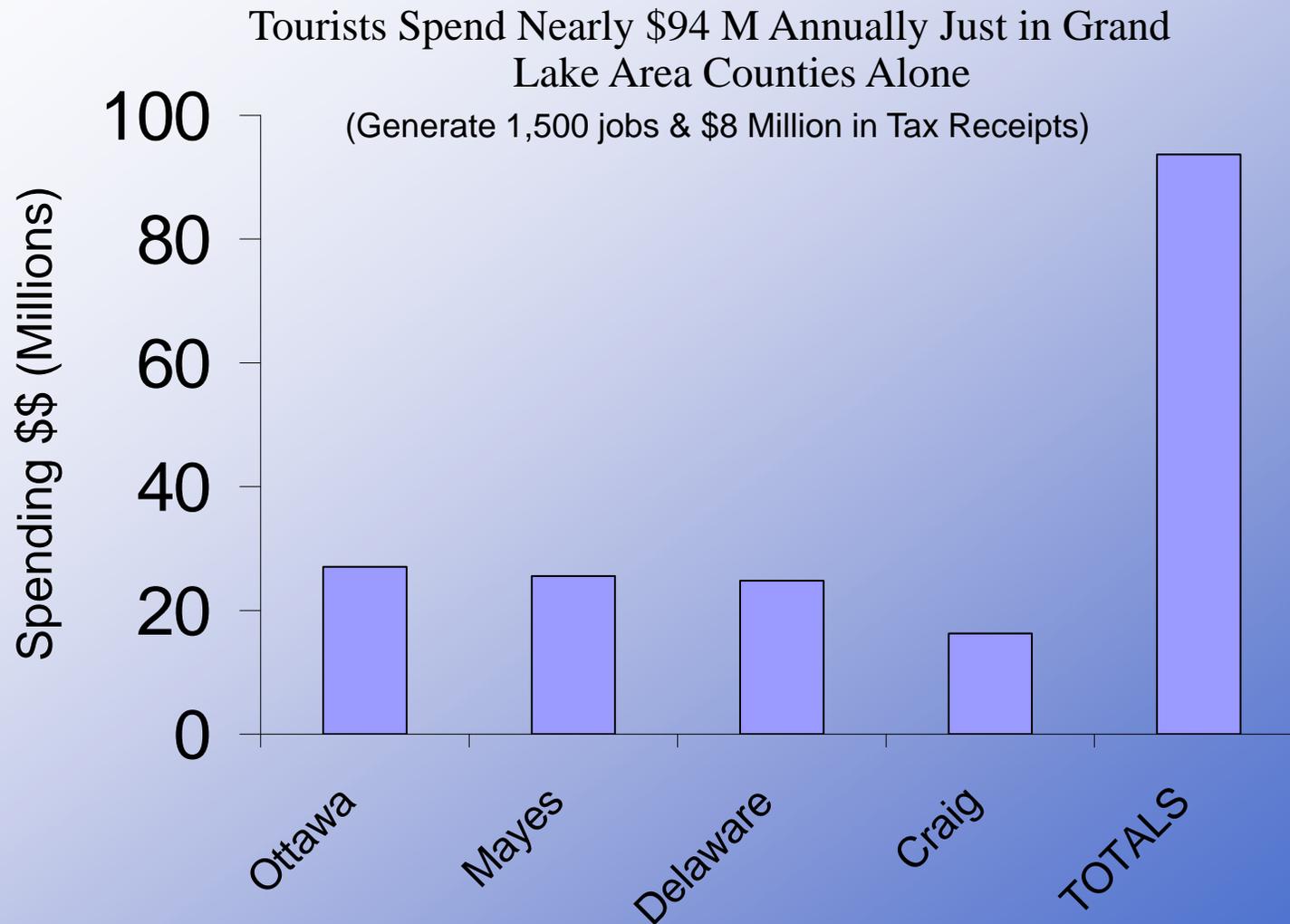
- **Basic Stats...**
 - 18,000 Waterfront Homes
 - >10,000 boat slips
 - 150 Commercial Marinas
 - Shoreline Property
 - >\$1,000/foot
 - Boat Fuel Taxes
 - > 50% from Grand Lake.



Grand Lake's development contributes to a broad tax base.

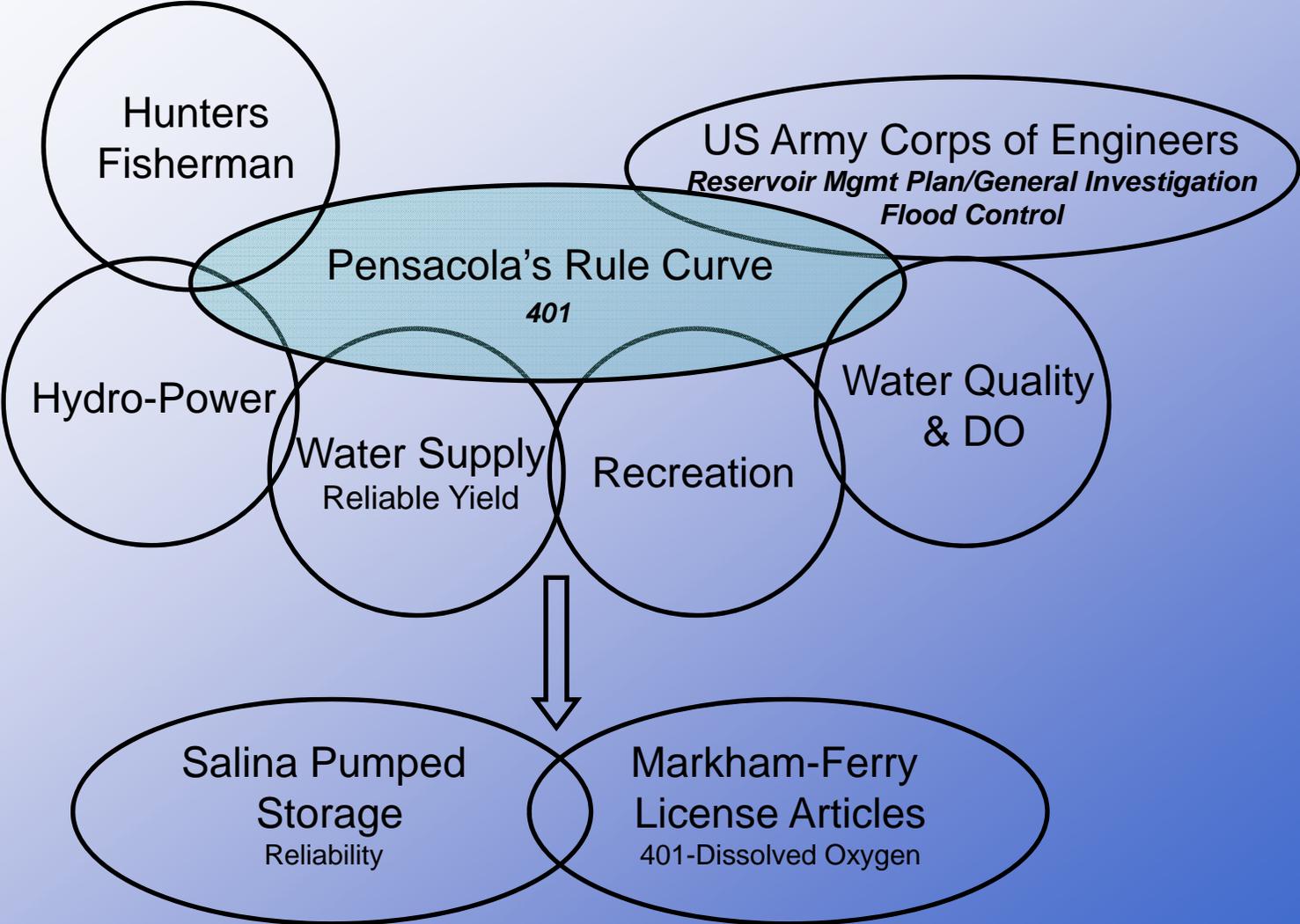
Tourism ...

Providing vital revenue for state, county and local communities...

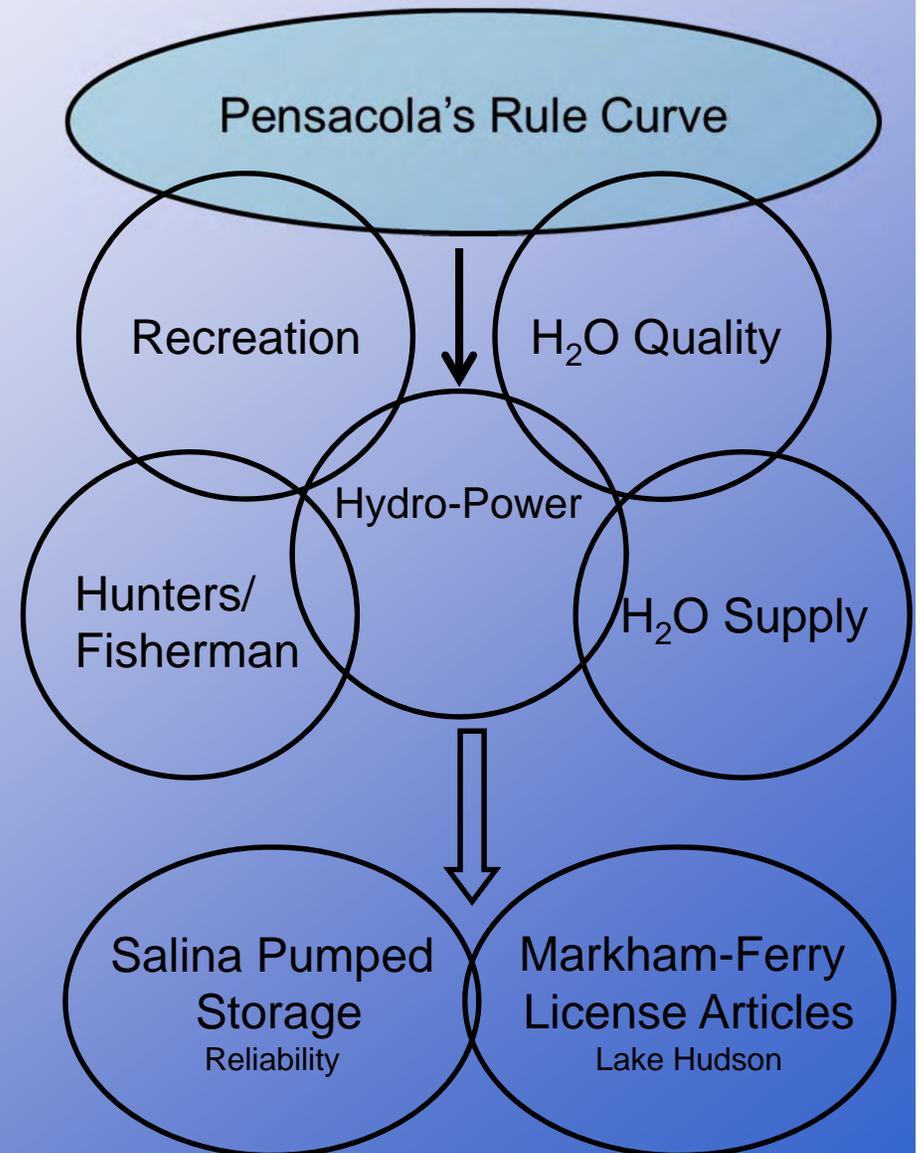
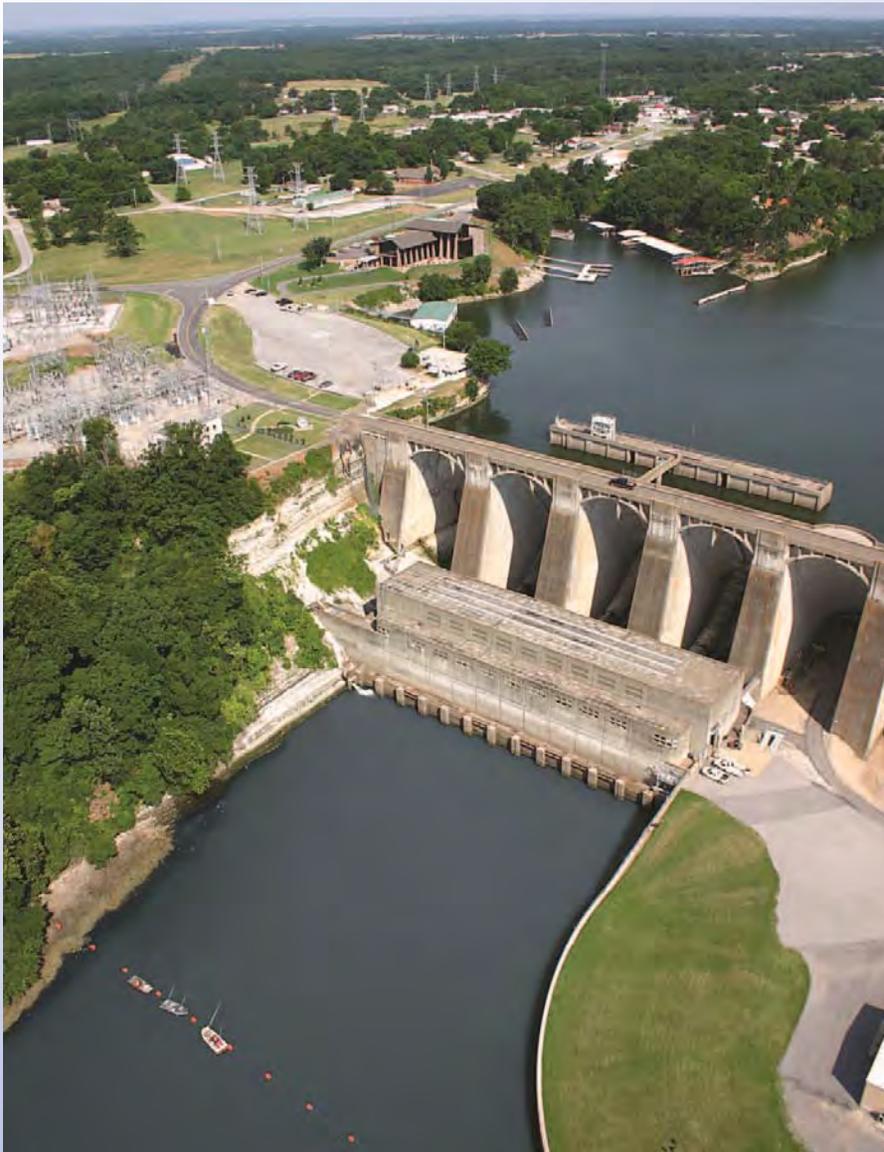


Data Provided by:
Travel Industry Association of America; Washington, D.C., 2005.

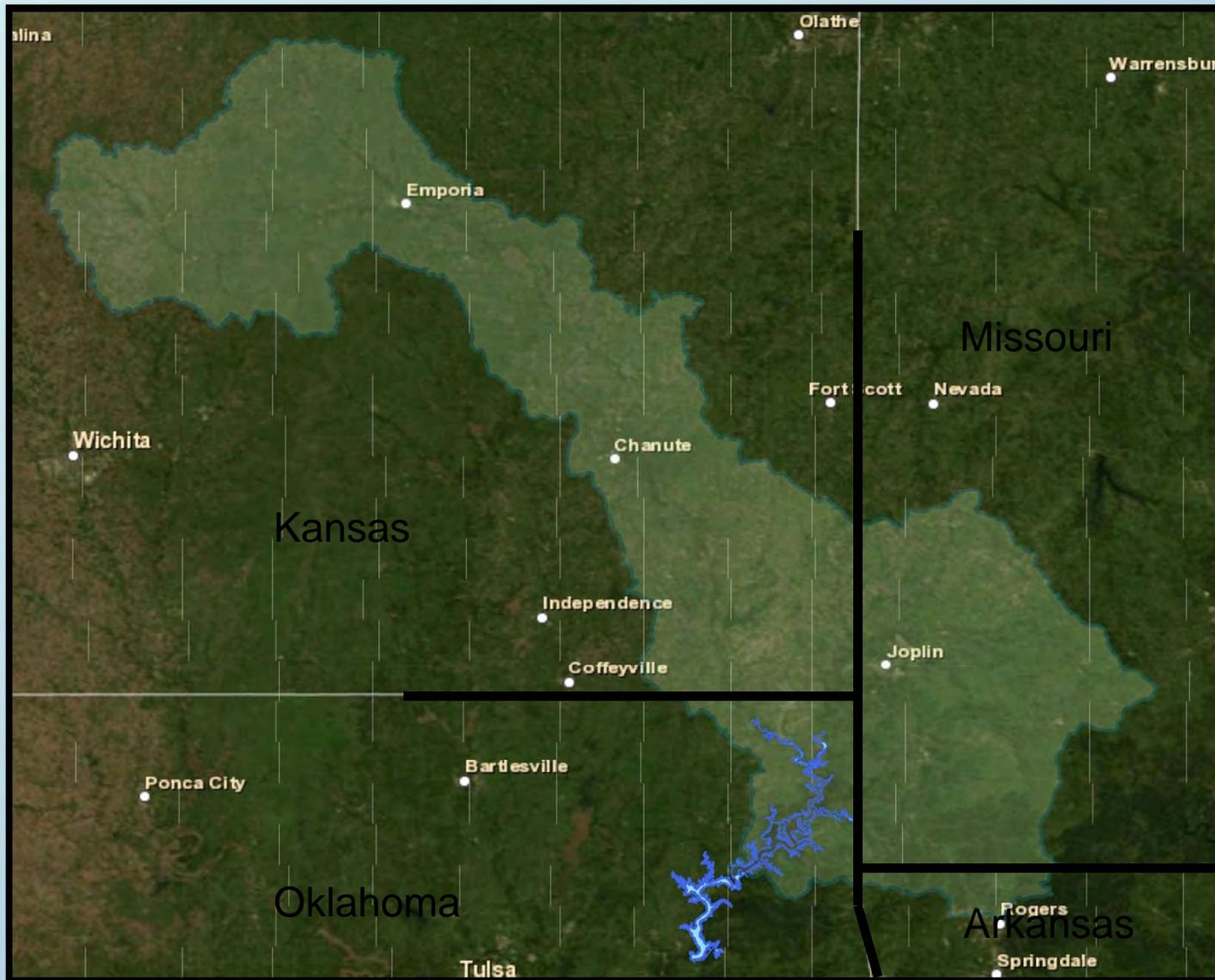
Competing Interests for Water



Competing H₂O Interests



The Grand Lake Watershed



Watershed Inputs & Water Quality Challenges...

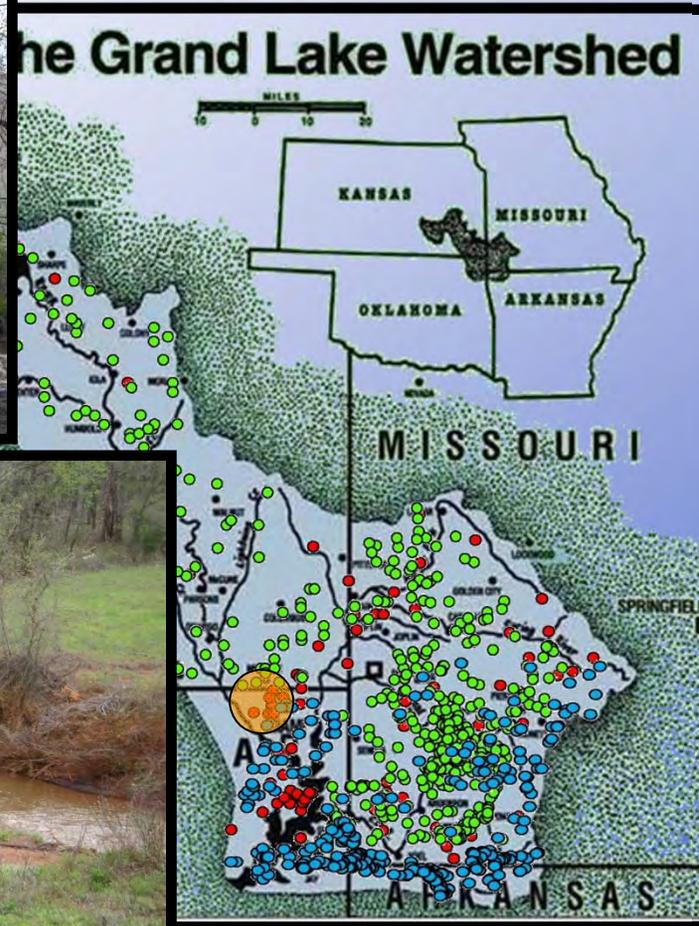
H₂O Quality



Chat Pile



Tar Creek



● Poultry

● Feed Lots

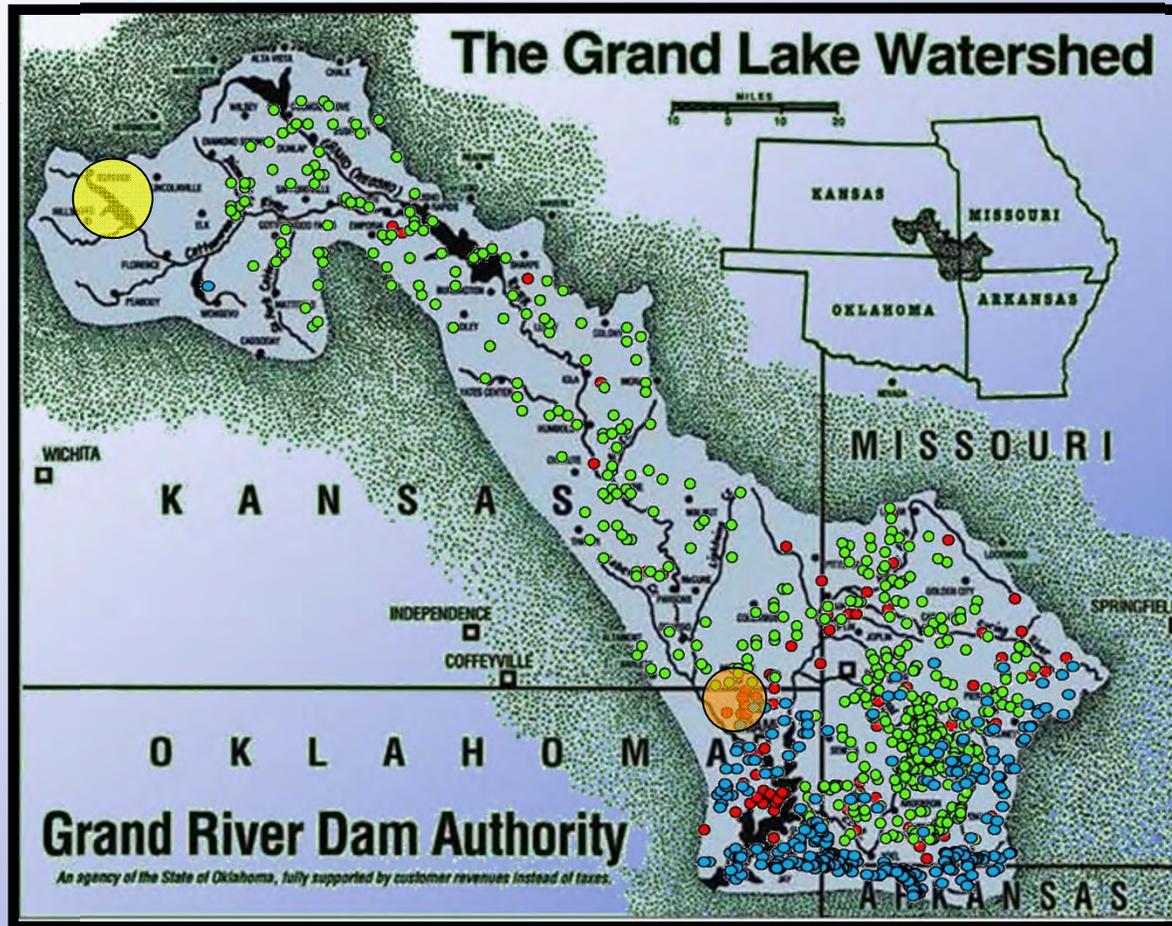
● Waste-Water Treatment

● Superfund Site

Watershed Inputs & Challenges...



Zebra Mussels
Blue Green Algae
Lake Marion



Superfund Site

Poultry

Feed Lots

Waste-Water Treatment

Harmful Algae Blooms



Governor quick to respond to warning about Grand Lake

TULSA (AP) — Oklahoma officials said Friday they are discouraging swimming in Grand Lake because of potentially dangerous blue-green algae — a statement that drew a quick response from the governor, who was concerned about the effect on tourism over the holiday weekend.

Gov. Mary Fallin said she was extremely concerned about the economic damage that could result if people canceled trips to the north-eastern Oklahoma lake at the last minute.

"There are still a lot of great things to do at the lake, even though there are concerns about the quality of the water," Fallin told The Associated Press.

Public pools are available for swimming, and there's golf courses, fireworks, an

air show, free concerts, a carnival and numerous tourist attractions in the towns near the lake, including Grove, Pryor, Salina, Langley and Miami.

"I've had calls from businesses at the lake expressing concern about the effect on business and revenue," Fallin said. "Grand Lake is a wonderful tourism spot for Oklahoma. There's a lot of economic activity at the lake. We need to do all we can to support the lake."

Fallin's family had already planned a trip to Grand Lake over the Independence Day weekend and "we're still going," she said.

The GRDA is "strongly discouraging" swimming or other activities that would bring people into contact with the water, agency spokesman Justin Albery



THE TULSA WORLD, TOM GILBERT

This aerial photograph shows Oklahoma officials said Friday Grand Lake because of potential statement that drew a quick concerned about the effect

said. The agency issued advisory because of rapidly changing levels of green algae in the lake

The agency's board of directors scheduled an emergency meeting in Tulsa Friday afternoon to discuss the situation.

Blue-green algae are microscopic organisms that are naturally present in lakes and streams, usually in low numbers. However, the algae can become a dominant in shallow, warm w

DEQ Issues Algae Alert

By CAREY HEAD
News Lifestyles Editor
OKLAHOMA CITY — An Oklahoma Department of Environmental Quality recommendation to temporarily avoid body contact with water at Bernice State Park and a few other areas of Grand Lake is prompting the Grand River Dam Authority to remind lake enthusiasts to take extra precaution on Grand Lake this summer. The state park is putting up signage to notify the public.

Blue green algae, or BGA has been found in the waters near Bernice State Park, in portions of Horse Creek and the back of Duck Creek — all popular destinations for tourists enjoying the waters of Grand Lake. The DEQ made the recommenda-

tion to avoid body contact with water in these areas after BGA was found there.

Toxins produced by BGA, or cyanobacteria, may cause allergic reactions, damage to the liver and other internal organs, as well as damage to the central nervous system and the brain.

According to Justin Albery, corporate communications director with GRDA, the area on Duck Creek where the BGA was found was at the back of

the creek beyond the popular Thunder Bay restaurant.

Albery explained the biggest area of concern is Bernice State Park and Horse Creek. Tests conducted June 17 found the largest amounts were in Horse Creek, "but over the weekend, the strong southerly winds helped it dissipate."

Over a busy holiday weekend, such as the Fourth of July, the population of Grand Lake proper swells to the third largest in Oklahoma,

according to Grand Lake area Chambers of Commerce.

Visitors are advised to avoid areas where the water is shallow, still and warm. "We've not had this on Grand Lake before," Albery said. "We don't want to panic anybody but still advise everyone to swim in the main lake."

Three magnets attracting boaters are Woodard Hollow, Big Hollow and Dripping Springs.

(See ALGAE, Page 3)



IN THIS PHOTO provided by State of Washington Department of Ecology, a blue green algae bloom washed up along the shoreline in Long Lake, Thurston County, Washington. The bluish color means that some of the algae are starting to decompose leaving the blue pigment. Some forms of blue green algae, or BGA, are toxic to humans, pets and livestock. The Oklahoma Department of Environmental Quality and the Grand River Dam Authority have issued a warning to visitors to Grand Lake that BGA has been found in the waters of Bernice State Park, Horse Creek and Duck Creek on Grand Lake.

Lawton Constitution: July 2, 2011

Ponca City News: June 28, 2011

News Headlines

Ada Evening News: July 21, 2011

Heat wave fosters toxic algae in touristy lakes

OKLAHOMA CITY (AP) — A prolonged heat wave in the central U.S. has fostered the growth of a dangerous form of algae in lakes and ponds, threatening swimmers and livestock and scaring away tourists during the busy summer season.

Blue-green algae are actually bacteria that produce toxins

harmful to humans and livestock. It flourishes in warm, stagnant, sunlit water, and this year's heat wave combined with Oklahoma's worst drought since the Dust Bowl have created what one water official called a "perfect storm" for its growth.

Officials have issued a series of warnings, telling boaters and

swimmers at lakes in northeast Oklahoma, southern Kansas and Nebraska to avoid contact with the toxic gunk. The issue attracted national attention earlier this month when Oklahoma Sen. James Inhofe blamed a respiratory illness on a swim in **Grand Lake** in Ketchum Hollow.

The bad publicity has had dire

consequences for some businesses in Oklahoma where tourism is the third largest industry with an estimated annual impact of \$6.2 billion. Oklahoma's numerous lakes are a "huge economic engine" driving that industry, said Leslie Blair, a spokeswoman for the Department of Tourism and Recreation.

Problems on **Grand Lake** have subsided, the **Grand River Dam Authority** said. Advisories remained in effect Wednesday for portions of Keystone, Fort Gibson and Eufaula lakes in Oklahoma, Marion and Big Hill lakes in Kansas, and Willow Creek Lake in northeast Nebraska.

H₂O Quality

Dangerous algae plague Oklahoma's lakes, ponds

By Sean Murphy
Associated Press

OKLAHOMA CITY — A prolonged heat wave in the central U.S. has fostered the growth of a dangerous form of algae in lakes and ponds, threatening swimmers and livestock and scaring away tourists during the busy summer season.

Blue-green algae are actually bacteria that produce toxins

"My friends at the marinas say their shops are full to the ceiling with beer that they haven't sold ... all because a senator went into a bad area in a cove and got a rash."

— Sam Williams

quences for some businesses in Oklahoma, where tourism is the third largest industry with an estimated annual impact of \$6.2 billion. Oklahoma's numerous lakes are a "huge economic engine" driving that industry, said Leslie Blair, a spokeswoman for the Department of Tourism and Recreation.

"We took a beating from hell," said Sam Williams, who sells everything from water

Durant Daily Democrat: July 3, 2011

Inhofe says swimming in **Grand Lake** made him ill

TULSA (AP) — Sen. James Inhofe says he believes a swim earlier this week in **Grand Lake** made him ill.

Inhofe told the Tulsa World that he took a routine dive into the lake Monday morning and

that night he was "deathly sick."

Oklahoma authorities warned people Friday against swimming in the lake, saying potentially

toxic blue-green algae had been detected. They've also advised

against water skiing and other activities that would bring people or pets in contact with the water.

Inhofe has had a home on the lake in Ketchum Hollow for decades.

He says he's never

seen that kind of algae in the water before.

The 76-year-old Republican says he believes he's turned the corner on the respiratory illness and plans to return to Washington

next week.

Enid New and Eagle: July 21, 2011

Invasive Species



W.R. Holway Pump back





Dissolved Oxygen & Turbine Venting

