

INVESTIGATING FISH KILLS ON THE SALT FORK OF THE ARKANSAS RIVER USING A COLLABORATIVE APPROACH



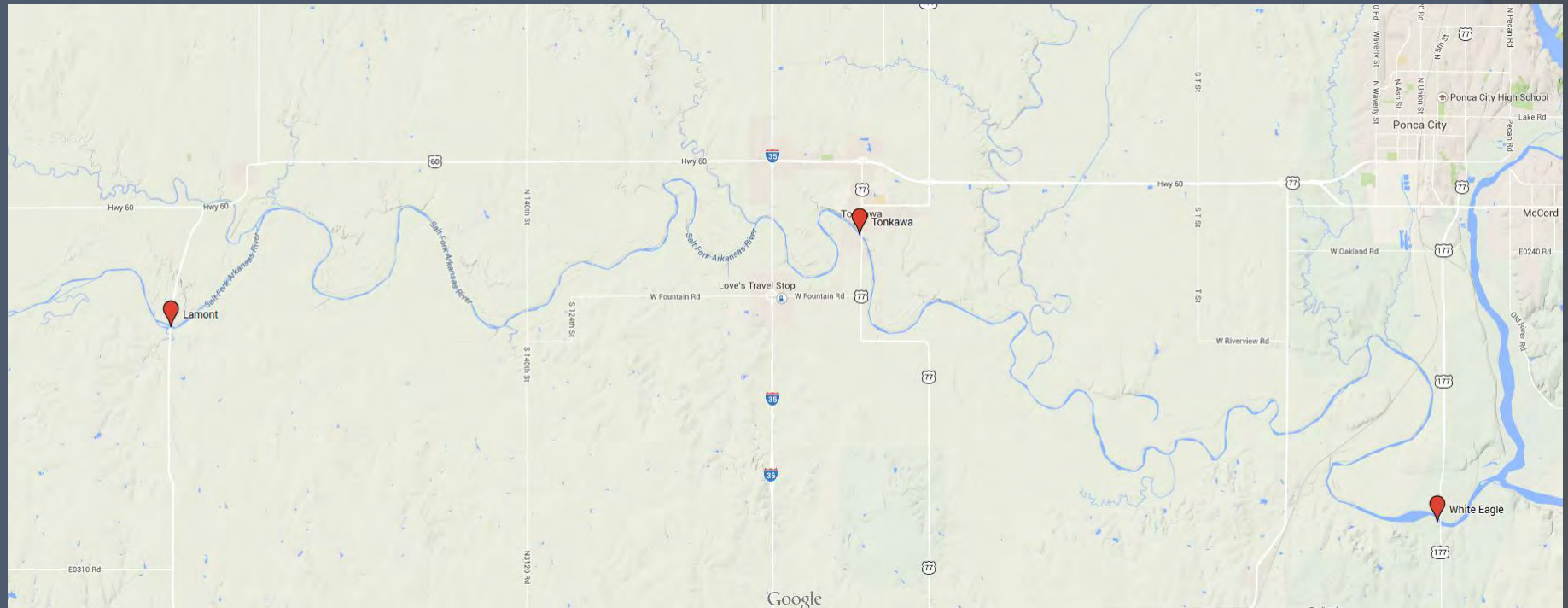
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Introduction

- Brief overview of the history of the Salt Fork of the Arkansas River fish kills
- General characteristics of the fish kills
- Oklahoma Kill Response Management Team(OKRMT) timeline
- Monitoring work plan overview
- Response plan overview

Recent History of Fish Kills on the Salt Fork of the Arkansas River

- Seven Kills between January 2012 and August 2014
- Extent of kills were from 7 to 50 miles
- Kills typically began in Grant County near Nash or Lamont and extended through Kay County
- Kills investigated by the Oklahoma Department of Wildlife Conservation (ODWC, the Oklahoma Department of Environmental Protection (ODEQ), and the Oklahoma Conservation Commission (OCC)



General Characteristics of Recent Salt Fork of the Arkansas Fish Kills

- Numerous Large Fish
 - > 1,500 in 2012
 - > 1,400 in 2013
 - > 1,300 in 2014
- Diverse species of fish including flathead, blue, and channel catfish, smallmouth buffalo, carp, white bass, river carpsucker, paddlefish, freshwater drum, etc.



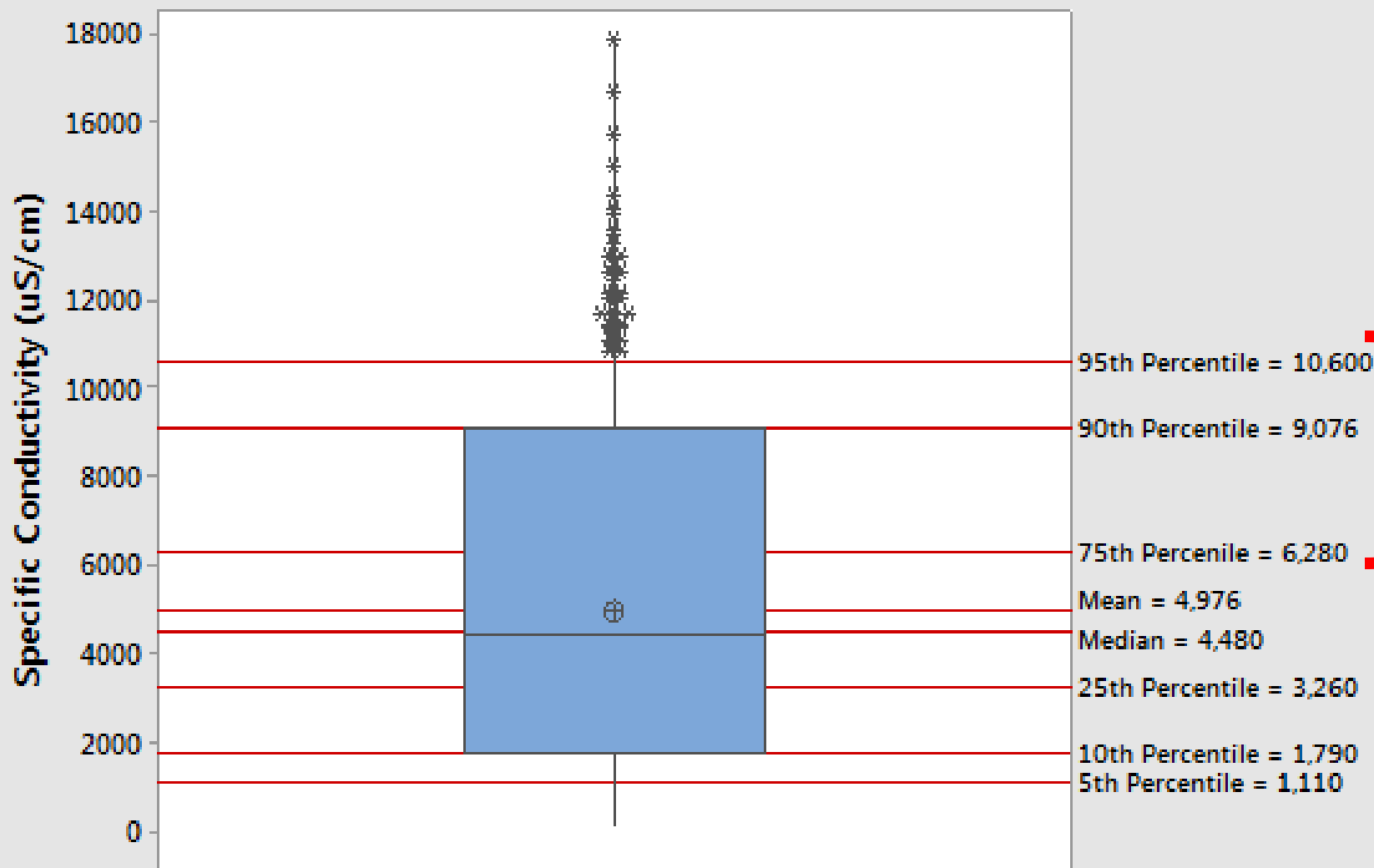
General Characteristics

- Water was tea colored with a metallic taste and was irritating to the skin
- Dissolved oxygen was at acceptable levels
- Elevated specific conductivity and metals concentrations



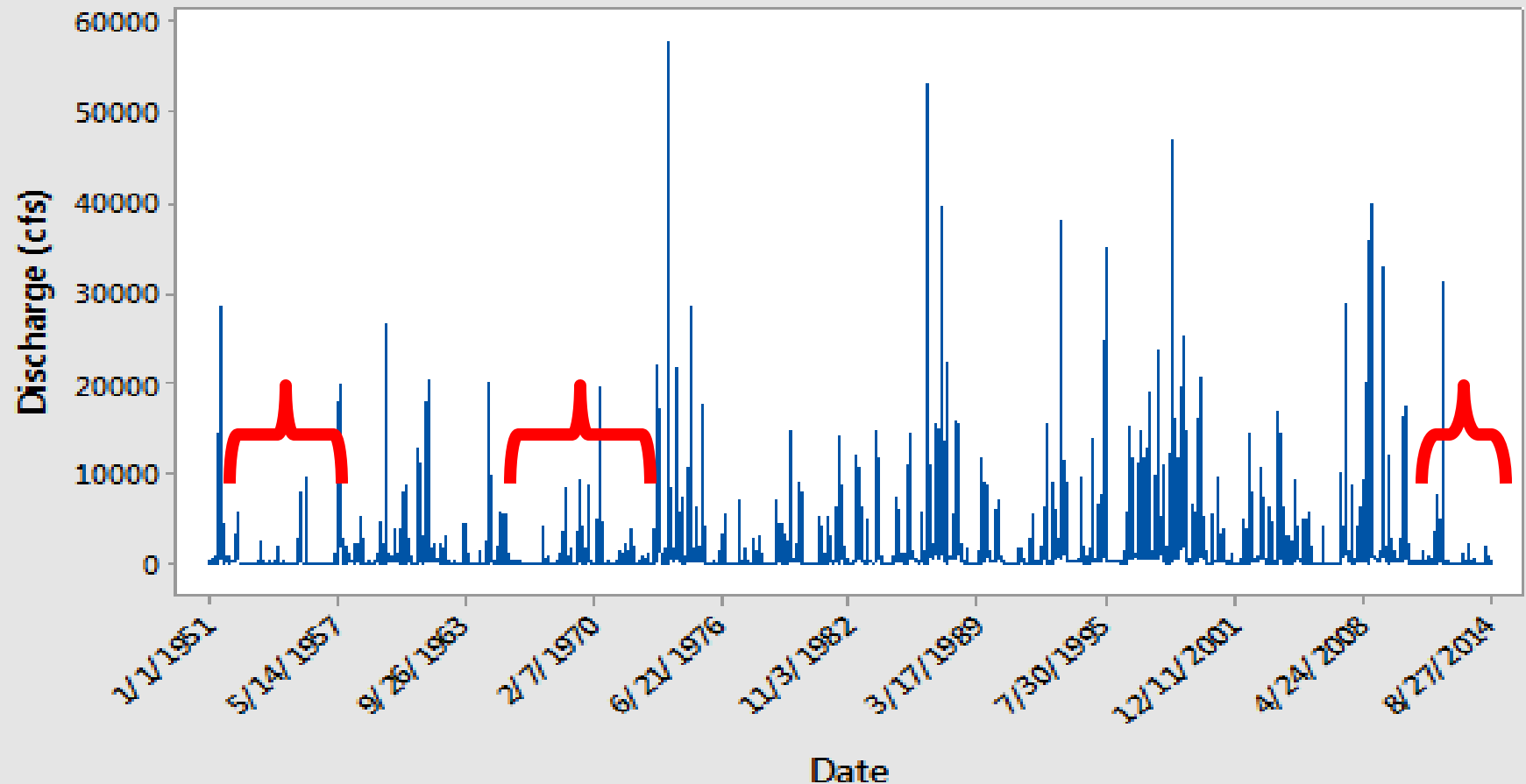
Kills Coincide with Elevated Conductivity

Range of Conductivity Data (1951-2014) at the Salt Fork near Tonkawa, OK (n=1071)



Recent Water Levels Are Comparable to Droughts of the 1950's and 1960-70's

Discharge (1951-2014) at the Salt Fork near Tonkawa, OK



Land Use Characteristics Near Genesis of Kills

(photos provided by ODEQ)



Oklahoma Kill Response Management Taskforce

Collaborative Effort Timeline

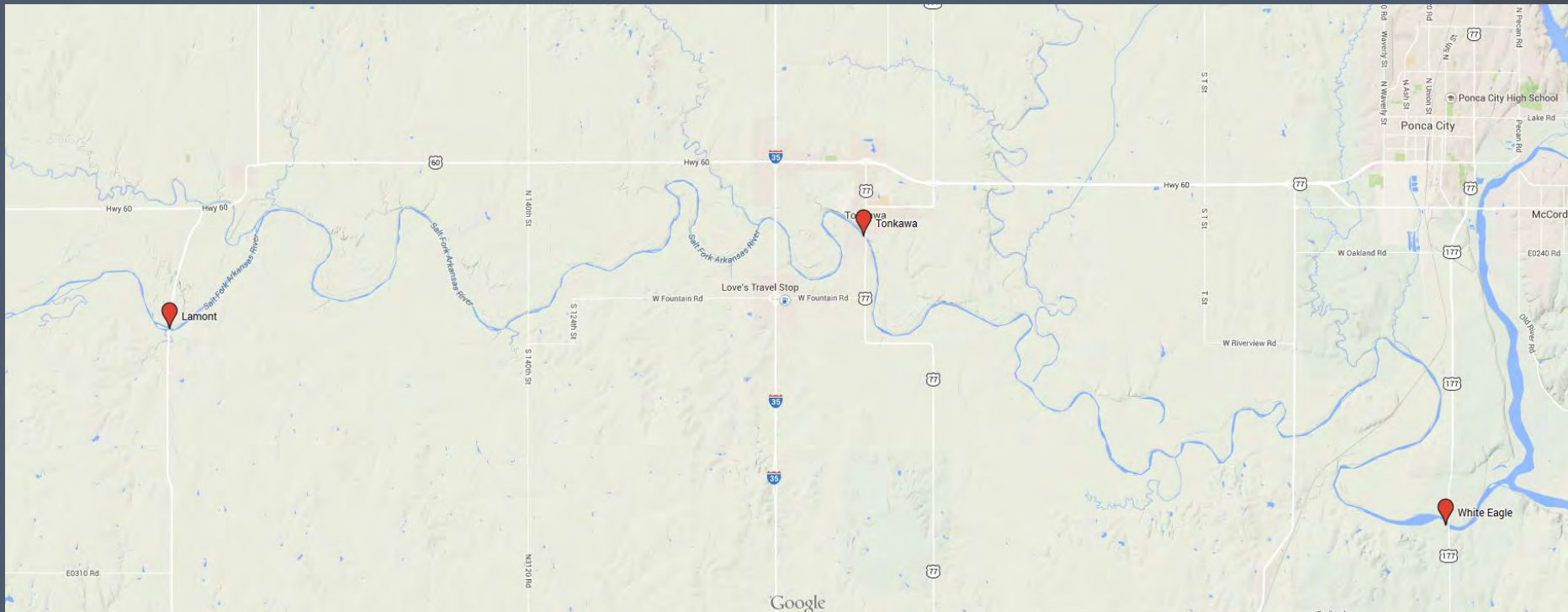
- Summer 2014—OKRMT Technical Workgroup suggests a collaborative study
- Early September 2014—Representatives from ODEQ, ODWC, and OCC agree to fund a coordinated monitoring action
- Late September 2014—OWRB brought in as the study technical lead
- October to December 2014—Workplan and Memorandum of Understanding developed by OKRMT and approved by the OWRB, ODEQ, ODWC, and OCC
- January 2015 to Present—Implementation of Monitoring Plan by OWRB, with assistance from ODEQ and ODWC

Workplan for Continuous Monitoring of *in situ* Water Quality

- Monitoring Objective 1: Quantify local, diurnal, and seasonal effects on in-situ DO, pH and specific conductivity(SpC) at three stations along the Salt Fork of the Arkansas River.
- Monitoring Objective 2: Quantify spatial variation in DO, pH and SpC along the Salt Fork of the Arkansas River.
- Monitoring Objective 3: Develop a fish kill response and monitoring plan based on instantaneous levels of conductivity and potentially DO.

Monitoring Locations

Station Description	Highway Crossing	County	Latitude	Longitude
Salt Fork River near Lamont	State Highway 74	Grant	36.665518	-97.554818
Salt Fork River near Tonkawa	US Highway 77	Kay	36.670704	-97.309517
Salt Fork River near White Eagle	US Highway 177	Noble	36.578038	-97.076675



Monitoring Plan

- YSI EXO2 sondes deployed from the bridge at each of the monitoring sites
 - Specific Conductivity
 - pH
 - Water Temperature
 - Dissolved Oxygen
- YSI sondes are housed inside a 6" HDPE pipe suspended from the bridge
 - This provides protection and allows the sonde to be placed in the main flow of the channel.
- Nexsens data loggers mounted to the bridge will collect and transmit data every 15 min. using cellular telemetry.
- Equipment will be maintained and calibrated on a regular basis by OWRB and ODEQ staff.



Response Plan

- Elevated conductivity will trigger alarms in the system.
- Multiple alarms can be created
- Parameter limits can be adjusted
- Email and text messages can be sent out automatically
 - Example
 - Specific conductivity at (*station name*) is (*value*). Please watch the situation closely and begin preparations for WQ sampling. For more information contact (*name and telephone number*)



Questions?