



**US Army Corps  
of Engineers ®**

Tulsa District

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# **APPENDIX E 1: Public Involvement Tulsa and West-Tulsa Levees Feasibility Study**

**August 2019**

## **Public Notices**



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

September 11, 2019

NOTICE OF AVAILABILITY

**DRAFT FEASIBILITY REPORT WITH INTEGRATED ENVIRONMENTAL  
ASSESSMENT FOR THE TULSA AND WEST-TULSA LEVEES FEASIBILITY  
STUDY, TULSA COUNTY, OKLAHOMA**

The public is hereby notified of the availability of the Draft Feasibility Report with Integrated Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Tulsa and West-Tulsa Levees Feasibility Study in Tulsa County, Oklahoma. The U.S. Army Corps of Engineers, Tulsa District, in partnership with the non-Federal sponsor, Tulsa County Drainage District No. 12, prepared the Draft Report with Integrated EA to identify, evaluate, and disclose all associated impacts that would result from the construction and operation of the potential alternatives aimed at improving life safety during flood events within the levee protected areas.

Alternatives being considered include varying combinations of the following measures: filtered berms, detention ponds, cutoff walls, and residential buyouts, in addition to a no action alternative.

A 30-day public comment period begins on September 16, 2019. The Draft Feasibility Report with Integrated EA and FONSI will be available for review during the public comment period at the following locations:

U.S. Army Corps of Engineers  
Tulsa District Office  
Public Affairs Office  
2488 East 81<sup>st</sup> Street  
Tulsa, Oklahoma 74137

Charles Page Library  
551 East 4<sup>th</sup> Street  
Sand Springs, Oklahoma 74063

The Draft Feasibility Report with Integrated EA and FONSI can also be viewed on the Tulsa District's website at the following address: <http://www.swt.usace.army.mil>.

An open house style public information meeting will be held at the Case Community Center, 1050 W Wekiwa Road, Sand Springs, Oklahoma 74063 on October 8, 2019 from 5:30PM to 8:00PM.

Please address any comments to Dr. David Gade, Environmental Branch, Regional Planning and Environmental Center, by mail at U.S. Army Corps of Engineers, 2488 East 81<sup>st</sup> Street, Tulsa, Oklahoma 74137-4290 or by email at [TWT-Levees@usace.army.mil](mailto:TWT-Levees@usace.army.mil). Written comments may also be submitted at the public meeting.

Sincerely,

*Angela Lane*

Angela M. Lane  
Acting Chief, Environmental Branch  
Regional Planning and Environmental Center



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

February 5, 2019

## PUBLIC NOTICE

### TULSA AND WEST TULSA LEVEES FEASIBILITY STUDY, TULSA COUNTY, OKLAHOMA PUBLIC WORKSHOP

The U.S. Army Corps of Engineers (USACE) Tulsa District, in cooperation with the non-Federal sponsor, Tulsa County Drainage Levee District Number 12, hereby informs the public of the public workshop for the Tulsa and West Tulsa Levees Feasibility Study (Study), Tulsa County, Oklahoma. The public workshop will be conducted in an open house format.

The Study will develop and analyze alternatives, including the No Action Alternative, to reduce overtopping and breach risk of the existing TWT Levee System and restore acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

A public workshop will be held on Wednesday, February 13, 2019 from 5:00pm to 8:00pm at the Case Community Center, 1050 W Wekiwa Road, Sand Springs, Oklahoma 74063. General information about the Study and its process will be available for review. There will be an opportunity to view maps, ask questions, and provide written comments about the Study. USACE staff will be on site to answer any questions and/or address concerns about the project.

The public workshop information will be available to download at the following Tulsa District website beginning on Wednesday, February 13, 2019:

<https://www.swt.usace.army.mil/>

A 30-day public comment period begins on Wednesday, February 13, 2019. Comments may be submitted at the public workshop, emailed to TWT-Levees@usace.army.mil, or mailed to Dr. David Gade, Limnologist, Environmental Branch, Regional Planning and Environmental Center, at U.S. Army Corps of Engineers, 2488 E 81<sup>st</sup> Street, Tulsa, Oklahoma 74137-4290.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Sims", is written over a horizontal line.

Douglas C. Sims, PMP, RPA  
Chief, Environmental Branch  
Regional Planning and Environmental Center



**US Army Corps  
of Engineers®**

## ***Tulsa and West Tulsa Levees Feasibility Study***

**Tulsa County, Oklahoma**

### ***Comment Form Instructions***

*30 Day Public Comment Period Starts: February 13, 2019 Ends: March 15, 2019*

The U.S. Army Corps of Engineers is in the process of scoping the Tulsa and West Tulsa (TWT) Levees Feasibility Study. The TWT Study will develop and analyze alternatives, including the No Action Alternative, to address flood risk to the public and infrastructure protected by the TWT Levee System.

Your comments, suggestions, or concerns regarding the TWT Study can be submitted using any of the following methods:

- Dropped off during the public workshop on February 13, 2019.
- Emailed to [TWT-Levees@usace.army.mil](mailto:TWT-Levees@usace.army.mil)
- Mailed to:

Dr. David Gade, Limnologist  
Environmental Branch, Regional Planning and Environmental Center  
U.S. Army Corps of Engineers  
2488 E 81st Street, Tulsa, OK 74137-4290

The Tulsa and West Tulsa Levees Feasibility Study public workshop information is available for viewing at: <https://www.swt.usace.army.mil>

Thank you for your participation in the Tulsa and West Tulsa Levees Feasibility Study.



# Tulsa County, Oklahoma

*30 Day Public Comment Period Starts: February 13, 2019 Ends: March 15, 2019*

We need your thoughts and comments on the Tulsa and West Tulsa Levees Feasibility Study. Your participation is a key element in producing a meaningful and useful feasibility study. The information provided at the public workshop can be revisited at the website listed below. Please write your concerns, comments, or suggestions regarding the Tulsa and West Tulsa Levees Feasibility Study in the space provided below. Feel free to use additional pages if needed. Forms may be submitted at the public workshop, via email, or mailed to the address below. Thank you for your participation!

[illegible]

Name:\_\_\_\_\_ Affiliation:\_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_

Zip code: \_\_\_\_\_ Phone: \_\_\_\_ / \_\_\_\_\_ Email: \_\_\_\_\_

**Dr. David Gade, Limnologist**  
**Environmental Branch, Regional Planning and Environmental Center**  
**U.S. Army Corps of Engineers**  
**2488 E 81st Street, Tulsa, OK 74137-4290**  
**Email: TWT-Levees@usace.army.mil**

Workshop information and additional comment sheets can be found at the following link:  
<https://swt.usace.army.mil>



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

January 14, 2018

**Public Notice**

**Tulsa and West Tulsa Levees Feasibility Study Initiation**

The Tulsa District, U.S. Army Corps of Engineers, in cooperation with the non-Federal sponsor, Tulsa County Drainage Levee District Number 12, has initiated the Tulsa and West Tulsa (TWT) Levees Feasibility Study located Tulsa County, Oklahoma. The Feasibility Study for the TWT Levee System is authorized in Section 216 of the River and Harbor Flood Control Act of 1970 and Section 1202 of the Water Infrastructure Improvements for the Nation Act of 2016. The Feasibility Study will develop alternatives to improve the resiliency of the existing TWT Levee System by reducing risk, identified in a *Semi-Quantitative Risk Assessment of the TWT Levee System* completed in 2016, and restore acceptable levels of flood risk to portions of Tulsa County, and the City of Tulsa.

The TWT Levee System was constructed by the U.S. Army Corps of Engineers in the 1940s and turned over to the non-Federal sponsor for operation and maintenance after construction. The structure stretches approximately 20 miles along the Arkansas River and is divided into three portions. Levee 'A', reducing flood risk in portions of the City of Sand Springs, and Levee 'B', reducing flood risk in western portions of the City of Tulsa, are both on the left bank of the Arkansas River. Levee 'C', on the right bank of the Arkansas River, reduces flood risk in portions of the City of Tulsa and unincorporated Tulsa County (see enclosure).

Semi-Quantitative Risk Assessment inspections by the U.S. Army Corps of Engineers resulted in classifications of Levee 'A' and Levee 'B' as "Very High Risk", while Levee 'C' is classified as "High Risk". Risk characterization as "Very High Risk" is due to high potential for levees being overtopped in flood conditions, likelihood that the levees will rapidly erode and breach when overtopped, and the potential for life loss and property damage as a result of levee failure. Risk characterization as "High Risk" is due to potential for overtopping and breach of the levee embankment, and concerns about operation of closure structures.

The TWT Levee System reduces flood risk for up to 10,000 people, and thousands of residential, commercial, industrial, and public structures. If catastrophic failure occurs, there is potential for life loss and significant economic consequences due to property damage and disruption of commercial and industrial activity (including a major refinery and an electric power generating station). Under these conditions, extreme flooding and the potential release of hazardous materials could have serious environmental consequences.

Pursuant to Section 102 of the National Environmental Policy Act (NEPA) as implemented by the regulations promulgated by the Council on Environmental Quality (40 Code of Federal Regulations Parts 1500-1508 and U.S. Army Corps of Engineers' Engineering Regulation 200-2-2), an Environmental Assessment will be prepared to describe risk reduction alternatives and the affected environment, as well as analyze the potential direct, indirect, and cumulative environmental effects.

Our office would like to solicit any input you may have with respect to the Tulsa and West Tulsa Levees Feasibility Study area to assist us as we progress through the NEPA process. We look forward to receiving your comments. Please contact Dr. David Gade, Limnologist, Environmental Compliance Branch, Regional Planning and Environmental Center, by mail U.S. Army Corps of Engineers, 2488 E 81<sup>st</sup> Street, Tulsa, Oklahoma 74137-4290, email at David.Gade@usace.army.mil, or telephone at (918) 669-7579 with comments, questions, or the need for further information.

Sincerely,

A handwritten signature in black ink, appearing to read 'Arnold Newman', with a long horizontal flourish extending to the right.

Arnold (Rob) Newman  
Director, Regional Planning and Environmental  
Center

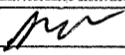
Enclosure

This aerial map illustrates the West Tulsa Levee System, which is designed to protect the city of Tulsa from flooding by the Arkansas River. The river flows from the top of the image towards the bottom. The levee system is divided into three main sections: Leveed Area A, located near Sand Springs; Leveed Area B, in the middle section; and Leveed Area C, near the city of Tulsa. The map also shows major roads like I-44 and I-24, and a scale bar indicating a distance of 2 miles. A north arrow is located in the upper left corner.

This aerial map illustrates the West Tulsa Levee System, which is designed to protect the city of Tulsa from flooding by the Arkansas River. The river flows from the top of the image towards the bottom. The levee system is divided into three main sections: Leveed Area A, located near Sand Springs; Leveed Area B, in the middle section; and Leveed Area C, closer to Tulsa. The city of Tulsa is visible in the upper right corner, with major roads like Interstate 44 and I-24 shown. A north arrow and a 2-mile scale bar are provided for orientation and measurement. The map also shows various other features such as roads, fields, and industrial areas.

# West Tulsa Levee System



STAFF COORDINATION AND ROUTER						
<b>TO:</b> CESWF-PEC-C		<b>SUBJECT:</b> Tulsa-West Tulsa Levee Study				
<b>FROM:</b> CESWF-PEC-CC		<b>DATE:</b> 3 December 2018				
<b>SUMMARY OF ACTION REQUIRED, NOTES, REMARKS, ETC:</b>		<b>ACTION POINT OF CONTACT:</b> Brandon Wadlington <b>TELEPHONE NO:</b> 817 886 1720				
Router for Tulsa-West Tulsa Levee Study initiation letters to stakeholders and resource agencies.		<b>OFFICE /STAFF COORDINATION</b>				
		<b>OFFICE</b>	<b>CONCUR</b>	<b>NON-CONCUR</b>	<b>DATE</b>	
		Tacy Jensen- Study Planner	JENSEN.TACY. M.1260291935			
		Brannen Parrish - SWT PAO	PARRISH.BRANNE N.D.1064916650			
		Bryan Taylor - Study PM	TAYLOR.BRYAN K.1255784877			
		Mandy McGuire - PEC-C	MCGUIRE.AMANDA M.1399923332			
		Mike Abate - SWT-PPMD	ABATE.MIKEL 31164860			
		C Oncken/PEC	ONCKEN.CAROL N.E.E.1185922533			
		Rob Newman - RPEC Director				12/19/18
		<b>EXECUTIVE COORDINATION</b>				
			<b>APPROVE</b>	<b>DISAPPROVE</b>	<b>SEE ME</b>	
		<b>COMMANDER</b>				
<b>DEPUTY COMMANDER</b>						
<b>DEPUTY DISTRICT ENGINEER</b>						
<b>EXECUTIVE ASSISTANT</b>						
<b>EXECUTIVE REMARKS:</b>						
Just make small change to Levee District No. 12						



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

December 19, 2018

**Public Notice**

**Tulsa and West Tulsa Levees Feasibility Study Initiation**

The Tulsa District, U.S. Army Corps of Engineers, in cooperation with the non-Federal sponsor, Tulsa County Drainage Levee District Number 12, has initiated the Tulsa and West Tulsa (TWT) Levees Feasibility Study located Tulsa County, Oklahoma. The Feasibility Study for the TWT Levee System is authorized in Section 216 of the River and Harbor Flood Control Act of 1970 and Section 1202 of the Water Infrastructure Improvements for the Nation Act of 2016. The Feasibility Study will develop alternatives to improve the resiliency of the existing TWT Levee System by reducing risk, identified in a *Semi-Quantitative Risk Assessment of the TWT Levee System* completed in 2016, and restore acceptable levels of flood risk to portions of Tulsa County, and the City of Tulsa.

The TWT Levee System was constructed by the U.S. Army Corps of Engineers in the 1940s and turned over to the non-Federal sponsor for operation and maintenance after construction. The structure stretches approximately 20 miles along the Arkansas River and is divided into three portions. Levee 'A', reducing flood risk in portions of the City of Sand Springs, and Levee 'B', reducing flood risk in western portions of the City of Tulsa, are both on the left bank of the Arkansas River. Levee 'C', on the right bank of the Arkansas River, reduces flood risk in portions of the City of Tulsa and unincorporated Tulsa County (see enclosure).

Semi-Quantitative Risk Assessment inspections by the U.S. Army Corps of Engineers resulted in classifications of Levee 'A' and Levee 'B' as "Very High Risk", while Levee 'C' is classified as "High Risk". Risk characterization as "Very High Risk" is due to high potential for levees being overtopped in flood conditions, likelihood that the levees will rapidly erode and breach when overtopped, and the potential for life loss and property damage as a result of levee failure. Risk characterization as "High Risk" is due to potential for overtopping and breach of the levee embankment, and concerns about operation of closure structures.

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Sincerely,

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Arnold (Rob) Newman  
Director, Regional Planning and Environmental  
Center

Enclosure



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

December 19, 2018

SUBJECT: Tulsa and West Tulsa Levees Feasibility Study Initiation

Location: Sections 10 through 15 in T19N R11E Tulsa County, Oklahoma, and Sections 2 through 11, 13, 14, 15, 22, 23, and 24 in T19N R12E Tulsa County, Oklahoma.

Bill John Baker  
Principal Chief  
Cherokee Nation of Oklahoma  
PO Box 948  
Tahlequah, Oklahoma 74465

Dear Chief Baker:

The Tulsa District, U.S. Army Corps of Engineers, in cooperation with the non-Federal sponsor Tulsa County Drainage Levee District Number 12, has initiated the Tulsa and West Tulsa (TWT) Levees Feasibility Study located in Tulsa County, Oklahoma. The Feasibility Study for the TWT Levee System is authorized in Section 216 of the River and Harbor Flood Control Act of 1970 and Section 1202 of the Water Infrastructure Improvements for the Nation Act of 2016. The Feasibility Study will develop alternatives to improve the resiliency of the existing TWT levee system by reducing risk identified in a *Semi-Quantitative Risk Assessment of the TWT Levee System* completed in 2016, and restore acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

The TWT Levee System in Tulsa County, Oklahoma was constructed by the U.S. Army Corps of Engineers in the 1940s and turned over to the non-Federal sponsor for operation and maintenance after construction. The structure stretches approximately 20 miles along the Arkansas River and is divided into three portions. Levee 'A', reducing flood risk in portions of the City of Sand Springs, and Levee 'B', reducing flood risk in western portions of the City of Tulsa, are both on the left bank of the Arkansas River. Levee 'C', on the right bank of the Arkansas River, reduces flood risk in portions of the City of Tulsa and unincorporated Tulsa County (see enclosure).

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Pursuant to Section 102 of the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA), an Environmental Assessment will be prepared to describe risk reduction alternatives and the affected environment as well as analyze potential impacts to historic properties.

Our office would like to solicit any input you may have with respect to the Tulsa and West Tulsa Levees Feasibility Study area in accordance with the NHPA and other applicable laws and regulations to assist us in the identification of historic properties. We look forward to receiving your comments. Please contact Dr. David Gade, Limnologist, Environmental Compliance Branch, Regional Planning and Environmental Center, by mail at U.S. Army Corps of Engineers, 2488 E 81<sup>st</sup> Street, Tulsa, Oklahoma 74137-4290, email at David.Gade@usace.army.mil, or telephone at (918) 669-7579 with comments, questions, or the need for further information.

Sincerely,

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Arnold (Rob) Newman  
Director, Regional Planning and Environmental  
Center

Enclosure



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

December 19, 2018

SUBJECT: Tulsa and West Tulsa Levees Feasibility Study Initiation

Location: Sections 10 through 15 in T19N R11E Tulsa County, Oklahoma, and Sections 2 through 11, 13, 14, 15, 22, 23, and 24 in T19N R12E Tulsa County, Oklahoma.

Corain Lowe-Zepeda  
Tribal Historic Preservation Officer  
Muscogee (Creek) Nation  
PO Box 580  
Okmulgee, Oklahoma 74447

Dear Ms. Lowe-Zepeda:

The Tulsa District, U.S. Army Corps of Engineers, in cooperation with the non-Federal sponsor Tulsa County Drainage Levee District Number 12, has initiated the Tulsa and West Tulsa (TWT) Levees Feasibility Study located in Tulsa County, Oklahoma. The Feasibility Study for the TWT Levee System is authorized in Section 216 of the River and Harbor Flood Control Act of 1970 and Section 1202 of the Water Infrastructure Improvements for the Nation Act of 2016. The Feasibility Study will develop alternatives to improve the resiliency of the existing TWT levee system by reducing risk identified in a *Semi-Quantitative Risk Assessment of the TWT Levee System* completed in 2016, and restore acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

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Pursuant to Section 102 of the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA), an Environmental Assessment will be prepared to describe risk reduction alternatives and the affected environment as well as analyze potential impacts to historic properties.

Our office would like to solicit any input you may have with respect to the Tulsa and West Tulsa Levees Feasibility Study area in accordance with the NHPA and other applicable laws and regulations to assist us in the identification of historic properties. We look forward to receiving your comments. Please contact Dr. David Gade, Limnologist, Environmental Compliance Branch, Regional Planning and Environmental Center, by mail at U.S. Army Corps of Engineers, 2488 E 81<sup>st</sup> Street, Tulsa, Oklahoma 74137-4290, email at David.Gade@usace.army.mil, or telephone at (918) 669-7579 with comments, questions, or the need for further information.

Sincerely,

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Arnold (Rob) Newman  
Director, Regional Planning and Environmental  
Center

Enclosure



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

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Location: Sections 10 through 15 in T19N R11E Tulsa County, Oklahoma, and Sections 2 through 11, 13, 14, 15, 22, 23, and 24 in T19N R12E Tulsa County, Oklahoma.

Dr. Kary L. Stackelbeck  
State Archaeologist  
Oklahoma Archeological Survey  
University of Oklahoma  
111 E. Chesapeake Street  
Norman, Oklahoma 73019-5111

Dear Dr. Stackelbeck:

The Tulsa District, U.S. Army Corps of Engineers, in cooperation with the non-Federal sponsor Tulsa County Drainage Levee District Number 12, has initiated the Tulsa and West Tulsa (TWT) Levees Feasibility Study located in Tulsa County, Oklahoma. The Feasibility Study for the TWT Levee System is authorized in Section 216 of the River and Harbor Flood Control Act of 1970 and Section 1202 of the Water Infrastructure Improvements for the Nation Act of 2016. The Feasibility Study will develop alternatives to improve the resiliency of the existing TWT levee system by reducing risk identified in a *Semi-Quantitative Risk Assessment of the TWT Levee System* completed in 2016, and restore acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

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Sincerely,

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Arnold (Rob) Newman  
Director, Regional Planning and Environmental  
Center

Enclosure



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

December 19, 2018

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Location: Sections 10 through 15 in T19N R11E Tulsa County, Oklahoma, and Sections 2 through 11, 13, 14, 15, 22, 23, and 24 in T19N R12E Tulsa County, Oklahoma.

Dr. Bob L. Blackburn  
State Historic Preservation Officer  
Oklahoma Historical Society  
Oklahoma History Center  
800 Nazih Zundi Drive  
Oklahoma City, Oklahoma 73105-7917

Dear Dr. Blackburn:

The Tulsa District, U.S. Army Corps of Engineers, in cooperation with the non-Federal sponsor Tulsa County Drainage Levee District Number 12, has initiated the Tulsa and West Tulsa (TWT) Levees Feasibility Study located in Tulsa County, Oklahoma. The Feasibility Study for the TWT Levee System is authorized in Section 216 of the River and Harbor Flood Control Act of 1970 and Section 1202 of the Water Infrastructure Improvements for the Nation Act of 2016. The Feasibility Study will develop alternatives to improve the resiliency of the existing TWT levee system by reducing risk identified in a *Semi-Quantitative Risk Assessment of the TWT Levee System* completed in 2016, and restore acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

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Semi-Quantitative Risk Assessment inspections by the U.S. Army Corps of Engineers resulted in classifications of Levee 'A' and Levee 'B' as "Very High Risk", while Levee 'C' is classified as "High Risk". Risk characterization as "Very High Risk" is due to high potential for levees being overtopped in flood conditions, likelihood that the levees will rapidly erode and breach when overtopped, and the potential for life loss and property damage as a result of levee failure. Risk characterization as "High Risk" is due

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Pursuant to Section 102 of the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA), an Environmental Assessment will be prepared to describe risk reduction alternatives and the affected environment as well as analyze potential impacts to historic properties.

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Sincerely,

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Arnold (Rob) Newman  
Director, Regional Planning and Environmental  
Center

Enclosure



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

December 19, 2018

SUBJECT: Tulsa and West Tulsa Levees Feasibility Study Initiation

Location: Sections 10 through 15 in T19N R11E Tulsa County, Oklahoma, and Sections 2 through 11, 13, 14, 15, 22, 23, and 24 in T19N R12E Tulsa County, Oklahoma.

Dr. Bob L. Blackburn  
State Historic Preservation Officer  
Oklahoma Historical Society  
Oklahoma History Center  
800 Nazih Zundi Drive  
Oklahoma City, Oklahoma 73105-7917

Dear Dr. Blackburn:

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Geoffrey Standing Bear  
Principal Chief  
The Osage Nation  
627 Grandview Avenue  
Pawhuska, Oklahoma 74355

Dear Chief Standing Bear:

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Arnold (Rob) Newman  
Director, Regional Planning and Environmental  
Center

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2488 EAST 81<sup>ST</sup> STREET  
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December 19, 2018

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Location: Sections 10 through 15 in T19N R11E Tulsa County, Oklahoma, and Sections 2 through 11, 13, 14, 15, 22, 23, and 24 in T19N R12E Tulsa County, Oklahoma.

Cheryl Seager  
Director  
Compliance Assurance and Enforcement Division  
U.S. EPA Region 6  
Fountain Place 12<sup>th</sup> Floor, Suite 1200  
1445 Ross Avenue  
Dallas, Texas 75202-2733

Dear Ms. Seager:

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Arnold (Rob) Newman  
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2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

December 19, 2018

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Location: Sections 10 through 15 in T19N R11E Tulsa County, Oklahoma, and Sections 2 through 11, 13, 14, 15, 22, 23, and 24 in T19N R12E Tulsa County, Oklahoma.

Gary O'Neill  
State Conservationist  
USDA - NRCS  
100 USDA Suite 206  
Stillwater, Oklahoma 74074-2655

Dear Mr. O'Neill:

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2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

December 19, 2018

SUBJECT: Tulsa and West Tulsa Levees Feasibility Study Initiation

Location: Sections 10 through 15 in T19N R11E Tulsa County, Oklahoma, and Sections 2 through 11, 13, 14, 15, 22, 23, and 24 in T19N R12E Tulsa County, Oklahoma.

Scott Thompson  
Executive Director  
Oklahoma Department of Environmental Quality  
707 N Robinson  
Oklahoma City, Oklahoma 73102

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J.D. Strong  
Director  
Oklahoma Department of Wildlife Conservation  
1801 N. Lincoln  
Oklahoma City, Oklahoma 73105

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Jonna Polk  
Project Leader  
Oklahoma Ecological Services Field Office  
9014 East 21<sup>st</sup> Street  
Tulsa, Oklahoma 74129-1428

Dear Ms. Polk:

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## **Scoping Comments Received**



**US Army Corps  
of Engineers®**

## Sign In Sheet

**Tulsa and West Tulsa Levees Feasibility Study Public Workshop**

**Sand Springs, Oklahoma**

**Wednesday, February 13, 2019**

**Name:**

**Affiliation:**

**Email:**

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USACE

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STANGEBY

Ronda Hensley

Charles Page Neighborhood Assoc.

mastangeb@cox.net

Jan Hollingshead

Charles Page Neighborhood Assoc.

COO CHRIS HUSSIN

USACE

Bob Tickman

SELF

John Fothergill

tulsa county

jfothergill@tulsacounty.org

Robyn Caseboldt

Public

Carlisle Lane

City of Sand Springs

east@sandspingsok.us

M. J. Kilpatrick

TWT

tkilpatrick@

Greg Fisher

Sand Springs EM

tulsacounty.org

gfisher@sandspingsak.org

**Congress of the United States**  
**House of Representatives**  
**Washington, DC 20515-3601**

March 12, 2019

Dr. David Gade, Limnologist, Environmental Branch  
Regional Planning and Environmental Center  
U.S. Army Corps of Engineers  
2488 E 81st Street  
Tulsa, Oklahoma 74137-4290

RE: Tulsa West Tulsa Levee System Feasibility Study

Dr. Gade,

I represent Oklahoma's First Congressional District in the U.S. House of Representatives, and I am writing to support the continuation of the Tulsa West Tulsa Levee System Feasibility Study.

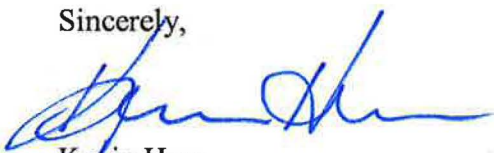
Since a significant portion of the District's population and critical infrastructure is protected by the levee system, I believe that maintaining reliable safeguards for the system is important to the safety and welfare of my constituents.

Thus, I support the Feasibility Study for the levee system and encourage the U.S. Army Corps of Engineers (USACE) to study a thorough array of improvement alternatives, including an increase in the levee's capacity to sustain flooding associated with a 500-year flood event on the Arkansas River or higher. It is also important to consider increasing the downstream capacity of the levee, due to the alternatives being explored in the Keystone Dam Safety Study. I recommend that the Feasibility Study factually determine the feasibility and impact of increasing the levee capacity, up to the proposed 1.6 million cubic feet per second release rate from Keystone Dam.

I believe it is important to consider structural improvements to the aging levee system to reduce the risk of future failure, utilizing current, cutting-edge techniques where possible to reduce future maintenance and to minimize the risk to citizens and their property. In addition, tributary flooding could be reduced along the system by correcting current deficiencies in flood control structures and tie-back levees.

In sum, I support and recommend the continuance of the Feasibility Study and the full consideration of these important improvements to our levee system.

Sincerely,



Kevin Hern  
Member of Congress

**Congress of the United States**  
**House of Representatives**  
**Washington, DC 20515-3602**

March 13, 2019

Mr. David Gade, Limnologist  
U.S. Army Corps of Engineers  
2488 E 81st St  
Tulsa, OK 74137-4290

RE: Tulsa-West Tulsa Levee System Feasibility Study

Dear Mr. Gade,

I write today in support of the Feasibility Study for the levee system and encourage the U.S. Army Corps of Engineers to study a thorough array of improvement alternatives.

Tulsa County has been an active stakeholder in the planning of improvements to the Tulsa-West Tulsa Levee District 12 system. Much of Tulsa County's critical infrastructure is protected by the levee system, and continuing the reliable protection of the levee system is critical to the future of the Tulsa County community. A thorough array of improvement alternatives, including increasing the levee capacity and protection to handle the flood flow associated with the 500-year flood event on the Arkansas River or higher, is critical to maintaining the levee system. In light of the alternatives being studied in the concurrent Keystone Dam Safety Study, I believe it is imperative that the downstream levee capacity be increased to a higher level. The Feasibility Study should factually determine the viability of increasing the levee capacity, even addressing the impact of the proposed 1.6 million cubic feet per second release rate from Keystone Dam.

Structural improvements to this 75-year-old levee system are needed to reduce the risk of failure during future flood events. These structural improvements should utilize current, state-of-art techniques wherever feasible to minimize future risks to life and property and to reduce future maintenance requirements associated with older techniques utilized in the existing levees. Additionally, tributary flooding along the levee system should be reduced by correcting current deficiencies in tie-back levees and flood control structures.

I support and recommend the continuance of the Feasibility Study and the implementation of these important improvements to the levee system. Should you have further questions, please do not hesitate to contact my office at 202-225-2701.

Sincerely,



Markwayne Mullin  
Member of Congress

JAMES M. INHOFE  
OKLAHOMA

WASHINGTON OFFICE  
205 RUSSELL SENATE OFFICE BUILDING  
WASHINGTON, DC 20510-3603  
(202) 224-4721

TULSA OFFICE  
1924 SOUTH UTICA, SUITE 530  
TULSA, OK 74104  
(918) 748-5111

OKLAHOMA CITY OFFICE  
3817 NORTHWEST EXPRESSWAY, SUITE 780  
OKLAHOMA CITY, OK 73112  
(405) 208-8841

# United States Senate

WASHINGTON, DC 20510-3603

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INTELLIGENCE  
EX OFFICIO

March 15, 2019

David Gade, Limnologist  
U.S. Army Corps of Engineers  
2488 E 81<sup>st</sup> Street  
Tulsa, Oklahoma 74137-4290

Dear Mr. Gade:

I am pleased to express my continued support of the Tulsa-West Tulsa Levee System Feasibility Study and request immediate implementation of the critical improvements to the levee system upon the conclusion of the study. There is a strong urgency with the completion of this study as much of Tulsa County's critical infrastructure is protected by the levee system. Continued protection of the levee system is critical to the future of the Tulsa County community. Along with my support of the Feasibility Study, I encourage the U.S. Army Corps of Engineers (USACE) to study improvement alternatives, including increasing the levees' capacity and protection to handle the flood flow associated with a 500-year flood event on the Arkansas River or higher. In light of the alternatives being studied in the Keystone Dam Safety Study, it is vital the downstream levee capacity be increased accordingly.

Structural improvements to the 75-year-old aging levee system are critical to reduce the risk of failure during future flood events. The improvements should utilize current, state-of-art techniques wherever feasible to minimize future risks to life and property and to reduce future maintenance requirements associated with older techniques utilized in the existing levees. Tributary flooding along the levee system should be reduced by correcting current deficiencies in tie-back levees and flood control structures.

Again, I give my support and recommend the continuance of the Feasibility Study and the implementation of these vital improvements to the Tulsa levee system. If you need additional information, please do not hesitate to contact my office.

Sincerely,



James M. Inhofe  
United States Senator

JAMES LANKFORD  
OKLAHOMA

COMMITTEES:  
APPROPRIATIONS  
CHAIRMAN  
SUBCOMMITTEE ON FINANCIAL  
SERVICES AND FEDERAL GOVERNMENT  
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INTELLIGENCE  
HOMELAND SECURITY AND  
GOVERNMENTAL AFFAIRS  
CHAIRMAN  
SUBCOMMITTEE ON REGULATORY  
AFFAIRS AND FEDERAL MANAGEMENT

## United States Senate

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316 HART SENATE OFFICE BUILDING  
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OKLAHOMA CITY OFFICE:  
1015 NORTH BROADWAY AVENUE, SUITE 310  
OKLAHOMA CITY, OK 73102  
(405) 231-4941  
TULSA OFFICE:  
224 SOUTH BOULDER AVENUE, SUITE 210  
TULSA, OK 74103  
(918) 581-7651

March 29, 2019

The Honorable R. D. James  
Assistant Secretary of the Army (Civil Works)  
108 Army Pentagon  
Washington, D.C. 20310-0108

Dear Secretary James,

I write to you with strong and continued support of the Tulsa-West Tulsa Levee System repair. I am pleased the feasibility study was finally appropriated in July 2018 as part of the Bipartisan Budget Act of 2018 (Pub. Law 115-123). The study is now finally underway after its authorization in December 2016.

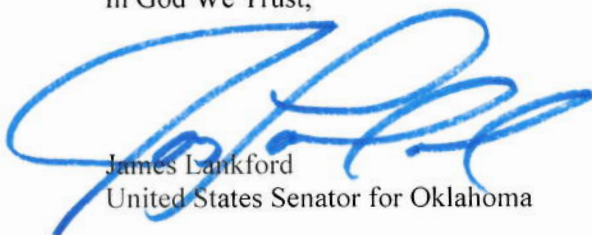
This is a high priority for the citizens of Tulsa County. As you know, the U.S. Army Corps of Engineers (USACE) agrees – levees A and B are classified as “Very High Risk.” It is imperative the feasibility study is completed as quickly as possible. Specifically, I am hopeful the USACE will be able to complete the study well ahead of the 36-month statutory deadline, which the Corps has suggested is possible. I look forward to USACE’s thorough review of all options and consideration of the community’s preferred solution.

The need for an expedited study cannot be overstated. The current 1940s levee system threatens the livelihood of Tulsa County. The 20-mile levee system runs along \$2 billion of infrastructure, including two refineries and the homes of more than 10,000 people.

Levee Commissioner Todd Kilpatrick and County Commissioner Karen Keith have led this project well, and I am confident their good work will continue. The Tulsa West Tulsa levee system is a great example of USACE working together with local partners to complete a critical repair project, and I encourage this productive partnership to continue.

I look forward to the continuation of the feasibility study so the Tulsa West Tulsa levee system can meet critical safety standards to protect the people of Tulsa County and our critical infrastructure. Please feel free to call my Washington, D.C., office at (202) 224-5754 for any additional information.

In God We Trust,



James Lankford  
United States Senator for Oklahoma



**Department of Energy**  
Southwestern Power Administration  
One West Third Street  
Tulsa, Oklahoma 74103-3502

March 7, 2019

David Gade  
U.S. Army Corps of Engineers, Tulsa District  
Regional Planning and Environmental Center  
2488 East 81st Street  
Tulsa, OK 74137-4290

RE: Tulsa and West Tulsa Levees Feasibility Study Initiation

Dear Dr. Gade,

Thank you for the opportunity to comment on the Tulsa and West Tulsa Levees Feasibility Study (Feasibility Study). Southwestern Power Administration (Southwestern) appreciates the public notice of the initiation of the Feasibility Study dated December 19, 2018, and the opportunity to be included from the beginning of the process. Southwestern participated in a stakeholder conference call on January 10, 2019, and the U.S. Army Corps of Engineers staff on the call were knowledgeable about the project and did an excellent job answering questions. As the Federal agency responsible for marketing the hydroelectric capacity and energy from Keystone Dam, Southwestern would like to comment on the Feasibility Study.

Southwestern requests that if an alternative is chosen that requires construction or other work in the Arkansas River downstream of Keystone Dam that there be no daily impact to hydropower operations. If any special hydropower operations are required for a chosen alternative, Southwestern further requests that they be coordinated with Southwestern's Tulsa office at least 30 days in advance. Please be aware that Southwestern's ability to accommodate special hydropower operations requests can be limited due to hydrologic conditions and energy demand.

Southwestern appreciates the opportunity to provide comments on the Feasibility Study. Please contact Jared Milford at (918) 595-6650 or [Jared.Milford@swpa.gov](mailto:Jared.Milford@swpa.gov) if you have any questions or wish to discuss our comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael R. Ohlson", is written over the typed name.

Fritha Ohlson

Director

Division of Resources and Rates

**From:** [Gade, David R CIV USARMY CESWF \(USA\)](#)  
**To:** [Wadlington, Brandon E CIV USARMY CESWF \(US\)](#)  
**Subject:** FW: Environmental Review (TWT) (UNCLASSIFIED)  
**Date:** Friday, January 11, 2019 7:57:37 AM

---

CLASSIFICATION: UNCLASSIFIED

Hi Brandon,

Coordination letter response from ODEQ with respect to TWT is below.

David Gade

Limnologist

Environmental Branch

Regional Planning & Environmental Center

Office: 918.669.7579

From: Jon Roberts [<mailto:Jon.Roberts@deq.ok.gov>] On Behalf Of DEQ EnvReviews  
Sent: Friday, January 11, 2019 7:30 AM  
To: Gade, David R CIV USARMY CESWF (USA) <David.Gade@usace.army.mil>  
Cc: Amy Brittain <Amy.Brittain@deq.ok.gov>  
Subject: [Non-DoD Source] Environmental Review

Dear Dr. Gade:

In response to your request, we have completed an environmental review of air, land and water records for the project listed below. Additional recommendations to consider as you complete your project may be found at [Blockedhttps://go.usa.gov/xnhCE](https://go.usa.gov/xnhCE) <Blockedhttps://go.usa.gov/xnhCE> .

Project

## Comments

1. Prior to beginning any construction activity disturbing more than one acre, you must submit an NOI and obtain authorization under OKR10, construction stormwater.

2. DEQ's Land Protection Division (LPD) has many hazardous waste and remediation projects in Levee Areas A and C. For more information about the locations of these facilities visit our GIS Data Viewer at [Blockedhttps://gis.deq.ok.gov/maps/](https://gis.deq.ok.gov/maps/) <Blockedhttps://gis.deq.ok.gov/maps/> . The facilities and their LPD contacts are:

### Levee Area A –

- \* Sand Springs Petrochemical Superfund site – Kelsey Bufford 405-702-5184.
- \* Sheffield Steel – Ray Roberts 405-702-5140
- \* ASARCO Trust/Formerly Federated Metals – Aron Samwel 405-702-5123
- \* City of Sand Springs Keystone Corridor Redevelopment Area A – Rachel Francks 405-702-5103
- \* Sand Springs Railway – Aron Samwel 405-702-5123

### Levee Area C –

- \* Covanta Tulsa Renewable Energy LLC, Solid Waste Incinerator – Cindy Hailes (405)702-5114.
- \* HollyFrontier Tulsa Refining LLC RCRA-permitted facility (Both East and West) – Orphius Mohammad 405-702-5118
- \* Former Ozark Fluorine Specialties, Inc. Wastewater Treatment Plant – Emily Dixon 405-702-5125
- \* Stericycle Specialty Waste Solutions, Inc. RCRA-permitted facility – Adrian Simmons 405-702-5217
- \* US Ecology Tulsa, Inc. RCRA-permitted facility – Jon Fields 405-702-5145
- \* Baker Petrolite Tulsa Warehouse – Ray Roberts 405-702-5140
- \* Ozark Mahoning Company Phosphogypsum Stack – Aron Samwel 405-702-5123
- \* Electronic Chemicals, Inc. – Aron Samwel 405-702-5123
- \* Flint Industries/Flintco Warehouse – Aron Samwel 405-702-5123

Future requests may be submitted electronically to [EnvReviews@deq.ok.gov](mailto:EnvReviews@deq.ok.gov) <<mailto:EnvReviews@deq.ok.gov>> by attaching a single pdf file containing your request and any attachments.

If you have any questions or need clarification, please contact me.

Regards,

---

Jon A. Roberts, Senior Manager

Office of External Affairs

Oklahoma Department of Environmental Quality

P. O. Box 1677

707 N. Robinson Ave.

Oklahoma City, OK 73101-1677

Ph: (405) 702-7111

Blocked<http://www.deq.state.ok.us/OEA/index.html> <Blocked<http://www.deq.state.ok.us/OEA/index.html>>

CLASSIFICATION: UNCLASSIFIED



March 7, 2019

Mr. David Gade, Limnologist  
U.S. Army Corps of Engineers  
2488 E 81<sup>st</sup> Street  
Tulsa, Oklahoma 74137-4290

RE: Tulsa-West Tulsa Levee System Feasibility Study

Dear Mr. Gade:

The Indian Nations Council of Governments (INCOG), as the regional planning agency for the Tulsa area, is a strong proponent of the Feasibility Study for the Tulsa-West Tulsa Levee System and supports future improvements to the levee system. Much of the Tulsa County's critical infrastructure is protected by this levee system, and continuing the reliable protection of the levee system is critical to the future of the Tulsa community. We support the Feasibility Study for the levee system and encourage the U.S. Army Corps of Engineers (USACE) to study a thorough array of improvement alternatives, which include increasing the levee capacity and protection to handle the flood flow associated with the 500-year flood event on the Arkansas River or higher. In light of the alternatives being studied in the concurrent Keystone Dam Safety Study, we believe it is imperative that the downstream levee capacity be increased to a higher level. The Feasibility Study should determine the feasibility of increasing the levee capacity, even addressing the impact of the proposed 1.6 million cubic feet per second release rate from Keystone Dam.

We believe that structural improvements to this 75-year-old, aging levee system are definitely needed to reduce the risk of failure during future flood events. These structural improvements should utilize current, state-of-art techniques wherever feasible to minimize future risks to life and property and to reduce future maintenance requirements associated with older techniques utilized in the existing levees. Tributary flooding along the levee system should be reduced by correcting current deficiencies in tie-back levees and flood control structures. The existing antiquated pumping stations should be evaluated and improved as needed.

We highly support and recommend the continuance of the Feasibility Study and the implementation of these very important improvements to our levee system. If you need additional information from INCOG, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Rich Brierre", with a stylized flourish at the end.

Rich Brierre  
Executive Director



February 13, 2019

Mr. David Gade, Limnologist  
U.S. Army Corps of Engineers  
2488 E 81<sup>st</sup> Street  
Tulsa, Oklahoma 74137-4290

RE: Tulsa-West Tulsa Levee System Feasibility Study

Dear Mr. Gade:

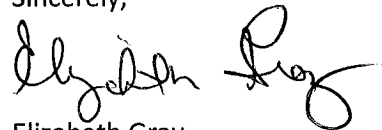
The City of Sand Springs has been an active stakeholder in the planning of improvements to the Tulsa-West Tulsa Levee District 12 system. The lives, properties and infrastructure of Tulsa County residents, including the residents of Sand Springs, are protected by the levees. We encourage the Feasibility Study for the levee system by the U.S. Army Corps of Engineers (USACE) to research an array of improvement alternatives, which include increasing the levee capacity and protection to handle the flood flow associated with a 500-year flood event on the Arkansas River. For decades Sand Springs citizens have paid a fee for the continued maintenance and improvement of the levee system; levee improvements and updates are a benefit to all residents.

We believe that structural improvements to this 75-year-old, aging levee system are needed to reduce the risk of failure during future flood events. Structural improvements should utilize current, state-of-art techniques wherever feasible to minimize future risks to life and property and to reduce future maintenance requirements associated with older techniques utilized in the existing levees.

Tributary flooding along the levee system should be reduced by correcting current deficiencies in tie-back levees and flood control structures.

We encourage the continuance of the Feasibility Study by the Corps for the Tulsa- West Tulsa Levee system and the implementation of these improvements to the levee system. If you need additional information from the City Sand Springs, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Elizabeth Gray", written in a cursive style.

Elizabeth Gray  
City Manager  
Sand Springs

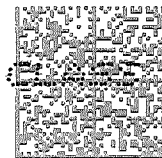


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U.S Army Corps of Engineers  
David Gade, Limnologist  
2488 East 81<sup>st</sup> Street  
Tulsa, OK 74137

AAQJSAB 74137





G.T. Bynum  
OFFICE OF THE MAYOR

February 13, 2019

Mr. David Gade, Limnologist  
U.S. Army Corps of Engineers  
2488 E 81st Street  
Tulsa, Oklahoma 74137-4290

RE: Tulsa-West Tulsa Levee System Feasibility Study

Dear Mr. Gade:

The City of Tulsa has been an active stakeholder in the planning of improvements to the Tulsa-West Tulsa Levee District 12 system. Much of the City's critical infrastructure is protected by the levee system and continuing the reliable protection of the levee system is critical to the future of the Tulsa community. We support the Feasibility Study for the levee system and encourage the U.S. Army Corps of Engineers (USACE) to study a thorough array of improvement alternatives, which include increasing the levee capacity and protection to handle the flood flow associated with the 500-year flood event on the Arkansas River or higher. Considering the alternatives being studied in the concurrent Keystone Dam Safety Study, we believe it is imperative that the downstream levee capacity be increased to a higher level. The Feasibility Study should factually determine the feasibility of increasing the levee capacity, even addressing the impact of the proposed 1.6 million cubic feet per second release rate from Keystone Dam.

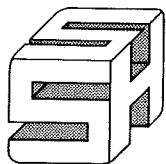
We believe that structural improvements to this 75-year-old, aging levee system are definitely needed to reduce the risk of failure during future flood events. These structural improvements should utilize current, state-of-art techniques wherever feasible to minimize future risks to life and property and to reduce future maintenance requirements associated with older techniques utilized in the existing levees.

Tributary flooding along the levee system should be reduced by correcting current deficiencies in tie-back levees and flood control structures.

We highly support and recommend the continuance of the Feasibility Study and the implementation of these very important improvements to our levee system. If you need additional information from the City of Tulsa, please do not hesitate to contact me.

Best regards,

G.T. Bynum  
Mayor  
City of Tulsa



## **SAND SPRINGS HOME**

15 WEST 2ND STREET  
P.O. BOX 278  
SAND SPRINGS, OK 74063-0278

EXECUTIVE OFFICES  
BOARD OF TRUSTEES  
(918) 245-1391

February 13, 2019

Mr. David Gade, Limnologist  
U.S. Army Corps of Engineers  
2488 E 81<sup>st</sup> Street  
Tulsa, Oklahoma 74137-4290

RE: Tulsa-West Tulsa Levee System Feasibility Study

Dear Mr. Gade:

The Sand Springs Home was started in the early 1900's for the purpose of giving support to widows and orphans in the Tulsa area. The Home first started in the west Tulsa area and watch the City of Sand Springs grow around it. The Home predates the Tulsa-West Tulsa Levee system by several decades and has seen the destruction caused by many Arkansas River floods before the levees were completed. Since the construction of the levees and Keystone Dam, we have enjoyed the protection to life and property provided by the levees and strongly support the continuation and improvement of that protection to the Tulsa area. Much of Tulsa County's critical infrastructure is protected by the levee system and continuing the reliable protection of the levee system is critical to the future of the Sand Spring Home, the City of Sand Springs and the Tulsa County community. We support the Feasibility Study for the levee system and encourage the U.S. Army Corps of Engineers (USACE) to study a thorough array of improvement alternatives, which include increasing the levee capacity and protection to handle the flood flow associated with the 500-year flood event on the Arkansas River or higher. In light of the alternatives being studied in the concurrent Keystone Dam Safety Study, we believe it is imperative that the downstream levee capacity be increased to a higher level. The Feasibility Study should evaluate the feasibility of increasing the levee capacity, even addressing the impact of the proposed 1.6 million cubic feet per second release rate from Keystone Dam.

We believe that structural improvements to this aging levee system are needed to reduce the risk of failure during future flood events. These structural improvements should utilize current, state-of-art techniques wherever feasible to minimize future risks to life and property and to reduce future maintenance requirements associated with older techniques utilized in the existing levees. Tributary flooding along the levee system should be reduced by correcting current deficiencies in tie-back levees and flood control structures.

We highly support and recommend the continuance of the Feasibility Study and the implementation of these very important improvements to our levee system. If you need additional information from the Sand Springs Home, please do not hesitate to contact me.

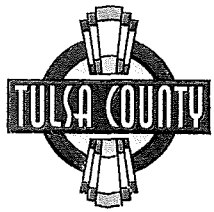
Sincerely,

Ron Weese, Trustee  
Sand Springs Home

CHILDREN'S HOME  
245-3132

CHARLES PAGE FAMILY VILLAGES  
245-6592

REAL ESTATE DEPARTMENT  
245-5939



**Board of County Commissioners**

Tulsa County Administration Bldg.  
500 South Denver  
Tulsa, Oklahoma 74103-3832

**K Keith**

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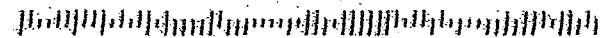


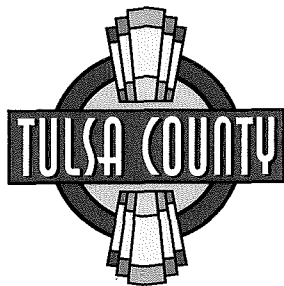
ZIP 74127  
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Mr. David Gade, Limmologist  
US Army Corps of Engineers  
2488 East 81st Street  
Tulsa, OK 74137-4290

*rec*

741374290 C012





Board of County Commissioners

Tulsa County Administration Bldg.  
500 South Denver  
Tulsa, Oklahoma 74103-3832  
918.596.5015

**KAREN KEITH**  
DISTRICT 2

February 14, 2019

Mr. David Gade, Limnologist  
U.S. Army Corps of Engineers  
2488 East 81<sup>st</sup> Street  
Tulsa, Oklahoma 74137-4290

RE: Tulsa-West Tulsa Levee System Feasibility Study

Dear Mr. Gade:

Tulsa County has been an active stakeholder in the planning of improvements to the Tulsa-West Tulsa Levee District 12 system. Much of Tulsa County's critical infrastructure is protected by the levee system, therefore, continuing the reliable protection of the levee system is critical to the future of the Tulsa County community. We support the Feasibility Study for the levee system and encourage the U.S. Army Corps of Engineers (USACE) to study a thorough array of improvement alternatives, which include increasing the levee capacity and protection to handle the flood flow associated with the 500-year flood event on the Arkansas River or higher. In light of the alternatives being studied in the concurrent Keystone Dam Safety Study, we believe it is imperative that the downstream levee capacity be increased to a higher level. The Feasibility Study should factually determine the feasibility of increasing the levee capacity, even addressing the impact of the proposed 1.6 million cubic feet per second release rate from Keystone Dam.

We believe that structural improvements to this 75-year-old, aging levee system are definitely needed to reduce the risk of failure during future flood events. These structural improvements should utilize current, state-of-art techniques wherever feasible to minimize future risks to life and property and to reduce future maintenance requirements associated with older techniques utilized in the existing levees.

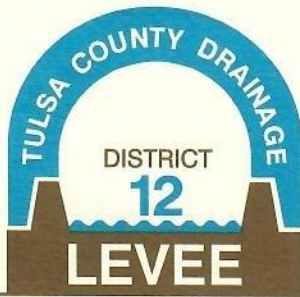
Tributary flooding along the levee system should be reduced by correcting current deficiencies in tie-back levees and flood control structures.

We highly support and recommend the continuance of the Feasibility Study and the implementation of these very important improvements to our levee system. If you need additional information from Tulsa County, please do not hesitate to contact me.

Sincerely,

Commissioner Karen Keith  
Tulsa County Commissioner, District 2

John Fothergill  
Chief Deputy County Commissioner, District 2



1202 E. Pecan Street • Sand Springs, OK 74063-8527 • (918) 591-6116 • Fax (918) 591-6117

**M. TODD KILPATRICK**  
*Levee Commissioner*

February 19, 2019

Mr. David Gade, Limnologist  
U.S. Army Corps of Engineers  
2488 E 81<sup>st</sup> Street  
Tulsa, Oklahoma 74137-4290

RE: Tulsa-West Tulsa Levee System Feasibility Study Comments

Dear Mr. Gade:

Tulsa Levee District 12 Advisory Board wishes to express its support for the Tulsa-West Tulsa Levee Feasibility Study. As the Non-Federal Sponsor (NFS), the Board supports this effort to identify and correct deficiencies in this 75-year old levee system and find feasible alternatives to increase its level of protection for the Tulsa area communities that we serve. We encourage the U.S. Army Corps of Engineers (USACE) to study a thorough array of improvement alternatives, which include increasing the levee capacity and protection to handle the flood flow associated with the 500-year flood event on the Arkansas River or higher. In light of the alternatives being studied in the concurrent Keystone Dam Safety Study, we believe it is imperative that the downstream levee capacity be increased to a higher level. The Feasibility Study should factually determine the feasibility of increasing the levee capacity, even addressing the impact of the proposed 1.6 million cubic feet per second release rate from Keystone Dam.

We believe that structural improvements to this aging levee system are definitely needed to reduce the risk of failure during future flood events. These structural improvements should utilize current, state-of-art techniques wherever feasible to minimize future risks to life and property and to reduce future maintenance requirements associated with older techniques utilized in the existing levees. We have used our limited resources to maintain the levee system over the past decades, but the technology utilized in the 1940 's had a limited useful life, estimated at 50 years. Toe drains, relief well, pump stations, and other installed appurtenances have exceeded their useful life, and major improvements and upgrades are needed to continue the low-risk flood protection that was originally envisioned. Additionally, tributary flooding along the levee system should be reduced by correcting current deficiencies in tie-back levees and flood control structures.

We will continue to support the Feasibility Study and will contribute to its success to the greatest extent possible. If you need additional information from the Levee District Advisory Board , please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "M. Todd Kilpatrick". The signature is fluid and cursive, with the first name "M." being more prominent.

M. Todd Kilpatrick, Commissioner  
Tulsa-West Tulsa Levee District 12  
[tkilpatrick@tulsacounty.org](mailto:tkilpatrick@tulsacounty.org)

E. Bruce Ford  
[ebruceford@yahoo.com](mailto:ebruceford@yahoo.com)

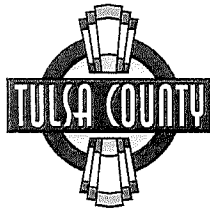
Montie box  
[montiebox@aol.com](mailto:montiebox@aol.com)

Rick Tallent  
[Rtallent8317@gmail.com](mailto:Rtallent8317@gmail.com)

Mike Luttrell  
[mluttrell@billknightauto.com](mailto:mluttrell@billknightauto.com)

John Fothergill  
[jfothergill@tulsacounty.org](mailto:jfothergill@tulsacounty.org)

Wayne Hamilton  
[whamilton@naguss.com](mailto:whamilton@naguss.com)



**Board of County Commissioners**

Tulsa County Administration Bldg.  
500 South Denver  
Tulsa, Oklahoma 74103-3832

**S Sallee**

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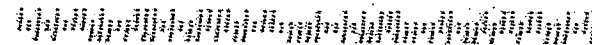


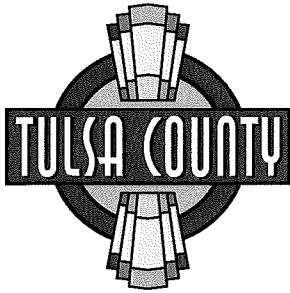
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Mr. David Gade, Limnologist  
US Army Corps of Engineers  
2488 East 81st Street  
Tulsa, OK 74137-4290

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## **Board of County Commissioners**

Tulsa County Administration Bldg.  
500 South Denver  
Tulsa, Oklahoma 74103-3832  
918.596.5020

**STAN SALLEE**  
DISTRICT 1

March 7, 2019

Mr. David Gade, Limnologist  
U.S. Army Corps of Engineers  
2488 East 81<sup>st</sup> Street  
Tulsa, Oklahoma 74137-4290

RE: Tulsa-West Tulsa Levee System Feasibility Study

Dear Mr. Gade:

Tulsa County's infrastructure is protected by the levee system and continuing the reliable protection of the levees is critical to the future of the Tulsa County community. We support the Feasibility Study for the levee system and encourage the U.S. Army Corps of Engineers (USACE) to study a thorough array of improvement alternatives, which include increasing the levee capacity and protection to handle the flood flow associated with the 500-year flood event on the Arkansas River or higher. In light of the alternatives being studied in the concurrent Keystone Dam Safety Study, we believe it is imperative that the downstream levee capacity be increased. The Feasibility Study should factually determine the feasibility of increasing the levee capacity, even addressing the impact of the proposed 1.6 million cubic feet per second release rate from Keystone Dam.

We believe that structural improvements to this 75-year-old, aging levee system are definitely needed to reduce the risk of failure during future flood events. These structural improvements should utilize current, state-of-art techniques wherever feasible to minimize future risks to life and property and to reduce future maintenance requirements associated with older techniques utilized in the existing levees.

Tributary flooding along the levee system should be reduced by correcting current deficiencies in tie-back levees and flood control structures.

We highly support and recommend the continuance of the Feasibility Study and the implementation of these very important improvements to our levee system. If you need additional information from Tulsa County, please do not hesitate to contact us.

Sincerely,

Commissioner Stan Sallee  
Tulsa County Commissioner, District 1

Mike Craddock  
Chief Deputy County Commissioner, District 1

## **Cooperating and Participating Agencies**



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

August 21, 2019

Fritha Olsen  
Director  
Division of Resources and Rates  
Southwestern Power Administration  
Tulsa Headquarters  
One West Third Street  
Tulsa, Oklahoma 74103-3502

Dear Ms. Olsen:

The Tulsa District, U.S. Army Corps of Engineers (USACE), in cooperation with the non-Federal sponsor, Tulsa County Drainage Levee District Number 12, initiated the Tulsa and West Tulsa Levees (TWT) Feasibility Study in December 2018, located in Tulsa County, Oklahoma. The Feasibility Study is developing alternatives to improve the resiliency of the existing TWT Levee System and restoring acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

In accordance with Section 1005 of the Water Resources Reform and Development Act of 2014 and other applicable laws and regulations, the USACE held an initial Resource Agency meeting on January 10, 2019, and will continue to host reoccurring Resource Agency meetings via teleconference, webinar, and in-person, as appropriate.

Our office would like to continue to solicit any input you may have with respect to the TWT study in accordance with the National Environmental Policy Act (NEPA) of 1969 and other applicable laws and regulations to assist us as we progress through the NEPA process. We would also like to invite you to serve as a cooperating agency for this project. We ask that you respond in writing to confirm or deny your participation by September 20, 2019. We will assume your agency as cooperating if no response is received. Please note, we will accept new information and comments throughout the process. Please contact Brandon Wadlington, Biologist, Environmental Compliance Branch, Regional Planning and Environmental Center, by mail at U.S. Army Corps of Engineers, 819 Taylor Street, P.O. Box 17300, Room 3A12, Fort Worth, Texas 76102-0300; by telephone at (817) 886-1720; or by email at [Brandon.Wadlington@usace.army.mil](mailto:Brandon.Wadlington@usace.army.mil) with comments, questions, or the need for further information.

Sincerely,

A handwritten signature in cursive script that reads "Angela M. Lane".

Angela M. Lane  
Acting Chief, Environmental Branch  
Regional Planning and Environmental Center



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

August 21, 2019

Jonna Polk  
Field Supervisor  
Oklahoma Ecological Services Field Office  
9014 East 21<sup>st</sup> Street  
Tulsa, Oklahoma 74129-1428

Dear Ms. Polk:

The Tulsa District, U.S. Army Corps of Engineers (USACE), in cooperation with the non-Federal sponsor, Tulsa County Drainage Levee District Number 12, initiated the Tulsa and West Tulsa Levees (TWT) Feasibility Study in December 2018, located in Tulsa County, Oklahoma. The Feasibility Study is developing alternatives to improve the resiliency of the existing TWT Levee System and restoring acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

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Our office would like to continue to solicit any input you may have with respect to the TWT study in accordance with the Fish and Wildlife Coordination Act and other applicable laws and regulations to assist us as we progress through the National Environmental Policy Act (NEPA) of 1969 process. We would also like to invite you to serve as a cooperating agency for this project. We ask that you respond in writing to confirm or deny your participation by September 20, 2019. We will assume your agency as cooperating if no response is received. Please note, we will accept new information and comments throughout the process. Please contact Brandon Wadlington, Biologist, Environmental Compliance Branch, Regional Planning and Environmental Center, by mail at U.S. Army Corps of Engineers, 819 Taylor Street, P.O. Box 17300, Room 3A12, Fort Worth, Texas 76102-0300; by telephone at (817) 886-1720; or by email at [Brandon.Wadlington@usace.army.mil](mailto:Brandon.Wadlington@usace.army.mil) with comments, questions, or the need for further information.

Sincerely,

A handwritten signature in cursive script that reads "Angela Lane".

Angela M. Lane  
Acting Chief, Environmental Branch  
Regional Planning and Environmental Center



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

August 21, 2019

J.D. Strong  
Director  
Oklahoma Department of Wildlife Conservation  
1801 N. Lincoln  
Oklahoma City, Oklahoma 73105

Dear Mr. Strong:

The Tulsa District, U.S. Army Corps of Engineers (USACE), in cooperation with the non-Federal sponsor, Tulsa County Drainage Levee District Number 12, initiated the Tulsa and West Tulsa Levees (TWT) Feasibility Study in December 2018, located in Tulsa County, Oklahoma. The Feasibility Study is developing alternatives to improve the resiliency of the existing TWT Levee System and restoring acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

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Sincerely,

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Angela M. Lane  
Acting Chief, Environmental Branch  
Regional Planning and Environmental Center



**DEPARTMENT OF THE ARMY**  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

August 21, 2019

Trapper Parks  
Oklahoma Dept. of Transportation  
4002 N. Mingo Valley Expressway  
Tulsa, Oklahoma 74116

Dear Mr. Parks:

The Tulsa District, U.S. Army Corps of Engineers (USACE), in cooperation with the non-Federal sponsor, Tulsa County Drainage Levee District Number 12, initiated the Tulsa and West Tulsa Levees (TWT) Feasibility Study in December 2018, located in Tulsa County, Oklahoma. The Feasibility Study is developing alternatives to improve the resiliency of the existing TWT Levee System and restoring acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

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Sincerely,

A handwritten signature in cursive script that reads "Angela Lane".

Angela M. Lane  
Acting Chief, Environmental Branch  
Regional Planning and Environmental Center



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

August 21, 2019

Scott Thompson, Executive Director  
Oklahoma Department of Environmental Quality  
707 N Robinson  
Oklahoma City, OK 73102

Dear Mr. Thompson:

The Tulsa District, U.S. Army Corps of Engineers (USACE), in cooperation with the non-Federal sponsor, Tulsa County Drainage Levee District Number 12, initiated the Tulsa and West Tulsa Levees (TWT) Feasibility Study in December 2018, located in Tulsa County, Oklahoma. The Feasibility Study is developing alternatives to improve the resiliency of the existing TWT Levee System and restoring acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

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Angela M. Lane  
Acting Chief, Environmental Branch  
Regional Planning and Environmental Center



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

August 21, 2019

Roberto Ramos  
Arkansas/Oklahoma Airport District Office  
Federal Aviation Administration  
10101 Hillwood Parkway  
Fort Worth, Texas 76117

Dear Mr. Ramos:

The Tulsa District, U.S. Army Corps of Engineers (USACE), in cooperation with the non-Federal sponsor, Tulsa County Drainage Levee District Number 12, initiated the Tulsa and West Tulsa Levees (TWT) Feasibility Study in December 2018, located in Tulsa County, Oklahoma. The Feasibility Study is developing alternatives to improve the resiliency of the existing TWT Levee System and restoring acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

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Angela M. Lane  
Acting Chief, Environmental Branch  
Regional Planning and Environmental Center



**DEPARTMENT OF THE ARMY**  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

August 21, 2019

Robert Houston  
Staff Director  
Office of Communities, Tribes and Environmental Assessment  
U.S. EPA Region 6  
1445 Ross Avenue, Suite 1200 (ORACN)  
Dallas, Texas 75202-2733

Dear Mr. Houston:

The Tulsa District, U.S. Army Corps of Engineers (USACE), in cooperation with the non-Federal sponsor, Tulsa County Drainage Levee District Number 12, initiated the Tulsa and West Tulsa Levees (TWT) Feasibility Study in December 2018, located in Tulsa County, Oklahoma. The Feasibility Study is developing alternatives to improve the resiliency of the existing TWT Levee System and restoring acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

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Sincerely,

A handwritten signature in cursive script that reads "Angela Lane".

Angela M. Lane  
Acting Chief, Environmental Branch  
Regional Planning and Environmental Center



DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS, TULSA DISTRICT  
2488 EAST 81<sup>ST</sup> STREET  
TULSA, OKLAHOMA 74137-4290

August 21, 2019

Gary O'Neill, State Conservationist  
USDA - NRCS  
100 USDA Suite 206  
Stillwater, OK 74074-2655

Dear Mr. O'Neill:

The Tulsa District, U.S. Army Corps of Engineers (USACE), in cooperation with the non-Federal sponsor, Tulsa County Drainage Levee District Number 12, initiated the Tulsa and West Tulsa Levees (TWT) Feasibility Study in December 2018, located in Tulsa County, Oklahoma. The Feasibility Study is developing alternatives to improve the resiliency of the existing TWT Levee System and restoring acceptable levels of flood risk to portions of Tulsa County and the City of Tulsa.

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Sincerely,

A handwritten signature in cursive script that reads "Angela Lane".

Angela M. Lane  
Acting Chief, Environmental Branch  
Regional Planning and Environmental Center



**US Army Corps  
of Engineers ®**

Tulsa District

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# **APPENDIX E 2: Draft Fish and Wildlife Coordination Act Compliance**

## **Tulsa and West-Tulsa Levees Feasibility Study**

**August 2019**

# **1 INTRODUCTION**

The purpose of this report is to describe existing fish and wildlife resources within the Arkansas River Corridor study area in Tulsa County, Oklahoma and to recommend preliminary measures for ecosystem restoration.

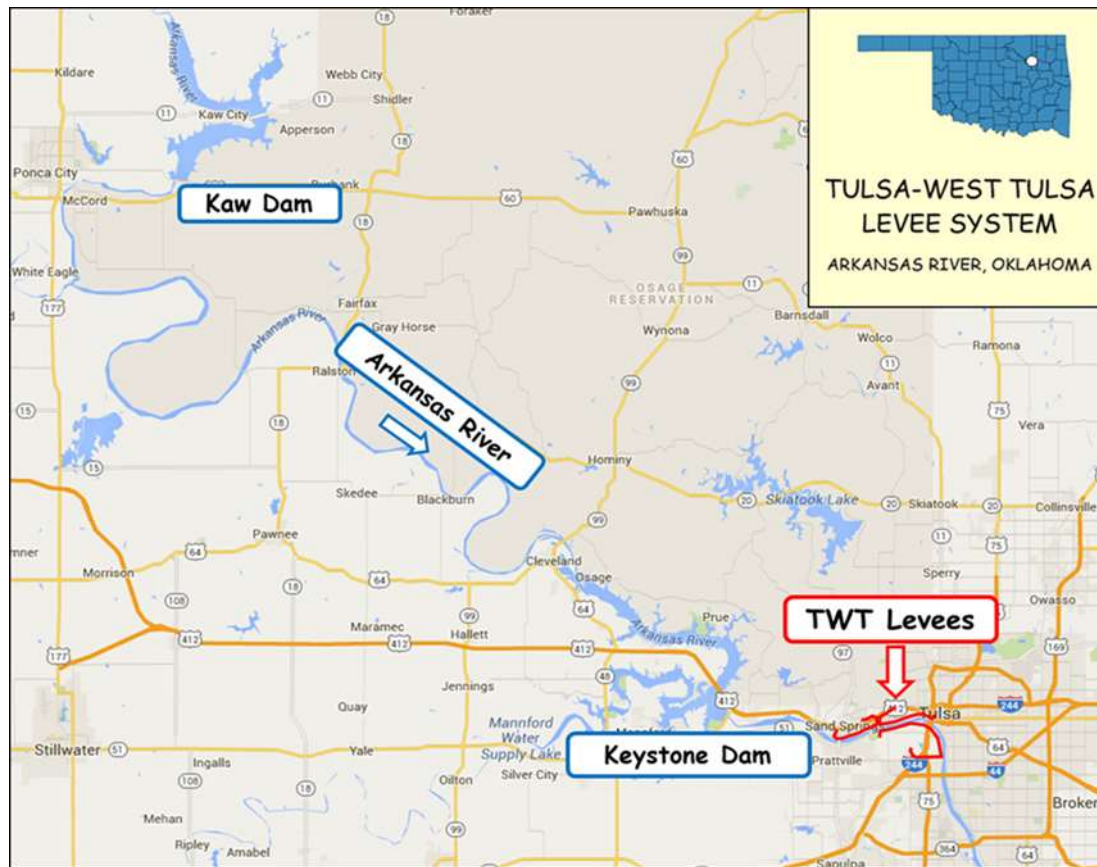
This planning assistance is provided to the U.S. Army Corps of Engineers (Corps), pursuant to the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq).

## **2 STUDY AREA**

### **2.1 Location**

As authorized by Section 1202 of the Water Infrastructure Improvements for the Nation Act (WIIN Act of 2016, Public Law 114-322), the study is an integrated feasibility report and environmental assessment completed by the U.S. Army Corps of Engineers (Corps), Tulsa District (SWT). The Corps constructed the Tulsa West Tulsa (TWT) levee system in the mid-1940s as authorized in the 1941 Flood Control Act to protect residential and industrial property from frequent flooding along the Arkansas River and associated tributaries in Tulsa and Sand Springs (a suburb of Tulsa). Levees A, B, and C completed in 1945 for a total of 20 miles of earthen levees on the left and right bank of the Arkansas River.

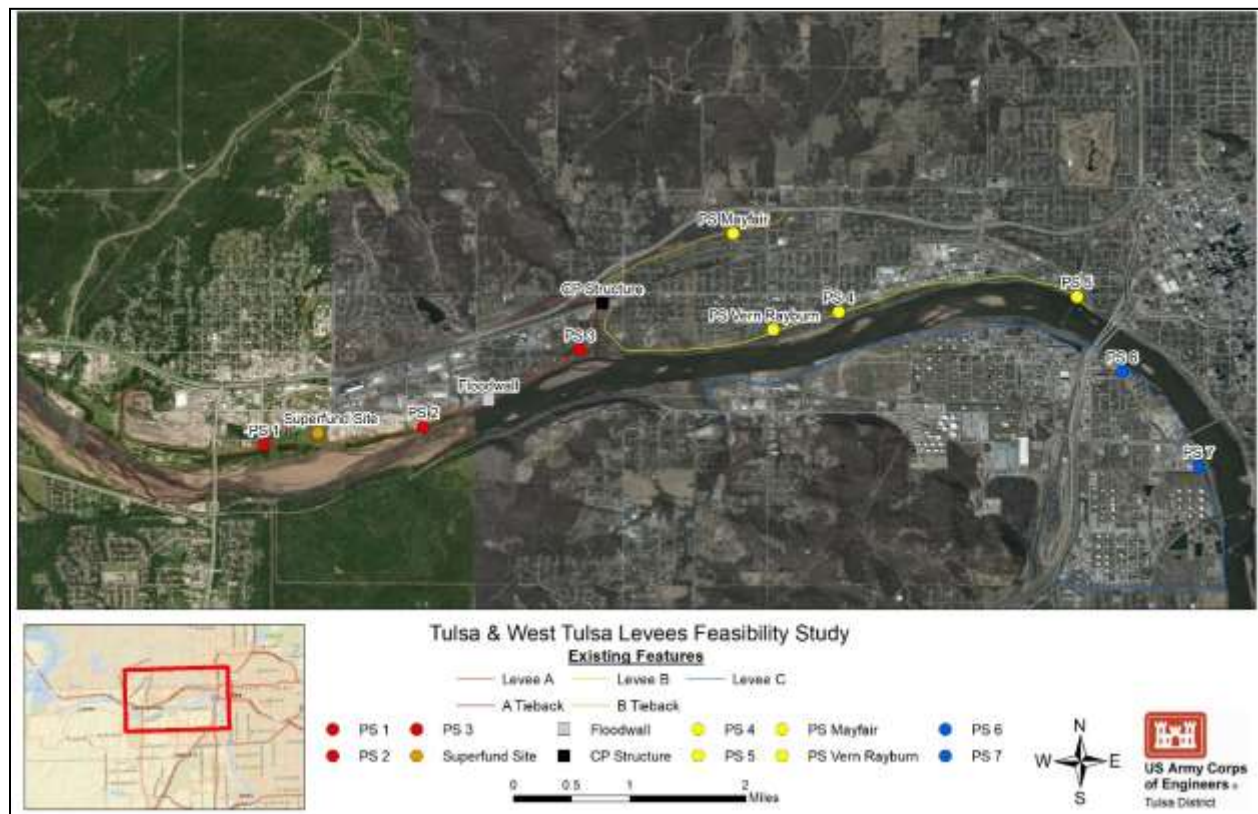
The TWT Levee System is located in northeast Oklahoma in Tulsa County, and extends from the City of Sand Springs downstream along the Arkansas River into the City of Tulsa. Upstream, there are a series of Corps flood control dams. Keystone Dam is about 8 miles upstream, and flood discharges from Keystone have direct and substantial impacts to the levee system. Kaw Dam is about 100 miles upstream of Keystone (Figure 1).



**Figure 1: Tulsa West Tulsa Levees Area Map**

The problem addressed is flood risk to life and property in communities behind the levee system. System levees could fail due to overtopping and inadequately controlled under-seepage and through seepage. As the levee system features continue to degrade as a result of flood events, the systems' ability to operate as originally diminishes. If no action is taken under and through seepage problems will worsen and pose a threat to the integrity of the levee while further degradation to pumping stations and appurtenant works could cause interior flooding that can impact industries, infrastructure and interrupt the transportation system. Give the problem, there is an opportunity to identify a long-term economically and environmentally sustainable solution to reduce risk of damages due to levee breach and non-breach flooding and life safety risks.

Figure 2 shows the existing elements of the Tulsa West Tulsa Levee Systems A, B, and C.



**Figure 2: Existing Features of the Tulsa West Tulsa Levees.**

## 2.2 Climate, Topography, and Ecology

The climate in the Tulsa area is considered continental, characterized by abundant sunshine and rapid fluctuations in temperature. Winters are generally mild, though temperatures occasionally fall below 0 degrees Fahrenheit (°F) for brief periods of time. During the summer, temperatures often exceed 100°F from late July to early September. The average annual temperature is 60°F, with average highs ranging from 88°F to 93°F during the summer and from 46°F to 53°F during the winter. Average low temperatures in the winter months generally range between 26°F and 31°F (NWS 2011).

Average annual precipitation in the study area is 42 inches (NWS 2011). Thunderstorms account for a significant amount of the annual precipitation and are most frequent in the spring. Generally, wet weather events take place only for a day or two, followed by fair skies. Snowfall is most prevalent in January and early March, with annual snowfall amounts averaging 9.2 inches (NWS 2011). In addition to local precipitation, rain and snowfall events throughout the Arkansas River watershed can impact flow conditions in the Tulsa area.

Large hail and windstorms may occur throughout the year, but are most common in spring and early summer. Typically these storms create scattered damage. Oklahoma has a very high level of tornado activity, with an average of 53 tornadoes a year state-wide, with an average of 12 in Tulsa County per year (NWS 2011b).

The Arkansas River is the fourth longest river in the U.S. It flows from the headwaters near Leadville, Colorado, to the confluence with the Mississippi River near Rosedale, Mississippi. The river flows 1,450 miles through Colorado, Kansas, Oklahoma, and Arkansas. The Arkansas River has a watershed area of almost 195,000 square miles (mi<sup>2</sup>) at the confluence of the Mississippi River and a watershed area of 74,615 mi<sup>2</sup> at the Tulsa gaging station maintained by the U.S. Geological Survey (USGS). The Arkansas River drains most of Tulsa County, but tributaries of the Verdigris, principally Bird Creek and the Caney River, drain the northern portion.

Tulsa County contains 587 mi<sup>2</sup> of land and water area. The landscape includes prairies and sandstone hills, with the lowlands of the Arkansas River Valley providing excellent farming soil. The Arkansas River flows through the study area in a wide, braided, sandy-bottomed channel referred to as a prairie river. Prairie rivers are a mix of runs and riffles that change within the larger river channel when higher flows move and redeposit sand. At lower flow conditions, these sandbars are exposed and may establish rooted vegetation or remain barren. Reservoirs such as Keystone and Kaw, which provide flood control and hydropower generation, have altered the seasonal pattern of hydrologic inputs from rainfall. Outside of flood pool releases and hydropower generation, the lack of river flow has changed the river hydrology that limited ecosystem function remains. The Arkansas River does support navigation up to Muskogee, Oklahoma, but is considered non-navigable within the study area.

The study area is located on the mainstem of the Arkansas River within Tulsa County, Oklahoma, which includes its banks from the Keystone Dam downstream to the Tulsa/Wagoner County line (42 miles), and is located entirely within the Polecat-Snake Watershed (HUC 11110101). Much of the surrounding land use includes the urbanized Tulsa metropolitan area, which includes the cities of Bixby, Owasso, Broken Arrow, Jenks, and Sand Springs. The remaining watershed land use is primarily agricultural with some commercial land use. Zink Dam and its associated reservoir pool are located near 31st Street and Riverside Drive in Tulsa, Oklahoma.

Between Keystone Dam and the Tulsa/Wagoner County line, is generally located within urbanized environment; therefore, the natural landscape has been heavily altered. Examples of modifications within the study area include riprap and graded banks, fill, concrete channels, commercial and residential development, and industrial facilities. Keystone Dam was built in 1964 along the Arkansas River upstream from Tulsa to control flooding and stabilize river flow. This has affected the ARC within Tulsa and its suburbs, changing the normal water levels downstream, and facilitating development along the banks.

The tributaries Euchee Creek, Fisher Creek, and old Prattville Creek, enter the Arkansas River within the study area. Of these tributaries, the Prattville Creek confluence and the surrounding area is the only area where additional restoration and ecosystem improvement work is required for this alternative. The Arkansas River flows west to east where the old Prattville Creek meets with the river, and the confluence is located on the south side of the Arkansas River directly north of Prattville and south of Sand Springs.

Multiple streams were realigned and modified during the construction of the TWT system. These include Harlow Creek, Blackboy Creek (hereafter referred to as Bigheart Creek), Lake Station Drainage Ditch (hereafter referred to as Bigheart Creek Tributary), and Cherry Creek.

The three tributary streams on the north side of the Arkansas River (Harlow Creek, Bigheart Creek, and Bigheart Tributary) used to arrive at different confluence locations. However, it became advantageous to combine these three drainage areas into a single outlet on the north side of the Arkansas River. This new confluence was designed to be controlled by the Charles Page Boulevard Floodway Structure which would also allow for the closure and linkage of Levees A and B along with their respective tieback segments.

Bigheart, Harlow, and Parkview Creeks are left bank tributaries of the Arkansas River that drain areas above Levees A and B. The lower reaches of these streams have gentle slopes within the flat Arkansas River floodplain. West Bigheart Creek, a tributary of Bigheart Creek, is separated from the protected area by the Levee A tieback and is largely regulated by Sand Springs Lake. Harlow Creek is separated from the protected area by the Levee B tieback. Bigheart Creek and Harlow Creek both originate in Osage County, and the confluence of both of these streams occurs just upstream from the Charles Page Floodway Structure.

Harlow Creek flows for a total of approximately 3.5 miles. Originally flowing south, stream slopes in the headwater areas approach 25 ft/mi. After passing beneath the US-412 Highway embankment, Harlow Creek flows in a southwesterly direction along the Levee B Tieback embankment with an average slope of approximately 7.5 ft/mi. The largest tributary to Harlow Creek (termed “Harlow Creek Tributary”) enters from the north and contributes approximately 2.25 sq. mi. to the seven sq. mi. total drainage area. Starting at West Edison Street, Harlow Creek has been realigned and channelized for its remaining length to the confluence with Bigheart Creek.

While the Arkansas River has long been a significant natural resource for the surrounding land and its inhabitants, historical alterations have substantially altered watershed conditions and degraded the river’s ecosystem. Keystone Dam, which was constructed in 1964 to protect nearby communities from extreme flood events, significantly changed the natural hydrology of the Arkansas River. Additionally, growth and development associated with the Tulsa metropolitan area, and related intensive land use practices, have led to streambank erosion, destruction of riverine wetlands, increased stormwater runoff, and a high degree of sediment transport to the river. As a result, ecosystems native to the Arkansas River area have been compromised, and instream habitats continue to be depleted and degraded.

Emergent wetland areas, characterized by usually flooded areas with rooted, herbaceous hydrophytes, also occur within the study area. They can be found either along the edge of the Arkansas River or in depressional areas within the floodplain. Dominant perennial vegetation in these emergent wetlands may include rushes (*Juncus* spp.), smartweed (*Polygonum* spp.), spikerush (*Eleocharis* spp.), grassy arrowhead (*Sagittaria graminea*), cattail (*Typha latifolia*), and various sedges (*Carex* spp.). Buttonbush (*Cephalanthus occidentalis*) is also commonly found scattered throughout wetland areas where inundation is less frequent (Oklahoma State University, 1998).

Riparian shrub wetlands, characterized by occasionally flooded areas with shrub and young woody vegetation, also occur within the study area. These are open areas dominated by shrub and hardwood saplings mixed with emergent herbaceous vegetation. Riparian shrub wetlands provide shelter, food, and nesting habitat for a variety of wildlife. Common vegetation in these wetland areas includes buttonbush (*Cephalanthus occidentalis*), hawthorn (*Crataegus crus-*

*galli*), deciduous holly (*Ilex decidua*), big bluestem (*Andropogon gerardii*), and soft rush (*Juncus effusus*). Young hardwoods common to this habitat may include black willow (*Salix nigra*), cottonwood (*Populus deltoides*), oaks (*Quercus* spp.), sandbar willow (*Salix exigua*), and sycamore (*Plantanus occidentalis*) (Oklahoma State University, 1998).

Bottomland hardwood forests are an extensive component of the Arkansas River riparian corridor, occurring largely within the floodplain of the river and adjacent to small tributaries. This forest habitat is regarded as extremely important because of the wildlife diversity it supports, high soil productivity, and hydrologic regimes. The forested bottomland in the study area consists of large- to medium-sized trees with a moderate understory. The overstory is dominated by cottonwood, sycamore, green ash (*Fraxinus pennsylvanica*), pecan (*Carya illinoensis*), box elder (*Acer negundo*), river birch (*Betula nigra*), black willow, silver maple (*Acer saccharinum*), black walnut (*Julgans nigra*), sugarberry (*Celtis laevigata*), water oak (*Quercus nigra*), overcup oak (*Quercus lyrata*), and willow oak (*Quercus phellos*). The bottomland understory is largely dominated by swamp privet (*Forestiera acuminata*), greenbriar (*Smilax* spp.), poison ivy (*Toxicodendron radicans*), violets (*Viola* spp.), and trumpet-creeper (*Campsis radicans*), along with young hardwood species (Oklahoma State University, 1998).

Riverine and sandbar habitat dominate the river channel habitats during lower flow conditions. Riverine sandbar habitat structure and function are influenced directly by the hydrology of the Arkansas River. The riverine sandbar size, location, and stability are dependent on the controlled flow conditions of the Arkansas River through releases from the Keystone Dam upstream. During typical river-stage conditions (less than 12,000 cfs), the sandbars within the study area are dry and not inundated by surface water. During higher river stages, the sandbars are partially or fully inundated by surface water.

Riverine sandbar habitats within the study area are mostly unvegetated. By their nature, the sandbars are subject to cycles of scour and deposition. At slightly higher elevations nearer the river banks, the riverine sandbars are less frequently inundated by surface waters and become more vegetated. Where established along the banks, vegetation is typically herbaceous shrubs, or smaller trees such as black willow, sandbar willow, buttonbush, sycamore, and big bluestem. The invasive species Johnson grass (*Sorghum halepense*) is readily abundant within these habitats because it quickly colonizes areas disturbed by the shifting river sands. The highest elevations within the riverine sandbar habitats include the bank slopes of the Arkansas River. The majority of the riverbanks are steep to near vertically sloped with areas that are sloughing and/or eroding or are reinforced with riprap or concrete rubble.

The primary ecological functions that the riverine sandbars provide within the study area include floodwater attenuation during high-river stage events; sediment source for downstream habitats; habitat for listed species; and foraging habitat for wading birds, waterfowl, and terrestrial species

Riverine sandbars within the study area have the potential to provide habitat for the federally listed Interior Least Tern (*Sterna antillarum*). The bald eagle (*Haliaeetus leucocephalus*), which was recently removed from federal listing, is also known to use habitats within the study area.

Open water habitats within the mainstem of the ARC include riverine riffle and pool run complexes, isolated pools, and a reservoir pool (Zink Lake). The riffle and pool run complexes

are features typical of a prairie river system. They are braided and relatively nonpermanent features that become repositioned within the river channel during higher flow conditions. Substrates are typically sand or bedrock with little gravel or cobble. At locations where the river channel substrate is bedrock, the riffle runs are more permanent features.

Isolated pools of open water occur throughout the study area in the absence of flood pool or hydropower releases. They include features created through natural processes such as oxbows, which are relics of meandering riffle and pool run complexes and those created through anthropogenic activities such as sand mining and at locations below stormwater outfalls entering the river. Many of these isolated pools are temporary, as braided riffle and pool run complexes meander under various river flow conditions and as riverine sandbars shift and are redeposited. The more permanent pools are found adjacent to the ARC banks and are connected to other surface waters under higher river stages. Many of these have emergent and shrub wetland vegetation present, creating a littoral fringe that helps stabilize the substrate. Water quality within the more permanent pools are typically reduced because of stormwater inputs and little to no mixing with other surface waters. Substrates within these pools include sand and organic sediments.

Zink Dam is located near 31<sup>st</sup> Street and Riverside Drive. The dam was constructed in 1983 creating a permanent reservoir pool known as Zink Lake. The backwater, or impounded area, extends upstream approximately 2 miles and encompasses approximately 298 acres when the dam is at the control elevation of 617 feet. The existing dam structure limits fish and fish egg passage, and reduces sediment transport downstream by trapping sediments in the reservoir.

The open water habitats within the study area provide foraging areas for wading areas and shorebirds, including the listed species Least Tern. They provide resting areas for waterfowl. The deeper and more permanent open water features provide habitat for fish communities.

Emergent wetland habitats found within the study area provide food and shelter for fish and other species including macroinvertebrates, which make up the foundation of the aquatic food chain. These wetland areas also provide habitat for amphibians, reptiles, birds, and insects. Frogs and salamanders use these wetland areas for breeding grounds and for egg laying. Ducks and migratory birds use them for resting areas on migration routes and for nesting. Insects associated with open water and emergent habitats include true flies (order Diptera), mayflies (order Ephemeroptera), caddisflies (order Trichoptera), dragonflies and damselflies (order Odonata), and beetles (order Coleoptera). These aquatic insects not only provide a food source for fish, aquatic invertebrates, amphibians, reptiles, and birds, they also break down organic material present in riverine and riparian wetland areas common throughout the study area.

Many species of reptiles and amphibians inhabit the riparian bottomland forests and emergent wetlands along the Arkansas River, with amphibians being more prevalent in the bottomland swamp areas and other aquatic habitats. Common reptiles include the western ribbon snake (*Thamnophis proximus*), eastern hognose snake (*Heterodon platyrhinos*), fence lizard (*Sceloporus undulatus*), timber rattlesnake (*Crotalus horridus*), common snapping turtle (*Chelydra serpentina*), red-eared slider (*Chrysemys scripta elegans*), and three-toed box turtle (*Terrapene carolina triunguis*). Common amphibians include the southern leopard frog (*Rana*

*sphenocephala*), northern spring peeper (*Hyla crucifer*), American toad (*Bufo americanus*), bullfrog (*Rana catesbeiana*), and green frog (*Rana clamitans melanota*) (CH2M, 2010).

Bird species commonly found in forested habitats surrounding the area include pileated woodpecker (*Dryocopus pileatus*), belted kingfisher (*Ceryle alcyon*), wood duck (*Aix sponsa*), herons and egrets (*Ardea* spp. and *Egretta* spp.), barred owl (*Strix varia*), and red-shouldered hawk (*Buteo lineatus*). Birds common in the wetland areas are similar to those that occur in upland forested habitats, particularly waterfowl such as herons, egrets, and cormorants (*Phalacrocorax* spp.).

The Arkansas River and its tributaries within the study area support a prominent fishery providing valuable recreational opportunities to area residents. Additionally, populations of suitable forage species for Least Terns and wading birds are relatively abundant in the Arkansas River. Sources cited in the Least Tern recovery plan (USFWS, 1990) identify species of *Notropis*, *Pimephales*, *Gambusia*, *Dorosoma*, and *Carpionodes* among important fish genera in the diet of Least Tern. Species of *Cyprinella* and *Labidesthes* also are small fish that are potentially suitable as prey. These smaller forage fishes are most abundant in pool runs, Zink Lake, and temporary and permanent isolated pools. Their local seasonal abundance is dependent on river flows, pool connections to other river channel surface waters, and water quality.

A seasonal fisheries survey conducted by ODWC biologists from October 2006 through September 2007 (Cherokee CRC, 2009) reported the occurrence of 41 species of fish in 12 families from the Arkansas River in Tulsa County. Of these reported species, three are listed as invasive exotics: grass carp (*Ctenopharyngodon idella*), common carp (*Cyprinus carpio*), and white perch (*Morone americana*). The families represented by the most species were sunfish (*Lepomis* spp.) (9 species), carp (family Cyprinidae) and minnows (8 species), and suckers (7 species). The principal sport fishes collected included largemouth bass (*Micropterus salmoides*), spotted bass (*Micropterus punctulatus*), striped bass (*Morone saxatilis*), channel catfish (*Ictalurus punctatus*), flathead catfish, white crappie (*Pomoxis annularis*), a variety of sunfish, and sauger (*Sander canadensis*). ODWC collected 29 species from the reach between Keystone Dam and Zink Dam and 37 species from the reach downstream of Zink Dam. Eleven species were collected exclusively downstream of Zink Dam, potentially indicative of habitat differences, water quality conditions, or Zink Dam as an impediment to upstream dispersal (as currently operated). The 11 species included 4 native minnows, and the larger native riverine species paddlefish (*Polyodon spathula*), river herring (*Moxostoma carinatum*), golden herring (*Moxostoma erythrurum*), sauger (*Sander canadensis*), and walleye (*Sander vitreus*). Recent occurrence (2015) of paddlefish in the Arkansas River in Tulsa County have also been reported. Numerous paddlefish were observed in pools below Zink Dam in late summer and early fall 2015, following elevated river stages throughout most of the summer, which likely allowed the paddlefish to travel farther upstream than during typical river stages.

From October 2006 to April 2008, Eagle Environmental Consulting, Inc., conducted aquatic macroinvertebrate surveys along the Arkansas River at locations upstream and downstream of the study area. The most common species collected were Chironomids (midges), Naiads (dragonflies and mayflies), Hyalellans (amphipods), and Daphnia (water fleas). Freshwater mussels with the potential to occur within the action area of the Arkansas River and its tributaries include white heelsplitter (*Lasmigonia complanata*), fragile papershell (*Leptodea*

*fragilis*), giant floater (*Pyganodon grandis*), pink papershell (*Potamilis ohienensis*), and mapleleaf (*Quadrula quadrula*) (Eagle Environmental Consulting, Inc., 2008). The shifting substrate of the river in most locations likely provides poor habitat for mussels, which generally prefer a stable substrate; however, this is not the case in Zink Lake.

According to the USGS Nonindigenous Aquatic Species (NAS) database, a record from 2006 indicated that zebra mussels (*Dreissena polymorpha*) in the Polecat Snake Watershed (HUC 11110101) of the Arkansas River downstream of the Zink Dam, had an established population (reproducing and overwintering) (USGS, 2016; ODWC, 2012). The infestation of zebra mussels in the Arkansas Rivers appears to have come from a commercial vessel in 1992 (USACE, 2010b). The infestation has continued down the Arkansas River, through Tulsa County, to the already infested navigation system.

### **2.3 Protected Species**

Protected resources within the area are contained in Attachment 1.

### **2.4 Preliminary Planning Recommendations**

Impact avoidance, minimization, and mitigation guidance are contained in Attachment 2.

### **2.5 Final Array of Alternatives**

The Initial array of alternatives were screened based on cost, benefit to life safety, constructability, environmental impacts, and socioeconomic impacts. The final array of alternatives are listed below.

### **2.6 Alternative 1E (TSP):**

This alternative will address seepage and erosion with a berm with filtered exit and drainage along entire levee A and B. Robust filter at Charles Page Blvd. Cutoff wall to rock at the Superfund Site for approximately 2,000 feet. Buyout within 50' of landside toe where required and other properties as needed. Armor landside slope at Pump Station No. 5 for approximately 3,000 feet. Construct a detention pond for 100 year storm above Levee B tieback. Levee A & B, conduits deemed unnecessary will be abandoned and all required for continued operation of the system will be replaced. Reconstruction Measures – Decommission and remove Levee A tieback west of Hwy 412. Update Pump Stations 1-7.

### **2.7 Alternative 3B:**

This alternative will address all potential failure modes for the entire system primarily with a cutoff wall along Levee A and B (approximately 13 miles) and approximately 90 conduits replaced and all others abandoned. Cutoff wall to rock at the Superfund Site for approximately 2,000 feet. Buyout within 50' of landside toe where required and other properties as needed. Armor landside slope at Pump Station No. 5 for approximately 3,000 feet. Construct a detention pond for 100 year storm above Levee B tieback. Levee A & B, conduits deemed unnecessary will be abandoned and all required for continued operation of the system will be replaced.

Reconstruction Measures – Decommission and remove Levee A tieback west of Hwy 412.  
Update Pump Stations 1-7.

## **2.8 Alternative 5:**

Alternative 5 is a complete residential buyout of the surrounding area within Levee A & B.

## **2.9 No Action (FWOP)**

This alternative assumes there will be ongoing and potential for other local or State sponsored projects that could be undertaken without Federal participation. It is expected that current FRM structures would be maintained and residual risk of flood damages would remain. The City of Tulsa has made updates to their warning, evacuation and mitigation plans. These updates contributed to the decreased risk in the updated 2019 SQRA. It is assumed that all of these features will remain in place under the FWOP condition

## **2.10 Proposed Alternative**

Based on the comparison of these plans, the TSP is Alternative 1E (Filtered Berm with Toe Drains on Levee A and Levee B and reconstruction of Pump Station Nos. 1 through 7). This plan meets study objectives of reducing flood risk and flood damages, reducing flood risk to public health, safety and life, and minimizes residual flood risks to the extent justified.

Alternative 1E is the Preferred Alternative and the Environmentally Preferable Alternative under NEPA. It is also the Least Environmentally Damaging Practicable Alternative under the Clean Water Act (CWA). Structural features of Alternative 1E include (Figure 4-1):

- 13 miles of a filtered berm with toe drain,
- 3,000 feet of cut off wall in Levee A at the Superfund site;
- Filtered floodway structure,
- Two detention ponds at Levee B tieback;
- Impervious blanket armoring on landside at overtopping in Levee B; and,
- Reconstruction of pump station 1 through 7 for system-wide effectiveness and completeness.

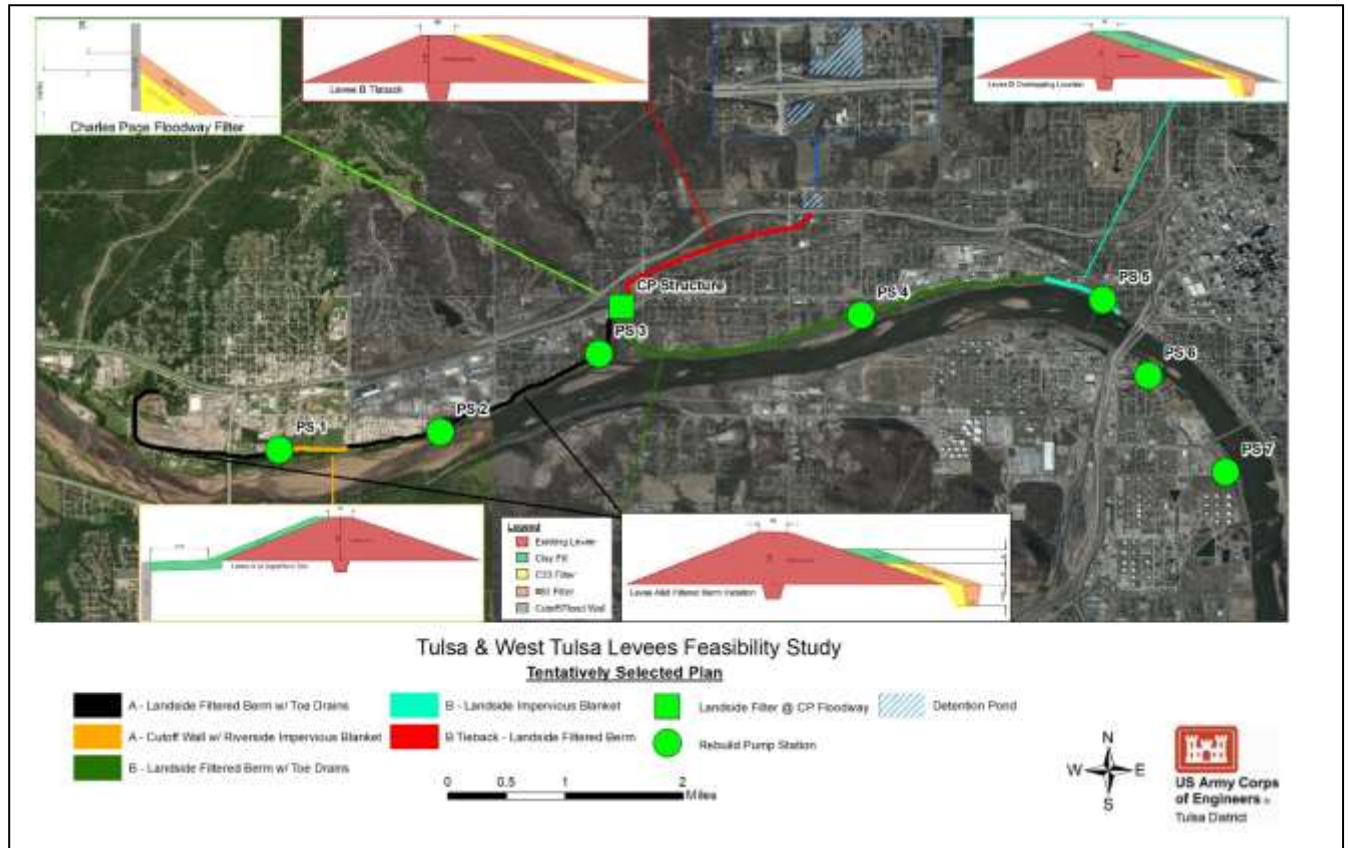


Figure 3: Schematic of the Tentatively Selected Plan Alternative 1 E

## 2.11 Future With Project Conditions

No riparian forest or wetlands would be impacts as a result of the TSP. Small patches of upland forest and individual trees would likely be removed in order to construct the filtered berms. Temporary loss of 1,833 linear feet of stream habitat would occur with the construction of the detention ponds.

## 2.12 Unavoidable Impacts and Mitigation

Bald eagles utilized the Arkansas River Corridor for roosting, nesting, and foraging. While the construction of the TSP is not anticipated to have direct take of bald eagles, indirect impacts to nests may occur. To comply with the Bald and Golden Eagle Protection Act, bald eagle surveys will be conducted and coordinated with the USFWS Oklahoma Ecological Services Office and USFWS Southwest Region Migratory Bird Office during the PED phase. This information will be used to develop impact avoidance and minimization plans and if necessary, obtain a bald eagle take permit prior to any construction occurring.

Oklahoma is home to several Federally listed species and unique habitats like karst features in the Ozark Highlands and native prairies. Through informal consultation with the USFWS Oklahoma Ecological Services, USACE determined the TSP would have No Effect on all species except for the ABB. USACE determined the construction of the detention ponds may affect, and is likely to adversely affect to the ABB. Therefore, USACE has requested Formal Consultation with USFWS Oklahoma Ecological Services Office and submitted a Biological Assessment to the USFWS Oklahoma Ecological Services Office.

To reduce impacts to the ABB, onsite conservation measures within the detention include replanting the area with native grasses, allowing the grass height within the detention ponds to remain at least 8 inches in height and limit mowing, and other ground disturbances, to a minimum. The purchase of 2.25 acres worth of credits from an ABB conservation bank will During the PED phase, USACE will conduct USFWS approved ABB surveys to confirm ABB presence. If no ABB are detected, USFWS will be consulted with to reevaluate mitigation needs.

USACE, under direction from Congress, regulates the discharge of dredged and fill material into all waters of the United States, including wetlands. Although USACE does not issue itself permits for construction activities that would affect waters of the United States, USACE must meet the legal requirements of the Act. A 404(b)(1) analysis was conducted for the TWT Study. Approximately 1,833 linear feet of Harlow Creek, including its creek bed and banks would be reshaped during detention pond construction. These losses would be offset by the purchase of adequate stream credits from mitigation banks in the region to fully offset the loss of stream habitat.

No net loss of waters of the United States would occur under the TSP. The excavation of the detention ponds would result in a total of approximately 2,901,664 cubic feet of material being removed from these upland forest and grassland sites including 1,833 linear feet of Harlow Creek. ODEQ was provided a copy of the 404(b)(1) analysis for review as part of the State Water Quality Certification process under Section 401 of the Federal Clean Water Act to ensure the proposed project supports water quality standards (see Appendix E4).

The construction activities that disturb upland areas (land above Section 404 jurisdictional waters) are subject to the National Pollutant Discharge Elimination System (NPDES) requirements of Section 402(p) of the Clean Water Act.

In Oklahoma, ODEQ is the permitting authority and administers the NPDES. Operators of construction activities that disturb 5 or greater acres must prepare a Storm Water Pollution Prevention Plan (SWPPP), submit a Notice of Intent to ODEQ and obtain authorization under OKR10, conduct onsite posting and periodic self-inspection, and follow and maintain the requirements of the SWPPP. During construction, the operator shall assure that measures are taken to control erosion, reduce litter and sediment carried offsite (silt fences, hay bales, sediment retention ponds, litter pick-up, etc.), promptly clean-up accidental spills, utilize BMPs onsite, and stabilize site against erosion before completion.

### **3 ATTACHMENT 1: TRUST RESOURCES AND THREATENED AND ENDANGERED SPECIES WITHIN THE STUDY AREA.**



## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Oklahoma Ecological Services Field Office  
9014 East 21st Street  
Tulsa, OK 74129-1428  
Phone: (918) 581-7458 Fax: (918) 581-7467  
<http://www.fws.gov/southwest/es/Oklahoma/>



In Reply Refer To:

August 19, 2019

Consultation Code: 02EKOK00-2019-SLI-3056

Event Code: 02EKOK00-2019-E-07508

Project Name: Tulsa & West Tulsa Levees Feasibility Study

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Non-federal entities conducting activities that may result in take of listed species should consider seeking coverage under section 10 of the ESA, either through development of a Habitat Conservation Plan (HCP) or, by becoming a signatory to the General Conservation Plan (GCP) currently under development for the American burying beetle. Each of these mechanisms provides the means for obtaining a permit and coverage for incidental take of listed species during otherwise lawful activities.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan ([http://www.fws.gov/windenergy/eagle\\_guidance.html](http://www.fws.gov/windenergy/eagle_guidance.html)). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process <http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm>.

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Attachment(s):

- Official Species List
  - USFWS National Wildlife Refuges and Fish Hatcheries
  - Migratory Birds
  - Wetlands
-

# Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Oklahoma Ecological Services Field Office**

9014 East 21st Street

Tulsa, OK 74129-1428

(918) 581-7458

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## Project Summary

Consultation Code: 02EKOK00-2019-SLI-3056

Event Code: 02EKOK00-2019-E-07508

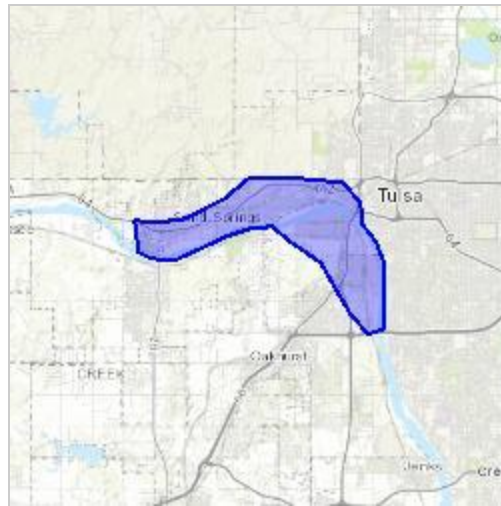
Project Name: Tulsa & West Tulsa Levees Feasibility Study

Project Type: STREAM / WATERBODY / CANALS / LEVEES / DIKES

**Project Description:** The TWT Feasibility Study is located within the city limits of Tulsa and Sand Springs, Oklahoma. The study evaluated various measures to improve the effectiveness Levees A, B, and C (roughly 19 miles long in total levees) to mitigate flood risk to life and property within the protected areas. The study is recommending filtered berms on the landside of Levee A, Levee B, and Levee B tieback, rebuilding pump stations 1-7, and two detention ponds along Harlow Creek upstream of Levee B tieback. Adjacent to the superfund site along Levee A, a riverside filtered berm, instead of a landside berm, would be built in order to avoid impacts to any remaining subsurface contamination.

**Project Location:**

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/36.125596360896125N96.0092478630743W>



Counties: Osage, OK | Tulsa, OK

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## Endangered Species Act Species

There is a total of 7 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries<sup>1</sup>, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

- 
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9045">https://ecos.fws.gov/ecp/species/9045</a>	Threatened

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## Birds

NAME	STATUS
<b>Least Tern <i>Sterna antillarum</i></b> Population: interior pop. No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/8505">https://ecos.fws.gov/ecp/species/8505</a>	Endangered
<b>Piping Plover <i>Charadrius melodus</i></b> Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/6039">https://ecos.fws.gov/ecp/species/6039</a>	Threatened
<b>Red Knot <i>Calidris canutus rufa</i></b> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/1864">https://ecos.fws.gov/ecp/species/1864</a>	Threatened
<b>Whooping Crane <i>Grus americana</i></b> Population: Wherever found, except where listed as an experimental population There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/758">https://ecos.fws.gov/ecp/species/758</a>	Endangered

## Insects

NAME	STATUS
<b>American Burying Beetle <i>Nicrophorus americanus</i></b> Population: Wherever found, except where listed as an experimental population No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/66">https://ecos.fws.gov/ecp/species/66</a>	Endangered
<b>Rattlesnake-master Borer Moth <i>Papaipema eryngii</i></b> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/7863">https://ecos.fws.gov/ecp/species/7863</a>	Candidate

## Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

# USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

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# Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act<sup>1</sup> and the Bald and Golden Eagle Protection Act<sup>2</sup>.

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

- 
1. The [Migratory Birds Treaty Act](#) of 1918.
  2. The [Bald and Golden Eagle Protection Act](#) of 1940.
  3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birds and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. <a href="https://ecos.fws.gov/ecp/species/1626">https://ecos.fws.gov/ecp/species/1626</a>	Breeds Sep 1 to Aug 31
Eastern Whip-poor-will <i>Antrostomus vociferus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20

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NAME	BREEDING SEASON
<b>Harris's Sparrow</b> <i>Zonotrichia querula</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
<b>Hudsonian Godwit</b> <i>Limosa haemastica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
<b>Kentucky Warbler</b> <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 20
<b>Lesser Yellowlegs</b> <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. <a href="https://ecos.fws.gov/ecp/species/9679">https://ecos.fws.gov/ecp/species/9679</a>	Breeds elsewhere
<b>Prothonotary Warbler</b> <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
<b>Red-headed Woodpecker</b> <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
<b>Rusty Blackbird</b> <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
<b>Semipalmated Sandpiper</b> <i>Calidris pusilla</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
<b>Wood Thrush</b> <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

## Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ “Proper Interpretation and Use of Your Migratory Bird Report” before using or attempting to interpret this report.

### Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is  $0.25/0.25 = 1$ ; at week 20 it is  $0.05/0.25 = 0.2$ .
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

#### **Breeding Season (■)**

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

#### **Survey Effort (|)**

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

#### **No Data (—)**

A week is marked as having no data if there were no survey events for that week.

#### **Survey Timeframe**

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

## Migratory Birds FAQ

**Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.**

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or

[permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

**What does IPaC use to generate the migratory birds potentially occurring in my specified location?**

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

**What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?**

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

**How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?**

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

**What are the levels of concern for migratory birds?**

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Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

### **Details about birds that are potentially affected by offshore projects**

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

### **What if I have eagles on my list?**

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

### **Proper Interpretation and Use of Your Migratory Bird Report**

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In

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contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

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# Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

## FRESHWATER EMERGENT WETLAND

- [PEM1C](#)
- [PEM1/SS1C](#)
- [PEM1F](#)

## FRESHWATER FORESTED/SHRUB WETLAND

- [PFO1A](#)
- [PFO1/SS1A](#)
- [PFO1C](#)
- [PSS1C](#)
- [PSS1A](#)

## FRESHWATER POND

- [PUBHx](#)
- [PUSCh](#)
- [PUBFh](#)
- [PUSC<sub>x</sub>](#)
- [PUBF](#)
- [PUBH](#)
- [PUSA<sub>h</sub>](#)
- [PUBF<sub>x</sub>](#)
- [PUBH<sub>h</sub>](#)
- [PUSC](#)

## RIVERINE

- [R2USA](#)
  - [R2UBH<sub>x</sub>](#)
  - [R2USC](#)
  - [R5UBF](#)
-

- [R2UBH](#)
  - [R4SBC](#)
  - [R4SBCx](#)
-

Last login August 19, 2019 10:54 AM MDT

# IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

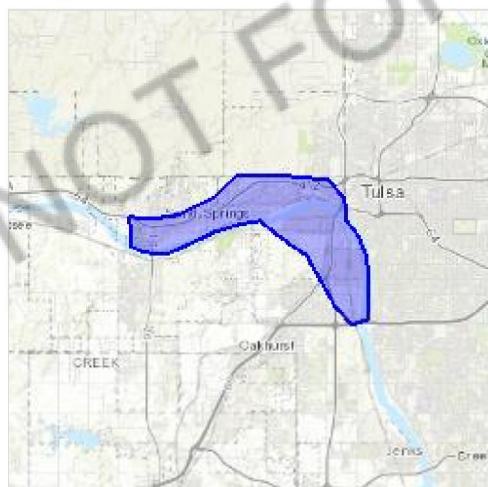
## Project information

### NAME

Tulsa & West Tulsa Levees Feasibility Study

### LOCATION

Osage and Tulsa counties, Oklahoma



### DESCRIPTION

The TWT Feasibility Study is located within the city limits of Tulsa and Sand Springs, Oklahoma. The study evaluated various measures to improve the effectiveness Levees A, B, and C (roughly 19 miles long in total levees) to mitigate flood risk to life and property within the protected areas. The study is recommending filtered berms on the landside of Levee A, Levee B, and Levee B tieback, rebuilding pump stations 1-7, and two detention ponds along Harlow Creek upstream of Levee B tieback. Adjacent to the superfund site along Levee A, a riverside filtered berm, instead of a

landside berm, would be built in order to avoid impacts to any remaining subsurface contamination.

## Local office

Oklahoma Ecological Services Field Office

☎ (918) 581-7458

📠 (918) 581-7467

9014 East 21st Street

Tulsa, OK 74129-1428

<http://www.fws.gov/southwest/es/Oklahoma/>

NOT FOR CONSULTATION

# Endangered species

**This resource list is for informational purposes only and does not constitute an analysis of project level impacts.**

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species<sup>1</sup> and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries<sup>2</sup>).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information.
2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

## Mammals

NAME

STATUS

Northern Long-eared Bat *Myotis septentrionalis*  
 No critical habitat has been designated for this species.  
<https://ecos.fws.gov/ecp/species/9045>

Threatened

## Birds

NAME	STATUS
Least Tern <i>Sterna antillarum</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/8505">https://ecos.fws.gov/ecp/species/8505</a>	Endangered
Piping Plover <i>Charadrius melodus</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/6039">https://ecos.fws.gov/ecp/species/6039</a>	Threatened
Red Knot <i>Calidris canutus rufa</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/1864">https://ecos.fws.gov/ecp/species/1864</a>	Threatened
Whooping Crane <i>Grus americana</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/758">https://ecos.fws.gov/ecp/species/758</a>	Endangered

## Insects

NAME	STATUS
American Burying Beetle <i>Nicrophorus americanus</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/66">https://ecos.fws.gov/ecp/species/66</a>	Endangered
Rattlesnake-master Borer Moth <i>Papaipema eryngii</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/7863">https://ecos.fws.gov/ecp/species/7863</a>	Candidate

## Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

# Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act<sup>1</sup> and the Bald and Golden Eagle Protection Act<sup>2</sup>.

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A  
BREEDING SEASON IS INDICATED  
FOR A BIRD ON YOUR LIST, THE  
BIRD MAY BREED IN YOUR  
PROJECT AREA SOMETIME WITHIN  
THE TIMEFRAME SPECIFIED,  
WHICH IS A VERY LIBERAL  
ESTIMATE OF THE DATES INSIDE  
WHICH THE BIRD BREEDS ACROSS  
ITS ENTIRE RANGE. "BREEDS

ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

**Bald Eagle** *Haliaeetus leucocephalus*

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/1626>

Breeds Sep 1 to Aug 31

**Eastern Whip-poor-will** *Antrostomus vociferus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 1 to Aug 20

**Harris's Sparrow** *Zonotrichia querula*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds elsewhere

**Hudsonian Godwit** *Limosa haemastica*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds elsewhere

**Kentucky Warbler** *Oporornis formosus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds Apr 20 to Aug 20

**Lesser Yellowlegs** *Tringa flavipes*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9679>

Breeds elsewhere

**Prothonotary Warbler** *Protonotaria citrea*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds Apr 1 to Jul 31

**Red-headed Woodpecker** *Melanerpes erythrocephalus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 10 to Sep 10

**Rusty Blackbird** *Euphagus carolinus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds elsewhere

**Semipalmated Sandpiper** *Calidris pusilla*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds elsewhere

**Wood Thrush** *Hylocichla mustelina*

Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

## Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

### Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is  $0.25/0.25 = 1$ ; at week 20 it is  $0.05/0.25 = 0.2$ .
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

### Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

### Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

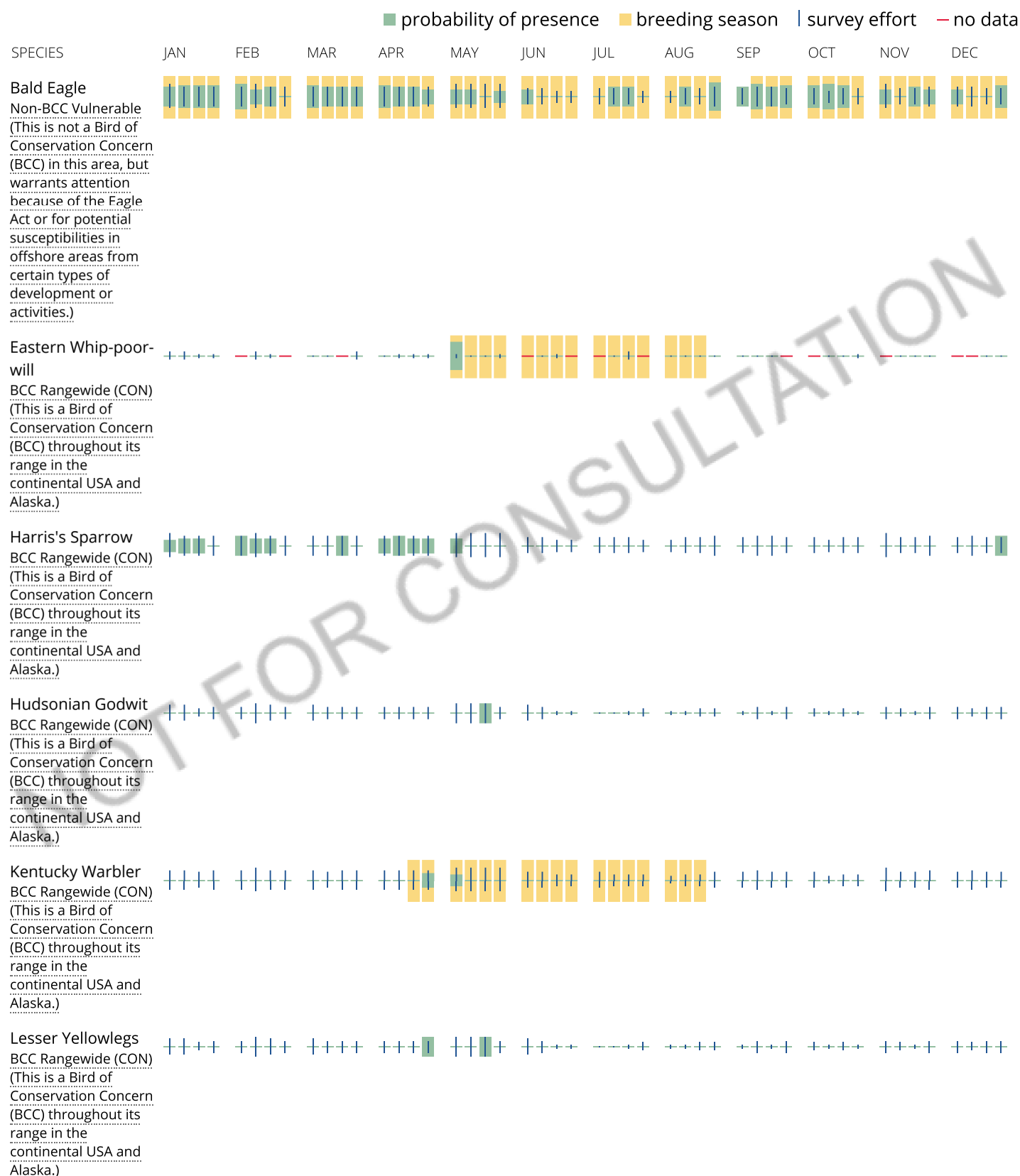
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

### No Data (—)

A week is marked as having no data if there were no survey events for that week.

## Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





**Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.**

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

**What does IPaC use to generate the migratory birds potentially occurring in my specified location?**

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects,

and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

### **What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?**

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

### **How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?**

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

### **What are the levels of concern for migratory birds?**

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

### **Details about birds that are potentially affected by offshore projects**

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review.

Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

### What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

### Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

## Facilities

### National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

### Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

## Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

#### FRESHWATER EMERGENT WETLAND

[PEM1F](#)

[PEM1C](#)

[PEM1/SS1C](#)

#### FRESHWATER FORESTED/SHRUB WETLAND

[PFO1/SS1A](#)

[PFO1A](#)

[PFO1C](#)

[PSS1C](#)

[PSS1A](#)

#### FRESHWATER POND

[PUBHx](#)

[PUBHh](#)

[PUBFx](#)

[PUBH](#)

[PUBF](#)

[PUBFh](#)

[PUSCh](#)

[PUSC](#)

[PUSC<sub>x</sub>](#)

[PUSA<sub>h</sub>](#)

#### RIVERINE

[R2UBH](#)

[R2USC](#)

[R2USA](#)

[R4SBC](#)

[R5UBF](#)

[R4SBC<sub>x</sub>](#)

[R2UBH<sub>x</sub>](#)

A full description for each wetland code can be found at the [National Wetlands Inventory website](#)

#### Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

### **Data exclusions**

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

### **Data precautions**

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Dear Mr. Wadlington,

Dec. 18, 2018

We have reviewed occurrence information on federal and state threatened, endangered or candidate species, as well as non-regulatory rare species and ecological systems of importance currently in the Oklahoma Natural Heritage Inventory database for the following location you provided:

Sec. 10, 11, 12, 13, 14, and 15-T19N-R11E and Sec. 2 through 17 and 22, 23, and 24-T19N-R12E, Tulsa County

We found 16 occurrence(s) of relevant species within the vicinity of the project location as described.

<b>Species Name</b>	<b>Common Name</b>	<b>Federal Status</b>
<b><i>Sternula antillarum athalassos</i></b>	<b>Interior Least Tern</b>	<b>Endangered</b>
<b>County</b>	<b>TRS</b>	<b>Count</b>
Tulsa	Sec. 11-T19N-R12E	1
Tulsa	Sec. 13-T19N-R12E	1
Tulsa	Sec. 25-T19N-R12E	1
Tulsa	Sec. 36-T18N-R12E	1
<b><i>Haliaeetus leucocephalus</i></b>	<b>Bald Eagle</b>	<b>Protected</b>
<b>County</b>	<b>TRS</b>	<b>Count</b>
Tulsa	Sec. 10-T19N-R11E	1
Tulsa	Sec. 13-T19N-R11E	2
Tulsa	Sec. 15-T19N-R11E	1
Tulsa	Sec. 7-T19N-R12E	2
Tulsa	Sec. 8-T19N-R12E	1
Tulsa	Sec. 9-T19N-R12E	2
Tulsa	Sec. 14-T19N-R12E	1
Tulsa	Sec. 25-T19N-R12E	1
Tulsa	Sec. 26-T19N-R12E	1

Additionally, absence from our database does not preclude such species from occurring in the area.

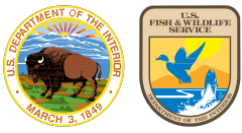
If you have any questions about this response, please send me an email, or call us at the number given below.

Although not specific to your project, you may find the following links helpful.

ONHI, guide to ranking codes for endangered and threatened species:  
[http://vmpincol.ou.edu/heritage/ranking\\_guide.html](http://vmpincol.ou.edu/heritage/ranking_guide.html)

Information regarding the Oklahoma Natural Areas Registry:  
[http://www.oknaturalheritage.ou.edu/registry\\_faq.htm](http://www.oknaturalheritage.ou.edu/registry_faq.htm)

Todd Fagin  
 Oklahoma Natural Heritage Inventory  
 (405) 325-4700  
[tfagin@ou.edu](mailto:tfagin@ou.edu)



# American Burying Beetle

## *Oklahoma Ecological Service Field Office*

### American Burying Beetle

*Nicrophorus americanus*

#### Description

The American burying beetle (ABB) is a large (0.98-1.4 inches) shiny black beetle, with hardened protective wing covers (elytra) that meet in a straight line down the back. Each elytron has 2 scalloped-shaped orange-red markings. Its most distinguishing feature is the large orange-red marking on the raised portion of the pronotum (shield over the mid-section between head and wings), which is circular, with raised central portion and flattened margins. The ABB has orange-red frons (a mustache-like feature) and a single orange-red mark on the clypeus (face). This mark is triangular in females and rectangular in males. The ABB has large antennae with notable orange clubs at tips.

#### Distribution

Rhode Island, South Dakota, Nebraska, Kansas, Arkansas, Texas, and Oklahoma, with 2 introduced populations in Massachusetts, and Missouri.

#### Life History

The ABB lives for just one year, it is nocturnal (active only at night), a strong flier, usually reproduces only once, and undergoes complete metamorphosis. The ABB is active in summer and inactive during winter. During winter months when temperatures are below 60°F (15°C), ABB bury themselves in the soil to overwinter. When temperatures are above 60°F (15°C) they emerge from the soil and begin mating and reproduction. ABB are scavengers dependent on carrion for their life cycle and must compete with vertebrate and other invertebrate species for carrion. Reproduction involves burying a small vertebrate carcass (1-9 ounces; 35-250 grams), laying eggs beside the carcass, and feeding the larvae from the carcass until mature. Both parents provide care to their young.

#### Habitat

Considered to be feeding habitat generalists, their reproductive habitat is believed to be more specialized. Habitat requirements for ABB, particularly



*American Burying Beetle.* © Roger Williams Park Zoo

reproductive habitat requirements are not fully understood. The ABB has been found in various habitat types including open fields and grasslands, oak-pine woodlands, oak-hickory forest, bottomland hardwoods, and natural edge habitats.

#### Conservation

Federally-listed as endangered (54 FR 29652; July 13, 1989). Critical habitat has not been designated. At the time of listing in 1989, there were only two known populations - Latimer County, Oklahoma and on Block Island, Rhode Island.

The ABB has disappeared from over 90% of its historic range and is currently restricted to the eastern and western extremities of its historic range. Habitat loss, alteration, and degradation have been attributed to the decline. In Oklahoma, the ABB is currently known to occur in 27 eastern counties. Of particular concern for ABB conservation is soil disturbances from construction projects because it is believed that the ABB stays underground or under leaf litter during the daytime and can easily be killed if soil is compacted or removed.

#### References

U.S. Fish and Wildlife Service. 1991. American burying beetle recovery plan. U.S. Fish and Wildlife Service, Newton Corner, Massachusetts.

Kozol, et al. 1988. *The American burying beetle, Nicrophorus americanus: studies on the natural history of a declining species.* *Psyche* 95:167-176.

Lomolino, M. V., J. C. Creighton, G. D. Schnell, and D. L. Certain. 1995. *Ecology and conservation of the endangered American burying beetle (Nicrophorus americanus).* *Conservation Biology* 9:605-614.

Sikes, D.S. and R. J. Raithel. 2002. *A review of hypotheses of decline of the endangered American burying beetle (Silphidae: Nicrophorus americanus Olivier).* *Journal of Insect Conservation* 6:103-113.

#### For Further Information

U.S. Fish and Wildlife Service  
Oklahoma  
Ecological Services Field Office  
9014 East 21st Street  
Tulsa, OK 74129  
918/581-7458



## U.S. Fish & Wildlife Service

# Least Tern

### Oklahoma Ecological Service Field Office

#### Least Tern (Interior Population)

*Sterna antillarum*

#### Description

The least tern is the smallest member of the tern family at about 9 inches long (23 cm) with a wingspan of 20 inches (50 cm). They have a grayish back and wings, and snowy white undersides. Least terns have a forked tail and narrow pointed wings. They can be distinguished from all other terns by their combination of a black crown, white forehead, and a variable black-tipped yellow bill. First-year birds have a dark bill, a dark gray eye stripe, and a dusky brown cap.

#### Distribution

Formerly the major river systems of the Midwestern United States. These rivers included the Red, Rio Grande, Arkansas, Missouri, Ohio, and Mississippi river systems. Currently, they occur as small remnant colonies throughout their former range. In Oklahoma, least terns nest along most of the larger rivers, as well as at the Salt Plains National Wildlife Refuge near Jet, Oklahoma. Least terns winter in South America.

#### Life History

Least terns arrive at breeding sites from late April to early June where they typically spend four to five months. Pairs go through an elaborate courtship period that includes courtship feedings and a variety of postures and vocalizations. Least terns nest in small colonies on exposed salt flats, river sandbars, or reservoir beaches. Nests are small scrapes in the sand, and usually two or three eggs are laid. The young are fairly mobile soon after hatching. Both parents feed the young and remain with them until fall migration. Least terns will travel four or more miles (6+ km) from their breeding colonies to find the small fish that make up the major part of their diet.



*Least Tern (Interior Population).* USFWS

#### Conservation

The least tern was federally listed as an endangered species on May 28, 1985 (50 FR 21784). Least terns have declined due to habitat loss from permanent flooding by reservoirs and channelization projects, unpredictable water discharge patterns, and overgrowth of brush and trees. The recreational use of sandbars by humans is a major threat to the tern's reproductive success.

#### What Can You Do to Help

Avoid disturbing nesting areas from mid-May to late August. Pets, livestock, people, and vehicles should be kept off these areas when terns are present. Promote public awareness and report disturbance of least terns to wildlife law enforcement officials. Private landowners should manage lands to benefit habitat in nesting areas by limiting ATV and off-road vehicles use and blocking access of these vehicles to rivers. Restore or create additional nesting habitat in rivers, navigation systems, or lakes.

Purchase land or conservation easements in areas with high-quality least tern nesting habitat.

#### References

U.S. Fish and Wildlife Service. 1990. *Recovery plan for the interior population of the least tern *Sterna antillarum**. U.S. Fish and Wildlife Service, Twin Cities, Minnesota. 90 pp.

#### For Further Information

U.S. Fish and Wildlife Service  
Oklahoma  
Ecological Services Field Office  
9014 East 21st Street  
Tulsa, OK 74129  
918/581-7458

**August 2011**



[Conserving the nature of America](#)

USFWS Midwest

Midwest Ecological Services

Contact Us

## Northern Long-Eared Bat

### *Myotis septentrionalis*

[PDF Version](#)

The northern long-eared bat is federally listed as a *threatened species* under the Endangered Species Act. **Endangered** species are animals and plants that are in danger of becoming extinct. **Threatened** species are animals and plants that are likely to become endangered in the foreseeable future. Identifying, protecting, and restoring endangered and threatened species is the primary objective of the U.S. Fish and Wildlife Service's endangered species program.

### What is the northern long-eared bat?

**Appearance:** The northern long-eared bat is a medium-sized bat with a body length of 3 to 3.7 inches but a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*.

**Winter Habitat:** Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible.

**Summer Habitat:** During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. This bat has also been found rarely roosting in structures, like barns and sheds.

**Reproduction:** Breeding begins in late summer or early fall when males begin to swarm near hibernacula. After copulation, females store sperm during hibernation until spring. In spring, they emerge from their hibernacula, ovulate and the stored sperm fertilizes an egg. This strategy is called delayed fertilization.

After fertilization, pregnant females migrate to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies of females and young generally have 30 to 60



Photo by New York Department of Environmental Conservation; Al Hicks

bats at the beginning of the summer, although larger maternity colonies have also been seen. Numbers of individuals in roosts, typically decreases from pregnancy to post-lactation. Most bats within a maternity colony give birth around the same time, which may occur from late May or early June to late July, depending where the colony is located within the species' range. Young bats start flying by 18 to 21 days after birth. Maximum lifespan for the northern long-eared bat is estimated to be up to 18.5 years.

**Feeding Habits:** Like most bats, northern long-eared bats emerge at dusk to feed. They primarily fly through the understory of forested areas feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation or by gleaning motionless insects from vegetation.

**Range:** The northern long-eared bat's range includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. The species' range includes the following 37 States and the District of Columbia: Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming.

## Why is the northern long-eared bat in trouble?

**White-nose Syndrome:** No other threat is as severe and immediate as the disease, white-nose syndrome. If this disease had not emerged, it is unlikely the northern long-eared bat would be experiencing such a dramatic population decline. Since symptoms were first observed in New York in 2006, white-nose syndrome has spread rapidly from the Northeast to the Midwest and Southeast; an area that includes the core of the northern long-eared bat's range where it was most common before this disease. Numbers of northern long-eared bats (from hibernacula counts) have declined by up to 99 percent in the Northeast. Although there is uncertainty about the rate that white-nose syndrome will spread throughout the species' range, it is expected to spread throughout the United States in the foreseeable future.

**Other Sources of Mortality:** Although no significant population declines have been observed due to the sources of mortality listed below, they may now be important factors affecting this bat's viability until we find ways to address white-nose syndrome.

**Impacts to Hibernacula:** Gates or other structures intended to exclude people from caves and mines not only restrict bat flight and movement, but also change airflow and internal cave and mine microclimates. A change of even a few degrees can make a cave unsuitable for hibernating bats. Also, cave-dwelling bats are vulnerable to human disturbance while hibernating. Arousal during hibernation causes bats to use up their already reduced energy stores, which may lead to individuals not surviving the winter.

**Loss or Degradation of Summer Habitat:** *Loss or Degradation of Summer Habitat:* Highway construction, commercial development, surface mining, and wind facility construction permanently remove habitat and are activities prevalent in many areas of this bat's range. Forest management benefits northern long-eared bats by keeping areas forested rather than converted to other uses. But, depending on type and timing, forest management activities can cause mortality and temporarily remove or degrade roosting and foraging habitat.

**Wind Farm Operation:** Wind turbines kill bats, and, depending on the species, in very large numbers. Mortality has been documented for northern long-eared bats, although a small number have been found to date. However, there are many wind projects within a large portion of the bat's range and many more are planned.

## What Is Being Done to Help the Northern Long-Eared Bat?

**Disease Management:** Actions have been taken to try to reduce or slow the spread of white-nose syndrome through human transmission of the fungus into caves (e.g. cave and mine closures and advisories; national decontamination protocols). A national plan was prepared by the Service and other state and federal agencies that details actions needed to investigate and manage white-nose syndrome. Many state and federal agencies, universities and non-governmental organizations are researching this disease to try to control its spread and address its affect. See [www.whitenosesyndrome.org/](http://www.whitenosesyndrome.org/) for more.

**Addressing Wind Turbine Mortality:** The Service and others are working to minimize bat mortality from wind turbines on several fronts. We fund and conduct research to determine why bats are susceptible to turbines, how to operate turbines to minimize mortality and [where important bird and bat migration routes are located](#). The Service, State natural resource agencies, and wind energy industry are developing a [Midwest Wind Energy Habitat Conservation Plan](#) that will provide wind farms a mechanism to continue operating legally while minimizing and mitigating listed bat mortality.

**Listing:** The northern long-eared bat is listed as a threatened species under the federal Endangered Species Act. Listing a species affords it the protections of the Act and also increases the priority of the species for funds, grants, and recovery opportunities.

**Hibernacula Protection:** Many federal and state natural resource agencies and conservation organizations have protected caves and mines that are important hibernacula for cave-dwelling bats.

## What Can I Do to Help the Northern Long-Eared Bat?

**Do Not Disturb Hibernating Bats:** To protect bats and their habitats, comply with all cave and mine closures, advisories, and regulations. In areas without a cave and mine closure policy, follow approved decontamination protocols (see <http://whitenosesyndrome.org/topics/decontamination>) - under no circumstances should clothing, footwear, or equipment that was used in a White-nose Syndrome affected state or region be used in unaffected states or regions.

**Leave Dead and Dying Trees Standing:** Like most eastern bats, the northern long-eared bat roosts in trees during summer. Where possible and not a safety hazard, leave dead or dying trees on your property. Northern long-eared bats and many other animals use these trees.

**Install a Bat Box:** Dead and dying trees are usually not left standing, so trees suitable for roosting may be in short supply and [bat boxes](#) may provide additional roost sites. Bat boxes are especially needed from April to August when females look for safe and quiet places to give birth and raise their pups.

**Support Sustainability:** Support efforts in your community, county and state to ensure that sustainability is a development goal. Only through sustainable living will we provide rare and declining species, like the northern long-eared bat, the habitat and resources they need to survive along with us.

**Spread the Word:** Understanding the important ecological role that bats play is a key to conserving the northern long-eared and other bats. Helping people learn more about the northern long bat and other endangered species can lead to more effective recovery efforts. Visit [www.whitenosesyndrome.org](http://www.whitenosesyndrome.org) for more information about white-nose syndrome.

**Join and Volunteer:** Join a conservation group; many have local chapters. Volunteer at a local nature center, zoo, or national wildlife refuge. Many state natural resource agencies benefit greatly from citizen involvement in monitoring wildlife. Check your state agency websites and get involved in citizen science efforts in your area.

*Updated April 2015*

[Northern Long-Eared Bat Home](#)  
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## U.S. Fish & Wildlife Service

# Piping Plover

### Oklahoma Ecological Service Field Office

#### Piping Plover

*Charadrius melodus*

#### Description

The piping plover is a 5 ½ inch long pale grayish-brown shorebird with a white breast. During the breeding season, it has a black breast band which is sometimes incomplete and a black bar between its eyes. The bill is dull orange with a black tip and the legs and feet are orange.

#### Distribution

Piping plovers occur in three disjunct populations in North America: Northern Great Plains, Great Lakes, and Atlantic Coast. This species migrates through Oklahoma each spring and fall.

#### Life History

In Oklahoma, the piping plover is a bi-annual migrant, traveling between its nesting habitat to the north of Oklahoma (the Great Plains population nests from Kansas to southern Canada), and its wintering grounds on the gulf coast. There is a record of piping plovers nesting at Optima Lake in Texas County.

Migration through Oklahoma is likely to occur from March-May and July-September. Piping plovers usually migrate as individuals or small groups and may be seen along sandbars of major rivers, salt flats, and mudflats of reservoirs. Piping plovers forage on these shoreline habitats and eat small invertebrates.

More detailed information on life history is available at *The Birds of North America* website.



*Piping plover.* USFWS

#### Conservation

The Great Plains population of piping plover was federally listed as a threatened species on December 11, 1985 (50 CFR 21784). There is no designated critical habitat for piping plovers in Oklahoma. Conservation of this species has focused on breeding and wintering habitat and relatively little is known about the habitat used during migration. During migration, piping plovers have been documented in many areas of Oklahoma from the panhandle to the eastern border and probably migrate through or over all of Oklahoma.

#### What Can You Do to Help

Ongoing conservation of large river and salt flat stopover habitat is helpful. Avoid disturbance of any piping plovers that may use river or reservoir shoreline habitat during migration.

#### References

*Great Lakes & Northern Great Plains Piping Plover Recovery Plan*, U.S. Fish and Wildlife Service. 1998.

*The Birds of North America*, No.2, 1992

#### For Further Information

U.S. Fish and Wildlife Service  
Oklahoma  
Ecological Services Field Office  
9014 East 21st Street  
Tulsa, OK 74129  
918/581-7458

August 2011

## RUFA RED KNOT

*Calidris canutus rufa*

The Endangered Species Act, enacted in 1973, serves to protect and recover imperiled species and the ecosystems upon which they depend. It is administered by the U.S. Fish and Wildlife Service.



Threatened - A Federally Protected Species

Imagine making a 3,000 mile grocery trip, twice a year. Though seemingly impossible for us, the red knot, a small shorebird with a 23-inch wingspan, makes this journey in just three days.

### IDENTIFICATION

Red knots are most easily identified when in their late spring and summer breeding plumage. During this time, the bird earns its name with its rusty head, neck and belly. The back is mottled gray, black and brown and the tail and wings are pale gray. In the fall, this sandpiper molts and turns pale gray with white flanks. Red knots have dull yellow or olive-green legs and a straight, dark bill. The sturdy bill is used to probe mudflats for mollusks, insects and seeds.



The *rufa* red knot is one of the longest distance migrants known to the animal kingdom.

### ADAPTATIONS FOR SURVIVAL

Most knots winter along the Chilean Coast and migrate to the Canadian Arctic breeding grounds by way of the Atlantic Coast. Some of these birds travel 18,000 miles a year! These birds often use Delaware and New Jersey's Delaware Bay area as a stopover, refueling on Horseshoe Crab eggs. But a small red knot population winters along the coast of Texas and migrates to the breeding grounds by way of the Great Plains. Even though this population passes over Oklahoma, these birds are often flying thousands of feet above the ground, seldom making landfall in our state. To date, only 40 birds have been reported in Oklahoma. Of those birds, 85% have been reported during the fall migration. It is suspected inclement weather, inexperience of younger birds or weakened physical condition forces these birds to land during migration.

Red knots have experienced severe population declines, with reduced food availability cited as the primary cause. These declines triggered the U.S. Fish and Wildlife Service's listing of the rufa red knot (the North American subspecies of red knot) as a threatened species under the Endangered Species Act. This decision was announced December 11, 2014.

The Wildlife Diversity Program, a program of the Oklahoma Department of Wildlife Conservation manages, monitors and promotes rare, declining and threatened species as well as those common species not hunted or fished. This program receives no state or federal tax appropriations and is primarily funded through the sale of publications, specialty license plates, the income tax check-off program and voluntary contributions.





## U.S. Fish & Wildlife Service

# Whooping Crane

## Oklahoma Ecological Service Field Office

### Whooping Crane

*Grus americana*

#### Description

At 5 feet (1.5 m), the whooping crane is the tallest American bird. It is a snowy white, long-necked bird with long legs. Its black primary feathers show only during flight. Adults have a red crown and a patch of black feathers below the eye. Young are whitish overall, but have a rusty-colored head and neck.

#### Distribution

Whooping cranes pass through western Oklahoma each spring and fall during migration. The Salt Plains National Wildlife Refuge, near Jet, Oklahoma, is a very important migration stopover area and is designated critical habitat. During migration, whooping cranes sometimes are sighted elsewhere in Oklahoma along rivers, in grain fields, or in shallow wetlands. Whooping cranes primarily use shallow, seasonally and semi permanently flooded palustrine wetlands and various cropland and emergent wetlands.

#### Life History

The whooping crane is a bi-annual migrant, traveling between its summer habitat in central Canada, and its wintering grounds on the Texas coast, across the Great Plains of the U.S. in the spring and fall of each year. Autumn migration normally begins in mid-September, with most birds arriving on the Texas wintering grounds between late October and mid-November. Spring migration departure dates are normally between late March and mid-April, with the last birds usually leaving by May 1. Whooping cranes migrate south as singles, pairs, in family groups, or as small flocks of 3 to 5 birds. They are diurnal migrants and stop daily to feed and rest. Whooping cranes eat a variety of things, including insects, frogs, small birds, rodents, minnows, and waste grains.



*Whooping crane.* USFWS

#### Conservation

By the mid- 1940s, only 15 whooping cranes were present in the wild. The whooping was federally listed as an endangered species on March 11, 1967 (32 FR 4001). An intensive captive-breeding program and careful protection of wild flocks have slowly increased the number in the wild to more than 120. Whooping cranes have declined primarily because of loss of wintering and breeding habitat. Current threats to wild cranes include collisions with manmade objects such as power lines and fences, shooting, predators, disease, habitat destruction, severe weather, and a loss of two thirds of the original genetic material.

#### What Can You Do to Help

Sightings are important for monitoring the status of federally-listed species.

To report whooping crane sightings to the US Fish and Wildlife Service please complete the sighting report form (<http://whoopingcrane.com/report-a-sighting/>) within the migration corridors, continue to gather sighting reports for whooping cranes and promote public awareness. Ongoing conservation of wetland habitat within historical stopover habitat is

helpful. Private landowners should be provided with incentives to manage lands to benefit wetlands in historic migration, breeding, and wintering areas. Additionally, purchase land or conservation easements in areas that still support healthy wetlands.

#### References

Canadian Wildlife Service and U.S. Fish and Wildlife Service. 2007. *International recovery plan for the whooping crane*. Ottawa: Recovery of Nationally Endangered Wildlife (RENEW), and U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 162 pp.

#### For Further Information

U.S. Fish and Wildlife Service  
Oklahoma  
Ecological Services Field Office  
9014 East 21st Street  
Tulsa, OK 74129  
918/581-7458

August 2011

## **4 ATTACHMENT 2: IMPACT AVOIDANCE, MINIMIZATION, AND MITIGATION GUIDANCE**

# **American Burying Beetle Impact Assessment for Project Reviews**



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U.S. Fish and Wildlife Service Southwest Region

Oklahoma Ecological Services Field Office

March 2016

## INTRODUCTION

The American burying beetle (*Nicrophorus americanus* Olivier, ABB) was federally listed as endangered in 1989 (54 FR 29652) by the U.S. Fish and Wildlife Service (Service) in accordance with the Endangered Species Act of 1973, as amended; 16 U.S.C. 1531 *et seq.*, (ESA). The ABB Recovery Plan was finalized in 1991 and a 5-year Review was completed in 2008 that recommended the ABB's status remain as endangered. Due to its Federal listing as endangered, activities that may affect ABB, whether adverse or completely beneficial, are regulated to ensure conservation and persistence of the species.

The Service recommends that project proponents use this document to determine whether their project may affect the ABB for section 7 consultation for Federal projects or may result in take of the ABB for non-Federal projects. This document describes how to assess the potential impacts of your project. Additional information regarding the recommended level of offsets or mitigation based on project location and type of impacts can be found in the ABB Conservation Strategy and Mitigation Guidance document, found on our webpage:

[http://www.fws.gov/southwest/es/oklahoma/ABB\\_Add\\_Info.htm](http://www.fws.gov/southwest/es/oklahoma/ABB_Add_Info.htm). The Service anticipates that with the accumulation of more detailed information, management strategies and priorities may change.

One of the goals of the ESA is to conserve ecosystems upon which listed threatened and endangered species of fish, wildlife, and plants depend. Section 9 of the ESA makes it illegal for any person subject to the jurisdiction of the United States to “take” any federally-listed endangered or threatened species of fish or wildlife without a special exemption. “Person” is defined under the ESA to include individuals, corporations, partnerships, trusts, associations, or any other private entity; local, state, and Federal agencies; or any other entity subject to the jurisdiction of the United States. Under the ESA, “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering (50 CFR § 17.3). Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Consequently, it is a violation of Federal law to take endangered species without appropriate permits. Take of federally-listed species incidental to an otherwise lawful activity may be authorized through section 7 or 10 of the ESA.

Section 7(a)(1) of the ESA directs Federal agencies, in consultation with the Service, to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species. Additionally, Section 7(a)(2) of the ESA requires Federal agencies to ensure that any action they authorize, fund, or carry out (Federal nexus) is not likely to jeopardize the continued existence of any federally listed threatened or endangered species or result in the destruction or adverse modification of designated critical habitat. Jeopardy is defined as an appreciable reduction in the likelihood of survival and recovery in the wild. This includes actions that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02). In the event that a Federal agency determines that their authorized, funded, or carried out action “may affect” a listed threatened or endangered species or designated critical habitat, the agency is required to consult with the Service regarding the degree of impact and measures available to avoid or minimize the adverse effects.

Section 10 provides a mechanism for take authorization for private entities where no Federal nexus exists. This provision authorizes the Service, under some circumstances, to permit the taking of federally-listed fish and wildlife if such taking is “incidental to, and not the purpose of carrying out otherwise lawful activities.” This process is also intended to be used to reduce conflicts between listed species and private development and to provide a framework that would encourage creative partnerships between the private sector and local, state, and Federal agencies in the interest of endangered and threatened species and habitat conservation.

Applications for such permits include habitat conservation plans (HCP). When an HCP meets issuance criteria (50 CFR §§ 17.22(b) and 17.32(b)) and is approved by the Service, an incidental take permit is issued for the anticipated incidental take. The HCP must include appropriate conservation measures that, to the maximum extent practicable, minimize and mitigate the effects of the authorized take of the species.

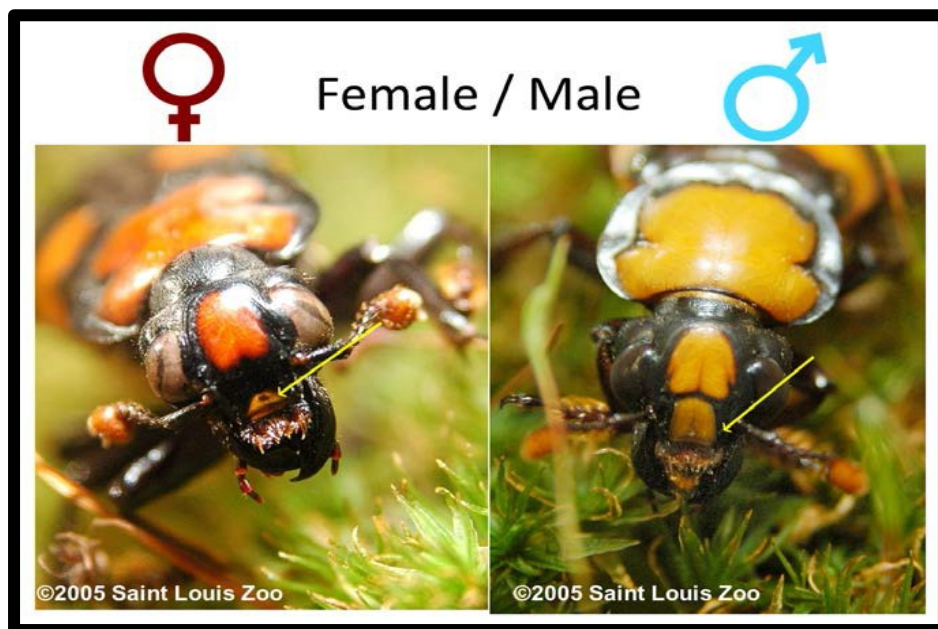
## **SPECIES DESCRIPTION**

### **Physical Characteristics**

The ABB is the largest species of its genus (*Nicrophorus*) in North America, measuring 25-46 mm (1 – 1.8 inches) long (Wilson 1971, Anderson 1982). Species in the genus *Nicrophorus* are generally referred to as burying or undertaker beetles due to their unique behavior of burying carrion to provide a source of nutrition for developing young.

ABBs are black with orange-red markings (Figure 1). The most diagnostic feature of the ABB is the large orange-red marking on the raised portion of the pronotum (the upper surface of the first

segment of the body that lies between the head and the abdomen), a feature shared with no other members of the genus in North America (USFWS 1991). Gender can be determined from markings on the clypeus (a shield-like plate on the front of the head of an insect); males have a large, rectangular, red marking and females have a smaller, triangular, red marking.



**Figure 1.** Female and Male American burying beetles. The female (left) has a smaller, triangular, red marking, while the male (right) has a larger, rectangular marking. Photo credit: Saint Louis Zoo, St. Louis, Missouri.

### Geographic Distribution

The ABB once occurred throughout much of temperate eastern North America, including 35 U.S. states (USFWS 1991). Its absence throughout much of its former range became apparent in the 1980s, and by 1989 the ABB was thought to occur only on Block Island, Rhode Island, and at one location in Oklahoma (Davis 1980; Kozol et al. 1988; USFWS 1991). Currently, the ABB can be found in less than 10% of its historic range, with localized, extant populations discovered in six states (Backlund and Marrone 1997, Bedick et al. 1999, Godwin 2003, Lomolino et al. 1995, Miller and McDonald 1997, Ratcliffe 1996, Sikes and Raithel 2002, USFWS 2008). These locations include Block Island off the coast of Rhode Island, eastern Oklahoma, western Arkansas, the Sand Hills and Loess Hills regions in Nebraska, the Chautauqua Hills region of southeastern Kansas, south-central South Dakota, and northeastern Texas. Additionally, a reintroduced population on Nantucket Island off the coast of Massachusetts is thought to be stable and a recent reintroduction attempt in Missouri in 2012 has reported successful brood

rearing and overwintering (personal communication with Bob Mertz, St. Louis Zoo, May 30, 2013).

## **Life History**

The ABB is a nocturnal species. Individuals usually live for only one year. Adults and larvae are dependent on carrion (flesh of dead animals) for food and reproduction. The ABB competes with other invertebrate species, as well as vertebrate species, for carrion. They are active in the summer months (active season) and bury themselves in the soil during the winter months (inactive season). The length of the inactive season can fluctuate depending on temperature. (Once nighttime temperatures are below 60 degrees Fahrenheit (°F), the ABB retreat underground and become inactive until the temperatures are above 60 °F.) In Oklahoma the inactive season is typically from October to April or May. The ABB begins reproduction soon after emergence from the inactive season, finding and securing a mate and carcass for reproduction. Adults bury a small vertebrate carcass (35-250 grams; 1-9 ounces, with a preferred range of 80-200 grams; 3-7 ounces) and lay eggs beside it. Resulting ABB larvae use the carcass as a food source until they emerge. The entire reproductive process takes approximately 48-65 days (Kozol et al. 1988). Following metamorphosis from larva to adult, teners (adult ABBs newly emerged from the pupal case) typically emerge from underground in late summer; although timing can vary based on latitude and weather conditions and some presence/absence surveys in Oklahoma have documented teners in early summer (USFWS species files). Typically, teners over-winter as adults and comprise the breeding population the following spring and summer (Kozol 1990).

## **Movement**

ABBs fly and have been reported moving nightly distances ranging from 0.16 to 30 kilometers (km) (0.10 to 18.6 miles) in various parts of their range (Bedick et al. 1999, Creighton and Schnell 1998, Jurzenski et al. 2011, Schnell et al 2011). In Oklahoma, ABBs have been recorded to move approximately 10 km (6.2 miles) in 6 nights (Creighton and Schnell 1998). In Nebraska, one ABB was reported to move, wind-aided, approximately 30 km (18.6 miles) in one night (Jurzenski et al. 2011).

## **Habitat**

ABBs have been successfully live-trapped in several vegetation types including native grassland, grazed pasture, riparian zone, coniferous forest, mature forest, and oak-hickory forest, as well as on a variety of soil types (Creighton et al. 1993; Lomolino and Creighton 1996; Lomolino et al. 1995; USFWS 1991). Ecosystems supporting ABB populations are diverse and include primary

forest, scrub forest, forest edge, grassland prairie, riparian areas, mountain slopes, and maritime scrub communities (Ratcliffe 1996; USFWS 1991).

The ABB readily moves between different habitats (Creighton and Schnell 1998, Lomolino et al. 1995) and are considered to be habitat generalists. However, they are believed to have more selective breeding habitat (suitable soils and vegetation layer) compared to their feeding habitat (Anderson 1982).

#### Areas Unfavorable for the ABB

While the ABB uses a wide variety of habitats, the Service currently believes that areas exhibiting the following characteristics are *unfavorable* for use by ABBs based on disturbance regime, vegetation structure, unsuitable soil conditions and carrion availability:

1. Land that is tilled on a regular basis, planted in monoculture, and does not contain native vegetation.
2. Pasture or grassland that have been maintained through frequent mowing, grazing, or herbicide application at a height of 20 cm (8 inches) or less.
3. Land that has already been developed and no longer exhibits surficial topsoil, leaf litter, or vegetation.
4. Urban areas with maintained lawns, paved surfaces, or roadways.
5. Stockpiled soil without vegetation.
6. Wetlands with standing water or saturated soils (defined as sites exhibiting hydric-soils, and vegetation typical of saturated soils, and/or wetland hydrology).

**NOTE: Areas adjacent to wetlands and/or riparian areas may be used by the ABB (and are therefore not considered unfavorable for the ABB). These areas may be important for ABBs seeking moist soils during dry conditions.**

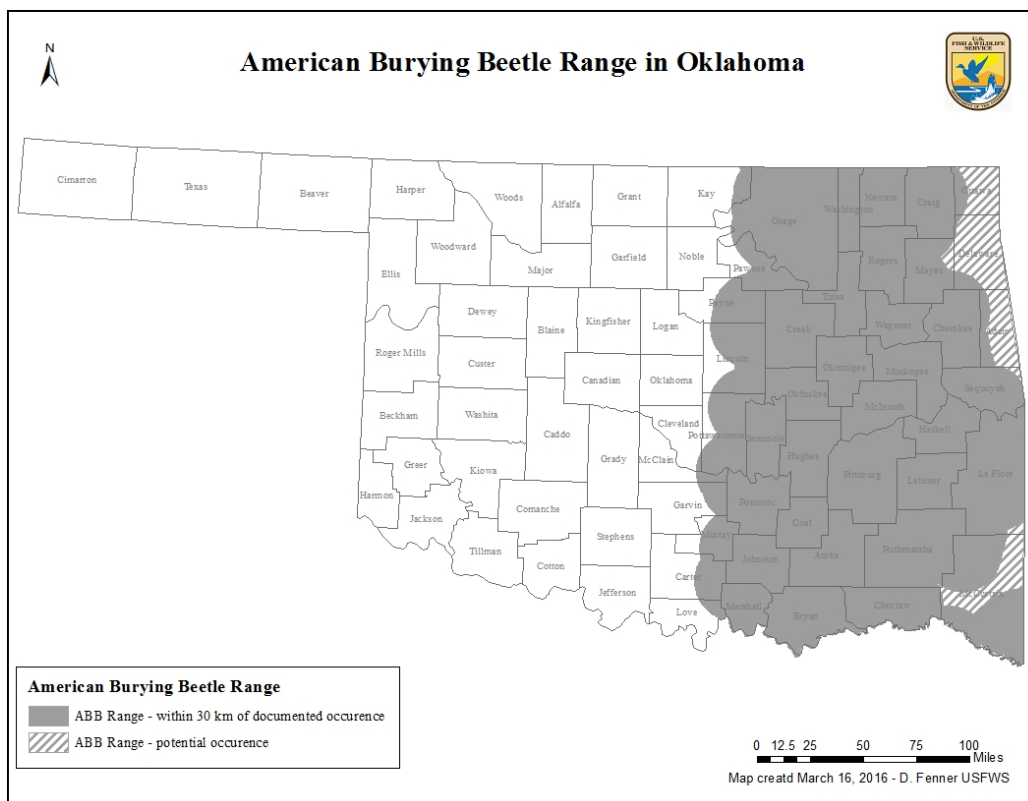
Additional information regarding ABB biology and habitat can be found on the Oklahoma Ecological Field Service's ABB website at:

*<[http://www.fws.gov/southwest/es/Oklahoma/ABB\\_Add\\_Info.htm](http://www.fws.gov/southwest/es/Oklahoma/ABB_Add_Info.htm)>.*

## ABB RANGE IN OKLAHOMA

The Service has delineated the range of the ABB in Oklahoma based on locations of known ABB occurrences. The primary source for documented ABB occurrences is ABB presence/absence surveys conducted by Service-permitted biologists. The ABB range in Oklahoma includes all areas within 30 km (18.6 miles) (maximum ABB movement recorded by Jurzenski et al. 2011) of all documented ABB occurrences. The Service also considers portions of counties on the eastern edge of Oklahoma that are not within 30 km of a documented ABB occurrence as potential ABB range, due to the potential for ABB habitat in these areas and previously documented ABB locations in adjacent states. These areas are identified at the Information for Planning and Conservation (IPaC) website at <http://ecos.fws.gov/ipac/>.

The ABB range will be updated as new occurrence data are gathered using the above delineation methods unless the best available science identifies a better technique for identifying ABB range. Updated ABB range information will be available through our website [http://www.fws.gov/southwest/es/Oklahoma/ABB\\_Add\\_Info.htm](http://www.fws.gov/southwest/es/Oklahoma/ABB_Add_Info.htm) and the IPaC website <http://ecos.fws.gov/ipac/>.

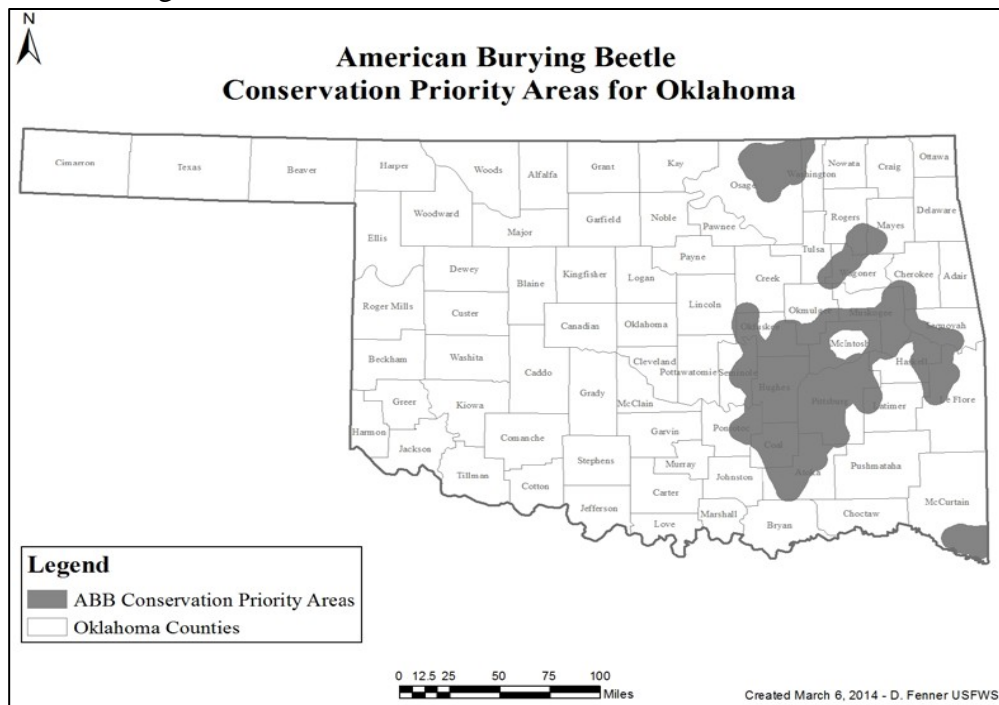


**Figure 2.** Range of ABB within Oklahoma. Portions of several counties on the eastern edge of the ABB range in Oklahoma are not within 30 km of a recent survey; however, these areas may be occupied by ABBs.

Part or all of the following counties are currently included in the ABB range in Oklahoma (**Figure 2**): Adair, Atoka, Bryan, Carter, Cherokee, Choctaw, Coal, Craig, Creek, Delaware, Garvin, Haskell, Hughes, Johnston, Kay, Latimer, Le Flore, Lincoln, Love, Marshall, Mayes, McClain, McCurtain, McIntosh, Murray, Muskogee, Noble, Nowata, Okfuskee, Okmulgee, Osage, Ottawa, Pawnee, Payne, Pittsburg, Pontotoc, Pottawatomie, Pushmataha, Rogers, Seminole, Sequoyah, Tulsa, Wagoner, and Washington. If a project is located within the ABB range, the Service recommends that the project proponent consider impacts to ABB. In several counties on the western edge, only the eastern portion of that county is included in the ABB range (see Figure 2). Within the ABB range, the Service recommends ABB presence/absence surveys for any proposed projects with potential impacts to suitable habitat.

### ABB CONSERVATION PRIORITY AREAS IN OKLAHOMA

The Service has identified areas where conservation of the ABB should be targeted in Oklahoma (Figure 3.) The ABB Conservation Priority Areas (CPA) will serve as areas where conservation efforts should be focused and where higher ratios of mitigation for impacts to ABBs should occur. CPAs include areas with recent (within 10 years) documented ABB presence that the Service believes are likely to contain important elements for ABB conservation, such as documented presence over multiple years, relatively high density populations, suitable breeding, feeding, and sheltering habitat, and carrion resources.



**Figure 3.** American burying beetle Conservation Priority Areas in Oklahoma.

The Service anticipates re-analyzing and updating the CPAs in Oklahoma every three years using the most recent 10 years of ABB occurrence data. The Service will also use the best available scientific information to determine whether a new method for identifying CPAs should be used in the future.

## IMPACTS ANALYSIS

The Service’s recommended step-wise process for determining the potential for take of the ABB resulting from a proposed activity is described below. The Service provides this step-wise process to assist project proponents with evaluating their action’s risk of taking ABBs. However, the responsibility for this determination is ultimately that of each Federal agency or project proponent, as applicable. These recommendations are based on the best available information and are subject to change.

1. a. Project has a Federal nexus (Federal agency is undertaking, funding, permitting, or authorizing actions).....Cont. to Step 2
1. b. Project does not have a Federal nexus (no Federal agency is undertaking, funding, permitting, or authorizing actions).....Cont. to Step 6

### Federal Nexus

2. a. Entire Action Area (all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action [50 CFR §402.02]) occurs outside of ABB range (as identified in IPaC).....*Activity will have “No Effect” on the ABB. No concurrence from the Service required. Document your decision in your project files.*
2. b. All or portions of the Action Area occur within ABB range.....Cont. to Step 3
3. a. Entire Action Area considered unfavorable for use by ABBs (see list in “Areas Unfavorable for the ABB” section above)..... *Activity will have “No Effect” on the ABB. No concurrence from the Service required. Document your decision in your project files.*
3. b. All or portions of the action area may be favorable for use by the ABB (ABB habitat; areas not excluded by list of “Areas Unfavorable for the ABB”).....Cont. to Step 4

4. a. Project actions do not include soil disturbance, use of vehicles or heavy equipment, artificial lighting, vegetation removal, use of herbicides, pesticides, other hazardous chemicals, **OR** any activity that may impact soil or vegetation in suitable ABB habitat, **OR** otherwise harm ABBs..... *Activity will have “No Effect” on the ABB. No concurrence from the Service required. Document your decision in your project files.*
4. b. Project actions include soil disturbance, use of vehicles or heavy equipment, artificial lighting, vegetation removal, use of herbicides, pesticides, other hazardous chemicals, **OR** any activity that may impact soil or vegetation in suitable ABB habitat, **OR** otherwise harm ABBs.....Cont. to Step 5
5. a. Valid and current ABB presence/absence survey conducted in the action area where ABB habitat was identified did not find any ABBs (according to the latest ABB Oklahoma Presence/Absence Survey Guidance – <http://www.fws.gov/southwest/es/Oklahoma/>)..... *Activity “May Affect, Not Likely to Adversely Affect” the ABB. Federal agency requests concurrence from the Service through informal Section 7 consultation.*
5. b. Presence/absence surveys conducted for the action area find ABBs (according to the latest ABB Oklahoma Presence/Absence Survey Guidance) **OR** no presence/absence surveys are conducted (presence assumed).

*Activity “May Affect, Likely to Adversely Affect” ABBs. Submit a Biological Assessment (BA) to the Service and initiate formal consultation through Section 7(a)(2) of the ESA. Incorporate the Service’s BMPs for the ABB (Appendix A) into the proposed project description as conservation measures in the BA. Additionally, the Service encourages Federal agencies to improve the status of the species and minimize the impact of the taking by including conservation measures as part of their project, through mitigation lands (described below in Appendix B).*

#### **No Federal Nexus**

6. a. Entire Action Area (all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action [50 CFR§402.02]) occurs outside of ABB range (as defined by the Service).....*Activity causes “No Take” of ABB, Incidental Take Permit not needed.*
6. b. All or portions of the Action Area occur within ABB range.....Cont. to Step 7

7. a. Entire Action Area considered unfavorable for use by ABBs (see list in “Areas unfavorable for the ABB” section above).....*Activity causes “No Take” of ABB, Incidental Take Permit not needed.*
7. b. All or portions of the action area may be favorable for use by the ABB (ABB habitat; areas not excluded by list of “Areas unfavorable for the ABB”).....Cont. to Step 8
8. a. Project actions do not include soil disturbance, use of vehicles or heavy equipment, artificial lighting, vegetation removal, use of herbicides, pesticides, other hazardous chemicals **OR** any activity that may cause take of ABBs...  
*Activity causes “No take” of ABB, Incidental Take Permit for the ABB is not needed.*
8. b. Project actions include soil disturbance, use of vehicles or heavy equipment, artificial lighting, vegetation removal, use of herbicides, pesticides, other hazardous chemicals, **OR** any action that could cause take of ABBs.....Cont. to Step 9
9. a. Valid and current ABB presence/absence survey conducted for the portion(s) of the action area with ABB habitat did not find any ABBs (according to the latest ABB Oklahoma Presence/Absence Survey Guidance – <<http://www.fws.gov/southwest/es/Oklahoma/>>)  
  
*Activity causes “No take” of ABB, Incidental Take Permit for the ABB is not needed.*
9. b. Presence/absence surveys conducted for the action area find ABBs (according to the latest ABB Oklahoma Presence/Absence Survey Guidance) **OR** no presence/absence surveys are conducted (presence assumed).  
  
*The Service recommends obtaining an ESA Section 10(a)(1)(B) permit through the development of a Habitat Conservation Plan (either individually or as part of an applicable General Conservation Plan). Incorporate the Service’s BMPs for the ABB (Appendix A) as minimization measures in the HCP. Contact the Service for more information on how to prepare a Habitat Conservation Plan or permit application.*

Survey’s results should only be used in the decision-making process if they are current and valid - as described in the latest *ABB Oklahoma Presence/Absence Live-trapping Survey Guidance* – <<http://www.fws.gov/southwest/es/Oklahoma/>>. Project proponents should re-evaluate impacts and consider additional surveys if survey results have expired prior to project implementation. For example, current guidance describes surveys completed prior to July 28 as valid for only that

active period, typically ending in September. Surveys completed after July 28, however, will be valid until the start of the new active period, typically in May. See the latest *ABB Oklahoma Presence/Absence Live-trapping Survey Guidance* for more information; this document can be found on the OKESFO webpage

<[http://www.fws.gov/southwest/es/oklahoma/ABB\\_Add\\_Info.htm](http://www.fws.gov/southwest/es/oklahoma/ABB_Add_Info.htm)>.

Additionally, see Appendix A for the Service's BMPs for American burying beetle in Oklahoma. These BMPs should be incorporated as conservation measures in Federal project Biological Assessments and as minimization measures in non-Federal project HCPs. The list of BMPs is not exhaustive and is subject to change at any time. To ensure you have the most recent version, visit our webpage at <[http://www.fws.gov/southwest/es/oklahoma/ABB\\_Add\\_Info.htm](http://www.fws.gov/southwest/es/oklahoma/ABB_Add_Info.htm)>.

Mitigation, which includes avoidance, minimization, rectifying, reducing, and compensating impacts, is an essential component of achieving the overarching purpose of the ESA, which is to conserve listed species and the ecosystems upon which they depend. Effective mitigation can contribute to the recovery of listed species or prevent further declines in populations and habitat resources that would otherwise slow or impede recovery of listed species. The Service expects Federal agencies to exercise their responsibility under section 7 to carry out programs for the conservation of threatened and endangered species by mitigating the impact of the take and establishing appropriate mitigation, including the establishment of lands for conservation. For private actions that result in take, but have no federal nexus, an HCP must be developed, which includes appropriate conservation measures that, to the maximum extent practicable, minimize and mitigate the effects of the authorized take of the species (pursuant to section 10(a)(1)(B) of the ESA). For additional mitigation information specific to the ABB see the *American Burying Beetle Conservation Strategy for the Establishment, Management, and Operations of Mitigation Lands* document on our webpage at

<<http://www.fws.gov/southwest/es/oklahoma/ConsBank.htm>>.

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**APPENDIX A:**

**Best Management Practices for American burying  
beetle (ABB) in Oklahoma**

*Oklahoma Ecological Services  
Office March 2016*

1. To decrease habitat loss, minimize clearing of temporary work areas and use small equipment or hand cutting techniques that leave the root zone intact. In general, using hand cutting techniques is likely to result in a smaller area of impact and reduce soil compaction relative to heavy equipment.
2. Minimize construction requiring artificial lighting. In situations where night construction work is necessary, shield direct light to the work area and prevent light from projecting upwards, thus minimizing the potential to attract insects, including ABBs.
3. In areas where ABBs are present (determined by valid surveys) or where ABB presence is assumed (when no ABB surveys were completed), return surface soils to approximate pre-construction conditions.
4. Restore areas in native range using approved native seed mixes developed for the applicable ecozone.
5. Prior to the topsoil replacement, rip (i.e., mechanically turn soil with a plow or ripping device) the impacted area. Rip and disk at a time when the soil is dry enough for normal tillage operations to occur on undisturbed farmlands adjacent to the areas to be ripped. This soil de-compaction treatment should be beneficial to the ABB by reducing the extent of soil compaction.
6. Educate all workers operating in the project areas about ABB habitat, biology, reasons for ABB decline, and the responsibility of all workers to protect the ABB. Require all workers to report any ABB sightings to the project manager or environmental inspector, remove all food wastes from the ROW each day, and prohibit dogs or cats on the ROW. Provide each worker a full color Endangered Species Card with a picture of the ABB and all information summarized on the

card before they are allowed to conduct soil disturbing activities. Post signs at all access points to the project area highlighting the areas as ABB habitat and reminding workers to follow special restrictions in the area.

7. Install appropriate erosion controls, including such items as straw bales, biologs, silt fence, and similar materials.
8. Implement Pollution Prevention Requirements as required in section 3.3.3 of the Oklahoma Department of Environmental Quality General Permit OKR10 for Storm Water Discharges. Additionally, fuel all equipment outside of ABB habitat (that is, outside of undisturbed native vegetation) and store all fuel and motor vehicle oil outside of ABB habitat.

## APPENDIX B:

# Mitigation Recommendations for the American burying beetle (ABB) in Oklahoma

*Oklahoma Ecological Services Office*

The Service recommends that each project proponent conserve an amount of land proportional to the impacts to ABB habitat resulting from the project. The Service's proportions, or ratios, are based on proximity of the impacts to areas of importance to ABB conservation (location) and duration of habitat impacts (**Table 1**).

**Table 1.** Mitigation Ratios for ABB impacts. Ratio = acres of impact : acres of offset

	Location of impact		
Impact Duration	ABB Range (but not within CPA)	Conservation Priority Area (CPA)	Mitigation Land
Temporary	1:0.25	1:0.5	1:1.5*
Permanent Cover Change	1:0.5	1:1	1:2*
Permanent	1:1	1:2	1:3*
*Mitigation Land ratio= CPA ratio plus replacement of lost mitigation value.			

Areas where impacts may result in a greater magnitude of take, and thus a larger effect on ABB, have higher mitigation ratios. For example, for permanent impacts occurring within the ABB range but outside of a CPA, for each acre of impact, 1 acre of mitigation is required (1:1 ratio). For permanent impacts occurring within an ABB CPA, for each acre of impact, 2 acres of mitigation is required (1:2 ratio). For impacts occurring within an established mitigation area, 3 acres of mitigation is expected for each acre of impact (1:3 ratio); this is the same as the ratio for impacts in a CPA, plus replacement for the acre of mitigation from prior projects that would be impacted by the action. Mitigation ratios start at 1:0.25 for temporary impacts and increase as duration of impacts increase. Greater duration of impacts likely results in greater adverse impacts to the ABB.

The ABB CPAs have a higher proportion of positive ABB surveys; consequently these areas will contribute more towards ABB conservation and recovery than areas within the ABB's range but outside the CPAs. Factors such as availability of habitat, food resources, and environmental variables likely contribute to higher density of ABB present within the CPAs. Therefore, impacts that could cause take and that occur within the CPAs have a greater effect on ABB and thus have a higher mitigation ratio than impacts in areas outside of CPAs.

Conservation easements are required for mitigation lands to protect the land from various potential impacts. However, it may not be possible to avoid all impacts, such as sub-surface mineral exploration. In cases where impacts to mitigation lands cannot be avoided, the Service expects a higher mitigation ratio. For temporary impacts the ratio is 1:1.5 and for permanent impacts 1:3. Mitigation lands are usually within ABB CPAs, have additional conservation value for the ABB through permanent protection by a conservation easement, and have a management plan specifically for the ABB.

Temporary impacts are those that impact ABB habitat for 5 years or less (areas impacted by the project are restored to a condition suitable for ABB use within 5 years of the original impact). Based on the climate and vegetation types of eastern Oklahoma, the Service expects that most grass and shrub-dominated cover types can be re-established to their pre-impact condition within 5 years. When considering precipitation, vegetation regrowth time, etc. in ABB range in Oklahoma, 5 years after the impacts occur is a reasonable timeframe for habitat to be restored to a condition suitable for ABB use.

Permanent cover change impacts are defined as impacts that change the successional stage of an area to a different stage (e.g., forest or shrubland to grassland; grassland to forest), resulting in habitat that is possibly less preferable for ABB use. Similar to temporary impacts, these areas will be restored to a condition suitable for ABB use within 5 years. However, if these areas will be permanently maintained at a different successional stage (through vegetation control, tree planting, or suppression of natural vegetation), the Service considers the vegetation cover of the area to have been permanently changed. Anthropogenic changes in cover type create intense, sudden contrast between patches (e.g., a grassland ROW fragmenting a contiguous stand of forest habitat or a forest stand fragmenting a contiguous grassland), compared to the natural patchy landscapes in Oklahoma, which have less contrast between adjacent patches. Evidence suggests that permanent change in cover, even if the types are native to the area, can increase threats to ABBs (Trumbo and Bloch 2000) by increasing invasive plant and animal species (Marvier et al. 2004), reducing the carrion prey base of the appropriate size for ABB reproduction (Oxley et al. 1974), or increasing the vertebrate scavenger competition for carrion (Kozol 1995, Ratcliffe 1996, Amaral et al. 1997, Bedick et al. 1999) necessary for ABB reproduction.

Permanent impacts are those that eliminate ABB habitat (e.g., buildings, roads, quarries, strip mines), as well as any impact to habitat that takes more than 5 years to re-establish as suitable for ABB use.

Please see the *American Burying Beetle Conservation Strategy for the Establishment, Management, and Operations of Mitigation Lands* document for additional information about implementing appropriate mitigation ratios. This is available on our webpage at <http://www.fws.gov/southwest/es/oklahoma/ConsBank.htm>.

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## **BEST MANAGEMENT PRACTICES FOR PROJECTS AFFECTING RIVERS, STREAMS AND TRIBUTARIES**

The project crosses or potentially affects river, stream or tributary aquatic habitat. Therefore the Service recommends implementing the following applicable Best Management Practices:

1. Construct stream crossings during a period of low streamflow (e.g., July - September);
2. Cross streams, stream banks and riparian zones at right angles and at gentle slopes;
3. When feasible, directionally bore under stream channels;
4. Disturb riparian and floodplain vegetation only when necessary;
5. Construction equipment should cross the stream at one confined location over an existing bridge, equipment pads, clean temporary native rock fill, or over a temporary portable bridge;
6. Limit in-stream equipment use to that needed to construct crossings;
7. Place trench spoil at least 25 feet away landward from streambanks;
8. Use sediment filter devices to prevent movement of spoil off right-of-way when standing or flowing water is present;
9. Trench de-watering, as necessary, should be conducted to prevent discharge of silt laden water into the stream channel;
10. Maintain the current contours of the bank and channel bottom;
11. Do not store hazardous materials, chemicals, fuels, lubricating oils, and other such substances within 100 feet of streambanks;
12. Refuel construction equipment at least 100 feet from streambanks;
13. Revegetate all disturbed areas as soon as possible after construction to prevent unnecessary soil erosion. Use only native riparian plants to help prevent the spread of exotics;
14. Maintain sediment filters at the base of all slopes located adjacent to the streams until right-of-way vegetation becomes established;
15. Maintain a vegetative filtration strip adjacent to streams and wetlands. The width of a filter strip is based on the slope of the banks and the width of the stream. Guidance to determine the appropriate filter strip (stream management zone, SMZ) width is provided below; and
16. Direct water runoff into vegetated areas.

SMZ widths should consider watershed characteristics, risk of erosion, soil type, and stream width. SMZ widths are measured from the top of each bank and established on each side of the stream. Erosion risk is increased with sandy soil, steep slopes, large watersheds and increasing stream widths. Recommended primary and secondary SMZ widths are provided in the table below.

Stream Width (Feet)	Slope (Percent)	Primary SMZ (Feet)	Secondary SMZ (Feet)
<20	<7	35	0
<20	7-20	35	50
<20	>20	Top of slope or 150	75
20-50	<7	50	0
20-50	7-20	50	50
20-50	>20	Top of slope or 150	75
>50	<7	Width of stream or 100 max.	0
>50	7-20	Width of stream or 100 max.	50
>50	>20	Top of slope or 150	75

## Reference

Arkansas Forestry Commission. 2001. Draft Arkansas Forestry Best Management Practices for Water Quality Protection.

# **BEST MANAGEMENT PRACTICES FOR STREAMSIDE MANAGEMENT ZONES**

## **PURPOSE**

The Best Management Practices (BMP's) for Streamside Management Zones (SMZ) provided in this enclosure are designed to facilitate establishment of natural vegetated filters, erosion control, and increased filtration adjacent to natural or manmade water bodies.

## **GENERAL RECOMMENDATIONS**

BMP's should include precautions to protect the remaining timber stands within the SMZ. Flag or mark SMZ's adjacent to all perennial and intermittent streams and lakes before harvesting timber, locating roads, skid trails, fire lanes, and logging sets outside the SMZ; limit harvesting within SMZs and sensitive forested wetlands during abnormally wet periods; maintain a vegetative filtration strip around streams and wetlands; consider using wide-tired skidders, forwarders, cable skidders, and tracked equipment to minimize soil disturbance in an SMZ; direct water runoff into vegetated areas.. Reestablish vegetation on temporary roads, drainage systems, side slopes, back slopes, skid trails or landings following significant soil disturbances when natural revegetation will not prevent erosion; replant seeds or seedlings by hand; fell trees away from stream; remove all logging debris from the stream; never block the flow of water within a stream. Harvest of any stems on the edge of a stream should be accomplished in such a manner as to minimize impact to the stream bank.

## **CROSSINGS**

Care should be taken to minimize the number of stream crossing points; cross streams at right angles and at gentle slopes; stabilize crossing approaches. After construction, promptly remove all temporary crossings and restore the site after harvesting is completed; use seeding and mulching in a timely manner to reduce erosion. Portable bridges should be considered for temporary stream crossings.

## **ROADS**

Road construction should incorporate a grade of less than 10 percent; proper road drainage should disperse water through the forest and not cut channels across the SMZ; logs or stems should be used as fill over temporary culverts instead of fill dirt; rehabilitate roads with vegetation when timber harvest completed.

## **AVOIDANCE**

At all times the following should be avoided: skidding across perennial or large intermittent streams, except over an adequately designed crossing; removing trees from stream banks, beds or steep slopes, if removal will destabilize soil and degrade water quality; use of streams or drainage channels as a skid trail or road; excessive skidding within an SMZ; chemical and fertilizer applications; mechanical site preparation; and spillage of petroleum products, antifreeze and other equipment maintenance materials.

## **SMZ WIDTH**

SMZ widths should consider watershed characteristics, risk of erosion, soil type, and stream

width. SMZ widths are measured from the top of each bank and established on each side of the stream. The table below provides recommended SMZ widths.

Erosion risk is increased with sandy soil, steep slopes, large watersheds and increasing stream widths. Primary SMZ refers to ephemeral streams; secondary SMZ refers to intermittent, braided, and perennial streams, lakes and ponds.

Stream Width (Feet)	Slope (Percent)	Primary SMZ (Feet)	Secondary SMZ (Feet)
<20	<7	35	0
<20	7-20	35	50
<20	>20	Top of slope or 150	75
20-50	<7	50	0
20-50	7-20	50	50
20-50	>20	Top of slope or 150	75
>50	<7	Width of stream or 100 max.	0
>50	7-20	Width of stream or 100 max.	50
>50	>20	Top of slope or 150	75

## PERMIT REQUIREMENTS

A permit may be required from the U.S. Army Corps of Engineers should fill material be placed in wetlands or other waters of the United States. Should such a permit be required, the BMP's contained in this enclosure, as well as other conservation provisions, may become permit conditions. Additional permit requirements may apply, depending upon the nature of individual projects.

## DEFINITIONS

*Perennial* streams have a well defined channel and flow year-round, except during periods of extreme drought.

*Intermittent* streams have a seasonal flow and a continuous well-defined channel.

*Ephemeral* streams flow during and for a few hours or days after periods of heavy rain and the stream channel is less recognizable than either perennial or intermittent streams.

*Braided* streams are stream systems with multiple and frequently interconnected channels.

*Wetlands* generally support hydrophytic vegetation, hydric soils and wetland hydrology.

## Literature Cited

Arkansas Forestry Commission. 2001. Draft Arkansas Forestry Best Management Practices for Water Quality Protection.

# **Oklahoma Ecological Services Field Office Migratory Bird and Eagle Impact Avoidance Measures for Actions Associated with Oil and Gas Projects**

**April 2014**

Note to Users: This U.S. Fish and Wildlife Service (Service) document is intended to assist the oil and gas industry with project evaluation and compliance with the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) for activities within Oklahoma. These recommendations may also be useful for other industries and activities in Oklahoma. Guidance herein may also be useful in planning by agencies and organizations concerned with protecting avian resources, such as the Avian Power Line Interaction Committee (APLIC). The APLIC recently released an updated version of their guidance document entitled, Reducing Avian Collisions with Power Lines: State of the Art in 2012, available at [www.aplic.org](http://www.aplic.org).

The following are general considerations that may apply to most, but not every situation that may occur during oil and gas activities within Oklahoma. Additional conservation measures may be considered and/or required to avoid or minimize impacts to eagles and other species of migratory birds.

With the exception of Arizona, the bald eagle is no longer protected under the Endangered Species Act. However, eagles (both bald eagles and golden eagles) in the United States are protected by the BGEPA, in addition to the MBTA. The BGEPA prohibits the take, possession, sale, purchase, barter, offer to sell, purchase, or barter, transport, export or import, of any eagle, alive or dead, including any part, nest, or egg, unless authorized by permit. Further, activities that would disturb an eagle are prohibited under the BGEPA. "Disturb" means to agitate or bother an eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. If a proposed project or action would occur in areas where there are nesting, feeding, or roosting eagles, proponents of the project may need to take additional conservation measures to comply with BGEPA. New regulations (50 CFR § 22.26 and § 22.27) allow the take of eagles and their nests, respectively, to protect interests in a particular locality. However, consultation with the Service's Migratory Bird, Ecological Services, and Law Enforcement programs will be required before a permit may be issued for such take.

If eagles might be taken in association with oil and gas activities in a given area, the responsible party should develop an Eagle Conservation Plan and apply for a take permit under the BGEPA. Relevant recommendations and guidance can be accessed on the Service's Eagle Management web page:

***<http://www.fws.gov/migratorybirds/BaldAndGoldenEagleManagement.htm>***.

## **AVOIDING AND MINIMIZING NEGATIVE IMPACTS TO EAGLES**

Both bald and golden eagles occur in Oklahoma. The western portion of Oklahoma has a small nesting population of golden eagles. Some golden eagles also winter throughout the state. However, this document primarily focuses on bald eagles, which have a larger population (both nesting and wintering) in Oklahoma. Please contact the Oklahoma Ecological Services Field Office for more information regarding potential impacts to golden eagles.

### **I. Thoroughly Document Area Use by Bald Eagles**

For bald eagles, use Appendix 2 of the Service's 2009 Bald Eagle Post-delisting Monitoring Standard Operating Procedures to conduct aerial surveys for nests and communal roost sites. This protocol should be used for any aspect of oil and gas activities. Persons conducting bald eagle nest surveys must have previous experience conducting eagle nest surveys. Eagle nest surveys must be conducted during winter, when leaves are off deciduous trees. This protocol only applies to nesting bald eagles. Refer to the following website for the most recent version:

***<http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BaldEagle/NationalBaldEagleManagementGuidelines.pdf>***

Avoidance measures for eagles include protection of nests and nest sites, nesting adults, eggs, nestlings, and fledglings. Eagle nest surveys must be conducted prior to activities that may alter potential nest site habitat. Not all eagle nest locations are documented and new nests are found each year, as the resident population of bald eagles in Oklahoma expands. Examples of activities that may harm a nest or nest tree include construction of pads, roads, pipelines, and distribution lines. It is paramount to collect information regarding bald eagles well in advance of construction activities.

Surveys could be conducted from the ground or from aircraft. Ground-based surveys may be most appropriate for open terrain with good access for ground survey crews. Aerial surveys may provide the best coverage for large areas with rugged terrain (i.e., inaccessible by ground) and heavily forested areas.

Ground Surveys – Methods for nest surveys must be consistent with accepted, published methodologies and consider species-specific characteristics, terrain, vegetation, and accessibility of the survey area. Smaller projects with limited and open nesting habitat can be effectively surveyed from the ground by qualified observers with experience in identifying eagle nests. Survey routes or transects must adequately cover all potential nesting habitat. Potential eagle nests must be documented with photographs and GPS locations. If observers are unsure of species and occupancy status, and it's during what could be laying through early nestling stages, observers should avoid line-of-sight closer than 660' (per National Bald Eagle Management Guidelines) and return during what normally would be late nestling to fledging stage, or observe activity with scope from a distance (> 660' line-of-sight) for 4+ hours under good weather conditions to validate species and occupancy status.

At minimum, appropriate search protocol for each site must include timing and number of surveys needed, search area, and search techniques. Selecting the method with the lowest probability of causing disturbance to target species is a key element when developing survey protocols. Protocols should follow the most recent recommendations from the Service.

## **II. Avoidance and Minimization Measures for Bald Eagles**

Examples of oil and gas activities that may harm an eagle nest or nest tree include construction of pads, roads, pipelines, and electrical distribution lines. If an oil and gas activity is proposed within 1 mile of a critical component of the bald eagle's life history, such as a nest, communal roost site, river, or freshwater wetland or reservoir covering more than 20 acres, measures listed below, or similar measures approved by the Service should be implemented. These critical life history needs are hereafter referred to as Eagle Use Areas (EUAs).

Bald eagles occurring in a given area throughout the year may also include migrants, overwintering individuals, immature and sub-adult residents, and non-breeding adult residents. Some oil and gas related activities could affect eagles and EUAs. All eagle life history stages should be considered when attempting to avoid and minimize negative impacts. In order to avoid take of bald eagles and their habitats, use the following recommendations as follows:

- a) For a complete description of how to avoid negative impacts to bald eagle nests refer to the National Bald Eagle Guidelines on pages 12-15.  
*<http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BaldEagle/NationalBaldEagleManagementGuidelines.pdf>*
- b) All flared gases should produce no exposed flames and ends of pipes for flaring gases should be fitted with devices that deter birds from perching.
- c) For a given project, avoid locating electrical distribution lines in EUAs or else bury lines.
- d) If a new electrical distribution line cannot be buried in an EUA, it should be marked with special diverter devices, per the Service recommendations in APLIC 2012, to alert birds to the line so they can more readily avoid it. As a minimization measure for the above ground electrical distribution lines in EUAs, if possible, mark an equal amount of existing electrical distribution lines within 1 mile of other EUAs.
- e) All power poles within an EUA should be designed to protect eagles from electrocution risk, following standard practices in the APLIC document referenced above.
- f) As a minimization measure, pre-existing electrical distribution lines and power poles in EUAs also need to be marked per Service recommendations in APLIC 2012.

Before eagle nest surveys are conducted, check with appropriate state agencies or interest groups to determine what data is already available.

#### **AVOIDING AND MINIMIZING NEGATIVE IMPACTS TO OTHER SPECIES OF MIGRATORY BIRDS**

The MBTA prohibits the taking, killing, possession, and transportation and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by a permit from the Service or by regulations. However, there is no provision for incidental take under the MBTA. Species of birds protected by the MBTA are listed in 75 FR 9282 or on the Service's website:

***<http://www.fws.gov/migratorybirds/RegulationsPolicies/mbta/mbtandx.html>***

Recommendations for avoiding and minimizing potential impacts to migratory birds are provided in Appendix A. Additional information may be obtained through the Service's Migratory Birds Division.

## **Suggested Conservation Actions for Projects to Avoid or Minimize Potential for Take of Protected Species of Migratory Birds**

**U.S. Fish and Wildlife Service, Division of Migratory Birds, Southwest Region  
P.O. Box 1306, Albuquerque, NM 87103; Phone 505-248-6878**

**May 2013**

The Migratory Bird Treaty Act (MBTA, 16 U.S.C. 703-712) prohibits, among other actions, the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior through a permit or other regulation. Protected species of birds are listed under Title 50, Code of Federal Regulations, Part 10. Currently 1,007 species of birds are protected by the MBTA, including nearly all species that are native to the United States.

Activities that involve modification of habitats in which birds are nesting, or occurring adjacent to habitats in which birds are nesting may take protected birds through direct mortality of eggs, nestlings, or adults, or indirectly by causing nest abandonment, thereby leading to death of eggs or nestlings. The MBTA is a strict liability statute, in that the developer need not know that the nesting birds are present and potentially at risk by the development activities. There is also no permit available under the MBTA that will authorize the unintentional take of migratory birds. The only way to ensure compliance with the MBTA is to avoid the take altogether. Below are suggestions for minimizing or eliminating the potential for take during construction activities.

1. Conduct the activity outside the local nesting season so there are no active nests of birds that may be inadvertently damaged or destroyed by the project actions, and no need to conduct surveys for active nests.
2. Minimize the loss, destruction, or degradation of migratory bird habitat during the local nesting season if activities must occur during that timeframe. Within the Southwest Region, although most species nest between early April and mid-August, some nesting activity may occur during all months of the year depending on location. In desert regions, for example, nesting may begin in January and continue into November. Some eagles, owls, and finches may nest in mid-winter. Due to this variability, project proponents should contact the U.S. Fish and Wildlife Service's (Service) Regional Migratory Bird Office (see above) for details on timing of nesting in the area of the project. The proponent should be knowledgeable of which species may nest outside of the core "nesting season" that is often cited by various entities.
3. Document extent of below- and above-ground construction activities and the habitats through which those will pass. Recommendations on avoidance practices, timing of surveys, and the suite of species potentially affected may differ accordingly.

4. For projects planned well in advance, clearing of vegetation in the year prior to construction (outside the nesting season) may discourage future nesting attempts of birds in the proposed project area, thereby decreasing chance of take during construction activities.
5. If a proposed project or action may take migratory birds through disturbance or alteration of nesting habitat, and work cannot occur outside the local nesting season, project proponents should provide the Service with an explanation for why work has to occur during the migratory bird nesting season. In these cases, project proponents should also demonstrate that all efforts to complete the work outside the migratory bird nesting season were attempted, and that the reasons work needs to be completed during the nesting season were beyond the proponent's control.
6. To determine if migratory birds are nesting on-site and therefore potentially at risk by the activity, project proponents should conduct initial general surveys of the project area during the best biological timeframe for detecting the presence of the locally nesting birds (to locate potential territories that may be in harm's way), followed by nest searches in the project area shortly before the disturbance will occur (ideally within a week of the start of construction due to the speed with which nests may be built). Contact the Service's Division of Migratory Birds for survey protocol recommendations.

Except for the nests of large species, bird nests are well hidden and very difficult to find, and nest searches can be time intensive. Surveyors must be experienced in locating nests, as doing so successfully often relies on the ability to interpret subtle behavioral cues by the adult birds. Project proponents should also be aware that results of migratory bird surveys are subject to spatial and temporal variability and should be conducted at the most appropriate times of day and season for detection of territories and ultimately nests.

7. If no migratory birds are found nesting in proposed project or action areas immediately prior to the time when construction and associated activities are to occur, then the project activity may proceed as planned.
8. If protected species of birds are present and nesting in the proposed project or action area when project activities are slated to occur, contact your nearest Service Ecological Services Field Office and the Service's Regional Division of Migratory Birds for guidance on appropriate next steps for minimizing risk of violating the MBTA.

\* These proposed conservation measures presume that no Endangered or Threatened animal or plant species (including migratory birds) exist in the project/action area. If Endangered or Threatened species are or potentially could be present and the project/action may affect these species, then consult with your nearest Service Ecological Services Office before proceeding with any project/action.

\*\* The MBTA prohibits the taking, killing, possession, and transportation, (among other actions) of migratory birds, their eggs, parts, and nests, except when specifically permitted by regulations. Although the Act has no provision for allowing unintentional take, the Service realizes that some birds may be killed due to construction activities, even if all known reasonable and effective measures to protect birds are used. The Service's Office of Law Enforcement (OLE) carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to avoid take of migratory birds and by encouraging others to implement measures to avoid take of migratory birds. It is not possible to absolve individuals, companies, or agencies from liability even if they implement bird mortality avoidance or other similar protective measures. However, the OLE focuses its resources on investigating and prosecuting individuals and companies that take migratory birds without identifying and implementing all reasonable, prudent and effective measures to avoid that take. Companies are encouraged to work closely with Service biologists to identify available protective measures when developing project plans and/or avian protection plans, and to implement those measures prior to/during construction or similar activities.

\*\*\* Bald and golden eagles receive additional protection under the BGEPA. BGEPA prohibits the take, possession, sale, purchase, barter, offer to sell, purchase, or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit. Further, activities that would disturb bald or golden eagles are prohibited under BGEPA. "Disturb" means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. If a proposed project or action would occur in areas where nesting, feeding, or roosting eagles occur, then project proponents may need to take additional conservation measures to achieve compliance with BGEPA. Regulations at 50 CFR 22.26 and 22.27 allow the take of bald and golden eagles and their nests, respectively, to protect interests in a particular locality. Consultation with the Migratory Bird and Ecological Services programs of the Service will be required before a permit may be considered.

\*\*\*\* Under the Service's Nest Destruction Policy, empty nests (except for eagles) may be destroyed without need for a permit from the Service. See the policy language below.

MBPM-2

Date: April 15, 2003

MIGRATORY BIRD PERMIT MEMORANDUM**SUBJECT:** Nest Destruction

**PURPOSE:** The purpose of the memorandum is to clarify the application of the Migratory Bird Treaty Act (MBTA) to migratory bird nest destruction, and to provide guidance for advising the public regarding this issue.

**POLICY:** The MBTA does not contain any prohibition that applies to the destruction of a migratory bird nest alone (without birds or eggs), provided that no possession occurs during the destruction. To minimize MBTA violations, Service employees should make every effort to inform the public of how to minimize the risk of taking migratory bird species whose nesting behaviors make it difficult to determine occupancy status or continuing nest dependency.

The MBTA specifically protects migratory bird nests from *possession, sale, purchase, barter, transport, import, and export, and take*. The other prohibitions of the MBTA – *capture, pursue, hunt, and kill* – are inapplicable to nests. The regulatory definition of *take*, as defined by 50 CFR 10.12, *means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue hunt, shoot, wound, kill, trap, capture, or collect*. Only *collect* applies to nests.

While it is illegal to collect, possess, and by any means transfer possession of any migratory bird nest, the MBTA does not contain any prohibition that applies to the destruction of a bird nest alone (without birds or eggs), provided that no possession occurs during the destruction. The MBTA does not authorize the Service to issue permits in situations in which the prohibitions of the Act do not apply, such as the destruction of unoccupied nests. (Some unoccupied nests are legally protected by statutes other than the MBTA, including nests of threatened and endangered migratory bird species and bald and golden eagles, within certain parameters.)

However, the public should be made aware that, while destruction of a nest by itself is not prohibited under the MBTA, nest destruction that results in the unpermitted take of migratory birds or their eggs, is illegal and fully prosecutable under the MBTA.

Due to the biological and behavioral characteristics of some migratory bird species, destruction of their nests entails an elevated degree of risk of violating the MBTA. For example, colonial nesting birds are highly vulnerable to disturbance; the destruction of unoccupied nests during or near the nesting season could result in a significant level of take. Another example involves ground nesting species such as burrowing owls and bank swallows, which nest in cavities in the ground, making it difficult to detect whether or not their nests are occupied by eggs or nestlings or are otherwise still essential to the survival of the juvenile birds.

The Service should make every effort to raise public awareness regarding the possible presence of birds and the risk of violating the MBTA, the Endangered Species Act (ESA), and the Bald and Golden Eagle Protection Act (BGEPA), and should inform the public of factors that will help minimize the likelihood that take would occur should nests be destroyed (i.e., when active nesting season normally occurs).

The Service should also take care to discern that persons who request MBTA permits for nest destruction are not targeting nests of endangered or threatened species or bald or golden eagles, so that the public can be made aware of the prohibitions of the ESA and the BGEPA against nest destruction.

In situations where it is necessary (i.e., for public safety) to remove (destroy) a nest that is occupied by eggs or nestlings or is otherwise still essential to the survival of a juvenile bird, and a permit is available pursuant to 50 CFR parts 13 and 21, the Service may issue a permit to take individual birds.

Note: A signed version of this Policy may be found at:

***<http://www.fws.gov/migratorybirds/mbpermits/PoliciesHandbooks/MBPM-2.nest.PDF>***

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**US Army Corps  
of Engineers ®**

Tulsa District

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# **APPENDIX E 3: Endangered Species Act Compliance**

## **Tulsa and West-Tulsa Levees Feasibility Study**

**September 2019**

# Biological Assessment for the Tulsa and West-Tulsa Levees Feasibility Study

Tulsa, Oklahoma

Prepared for:

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September 2019

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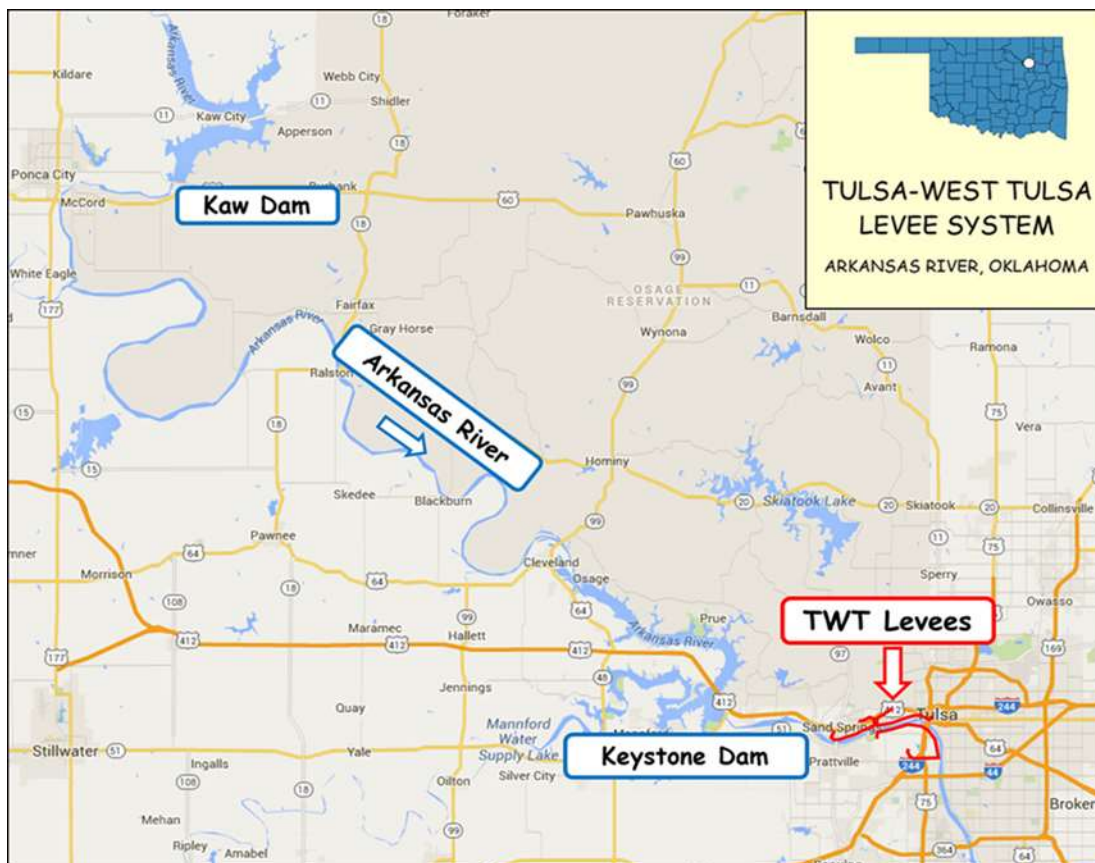
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## 1.0 INTRODUCTION

As authorized by Section 1202 of the Water Infrastructure Improvements for the Nation Act (WIIN Act of 2016, Public Law 114-322), the study is an integrated feasibility report and environmental assessment completed by the U.S. Army Corps of Engineers (Corps), Tulsa District (SWT). The Corps constructed the Tulsa West Tulsa (TWT) levee system in the mid-1940s as authorized in the 1941 Flood Control Act to protect residential and industrial property from frequent flooding along the Arkansas River and associated tributaries in Tulsa and Sand Springs (a suburb of Tulsa). Levees A, B, and C completed in 1945 for a total of 20 miles of earthen levees on the left and right bank of the Arkansas River.

The TWT Levee System is located in northeast Oklahoma in Tulsa County, and extends from the City of Sand Springs downstream along the Arkansas River into the City of Tulsa. Upstream, there are a series of Corps flood control dams. Keystone Dam is about 8 miles upstream, and flood discharges from Keystone have direct and substantial impacts to the levee system. Kaw Dam is about 100 miles upstream of Keystone (Figure 1).

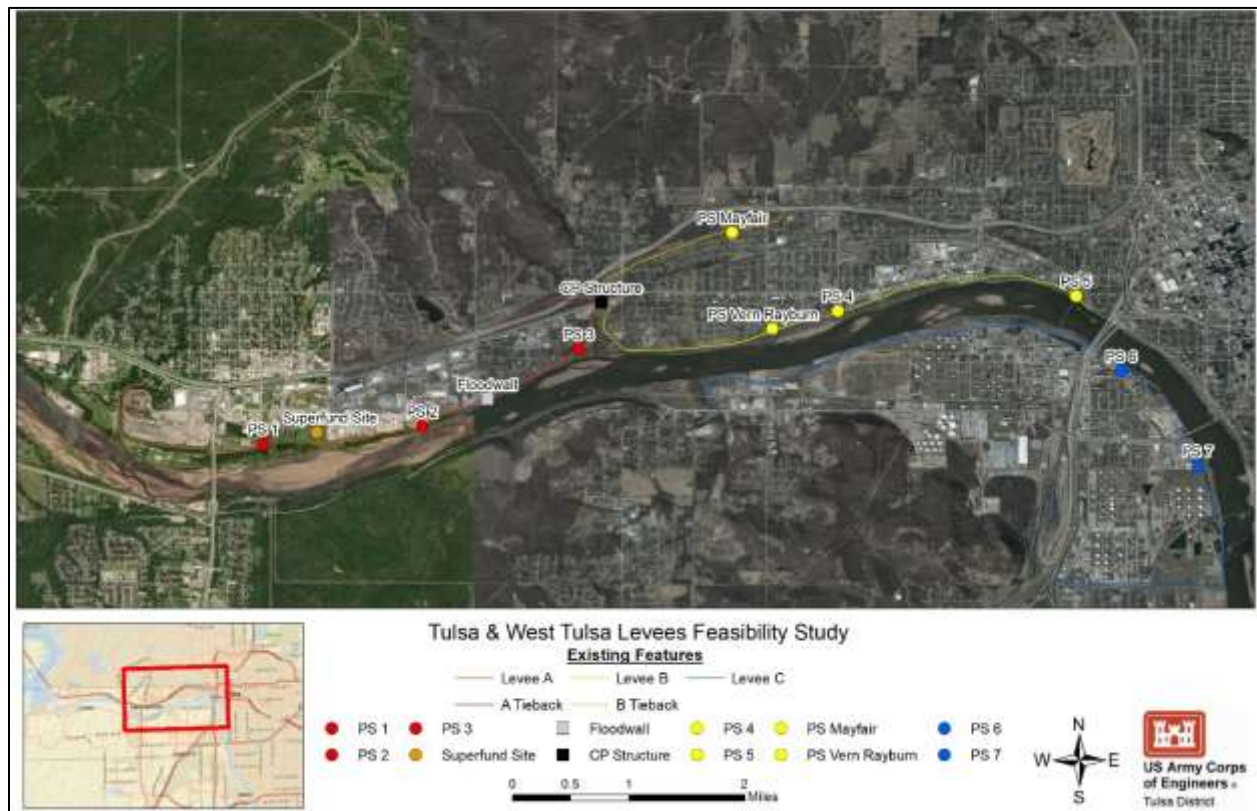


**Figure 1: Tulsa West Tulsa Levees Area Map**

The problem addressed is flood risk to life and property in communities behind the levee system. System levees could fail due to overtopping and inadequately controlled under-

seepage and through seepage. As the levee system features continue to degrade as a result of flood events, the systems' ability to operate as originally diminishes. If no action is taken under and through seepage problems will worsen and pose a threat to the integrity of the levee while further degradation to pumping stations and appurtenant works could cause interior flooding that can impact industries, infrastructure and interrupt the transportation system. Give the problem, there is an opportunity to identify a long-term economically and environmentally sustainable solution to reduce risk of damages due to levee breach and non-breach flooding and life safety risks.

Figure 2 shows the existing elements of the Tulsa West Tulsa Levee Systems A, B, and C.



**Figure 2: Existing Features of the Tulsa West Tulsa Levees.**

The overarching objective is to find an effective and environmentally acceptable solution to ensure a sustainable and resilient levee system, which reduces risk of damages and life safety. Each planning objectives applies to the study area for the 50-year period of analysis. Specific objectives are to:

- ☐ Reduce life safety risk,
- ☐ Reduce property damages,
- ☐ Reduce levee safety risk associated with overtopping, tie backs and internal erosion below tolerable risk guidelines (TRG); and,
- ☐ Support community resiliency.

After screening the preliminary array of alternatives that incorporated permutations of management measures such as filter berms with toe drain and cutoff walls, the study team selected four final alternatives.

- ☐ Alternative 1E (filter berm with toe drain);
- ☐ Alternative 3B (full cutoff wall)
- ☐ Alternative 5 (buyout of residential properties behind Levee A and B); and,
- ☐ Alternative 6 (no action).

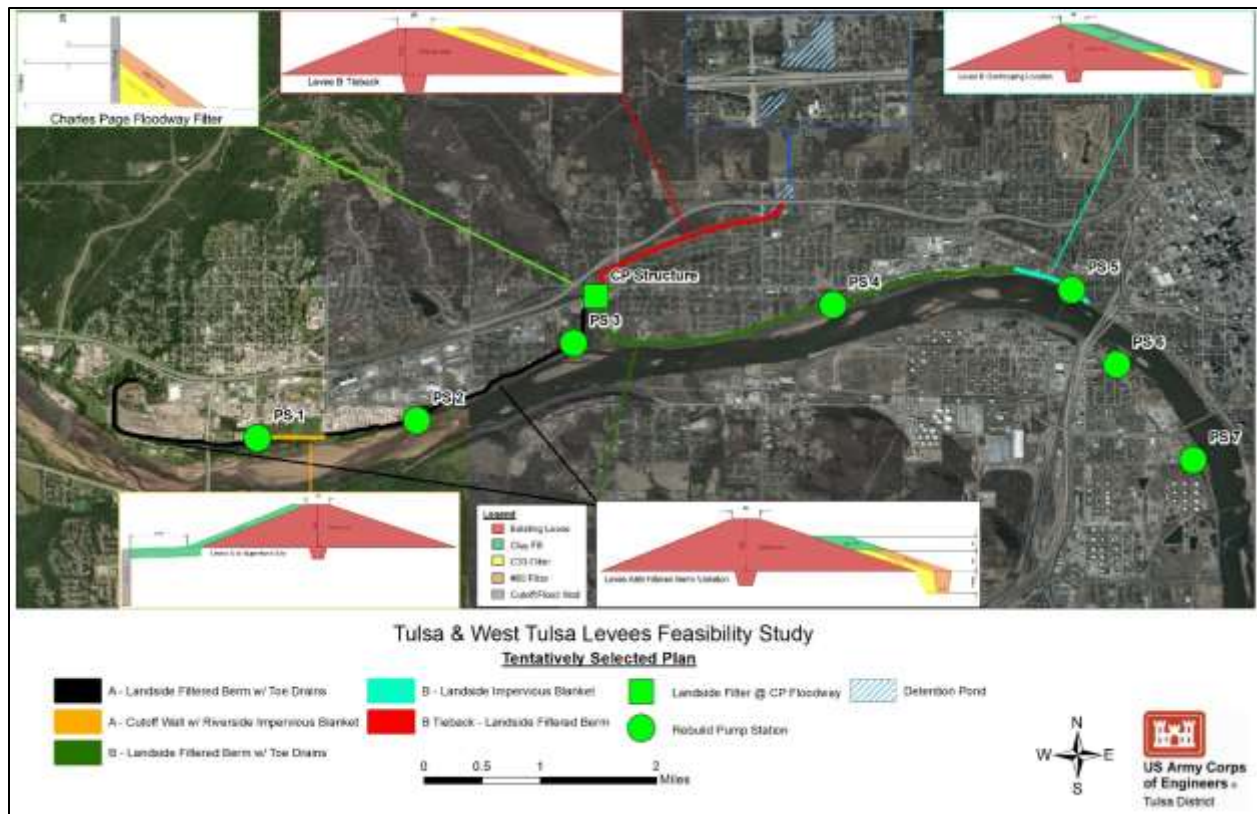
In addition to life safety risks, the final array of alternatives was evaluated based on:

- Cost effectiveness,
- Flood damages,
- Tolerable Risk Guideline 1,
- Tolerable Risk Guideline 4,
- Real estate impacts; and,
- Environmental criteria.
- 

Based on the comparison of these plans, the Tentatively Selected Plan (TSP) is Alternative 1E (Filtered Berm with Toe Drains on Levees A and B, reconstruction of pump stations 1 through 7, and the excavation of two detention ponds along Harlow Creek). This plan meets study objectives of reducing flood risk and flood damages, reducing flood risk to public health, safety and life, and minimizes residual flood risks to the extent justified. Structural features of Alternative 1E include:

- ☐ 13 miles of a filtered berm with toe drain,
- ☐ 2,000 feet of cut off wall in Levee A at the Superfund site;
- ☐ Filtered floodway structure,
- ☐ Two detention ponds at Levee B tieback;
- ☐ Impervious blanket armoring on landside at the overtopping in Levee B; and,
- ☐ Reconstruction of pump station 1 through 7 for system-wide effectiveness and completeness.

Figure 3 shows the general location and conceptual designs of the TSP elements.



**Figure 3: Locations and Conceptual Design of the Tentatively Selected Plan.**

To mitigate the unavoidable, adverse impacts to Federally threatened and endangered species associated with the construction and operation of the TSP, particularly the detention ponds, the implementation sponsor, Tulsa County, would purchase American Burying Beetle (*Nicrophorus americanus*, ABB) conservation banks credits to reduce impacts to the species to less than significant.

This Biological Assessment (BA) pertains to the proposed construction of the TSP located in Tulsa, Oklahoma. Specifically, the two detention ponds along Harlow Creek as no other features of the TSP would impact Federally threatened and endangered species. This BA serves to provide documentation to the U.S. Fish and Wildlife Service (Service) for the U.S. Army Corps of Engineers' (USACE) determination of "effect" to federally listed species under Section 7 consultation of the Endangered Species Act (ESA).

Section 9 of the ESA prohibits certain activities that may result in the "take" of species listed as threatened or endangered by the USFWS. "Take" is defined in the ESA as "harass, harm, pursue, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." "Harm" has been defined to include activities that modify or degrade habitat in a way that significantly impairs essential behavior patterns and results in death or injury. Alteration of the quality and/or quantity of endangered species habitat may "harm" the listed species that inhabit those areas. The Service and National Marine Fisheries Service (NMFS) are the agencies

within the U.S. Department of the Interior and U.S. Department of Commerce, respectively that evaluate threats to species. A number of potential impacts, directly or indirectly related to human activities, are of concern to USFWS and may be regulated by that agency to prevent “take” or “harm” of these listed species.

No foreseeable, direct or indirect effects to federally listed or candidate species are anticipated as a result of the proposed project, except for the ABB.

To summarize the findings of this BA, the proposed construction and operation of the TSP would measures:

- Have no effect on the Least Tern, Piping Plover, Red Knot, Whooping Crane, Northern Long-Eared Bat, or the Rattlesnake-master Borer Moth.
- May affect, likely to adversely affect ABB during construction of the detention ponds, and on a very occasional basis through inundation of individuals.

Also, because USACE has determined that the project may affect, is likely to adversely affect the ABB, USACE requests formal consultation under section 7 of the Endangered Species Act.

## **2.0 CONSULTATION HISTORY**

The USFWS (2019) Information for Planning and Consultation (IPaC) Official Species List was used to identify Federally listed species that may occur within the study area (Consultation Code: 02EKOK00-209-SLI-3056).

During informal consultation in 2019, USACE and the Service identified potential impacts to Federally endangered species.

Impacts to Piping Plover, Red Knot, Whooping Crane were not anticipated as there species generally do not occur in the area, or only briefly stop during migration.

Rattlesnake-master Borer Moth is not likely to occur in the area due to the project area being mostly urbanized or frequently disturbed.

The Least Tern annually nests and forages in the study area, however none of the proposed elements would be constructed in Least Tern habitat. In addition, the riparian forest along the Arkansas River would buffer visual and auditory impacts associated with construction along Levees A and B. As such, in direct impacts to Least Tern would be considered negligible.

The proposed detention ponds, however may contain habitat for the ABB. No presence/absence surveys have been conducted on these lands. Therefore, the upland forest and grassland habitat is assumed to be high quality and occupied by the ABB.

With no other TSP elements impacting Federally threatened or endangered species, this BA will only focus on the detention ponds and associated impacts to the ABB from here on.

## **3.0 PROJECT DESCRIPTION**

### 3.1 PROJECT LOCATION

The detention ponds would be constructed within the city limits of Tulsa, Oklahoma. The detention ponds would be constructed on both the north and south sides of the Sand Springs Expressway, between North 49th W Avenue and North 45th W Avenue in Tulsa, Oklahoma.



**Figure 4: Locations of Detention Ponds as part of the Tentatively Selected Plan.**

### 3.2 PROPOSED CONSTRUCTION AND OPERATIONAL ACTIVITY

Heavy construction vehicles and equipment would be needed to excavate the detention ponds. The vehicles and equipment would operate above the high bank of Harlow Creek in upland areas to the extent possible.

An assortment of wheeled and tracked equipment necessary to handle large loads of rock and soil, such as backhoes, track hoes, bulldozers, dump trucks, and front end loaders, would be used for construction. All material excavated would be hauled off and disposed of properly. Project work would take place during safe and low flow conditions.

Approximately 2,901,663 cubic feet of soil would be removed from the combined 9 acres of woodland, grassland, and 1,833 linear feet of creek habitat. The detention ponds would range between five to 8 feet deep. After construction is complete, all excavated areas would be planted with native grasses.

The temporary staging and storage of construction materials and vehicles would be sited in areas that are currently disturbed or are recommended to be cleared and excavated from the construction of the project components described above. All staging and storage areas would

be outside of jurisdictional wetlands. Best management practices (BMPs) in staging areas would include erosion control and spill prevention measures.

Upon construction completion, the detention areas outside of the creek bed would be planted in native grasses. These areas would not be allowed to be developed or otherwise disturbed outside of the minimal amount of mowing necessary to maintain its flood risk reduction purpose. Mowing would not cut the vegetation less than 8 inches in height. Harlow Creek, within the detention ponds, would pass normal flows through the existing creek pathway and existing culverts. Only during periods of heavy rainfall would the detention areas store water. Upon the passing of rainfall and associated runoff, the detention ponds would empty within 24 hours through the existing downstream culverts.

In Oklahoma, ODEQ is the permitting authority and administers the NPDES. Operators of construction activities that disturb 5 or greater acres must prepare a Storm Water Pollution Prevention Plan (SWPPP), submit a Notice of Intent to ODEQ and obtain authorization under OKR10, conduct onsite posting and periodic self-inspection, and follow and maintain the requirements of the SWPPP. During construction, the operator shall assure that measures are taken to control erosion, reduce litter and sediment carried offsite (silt fences, hay bales, sediment retention ponds, litter pick-up, etc.), promptly clean-up accidental spills, utilize BMPs onsite, and stabilize site against erosion before completion.

### **3.3 PROJECT LIMITS**

The limits of the area included in consultation between the Service and USACE regarding effect of construction and operation of the proposed detention ponds on federally listed species includes all lands directly affected by the construction and operation of the detention ponds, including access roads, the equipment staging area, and temporary construction easements, as well as all land that would be inundated under a PMF event.

### **3.4 PROJECT DURATION**

The detention ponds would be constructed to last more than 50 years before needing any type of significant repair or rehabilitation. The detention ponds would be expected to operate indefinitely.

## **4.0 PROJECT AREA DESCRIPTION**

### **4.1 LISTED, PROPOSED, AND CANDIDATE SPECIES OCCURRING IN THE REGION**

Attachment 1 contains fact sheets for all species with potential to occur in the region as well as information provided by the Oklahoma Natural Heritage Inventory regarding special status species occurrence in the area. As mentioned earlier, USACE has determined the TSP will have no effect on Least Tern, Piping Plover, Red Knot, Whooping Crane, Northern Long-Eared Bat, or the Rattlesnake-master Borer Moth.

However, the detention ponds may affect, and are likely to adversely affect ABB during construction, and on a very occasional basis through inundation of individuals.

No presence/absence surveys have been conducted on these lands. Therefore, the upland forest and grassland habitat is assumed to be high quality and occupied by the ABB.

#### **American Burying Beetle**

The American burying beetle is a member of the family Silphidae (carrion, or burying beetles) and is the largest species of *Nicrophorus* in North America. USFWS (1989) lists the American burying beetle as federally endangered. The historical range of the American burying beetle once included much of eastern temperate North America. Existing populations of this species include eastern Oklahoma and the study area. The presence of the species has been documented in Tulsa County within the last 15 years (USFWS, 2010). In 2007, a survey for American burying beetle was conducted over three nights, in representative habitats along the Arkansas River corridor, from Keystone Lake to downstream of the City of Bixby (Eagle Environmental Consulting, Inc., 2007). The survey included five baited pit-fall trap lines, with trapping methods performed according to the Survey Methods for the American Burying Beetle in Oklahoma and Arkansas (Creighton et al., 1993). Four individual American burying beetles were documented, with each occurring east of the river near the City of Bixby. As of 2016, critical habitat has not been designated for the American burying beetle (USFWS, 2016).

The habitat in the study area includes instream aquatic habitat, maintained grasslands, and upland forest. The American burying beetle is known to inhabit level areas in grasslands, grazed pastures, bottomland forest, open woodlands, and riparian areas. Wetlands with standing water or saturated soils and vegetation typical of hydric soils and wetland hydrology are listed by the USFWS (2015) as unfavorable habitats. American burying beetles are habitat generalists; however, it is thought that undisturbed habitat and the availability of carrion is the most likely influence on species distribution (USFWS, 1991).

## 4.2 DESCRIPTION OF ON-SITE AND OFF-SITE HABITATS

### 4.2.1 On-site Habitats

The upstream detention pond site is roughly seven acres of primarily mowed grasslands with Harlow Creek flowing down the center. Less than an acre of upland forest line a small existing detention area that fills with water during rain events. The area is surround by roads and housing on three sides (North, East, and South), while a small pocket of forest buffers the area to the west for a short distance before more roads and urban development fragment the landscape.

The downstream detention pond site is comprised of 1.88 acres of upland forest. Major roadways exist along the immediate north and west flanks. To the south and east, mowed grasslands surround the small patch of forest before Harlow Creek flows through the area. On the opposite side of Harlow Creek, the maintain grass lined slopes of the Levee B Tieback

### 4.2.2 Off-site Upstream Habitats

Multiple streams were realigned and modified during the construction of the TWT system. These include Harlow Creek, Bigheart Creek, Lake Station Drainage Ditch (hereafter referred to as Bigheart Creek Tributary), and Cherry Creek.

Harlow Creek flows for a total of approximately 3.5 miles. Originally flowing south, stream slopes in the headwater areas approach 25 feet/mile. After passing beneath the US-412 Highway embankment, Harlow Creek flows in a southwesterly direction along the Levee B Tieback embankment with an average slope of approximately 7.5 feet/mile. The largest

tributary to Harlow Creek (termed “Harlow Creek Tributary”) enters from the north and contributes approximately 2.25 square miles to the seven square miles of total drainage area.

Starting at West Edison Street, which crosses the Harlow Creek along the northern edge of the detention pond, Harlow Creek has been realigned and channelized for its remaining length to the confluence with Bigheart Creek.

The only non-channelized segments of Harlow Creek appear to be upstream of the proposed detention ponds. Aerial imagery show the upstream reaches featuring various meanders and riparian forest bracketing the creek.

#### 4.2.3 Off-site Downstream Habitats

The three tributary streams on the north side of the Arkansas River (Harlow Creek, Bigheart Creek, and Bigheart Tributary) used to arrive at different confluence locations. However, it became advantageous to combine these three drainage areas into a single outlet on the north side of the Arkansas River. This new confluence was designed to be controlled by the Charles Page Boulevard Floodway Structure which would also allow for the closure and linkage of Levees A and B along with their respective tieback segments.

Bigheart, Harlow, and Parkview Creeks are left bank tributaries of the Arkansas River that drain areas above Levees A and B. The lower reaches of these streams have gentle slopes within the flat Arkansas River floodplain. West Bigheart Creek, a tributary of Bigheart Creek, is separated from the protected area by the Levee A tieback and is largely regulated by Sand Springs Lake. Harlow Creek is separated from the protected area by the Levee B tieback. Bigheart Creek and Harlow Creek both originate in Osage County, and the confluence of both of these streams occurs just upstream from the Charles Page Floodway Structure.

### 4.3 HYDROGEOLOGY OF THE PROJECT AREA

As mentioned above, Harlow Creek flows for a total of approximately 3.5 miles. Originally flowing south, stream slopes in the headwater areas approach 25 feet/mile. After passing beneath the US-412 Highway embankment, Harlow Creek flows in a southwesterly direction along the Levee B Tieback embankment with an average slope of approximately 7.5 feet/mile. The largest tributary to Harlow Creek (termed “Harlow Creek Tributary”) enters from the north and contributes approximately 2.25 square miles to the seven square miles of total drainage area.

Little flow passes through Harlow Creek during normal conditions. During large flood events, up to 4,000 cfs can be conveyed downstream. This would remain unchanged with the TSP, however enough water would be detained to relieve flood loading on the Levee B tieback to substantially reduce life risk within Levee B during storms of up to a 100 year event.

### 4.4 PROJECT AREA SURVEY METHODS AND RESULTS

Species specific surveys were not conducted for this study. ABB occupancy is assumed due to the presence of suitable habitat. Although surveys may be possible in later phases of the project, prior to construction.

## **5.0 EFFECTS OF THE PROPOSED ACTION**

### **5.1 DIRECT EFFECTS**

#### **5.1.1 American Burying Beetle**

Any ABB present during excavation would, at best case scenario, be dispersed from the area. In the worst case scenario, live individuals would be harmed or killed by heavy equipment activities.

#### **5.1.2 All Other Species**

No other Federally threatened or endangered species would be impacted by the TSP.

### **5.2 INDIRECT EFFECTS**

#### **5.2.1 American Burying Beetle**

Upon construction completion, the detention areas outside of the creek bed would be planted in native grasses. These areas would not be allowed to be developed or otherwise disturbed outside of the minimal amount of mowing necessary to maintain its flood risk reduction purpose. Mowing would not cut the vegetation less than 8 inches in height. Harlow Creek, within the detention ponds, would pass normal flows through the existing creek pathway and existing culverts. Only during periods of heavy rainfall would the detention areas store water. Upon the passing of rainfall and associated runoff, the detention ponds would empty within 24 hours through the existing downstream culverts.

These dry detention ponds would become pseudo-refuges with grassland habitat outside of infrequent flooding events.

#### **5.2.2 All Other Species**

No other Federally threatened or endangered species would be impacted by the TSP.

### **5.3 INTERDEPENDENT EFFECTS**

Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR § 402.02). Interdependent effects are those expected to result from actions that are dependent upon and would not occur in absence of construction of the detention ponds. All on-site effects of the detention ponds were considered in Sections 5.1 and 5.2. No off-site effects to listed species are expected as a result of the proposed project.

### **5.4 INTERRELATED EFFECTS**

Interrelated actions are part of a larger action and depend on the larger action for their justification (50 CFR § 402.02). All on and off-sites have been discussed in sections 5.1 and 5.2. The only definite interrelated action that would result from construction of the detention ponds would be the periodic inspection of the area by representatives of the Tulsa County Drainage District No. 12 staff to ensure that the outlet culverts are not clogged and are functioning properly.

No other interrelated effects have been identified for this project.

## 5.5 CUMULATIVE EFFECTS

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR § 402.02). The USACE determined that the cumulative action area applies to lands and waters within the levee protected areas as well as the Arkansas River Corridor adjacent to the levees in Tulsa County, Oklahoma.

Two known projects were identified and considered to have potential cumulative effects, mostly due to the overlapping region of influence (ROI) in the study area. They include reconstruction of the existing low water dam and recreational improvements in Zink Lake, and the Arkansas River Corridor Ecosystem Restoration Project.

There would be no significant negative cumulative effects on the aquatic or terrestrial environment. The TSP in combination with other planned projects, either recently completed, ongoing, or proposed in the vicinity of the TWT levees, are not expected to add significant cumulative effects to natural, physical or human environments with the majority of effects being negligible to slightly adverse in regards to habitat but moderately beneficial in terms of life safety. Cumulative aquatic impacts would be limited to a semi-permanent loss of stream habitat along Harlow Creek.

### 5.5.3 No Action Alternative

Under the No Action Plan, improvements in life safety or property protection from flood events would occur within the levee protected areas. The No Action Alternative would not have any cumulative benefits nor negative impacts on land use, water resources, climate, topography, geology, soils, natural resources, threatened and endangered species, invasive species, recreation, and aesthetic resources within or near the levee protected areas.

### 5.5.4 Proposed Detention Ponds

#### Land Use

The construction of the detention ponds would result in reduced risk to life and property from future flooding for communities within the levee protected areas. This reduction in flood risk may promote development within the levees as shown in the 2005 Arkansas River Corridor Master Plan (Guernsey, C.H. and Company 2005). The 2005 master plan identifies the areas within levees A and B for new or re-development. Urban development (residential, commercial, and industrial) already occupies most of the land use behind both Levees A and B and surrounding the proposed detention ponds. Any new or re-development of the area would likely have minimal impacts on land use in the area outside of outward expansion into rural areas outside of the levee protected areas.

#### Water Resources

The proposed ponds, would require excavation in approximately 1,833 linear feet of Harlow Creek. This reach of Harlow Creek was previously straightened prior to or during the construction of the levees. To excavate the detention ponds, Harlow Creek would be reshaped and its banks likely widened. After construction, Harlow Creek would return to normal flow in its current footprint. The only permanent change that would occur to water resources would be the temporary detention of water during large storm events. Within 24 hours after a storm event, creek flow would return to normal.

### Climate

The construction of the proposed detention ponds, and other TSP elements, would have no impact on climate. While construction equipment would emit greenhouse gases that contribute to climate change, emissions would be temporary (up to 2 years). The narrow construction areas would also limit the number of construction equipment that can be in operation at any given time, curbing the intensity of greenhouse gas emissions that would otherwise occur in an open construction setting. The temporary increase in emissions and the small construction footprint would have no cumulative impacts on climate and air quality within the area when combined with other on going and future construction activities in the area.

### Topography, Geology, and Soils

The construction of the proposed of detention pond on Harlow Creek would have negligible to minor adverse impacts to soils and topography. The excavation of materials and altering of terrain would contribute have negligible to minor cumulative impacts on topography and soils within the area as most of the soils and topography within Levees A and B have already been disturbed.

### Natural Resources

After construction of the proposed detention ponds on Harlow Creek, the dry detention areas would allow for the preservation of a relatively small, grassland community within an urbanized area. This would have a negligible beneficial impact to natural resources when considering the area is already largely developed.

### Threatened and Endangered Species

Of the seven species listed as threatened, endangered, or as a candidate in the USFWS (2019) IPAC report, USACE determined that the American burying beetle would be the only species impacted by the TSP, specifically from the construction of the proposed detention ponds. Because the proposed detention areas represent some of the last remaining undisturbed areas within Levees A and B, and ABB is assumed to be present, the detention ponds would contribute to minor adverse impacts to ABB within the area. The proposed detention pond areas contain suitable grasslands and upland forest habitat for the ABB, urban development surrounds both areas. This likely limits the survivability of a stable population within the area. Lethal take of any ABBs present during construction is expected from heavy equipment operation. Upon construction completion, the area will be returned to natural vegetation and mowed on an infrequent basis. This area may support ABB in the future, however it may be difficult to re-establish a ABB population given the surrounding development.

### Invasive Species

The construction of the proposed of detention pond on Harlow Creek would have no cumulative impacts on invasive species within Levees A and B as the detention ponds would be replanted with native vegetation and monitored for invasive species.

### Recreation

The construction of the proposed of detention pond on Harlow Creek would have no cumulative impacts on recreation within Levees A and B as the detention pond areas currently do not support recreation or would impede existing recreation in the area.

### Aesthetic Resources

The construction of the proposed of detention pond on Harlow Creek would have negligible to minor adverse impacts to aesthetics. The excavation of materials, including approximately two acres of upland forest, and altering of terrain would contribute have negligible to minor cumulative impacts on aesthetics within the area as most of the natural streams and forests have already been altered within Levees A and B.

#### 5.5.1 American Burying Beetle

Construction of the proposed detention ponds entails excavating the ponding areas, hauling away of material, access roads, temporary staging areas, and replanting the area with native vegetation with an overall footprint of 9 acres of ABB habitat.

Within the ROI, little habitat exists for the ABB except for the peripheral areas of grasslands and forest that do not flood frequently and have yet to be impacted by urban sprawl.

#### 5.5.2 All Other Species

No other Federally threatened or endangered species would be impacted by the TSP.

## **6.0 INCIDENTAL TAKE**

### 6.1 American Burying Beetle

The term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (40 CFR 257.3-2). Incidental take refers to takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). USACE is assuming the potential detention pond areas are occupied by the ABB. Lethal, incident take is expected for any ABB present during construction and excavation of the area. Post-construction, the area will be replanted with native vegetation that could support ABB. Although the detention area would flood on an infrequent basis, potentially drowning any ABB unable to avoid rising waters.

### 6.2 All Other Species

No incidental take nor adverse impacts are expected from the construction of the proposed detention ponds, or any other feature of the TSP, on other Federally threatened or endangered species.

## **7.0 CONSERVATION MEASURES**

The Service recommends that each project proponent conserve an amount of land proportional to the impacts to ABB habitat resulting from the project. The Service’s proportions, or ratios, are based on proximity of the impacts to areas of importance to ABB conservation (location) and duration of habitat impacts.

Based on these recommendations, the USACE categorizes the construction of the detention ponds as temporary impacts due to the area being replanting in native vegetation within five years and infrequent mowing and flooded during larger rain events. The detention ponds are also outside of ABB Conservation Priority Areas. Based on these determinations and the Services guidance on ABB mitigation ratios. The USACE will mitigation habitat impacts at a ratio of 1 acre of impact to 0.25 acres of offsetting mitigation. With 9 acres temporarily disturbed, the

USACE will purchase 2.25 acres worth of conservation bank credits to fully offset impacts to ABB.

In Oklahoma, ODEQ is the permitting authority and administers the NPDES. Operators of construction activities that disturb 5 or greater acres must prepare a Storm Water Pollution Prevention Plan (SWPPP), submit a Notice of Intent to ODEQ and obtain authorization under OKR10, conduct onsite posting and periodic self-inspection, and follow and maintain the requirements of the SWPPP. During construction, the operator shall assure that measures are taken to control erosion, reduce litter and sediment carried offsite (silt fences, hay bales, sediment retention ponds, litter pick-up, etc.), promptly clean-up accidental spills, utilize BMPs onsite, and stabilize site against erosion before completion.

USACE is also proposing to follow, to the maximum extent practicable, the Best Management Practices for American burying beetle (ABB) in Oklahoma developed by the Service in March 2016. These measures include:

1. To decrease habitat loss, minimize clearing of temporary work areas and use small equipment or hand cutting techniques that leave the root zone intact. In general, using hand cutting techniques is likely to result in a smaller area of impact and reduce soil compaction relative to heavy equipment.
2. Minimize construction requiring artificial lighting. In situations where night construction work is necessary, shield direct light to the work area and prevent light from projecting upwards, thus minimizing the potential to attract insects, including ABBs.
3. In areas where ABBs are present (determined by valid surveys) or where ABB presence is assumed (when no ABB surveys were completed), return surface soils to approximate pre-construction conditions.
4. Restore areas in native range using approved native seed mixes developed for the applicable ecozone.
5. Prior to the topsoil replacement, rip (i.e., mechanically turn soil with a plow or ripping device) the impacted area. Rip and disk at a time when the soil is dry enough for normal tillage operations to occur on undisturbed farmlands adjacent to the areas to be ripped. This soil de-compaction treatment should be beneficial to the ABB by reducing the extent of soil compaction.
6. Educate all workers operating in the project areas about ABB habitat, biology, reasons for ABB decline, and the responsibility of all workers to protect the ABB. Require all workers to report any ABB sightings to the project manager or environmental inspector, remove all food wastes from the ROW each day, and prohibit dogs or cats on the ROW. Provide each worker a full color Endangered Species Card with a picture of the ABB and all information summarized on the ABB Impact Assessment for Oklahoma 15 card before they are allowed to conduct soil disturbing activities. Post signs at all access points to the project area highlighting the areas as ABB habitat and reminding workers to follow special restrictions in the area.
7. Install appropriate erosion controls, including such items as straw bales, biologs, silt fence, and similar materials.
8. Implement Pollution Prevention Requirements as required in Section 3.3.3 of the Oklahoma Department of Environmental Quality General Permit OKR10 for Storm Water

Discharges. Additionally, fuel all equipment outside of ABB habitat (that is, outside of undisturbed native vegetation) and store all fuel and motor vehicle oil outside of ABB habitat.

## **8.0 DETERMINATION OF EFFECT**

Based on the information presented in this Biological Assessment, USACE has determined that the proposed detention ponds may affect, and are likely to adversely affect the ABB during construction and occasional inundation within the detention areas under the assumption that the ABB occupies the proposed detention pond areas. Outside of flooding events, the detention areas would serve as a permanent pseudo-refuge area for ABB and its habitat as the area would be managed to benefit natural communities and development would not be allowed.

Based on these recommendations, the USACE categorizes the construction of the detention ponds as temporary impacts due to the area being replanting in native vegetation within five years and infrequent mowing and flooded during larger rain events. The detention ponds are also outside of ABB Conservation Priority Areas. Based on these determinations and the Services guidance on ABB mitigation ratios. The USACE will mitigation habitat impacts at a ratio of 1 acre of impact to 0.25 acres of offsetting mitigation. With 9 acres temporarily disturbed, the USACE will purchase 2.25 acres worth of conservation bank credits to fully offset impacts to ABB.

During later phases of the study or during the pre-construction engineering and design phase, USACE may conduct presence/absence surveys for ABB. If ABB is found to not be present, USACE may re-coordinate impacts and mitigation needs with the Service.

## **9.0 LITERATURE CITED**

- Creighton, J.C., C.C. Vaughn, and B.R. Chapman. 1993. Habitat preference of the endangered American burying beetle (*Nicrophorus americanus*) in Oklahoma. The Southwestern Naturalist 38(3):275-277.
- Eagle Environmental Consulting, Inc. 2007. *American Burying Beetle Survey, Arkansas River Corridor Project*. Tulsa County, Oklahoma.
- Guernsey, C.H. and Company, EDAW, Inc., Hisinc, LLC, Alaback Design and Associates, Adaptive Ecosystems, Inc., Schnake Turnbo Frank, Inc. 2005. *Final Arkansas River Corridor*

*Master Plan, Phase II Master Plan and Pre-Reconnaissance Study.* Prepared for the U.S. Army Corps of Engineers.

U.S. Fish and Wildlife Service (USFWS). 1991. American Burying Beetle (*Nicrophorus americanus*) Recovery Plan. Prepared by Christopher Raithel, Rhode Island Division of Fish and Wildlife.

USFWS. 2015. American Burying Beetle Impact Assessment for Project Reviews. Oklahoma Ecological Services Field Office. March 24, 2015.

USFWS. 2016. Environmental Conservation Online System (ECOS). Species Profile for American Burying beetle (*Nicrophorus americanus*). Website [https://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?spcode=I028](https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=I028). Accessed March 7, 2016.

USFWS. 2019. IPaC Official Species List. Consultation Code: 02EKOK00-2019-SLI-3056. Event Code: 02EKOKOO-2019-E-07508.

# Attachment 1



## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
Oklahoma Ecological Services Field Office  
9014 East 21st Street  
Tulsa, OK 74129-1428  
Phone: (918) 581-7458 Fax: (918) 581-7467  
<http://www.fws.gov/southwest/es/Oklahoma/>



In Reply Refer To:

August 19, 2019

Consultation Code: 02EKOK00-2019-SLI-3056

Event Code: 02EKOK00-2019-E-07508

Project Name: Tulsa & West Tulsa Levees Feasibility Study

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Non-federal entities conducting activities that may result in take of listed species should consider seeking coverage under section 10 of the ESA, either through development of a Habitat Conservation Plan (HCP) or, by becoming a signatory to the General Conservation Plan (GCP) currently under development for the American burying beetle. Each of these mechanisms provides the means for obtaining a permit and coverage for incidental take of listed species during otherwise lawful activities.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan ([http://www.fws.gov/windenergy/eagle\\_guidance.html](http://www.fws.gov/windenergy/eagle_guidance.html)). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process <http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm>.

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Attachment(s):

- Official Species List
  - USFWS National Wildlife Refuges and Fish Hatcheries
  - Migratory Birds
  - Wetlands
-

# Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Oklahoma Ecological Services Field Office**

9014 East 21st Street

Tulsa, OK 74129-1428

(918) 581-7458

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## Project Summary

Consultation Code: 02EKOK00-2019-SLI-3056

Event Code: 02EKOK00-2019-E-07508

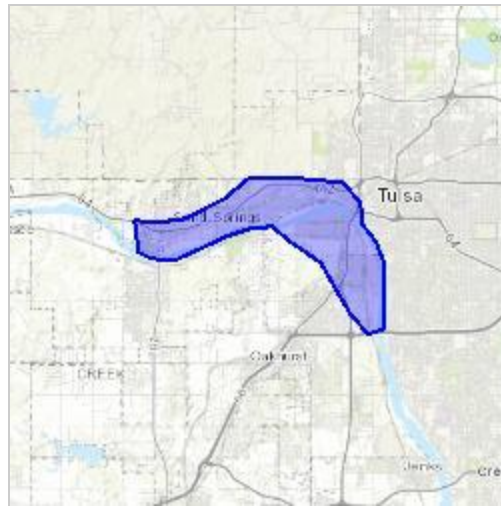
Project Name: Tulsa & West Tulsa Levees Feasibility Study

Project Type: STREAM / WATERBODY / CANALS / LEVEES / DIKES

**Project Description:** The TWT Feasibility Study is located within the city limits of Tulsa and Sand Springs, Oklahoma. The study evaluated various measures to improve the effectiveness Levees A, B, and C (roughly 19 miles long in total levees) to mitigate flood risk to life and property within the protected areas. The study is recommending filtered berms on the landside of Levee A, Levee B, and Levee B tieback, rebuilding pump stations 1-7, and two detention ponds along Harlow Creek upstream of Levee B tieback. Adjacent to the superfund site along Levee A, a riverside filtered berm, instead of a landside berm, would be built in order to avoid impacts to any remaining subsurface contamination.

**Project Location:**

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/36.125596360896125N96.0092478630743W>



Counties: Osage, OK | Tulsa, OK

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## Endangered Species Act Species

There is a total of 7 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries<sup>1</sup>, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/9045">https://ecos.fws.gov/ecp/species/9045</a>	Threatened

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## Birds

NAME	STATUS
<b>Least Tern <i>Sterna antillarum</i></b> Population: interior pop. No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/8505">https://ecos.fws.gov/ecp/species/8505</a>	Endangered
<b>Piping Plover <i>Charadrius melodus</i></b> Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/6039">https://ecos.fws.gov/ecp/species/6039</a>	Threatened
<b>Red Knot <i>Calidris canutus rufa</i></b> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/1864">https://ecos.fws.gov/ecp/species/1864</a>	Threatened
<b>Whooping Crane <i>Grus americana</i></b> Population: Wherever found, except where listed as an experimental population There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. Species profile: <a href="https://ecos.fws.gov/ecp/species/758">https://ecos.fws.gov/ecp/species/758</a>	Endangered

## Insects

NAME	STATUS
<b>American Burying Beetle <i>Nicrophorus americanus</i></b> Population: Wherever found, except where listed as an experimental population No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/66">https://ecos.fws.gov/ecp/species/66</a>	Endangered
<b>Rattlesnake-master Borer Moth <i>Papaipema eryngii</i></b> No critical habitat has been designated for this species. Species profile: <a href="https://ecos.fws.gov/ecp/species/7863">https://ecos.fws.gov/ecp/species/7863</a>	Candidate

## Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

# USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

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# Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act<sup>1</sup> and the Bald and Golden Eagle Protection Act<sup>2</sup>.

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

- 
1. The [Migratory Birds Treaty Act](#) of 1918.
  2. The [Bald and Golden Eagle Protection Act](#) of 1940.
  3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birds and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. <a href="https://ecos.fws.gov/ecp/species/1626">https://ecos.fws.gov/ecp/species/1626</a>	Breeds Sep 1 to Aug 31
Eastern Whip-poor-will <i>Antrostomus vociferus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20

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NAME	BREEDING SEASON
<b>Harris's Sparrow</b> <i>Zonotrichia querula</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
<b>Hudsonian Godwit</b> <i>Limosa haemastica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
<b>Kentucky Warbler</b> <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 20
<b>Lesser Yellowlegs</b> <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. <a href="https://ecos.fws.gov/ecp/species/9679">https://ecos.fws.gov/ecp/species/9679</a>	Breeds elsewhere
<b>Prothonotary Warbler</b> <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
<b>Red-headed Woodpecker</b> <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
<b>Rusty Blackbird</b> <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
<b>Semipalmated Sandpiper</b> <i>Calidris pusilla</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
<b>Wood Thrush</b> <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

## Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ “Proper Interpretation and Use of Your Migratory Bird Report” before using or attempting to interpret this report.

### Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is  $0.25/0.25 = 1$ ; at week 20 it is  $0.05/0.25 = 0.2$ .
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

#### **Breeding Season (■)**

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

#### **Survey Effort (|)**

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

#### **No Data (—)**

A week is marked as having no data if there were no survey events for that week.

#### **Survey Timeframe**

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

## Migratory Birds FAQ

**Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.**

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or

[permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

**What does IPaC use to generate the migratory birds potentially occurring in my specified location?**

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

**What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?**

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

**How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?**

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

**What are the levels of concern for migratory birds?**

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Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

### **Details about birds that are potentially affected by offshore projects**

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

### **What if I have eagles on my list?**

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

### **Proper Interpretation and Use of Your Migratory Bird Report**

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In

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contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

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# Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

## FRESHWATER EMERGENT WETLAND

- [PEM1C](#)
- [PEM1/SS1C](#)
- [PEM1F](#)

## FRESHWATER FORESTED/SHRUB WETLAND

- [PFO1A](#)
- [PFO1/SS1A](#)
- [PFO1C](#)
- [PSS1C](#)
- [PSS1A](#)

## FRESHWATER POND

- [PUBHx](#)
- [PUSCh](#)
- [PUBFh](#)
- [PUSC<sub>x</sub>](#)
- [PUBF](#)
- [PUBH](#)
- [PUSA<sub>h</sub>](#)
- [PUBF<sub>x</sub>](#)
- [PUBH<sub>h</sub>](#)
- [PUSC](#)

## RIVERINE

- [R2USA](#)
  - [R2UBH<sub>x</sub>](#)
  - [R2USC](#)
  - [R5UBF](#)
-

- [R2UBH](#)
  - [R4SBC](#)
  - [R4SBCx](#)
-

Dear Mr. Wadlington,

Dec. 18, 2018

We have reviewed occurrence information on federal and state threatened, endangered or candidate species, as well as non-regulatory rare species and ecological systems of importance currently in the Oklahoma Natural Heritage Inventory database for the following location you provided:

Sec. 10, 11, 12, 13, 14, and 15-T19N-R11E and Sec. 2 through 17 and 22, 23, and 24-T19N-R12E, Tulsa County

We found 16 occurrence(s) of relevant species within the vicinity of the project location as described.

<b>Species Name</b>	<b>Common Name</b>	<b>Federal Status</b>
<b><i>Sternula antillarum athalassos</i></b>	<b>Interior Least Tern</b>	<b>Endangered</b>
<b>County</b>	<b>TRS</b>	<b>Count</b>
Tulsa	Sec. 11-T19N-R12E	1
Tulsa	Sec. 13-T19N-R12E	1
Tulsa	Sec. 25-T19N-R12E	1
Tulsa	Sec. 36-T18N-R12E	1
<b><i>Haliaeetus leucocephalus</i></b>	<b>Bald Eagle</b>	<b>Protected</b>
<b>County</b>	<b>TRS</b>	<b>Count</b>
Tulsa	Sec. 10-T19N-R11E	1
Tulsa	Sec. 13-T19N-R11E	2
Tulsa	Sec. 15-T19N-R11E	1
Tulsa	Sec. 7-T19N-R12E	2
Tulsa	Sec. 8-T19N-R12E	1
Tulsa	Sec. 9-T19N-R12E	2
Tulsa	Sec. 14-T19N-R12E	1
Tulsa	Sec. 25-T19N-R12E	1
Tulsa	Sec. 26-T19N-R12E	1

Additionally, absence from our database does not preclude such species from occurring in the area.

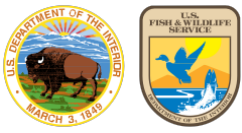
If you have any questions about this response, please send me an email, or call us at the number given below.

Although not specific to your project, you may find the following links helpful.

ONHI, guide to ranking codes for endangered and threatened species:  
[http://vmpincel.ou.edu/heritage/ranking\\_guide.html](http://vmpincel.ou.edu/heritage/ranking_guide.html)

Information regarding the Oklahoma Natural Areas Registry:  
[http://www.oknaturalheritage.ou.edu/registry\\_faq.htm](http://www.oknaturalheritage.ou.edu/registry_faq.htm)

Todd Fagin  
 Oklahoma Natural Heritage Inventory  
 (405) 325-4700  
[tfagin@ou.edu](mailto:tfagin@ou.edu)



# American Burying Beetle

## *Oklahoma Ecological Service Field Office*

### American Burying Beetle

*Nicrophorus americanus*

#### Description

The American burying beetle (ABB) is a large (0.98-1.4 inches) shiny black beetle, with hardened protective wing covers (elytra) that meet in a straight line down the back. Each elytron has 2 scalloped-shaped orange-red markings. Its most distinguishing feature is the large orange-red marking on the raised portion of the pronotum (shield over the mid-section between head and wings), which is circular, with raised central portion and flattened margins. The ABB has orange-red frons (a mustache-like feature) and a single orange-red mark on the clypeus (face). This mark is triangular in females and rectangular in males. The ABB has large antennae with notable orange clubs at tips.

#### Distribution

Rhode Island, South Dakota, Nebraska, Kansas, Arkansas, Texas, and Oklahoma, with 2 introduced populations in Massachusetts, and Missouri.

#### Life History

The ABB lives for just one year, it is nocturnal (active only at night), a strong flier, usually reproduces only once, and undergoes complete metamorphosis. The ABB is active in summer and inactive during winter. During winter months when temperatures are below 60°F (15°C), ABB bury themselves in the soil to overwinter. When temperatures are above 60°F (15°C) they emerge from the soil and begin mating and reproduction. ABB are scavengers dependent on carrion for their life cycle and must compete with vertebrate and other invertebrate species for carrion. Reproduction involves burying a small vertebrate carcass (1-9 ounces; 35-250 grams), laying eggs beside the carcass, and feeding the larvae from the carcass until mature. Both parents provide care to their young.

#### Habitat

Considered to be feeding habitat generalists, their reproductive habitat is believed to be more specialized. Habitat requirements for ABB, particularly



*American Burying Beetle.* © Roger Williams Park Zoo

reproductive habitat requirements are not fully understood. The ABB has been found in various habitat types including open fields and grasslands, oak-pine woodlands, oak-hickory forest, bottomland hardwoods, and natural edge habitats.

#### Conservation

Federally-listed as endangered (54 FR 29652; July 13, 1989). Critical habitat has not been designated. At the time of listing in 1989, there were only two known populations - Latimer County, Oklahoma and on Block Island, Rhode Island.

The ABB has disappeared from over 90% of its historic range and is currently restricted to the eastern and western extremities of its historic range. Habitat loss, alteration, and degradation have been attributed to the decline. In Oklahoma, the ABB is currently known to occur in 27 eastern counties. Of particular concern for ABB conservation is soil disturbances from construction projects because it is believed that the ABB stays underground or under leaf litter during the daytime and can easily be killed if soil is compacted or removed.

#### References

U.S. Fish and Wildlife Service. 1991. American burying beetle recovery plan. U.S. Fish and Wildlife Service, Newton Corner, Massachusetts.

Kozol, et al. 1988. *The American burying beetle, Nicrophorus americanus: studies on the natural history of a declining species.* *Psyche* 95:167-176.

Lomolino, M. V., J. C. Creighton, G. D. Schnell, and D. L. Certain. 1995. *Ecology and conservation of the endangered American burying beetle (Nicrophorus americanus).* *Conservation Biology* 9:605-614.

Sikes, D.S. and R. J. Raithel. 2002. *A review of hypotheses of decline of the endangered American burying beetle (Silphidae: Nicrophorus americanus Olivier).* *Journal of Insect Conservation* 6:103-113.

#### For Further Information

U.S. Fish and Wildlife Service  
Oklahoma  
Ecological Services Field Office  
9014 East 21st Street  
Tulsa, OK 74129  
918/581-7458



## U.S. Fish & Wildlife Service

# Least Tern

### Oklahoma Ecological Service Field Office

#### Least Tern (Interior Population)

*Sterna antillarum*

#### Description

The least tern is the smallest member of the tern family at about 9 inches long (23 cm) with a wingspan of 20 inches (50 cm). They have a grayish back and wings, and snowy white undersides. Least terns have a forked tail and narrow pointed wings. They can be distinguished from all other terns by their combination of a black crown, white forehead, and a variable black-tipped yellow bill. First-year birds have a dark bill, a dark gray eye stripe, and a dusky brown cap.

#### Distribution

Formerly the major river systems of the Midwestern United States. These rivers included the Red, Rio Grande, Arkansas, Missouri, Ohio, and Mississippi river systems. Currently, they occur as small remnant colonies throughout their former range. In Oklahoma, least terns nest along most of the larger rivers, as well as at the Salt Plains National Wildlife Refuge near Jet, Oklahoma. Least terns winter in South America.

#### Life History

Least terns arrive at breeding sites from late April to early June where they typically spend four to five months. Pairs go through an elaborate courtship period that includes courtship feedings and a variety of postures and vocalizations. Least terns nest in small colonies on exposed salt flats, river sandbars, or reservoir beaches. Nests are small scrapes in the sand, and usually two or three eggs are laid. The young are fairly mobile soon after hatching. Both parents feed the young and remain with them until fall migration. Least terns will travel four or more miles (6+ km) from their breeding colonies to find the small fish that make up the major part of their diet.



*Least Tern (Interior Population).* USFWS

#### Conservation

The least tern was federally listed as an endangered species on May 28, 1985 (50 FR 21784). Least terns have declined due to habitat loss from permanent flooding by reservoirs and channelization projects, unpredictable water discharge patterns, and overgrowth of brush and trees. The recreational use of sandbars by humans is a major threat to the tern's reproductive success.

#### What Can You Do to Help

Avoid disturbing nesting areas from mid-May to late August. Pets, livestock, people, and vehicles should be kept off these areas when terns are present. Promote public awareness and report disturbance of least terns to wildlife law enforcement officials. Private landowners should manage lands to benefit habitat in nesting areas by limiting ATV and off-road vehicles use and blocking access of these vehicles to rivers. Restore or create additional nesting habitat in rivers, navigation systems, or lakes.

Purchase land or conservation easements in areas with high-quality least tern nesting habitat.

#### References

U.S. Fish and Wildlife Service. 1990. *Recovery plan for the interior population of the least tern *Sterna antillarum**. U.S. Fish and Wildlife Service, Twin Cities, Minnesota. 90 pp.

#### For Further Information

U.S. Fish and Wildlife Service  
Oklahoma  
Ecological Services Field Office  
9014 East 21st Street  
Tulsa, OK 74129  
918/581-7458

**August 2011**



[Conserving the nature of America](#)

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## Northern Long-Eared Bat

### *Myotis septentrionalis*

[PDF Version](#)

The northern long-eared bat is federally listed as a *threatened species* under the Endangered Species Act. **Endangered** species are animals and plants that are in danger of becoming extinct. **Threatened** species are animals and plants that are likely to become endangered in the foreseeable future. Identifying, protecting, and restoring endangered and threatened species is the primary objective of the U.S. Fish and Wildlife Service's endangered species program.

### What is the northern long-eared bat?

**Appearance:** The northern long-eared bat is a medium-sized bat with a body length of 3 to 3.7 inches but a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*.

**Winter Habitat:** Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible.

**Summer Habitat:** During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. This bat has also been found rarely roosting in structures, like barns and sheds.

**Reproduction:** Breeding begins in late summer or early fall when males begin to swarm near hibernacula. After copulation, females store sperm during hibernation until spring. In spring, they emerge from their hibernacula, ovulate and the stored sperm fertilizes an egg. This strategy is called delayed fertilization.

After fertilization, pregnant females migrate to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies of females and young generally have 30 to 60



Photo by New York Department of Environmental Conservation; Al Hicks

bats at the beginning of the summer, although larger maternity colonies have also been seen. Numbers of individuals in roosts, typically decreases from pregnancy to post-lactation. Most bats within a maternity colony give birth around the same time, which may occur from late May or early June to late July, depending where the colony is located within the species' range. Young bats start flying by 18 to 21 days after birth. Maximum lifespan for the northern long-eared bat is estimated to be up to 18.5 years.

**Feeding Habits:** Like most bats, northern long-eared bats emerge at dusk to feed. They primarily fly through the understory of forested areas feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation or by gleaning motionless insects from vegetation.

**Range:** The northern long-eared bat's range includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. The species' range includes the following 37 States and the District of Columbia: Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming.

## Why is the northern long-eared bat in trouble?

**White-nose Syndrome:** No other threat is as severe and immediate as the disease, white-nose syndrome. If this disease had not emerged, it is unlikely the northern long-eared bat would be experiencing such a dramatic population decline. Since symptoms were first observed in New York in 2006, white-nose syndrome has spread rapidly from the Northeast to the Midwest and Southeast; an area that includes the core of the northern long-eared bat's range where it was most common before this disease. Numbers of northern long-eared bats (from hibernacula counts) have declined by up to 99 percent in the Northeast. Although there is uncertainty about the rate that white-nose syndrome will spread throughout the species' range, it is expected to spread throughout the United States in the foreseeable future.

**Other Sources of Mortality:** Although no significant population declines have been observed due to the sources of mortality listed below, they may now be important factors affecting this bat's viability until we find ways to address white-nose syndrome.

**Impacts to Hibernacula:** Gates or other structures intended to exclude people from caves and mines not only restrict bat flight and movement, but also change airflow and internal cave and mine microclimates. A change of even a few degrees can make a cave unsuitable for hibernating bats. Also, cave-dwelling bats are vulnerable to human disturbance while hibernating. Arousal during hibernation causes bats to use up their already reduced energy stores, which may lead to individuals not surviving the winter.

**Loss or Degradation of Summer Habitat:** Highway construction, commercial development, surface mining, and wind facility construction permanently remove habitat and are activities prevalent in many areas of this bat's range. Forest management benefits northern long-eared bats by keeping areas forested rather than converted to other uses. But, depending on type and timing, forest management activities can cause mortality and temporarily remove or degrade roosting and foraging habitat.

**Wind Farm Operation:** Wind turbines kill bats, and, depending on the species, in very large numbers. Mortality has been documented for northern long-eared bats, although a small number have been found to date. However, there are many wind projects within a large portion of the bat's range and many more are planned.

## What Is Being Done to Help the Northern Long-Eared Bat?

**Disease Management:** Actions have been taken to try to reduce or slow the spread of white-nose syndrome through human transmission of the fungus into caves (e.g. cave and mine closures and advisories; national decontamination protocols). A national plan was prepared by the Service and other state and federal agencies that details actions needed to investigate and manage white-nose syndrome. Many state and federal agencies, universities and non-governmental organizations are researching this disease to try to control its spread and address its affect. See [www.whitenosesyndrome.org/](http://www.whitenosesyndrome.org/) for more.

**Addressing Wind Turbine Mortality:** The Service and others are working to minimize bat mortality from wind turbines on several fronts. We fund and conduct research to determine why bats are susceptible to turbines, how to operate turbines to minimize mortality and [where important bird and bat migration routes are located](#). The Service, State natural resource agencies, and wind energy industry are developing a [Midwest Wind Energy Habitat Conservation Plan](#) that will provide wind farms a mechanism to continue operating legally while minimizing and mitigating listed bat mortality.

**Listing:** The northern long-eared bat is listed as a threatened species under the federal Endangered Species Act. Listing a species affords it the protections of the Act and also increases the priority of the species for funds, grants, and recovery opportunities.

**Hibernacula Protection:** Many federal and state natural resource agencies and conservation organizations have protected caves and mines that are important hibernacula for cave-dwelling bats.

## What Can I Do to Help the Northern Long-Eared Bat?

**Do Not Disturb Hibernating Bats:** To protect bats and their habitats, comply with all cave and mine closures, advisories, and regulations. In areas without a cave and mine closure policy, follow approved decontamination protocols (see <http://whitenosesyndrome.org/topics/decontamination>) - under no circumstances should clothing, footwear, or equipment that was used in a White-nose Syndrome affected state or region be used in unaffected states or regions.

**Leave Dead and Dying Trees Standing:** Like most eastern bats, the northern long-eared bat roosts in trees during summer. Where possible and not a safety hazard, leave dead or dying trees on your property. Northern long-eared bats and many other animals use these trees.

**Install a Bat Box:** Dead and dying trees are usually not left standing, so trees suitable for roosting may be in short supply and [bat boxes](#) may provide additional roost sites. Bat boxes are especially needed from April to August when females look for safe and quiet places to give birth and raise their pups.

**Support Sustainability:** Support efforts in your community, county and state to ensure that sustainability is a development goal. Only through sustainable living will we provide rare and declining species, like the northern long-eared bat, the habitat and resources they need to survive along with us.

**Spread the Word:** Understanding the important ecological role that bats play is a key to conserving the northern long-eared and other bats. Helping people learn more about the northern long bat and other endangered species can lead to more effective recovery efforts. Visit [www.whitenosesyndrome.org](http://www.whitenosesyndrome.org) for more information about white-nose syndrome.

**Join and Volunteer:** Join a conservation group; many have local chapters. Volunteer at a local nature center, zoo, or national wildlife refuge. Many state natural resource agencies benefit greatly from citizen involvement in monitoring wildlife. Check your state agency websites and get involved in citizen science efforts in your area.

*Updated April 2015*

[Northern Long-Eared Bat Home](#)  
[Midwest Endangered Species Home](#)

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## U.S. Fish & Wildlife Service

# Piping Plover

## Oklahoma Ecological Service Field Office

### Piping Plover

*Charadrius melodus*

#### Description

The piping plover is a 5 ½ inch long pale grayish-brown shorebird with a white breast. During the breeding season, it has a black breast band which is sometimes incomplete and a black bar between its eyes. The bill is dull orange with a black tip and the legs and feet are orange.

#### Distribution

Piping plovers occur in three disjunct populations in North America: Northern Great Plains, Great Lakes, and Atlantic Coast. This species migrates through Oklahoma each spring and fall.

#### Life History

In Oklahoma, the piping plover is a bi-annual migrant, traveling between its nesting habitat to the north of Oklahoma (the Great Plains population nests from Kansas to southern Canada), and its wintering grounds on the gulf coast. There is a record of piping plovers nesting at Optima Lake in Texas County.

Migration through Oklahoma is likely to occur from March-May and July-September. Piping plovers usually migrate as individuals or small groups and may be seen along sandbars of major rivers, salt flats, and mudflats of reservoirs. Piping plovers forage on these shoreline habitats and eat small invertebrates.

More detailed information on life history is available at *The Birds of North America* website.



*Piping plover.* USFWS

#### Conservation

The Great Plains population of piping plover was federally listed as a threatened species on December 11, 1985 (50 CFR 21784). There is no designated critical habitat for piping plovers in Oklahoma. Conservation of this species has focused on breeding and wintering habitat and relatively little is known about the habitat used during migration. During migration, piping plovers have been documented in many areas of Oklahoma from the panhandle to the eastern border and probably migrate through or over all of Oklahoma.

#### What Can You Do to Help

Ongoing conservation of large river and salt flat stopover habitat is helpful. Avoid disturbance of any piping plovers that may use river or reservoir shoreline habitat during migration.

#### References

*Great Lakes & Northern Great Plains Piping Plover Recovery Plan*, U.S. Fish and Wildlife Service. 1998.

*The Birds of North America*, No.2, 1992

#### For Further Information

U.S. Fish and Wildlife Service  
Oklahoma  
Ecological Services Field Office  
9014 East 21st Street  
Tulsa, OK 74129  
918/581-7458

**August 2011**

## RUFA RED KNOT

*Calidris canutus rufa*

The Endangered Species Act, enacted in 1973, serves to protect and recover imperiled species and the ecosystems upon which they depend. It is administered by the U.S. Fish and Wildlife Service.



Threatened - A Federally Protected Species

Imagine making a 3,000 mile grocery trip, twice a year. Though seemingly impossible for us, the red knot, a small shorebird with a 23-inch wingspan, makes this journey in just three days.

### IDENTIFICATION

Red knots are most easily identified when in their late spring and summer breeding plumage. During this time, the bird earns its name with its rusty head, neck and belly. The back is mottled gray, black and brown and the tail and wings are pale gray. In the fall, this sandpiper molts and turns pale gray with white flanks. Red knots have dull yellow or olive-green legs and a straight, dark bill. The sturdy bill is used to probe mudflats for mollusks, insects and seeds.



The *rufa* red knot is one of the longest distance migrants known to the animal kingdom.

### ADAPTATIONS FOR SURVIVAL

Most knots winter along the Chilean Coast and migrate to the Canadian Arctic breeding grounds by way of the Atlantic Coast. Some of these birds travel 18,000 miles a year! These birds often use Delaware and New Jersey's Delaware Bay area as a stopover, refueling on Horseshoe Crab eggs. But a small red knot population winters along the coast of Texas and migrates to the breeding grounds by way of the Great Plains. Even though this population passes over Oklahoma, these birds are often flying thousands of feet above the ground, seldom making landfall in our state. To date, only 40 birds have been reported in Oklahoma. Of those birds, 85% have been reported during the fall migration. It is suspected inclement weather, inexperience of younger birds or weakened physical condition forces these birds to land during migration.

Red knots have experienced severe population declines, with reduced food availability cited as the primary cause. These declines triggered the U.S. Fish and Wildlife Service's listing of the rufa red knot (the North American subspecies of red knot) as a threatened species under the Endangered Species Act. This decision was announced December 11, 2014.

The Wildlife Diversity Program, a program of the Oklahoma Department of Wildlife Conservation manages, monitors and promotes rare, declining and threatened species as well as those common species not hunted or fished. This program receives no state or federal tax appropriations and is primarily funded through the sale of publications, specialty license plates, the income tax check-off program and voluntary contributions.





## U.S. Fish & Wildlife Service

# Whooping Crane

## Oklahoma Ecological Service Field Office

### Whooping Crane

*Grus americana*

#### Description

At 5 feet (1.5 m), the whooping crane is the tallest American bird. It is a snowy white, long-necked bird with long legs. Its black primary feathers show only during flight. Adults have a red crown and a patch of black feathers below the eye. Young are whitish overall, but have a rusty-colored head and neck.

#### Distribution

Whooping cranes pass through western Oklahoma each spring and fall during migration. The Salt Plains National Wildlife Refuge, near Jet, Oklahoma, is a very important migration stopover area and is designated critical habitat. During migration, whooping cranes sometimes are sighted elsewhere in Oklahoma along rivers, in grain fields, or in shallow wetlands. Whooping cranes primarily use shallow, seasonally and semi permanently flooded palustrine wetlands and various cropland and emergent wetlands.

#### Life History

The whooping crane is a bi-annual migrant, traveling between its summer habitat in central Canada, and its wintering grounds on the Texas coast, across the Great Plains of the U.S. in the spring and fall of each year. Autumn migration normally begins in mid-September, with most birds arriving on the Texas wintering grounds between late October and mid-November. Spring migration departure dates are normally between late March and mid-April, with the last birds usually leaving by May 1. Whooping cranes migrate south as singles, pairs, in family groups, or as small flocks of 3 to 5 birds. They are diurnal migrants and stop daily to feed and rest. Whooping cranes eat a variety of things, including insects, frogs, small birds, rodents, minnows, and waste grains.



*Whooping crane.* USFWS

#### Conservation

By the mid- 1940s, only 15 whooping cranes were present in the wild. The whooping was federally listed as an endangered species on March 11, 1967 (32 FR 4001). An intensive captive-breeding program and careful protection of wild flocks have slowly increased the number in the wild to more than 120. Whooping cranes have declined primarily because of loss of wintering and breeding habitat. Current threats to wild cranes include collisions with manmade objects such as power lines and fences, shooting, predators, disease, habitat destruction, severe weather, and a loss of two thirds of the original genetic material.

#### What Can You Do to Help

Sightings are important for monitoring the status of federally-listed species.

To report whooping crane sightings to the US Fish and Wildlife Service please complete the sighting report form (<http://whoopingcrane.com/report-a-sighting/>) within the migration corridors, continue to gather sighting reports for whooping cranes and promote public awareness. Ongoing conservation of wetland habitat within historical stopover habitat is

helpful. Private landowners should be provided with incentives to manage lands to benefit wetlands in historic migration, breeding, and wintering areas. Additionally, purchase land or conservation easements in areas that still support healthy wetlands.

#### References

Canadian Wildlife Service and U.S. Fish and Wildlife Service. 2007. *International recovery plan for the whooping crane*. Ottawa: Recovery of Nationally Endangered Wildlife (RENEW), and U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 162 pp.

#### For Further Information

U.S. Fish and Wildlife Service  
Oklahoma  
Ecological Services Field Office  
9014 East 21st Street  
Tulsa, OK 74129  
918/581-7458

August 2011



**US Army Corps  
of Engineers ®**

Tulsa District

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# **APPENDIX E 4: Clean Water Act Compliance**

## **Tulsa and West-Tulsa Levees Feasibility Study**

**September 2019**

Section 404(b)(1) Analysis

*Tulsa and West-Tulsa Levees Feasibility  
Study*

U.S. Army Corps of Engineers,  
Tulsa District



**US Army Corps  
of Engineers®**

Tulsa District

September, 2019

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# Project Description

## 1.1 Location

The TWT Levee System is located in northeast Oklahoma in Tulsa County (Figure 1-1). The levee system extends from the City of Sand Springs downstream along the Arkansas River into the City of Tulsa. Levees A and B are on the left bank of the river and extend from river mile (RM) 531.1 to RM 524.1. Levee C spans from RM 526.7 to RM 521.3 on the right bank. Upstream of the levee system, there are a series of USACE flood control dams. Keystone Dam is approximately 8 miles upstream of Tulsa, and flood discharges from Keystone have direct and substantial impacts to the TWT levee system. Kaw Dam is about 100 miles upstream of Keystone (Figure 1-2).



**Figure 1-1: TWT Levee System Aerial Photograph (Map Imagery © Google 2016)**



Figure 1-2: Location of TWT Levees & USACE Dams (Map Imagery Google 2016)

## 1.2 General Description

The TWT Levee System is located in northeast Oklahoma in Tulsa County, and extends from the City of Sand Springs downstream along the Arkansas River into the City of Tulsa. Upstream, there are a series of Corps flood control dams. Keystone Dam is about 8 miles upstream, and flood discharges from Keystone have direct and substantial impacts to the levee system. Kaw Dam is about 100 miles upstream of Keystone Dam.

Formulation focused geographically on system levees A and B, and selection of a Tentatively Selected Plan (TSP) was based on reduced risks for life safety versus National Economic Development (NED) benefits as explained below. In terms of geographic focus, the Corps completed a Semi-Quantitative Risk Assessment (SQRA) for the TWT Levees in 2016 and 2017 and updated it for this study in 2019. SQRAs evaluate a range of flood events and identify potential modes of failure in a levee system, and estimate resulting life loss and property damage for each failure mode. Based on the updated SQRA, TWT levees A and B were assigned as a high risk of failure and life loss. In contrast Levee C was assigned a low risk of life loss given that estimated floods depths were comparatively small (i.e., 2 to 4 feet) when compared to levees A and B where depths were well above first story elevations.

With respect to NED versus life safety, the preliminary set of management measures and plans and the final array of alternatives were evaluated using standard Corps methods and models based both on NED benefits and life safety risk reduction benefits; however, given that the probability associated with inundation and damages to property behind the levees in the floodplain are relatively low, the estimated costs of alternatives are higher than estimated

property damages. Therefore, the NED plan is the without project alternative. In contrast, evaluation of alternatives based on life safety benefits show that several provided significant reductions in life safety risk. After screening the preliminary array of six alternatives that incorporated permutations of management measures such as filter berms with toe drain and cutoff walls, the PDT selected four final alternatives.

- ☐ Alternative 1E (filter berm with toe drain);
- ☐ Alternative 3B (full cutoff wall)
- ☐ Alternative 5 (buyout of residential properties behind Levee A and B); and,
- ☐ Alternative 6 (no action).

Based on the comparison of these plans, the TSP is Alternative 1E (Filtered Berm with Toe Drains on Levees A and B and reconstruction of pump stations 1 through 7). This plan meets study objectives of reducing flood risk and flood damages, reducing flood risk to public health, safety and life, and minimizes residual flood risks to the extent justified. Alternative 1E is the Preferred Alternative and the Environmentally Preferable Alternative under NEPA. It is also the Least Environmentally Damaging Practicable Alternative under the Clean Water Act (CWA). Structural features of Alternative 1E include:

- ☐ 13 miles of a filtered berm with toe drain,
- ☐ 2,000 feet of cut off wall in Levee A at the Superfund site;
- ☐ Filtered floodway structure,
- ☐ Two detention ponds at Levee B tieback;
- ☐ Impervious blanket armoring on landside at overtopping in Levee B; and,
- ☐ Reconstruction of pump station 1 through 7 for system-wide effectiveness and completeness.

The construction of the Tentatively Selected Plan would result in the temporary impact of 9 acres of American Burying Beetle (Federally endangered) habitat, and the semi-permanent loss of 1,833 feet stream habitat along Harlow Creek. In addition, bald eagles (federally protected) roost, nest, and forage along the Arkansas River that runs parallel to Levees A, B, and C. While the construction of the Tentatively Selected Plan is not expected to have direct take of bald eagles, construction activities and associated noise could indirectly impact nesting bald eagles.

Historic properties may exist and have the potential to be adversely impacted during construction. All practicable impact avoidance measures and BMPs will be utilized to avoid and minimize adverse impacts to the environment and historic properties. Unavoidable impacts to habitat, Federally threatened and endangered species, and known and unknown historic properties are accounted for in the mitigation plan to reduce impacts to less than significant.

The mitigation plan entails:

- Purchase the necessary amount of credits from a stream mitigation bank to reduce stream impacts to less than significant
- Purchase the necessary amount of credits from an American Burying Beetle conservation bank to reduce American Burying Beetle impacts to less than significant
- Conduct bald eagle surveys during PED, develop impact avoidance and minimization plan, obtain take permit if necessary all prior to any construction activities.
- A Programmatic Agreement would be executed between USACE, Tulsa

County Drainage District No. 12 (the implementation sponsor), Oklahoma State Historic Preservation Officer (SHPO), Muscogee (Creek) Nation and the Osage Nation tribes to account for impacts to known and unknown historic properties.

## 1.3 Purpose and Need

The purpose of the study is to investigate the feasibility of improving the resiliency of the existing Tulsa West Tulsa (TWT) levee system by reducing risk to life and damages to property in portions of Tulsa County and the City of Tulsa behind the levee system. The U.S. Army Corps of Engineers (USACE) constructed the TWT levee system in the mid-1940s as authorized in the 1941 Flood Control Act to protect residential and industrial property from frequent flooding along the Arkansas River and associated tributaries in Tulsa and Sand Springs (a suburb of Tulsa). Levees A, B, and C were completed in 1945 for a total of 20 miles of earthen levees on the left and right bank of the Arkansas River.

Several flood events have occurred along the Arkansas River in Tulsa County. Before construction of Keystone Dam, the flood of record occurred in October 1959 with an estimated peak flow of 246,000 cubic feet per second (cfs). The second largest pre-regulation flood was 244,000 cfs in June 1923. Since the construction of Keystone Dam, significant flood-control releases took place in 1974, 1986, 1993, 1998, 2007, and 2019, and the largest were in October 1986 with peak flows of 307,000 cfs and May 2019, with peak flows of 277,000 cfs.

The study or impact area is home to a substantial population of elderly and low income residents, and flood evacuation has historically proved to be more of a hurdle for this demographic for a number of reasons. For example, flood warnings may not be as effective because of physical and medical constraints on the part of residents, or due to a lack of technology to receive warnings such as mobile devices with text messaging. Another reason is that some may be reluctant to leave because of possible mistrust of public officials regarding the severity of the threat, or for fear of their personal property being stolen after they leave.

Study modeling using HEC-LifeSim indicates that within eight hours of receiving flood warnings, 81 percent of the population behind the levees would evacuate. If warning times were shorter or if fewer people evacuated, the number of casualties would likely rise dramatically. For example, the estimated number of fatalities triples when the model assumes a 75 percent evacuation rate after 24 hours (see Economic Appendix C for details on demographics and life safety).

Any catastrophic failure of TWT levees would pose significant public health and environmental concerns. Since the early 1900s, areas behind the levee system have been home to large concentrations of heavy industry such as the Sand Springs Petrochemical Complex (Superfund site) and the Sheffield Steel Corporation behind Levee A, both of which house hazardous materials and have reported hazardous material releases in the past. Breach or overtopping of the Levee A and B system could release hazardous materials from the Sand Springs Superfund site, or from one of the many industrial facilities behind the levee system. In the event of a release, hazardous materials could enter the Arkansas River and affect downstream communities and wildlife habitats.

Heavy industry also exists behind Levee C including Westside Chemical Co., Ozark Fluorine Specialties Inc., Koch Industries, Holly Frontier Corporation Tulsa Refinery, and the Public Service Company of Oklahoma (PSO). All house hazardous materials, and as is the case with Levee Areas A and B, there have been reported hazardous material releases here in the past. A breach or overtopping of Levee C could result in the release of hazardous materials from one of the many industrial facilities behind the levee.

## 1.4 Study Authority

This Study is authorized under Section 1202 of the Water Infrastructure Improvements for the Nation Act (WIIN Act of 2016, Public Law 114-322), which states:

*“(a) Tulsa and West Tulsa, Arkansas River, Oklahoma.—*

*(1) In general.--The Secretary shall conduct a study to determine the feasibility of modifying the projects for flood risk management, Tulsa and West Tulsa, Oklahoma, authorized by section 3 of the Act of August 18, 1941 (55 Stat. 645, chapter 377).*

*(2) Requirements.--In carrying out the study under paragraph (1), the Secretary shall address project deficiencies, uncertainties, and significant data gaps, including material, construction, and subsurface, which render the project at risk of overtopping, breaching, or system failure.”*

## 1.5 Project Goals

The overarching objective of the study is to find an environmentally acceptable and economically justified solution to ensure a sustainable levee system, which reduces risk of damages and life safety due to flooding. Specific planning objectives for the study are:

- Reduce life safety risk,
- Reduce flood damages,
- Reduce levee safety risk associated with:
  - overtopping,
  - tie backs,
  - internal erosion below TRG), and
- Support community resiliency.

# Alternatives Evaluation

The alternatives were identified and evaluated by the USACE in an iterative process that considered a variety of factors. Avoidance and minimization of impacts to aquatic environment and other ecosystems, and hydropower generation were a critical consideration throughout the project planning processes, and would remain so throughout the design, construction and operational phases of the project. In all cases, alternatives were evaluated for their ability to meet the project's purpose and need, which is flood risk management.

## 2.1 Management Measures

Initially, discrete management measures were flood risk management success and then alternative plans developed from sets of one or more management measures functioning together. Table 2.1-1 summarizes the non-structural management measures, and Table 2.1-2 summarizes the structural management measures that were considered by function and geographic area.

Table 2 1: Potential Non-Structural Measures to Address PFMs

Non-Structural	Description
Elevation of Structures	Technique lifts existing structure to an elevation at least equal to or greater than the 1% annual chance flood elevation. Best in situations of low water velocities and small debris. Generally requires frequent flooding to be cost effective.
Acquisition & Repurposing	Technique consists of buying the structure and the land and either demolish it or sell to others and relocate to a site external to the floodplain. The land is often rezoned as open space or for ecosystem restoration.
Flood Forecast & Warning Systems	Technique relies upon stream gage, rain gages, and hydrologic computer modeling to determine the impacts of flooding for areas of potential flood risk.
Flood Emergency Preparedness Plans (FEPPs)	The FEPP should incorporate the community's response to flooding, location of evacuation centers, primary evacuation routes, and post flood recovery processes.

Table 2-1: Potential Structural Measures to Address PFMs

Measure	Carried Forward/ Screened	Rationale
<b>Structural Measures formulated based on reduction of Life Safety</b>		
<b>MAINSTEM - LEVEE A, B &amp; C</b>		
Construct Floodwalls on top of Existing Levee System	Carried Forward	
Raise Existing Levee System in place to 500 ACE	Carried Forward	
Filtered Berm in Existing Levee System	Carried Forward	
Impervious Blanket	Carried Forward	

Measure	Carried Forward/ Screened	Rationale
Enlarge Culvert Capacity at Floodway Structure	Carried Forward	H&H modeling to determine size and effectiveness of measure.
Relief Wells	Screened	
<b>Structural Measures based on Reconstruction of the Levee System</b>		
<b>MAINSTEM - LEVEE A, B &amp; C</b>		
Update and/or add Pump Stations	Carried Forward	
Modify Interior Drainage to Existing Levee Systems	Carried Forward	Will be considered for any FRM structure to address residual risk.
<b>Non-Structural Measures</b>		
Buy and Relocate Flood Prone Structures		Structures impacted (including downtown Watsonville) and relocations would impact prime agricultural land. Not practical or acceptable to local landowners, sponsors, stakeholders.
Flood Proofing		Structures impacted (including downtown Watsonville). Not practical due to amount of structures impacted (2,400). Does not address life safety and evacuation concerns
Raise/Elevate Structures		Structures impacted (including downtown Watsonville). Partial protection of contents only. Not practical due to amount of structures impacted (2,400). Costs at approximately \$150,000 per structure are likely to be prohibitive. Does not address life safety and evacuation concerns
Evacuation Plan/Flood Warning Systems		Retained for all FRM alternatives. Highly effective at limiting potential life loss. Little or no impact on reduction of flood damages.
Zoning; Building Codes		
Easements/Pay Landowners for Water Retention		Not acceptable to local landowners, sponsors, stakeholders due to prime agricultural land impacts.

## 2.2 Alternatives

A meeting was held with the study team, sponsor and interested parties (hereinafter referred collectively as “the team”) to formulate alternatives.

The PDT developed an initial array of 6 alternatives to address the identified PFMs. The initial alternatives were developed using a “performance oriented” strategy. The team took a structural approach around the PFMs and developed initial alternatives, which addressed all PFMs within the entire study area. The team split into two groups and discussed separately how to address system performance. The two groups got back together and combined measures and developed alternatives that addressed all types of risk within the entire study area.

The team then formulated alternatives based on reducing risk to certain areas within the levee system. Levees A and B are in a Very High Risk category (LSAC 1) and Levee C is in a High Risk category (LSAC 2). The Levee C inundation is only 2-3 feet of water. The team formulated alternatives to address all PFMs within Levee A and Levee B only. Next, the team formulated alternatives based on the types of risk. The highest risk to the levee system is associated with breach prior to overtopping. Therefore, the team formulated alternatives to address only the

PFMs for breach prior to overtopping. These alternatives are described below as Alternatives No. 1 and 2.

The Sponsor requested an alternative plan that addressed all types of risk within the entire study area with risk reduction to the 500 ACE on the mainstem and 100 ACE on the tiebacks and a cut off wall for the entire length of the levee system. This Alternative can be found below as Alternative 3.

The next alternative was formulated based on diverting the water away from the area. Therefore, the team formulated pipelines to divert the water downstream of Keystone Dam past the Tulsa county line away from heavily populated areas, which is Alternative 4.

The primarily non-structural Alternative is Alternative 5 and the No Action Alternative is No. 6 below.

Cost estimates for these alternatives range from \$50M to \$250M for work on the Levee System itself, and an estimated cost of \$2.85B to create a diversion system to route water around Tulsa.

### **Initial Array of Alternatives:**

#### ***ALTERNATIVE 1 - ADDRESSES ISSUES PRIMARILY WITH FILTERED EXITS.***

**Alternative 1A** - This alternative will address all PFMs for the entire system primarily with filtered exits. Throughout the entire levee system (A, B and C), conduits will be abandoned and/or replaced and filtered exits constructed.

**Levee A:** Construct full Cutoff Walls at Charles Page Blvd (North and South) for approximately 600 feet and seal joints where needed and full cutoff wall at the Superfund site for approximately 15,000 feet.

**Levee B:** Permanently Raise Levee B back to original design flow at Pump Station No. 5 for approximately 3,000 feet; construct a stability berm with a filtered exit and relief wells at Pump Station No. 4; and a detention pond(s) for approximately 30 acres behind Levee B; and filter along the tieback.

**Levee C:** Permanently Raise Levee C back to original design flow at I-244 Corridor for about 1,000 feet; construct a landside berm with relief wells for approximately 6,800 feet; and construct a flood wall structure with flap gate;

**Non-Structural measures** will be evaluated and added as applicable each alternative: Update the City of Tulsa Hazard Mitigation Plan; update Temporary Evacuation Plan; Update Warning System; buyout; and raise structures.

**Alternative 1B** – (Formerly Alt 5) This alternative will address all PFMs for only Levee A and B, primarily with filtered exits. Throughout Levee A and B, conduits will be abandoned and/or replaced and filtered exits constructed. Same as Alternative 1A but without Levee C.

**Alternative 1C** – (Formerly Alt 7) This alternative will address penetration failure modes (no overtopping failure modes) for the entire levee system (A, B and C) primarily with filtered exits. Throughout the entire levee system (A, B and C), conduits will be abandoned and/or replaced and filtered exits constructed. Same as Alternative 1A but with no levee raise in Levee B or Levee C.

**Alternative 1D** – (Formerly Alt 9) This alternative will address penetration failure modes (no overtopping failure modes) for Levee A and B only. Throughout Levee A and B, conduits will be abandoned and/or replace and filtered exits constructed. Same as Alternative 1C but with no issues addressed within Levee C.

#### ***ALTERNATIVE 2 - ADDRESSES ISSUES PRIMARILY WITH CUTOFF WALLS***

- **Alternative 2A** - This alternative will address all PFMs for the entire system primarily with cutoff walls. Throughout the entire levee system (A, B and C), a cutoff wall will be constructed at each penetration for approximately 6,800 total feet and replace approximately 90 conduits.

**Levee A:** Construct full cutoff walls at Charles Page Blvd (North and South) for approximately 600 feet and seal joints where needed; full cutoff wall at the Superfund site for approximately 15,000 feet; and construct a detention pond for tieback.

**Levee B:** Permanently raise Levee B back to original design flow and armor landside slope at PS No. 5 for approximately 3,000 feet; construct a cutoff wall for approximately 3,000 feet at PS No. 4; and raise levee to original design flow and construct cutoff wall for approximately 9,000 feet along the tieback.

**Levee C:** Armor landside slope at I-244 Corridor for approximately 1,000 feet; construct a cutoff wall for approximately 6,800 feet; and construct a flood wall structure with flap gate.

**Non-Structural measures** will be evaluated and added as applicable each alternative: Update the City of Tulsa Hazard Mitigation Plan; update Temporary Evacuation Plan; Update Warning System; buyout; and raise structures.

- **Alternative 2B** – (Formerly Alt 6) This alternative will address all PFMs for only Levee A and B, primarily with cutoff walls. Throughout the Levee A and B, a cutoff wall will be constructed at each penetration for approximately 3,600 total feet and replace approximately 65 conduits. Same as Alternative 2A but with no Levee C.
- **Alternative 2C** – (Formerly Alt 8) This alternative will address penetration failure modes (no overtopping failure modes) for the entire levee system (A, B and C) primarily with cutoff walls. Throughout the entire levee system (A, B and C), cutoff walls will be constructed at each penetration and conduits replace. Same as Alternative 2A with no levee raise in Levee B or Levee C.
- **Alternative 2D** – This alternative will address penetration failure modes (no overtopping failure modes) for only Levee A and B. Throughout Levee A and B, cutoff walls will be constructed and conduits replace. Same as Alternative 2C but with no issues addressed within Levee C.

### **ALTERNATIVE 3—Cutoff Wall**

- **Alternative 3A** - This alternative will address all PFMs for the entire system primarily with a permanent levee raise to 1/500 ACE and permanent levee raise of 1/100 ACE for the tiebacks. Throughout the entire levee system (A, B and C), a cutoff wall will be constructed along the entire system (approximately 20 miles) and approximately 90 conduits replaced. In addition, non-structural measures will be evaluated and added as applicable each alternative: Update the City of Tulsa Hazard Mitigation Plan; update Temporary Evacuation Plan; Update Warning System; buyout; and raise structures.
- **Alternative 3B** – Same as Alternative 3A but only raising the mainstem levee system to the authorized flow elevation of 350,000 cfs.

### **ALTERNATIVE 4 – DIVERSION OF THE WATER AROUND TULSA**

Construct gravity flow pipelines to reduce flow around Tulsa area.

### **ALTERNATIVE 5 – BUYOUT AND PRIMARILY NON-STRUCTURAL MEASURES**

This alternative proposes a buyout for portions of the homes within Levee B, along with evaluating and adding any other non-structural measures: Update the City of Tulsa Hazard

Mitigation Plan; update Temporary Evacuation Plan; Update Warning System; and raise structures.

### **ALTERNATIVE 6 – NO ACTION**

The No Action Alternative assumes that there will be no federal project and the Sponsor will continue to perform limited O&M on the levee system. The Railroad will continue to place Locomotive Railcars on Conduits to address potential uplift. Sandbags will be placed on the tieback levee embankments and I-244 corridor in Levee C; and the Sponsor will continue to update the City of Tulsa Hazard Mitigation Plan, Temporary Evacuation Plan, and Warning System.

The Initial array of alternatives were screened based on cost, benefit to life safety, constructability, environmental impacts, and socioeconomic impacts. The final array of alternatives are listed below.

#### **Alternative 1E:**

This alternative will address seepage and erosion with a berm with filtered exit and drainage along entire levee A and B. Robust filter at Charles Page Blvd. Cutoff wall to rock at the Superfund Site for approximately 2,000 feet. Buyout within 50' of landside toe where required and other properties as needed. Armor landside slope at Pump Station No. 5 for approximately 3,000 feet. Construct a detention pond for 100 year storm above Levee B tieback. Levee A & B, conduits deemed unnecessary will be abandoned and all required for continued operation of the system will be replaced. Reconstruction Measures – Decommission and remove Levee A tieback west of Hwy 412. Update Pump Stations 1-7.

#### **Alternative 3B:**

This alternative will address all potential failure modes for the entire system primarily with a cutoff wall along Levee A and B (approximately 13 miles) and approximately 90 conduits replaced and all others abandoned. Cutoff wall to rock at the Superfund Site for approximately 2,000 feet. Buyout within 50' of landside toe where required and other properties as needed. Armor landside slope at Pump Station No. 5 for approximately 3,000 feet. Construct a detention pond for 100 year storm above Levee B tieback. Levee A & B, conduits deemed unnecessary will be abandoned and all required for continued operation of the system will be replaced. Reconstruction Measures – Decommission and remove Levee A tieback west of Hwy 412. Update Pump Stations 1-7.

#### **Alternative 5:**

Alternative 5 is a complete residential buyout of the surrounding area within Levee A & B.

#### **No Action (FWOP)**

This alternative assumes there will be ongoing and potential for other local or State sponsored projects that could be undertaken without Federal participation. It is expected that current FRM structures would be maintained and residual risk of flood damages would remain. The City of Tulsa has made updates to their warning, evacuation and mitigation plans. These updates contributed to the decreased risk in the updated 2019 SQRA. It is assumed that all of these features will remain in place under the FWOP condition.

## **2.3 Impacts to Jurisdictional Wetlands/Waters of the U.S.**

As part of the alternatives evaluation process, a semi-quantitative assessment of permanent impacts to jurisdictional wetlands and waters of the U.S. was conducted for the No-Action and the three alternatives to allow for a relative comparison of impacts. Impacts that were considered included the permanent excavation of material in jurisdictional waters such as the for

the construction of the detention ponds found in both Alternatives 1E and 3B. For purposes of the analysis, jurisdictional features were defined as any aquatic resource below the historic high bank of Harlow Creek which was previously impacted during the construction of the levees and road crossings. For this project, the only impacts to jurisdictional wetlands are relegated to the construction of detention ponds and impacts to stream habitat.

The specific type and quality of specific habitat impacts were not evaluated for this analysis. Habitat types that would be affected by the excavation of material are expected to be primarily open water, creek banks and the creek bed itself. The dynamic nature of the Arkansas River, and shifting of habitat types over time, precludes a precise determination. Available U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) online mapping data for wetlands within TWT project footprint were reviewed as part of the determination of linear feet. Impacts were primarily investigated in the upper and lower detention ponds being constructed in Alternatives 1E and 3B, as well as any stream impacts.

Jurisdictional impacts by alternative are summarized in Table 2-2.

Table 2-2 Estimated Impact Area by Alternative

<b>Alternative Component:</b>	<b>Acres:</b>	<b>Square Feet:</b>	<b>Cubic Feet:</b>	<b>Linear Feet (Stream):</b>
1E (TSP)	9.03	393,384.80	2,901,663.70	1,833.00
3B	9.03	393,384.80	2,901,663.70	1,833.00
Alternative 5	0.00	0.00	0.00	0.00
No Action Plan	0.00	0.00	0.00	0.00

<sup>1</sup>Alternatives 1E and the TSP were assumed to have the same size in impacts for the detention ponds.

A comprehensive alternatives analysis was done as part of the Tulsa-West Tulsa Levees Feasibility Study and Integrated Environmental Assessment. The study determined there were four practicable alternatives, including the No Action Alternative, as discussed in Section 2.1 and 2.2 above. Only these alternatives sufficiently meet the overall project purposes (summarized as life and property risk reduction from flooding) to be considered practicable. Alternatives 1E and 3B would have essentially the same aquatic ecosystem impact (See Table 2-2 above). However, Alternative 1E would cost less and considerably require less real estate for construction based on the design and materials used to improve levee performance. Alternative 5, residential buyouts, would not impact jurisdictional waters at all, however Environmental Justice impacts could be significant as this alternative would require relocating local residents away from jobs, schools, etc.

Based on primarily life safety considerations, in addition to potential environmental, cultural, Environmental Justice impacts, and costs, Alternative 1E was selected as the TSP.

# Tentatively Selected Plan

## 3.1 Project Description

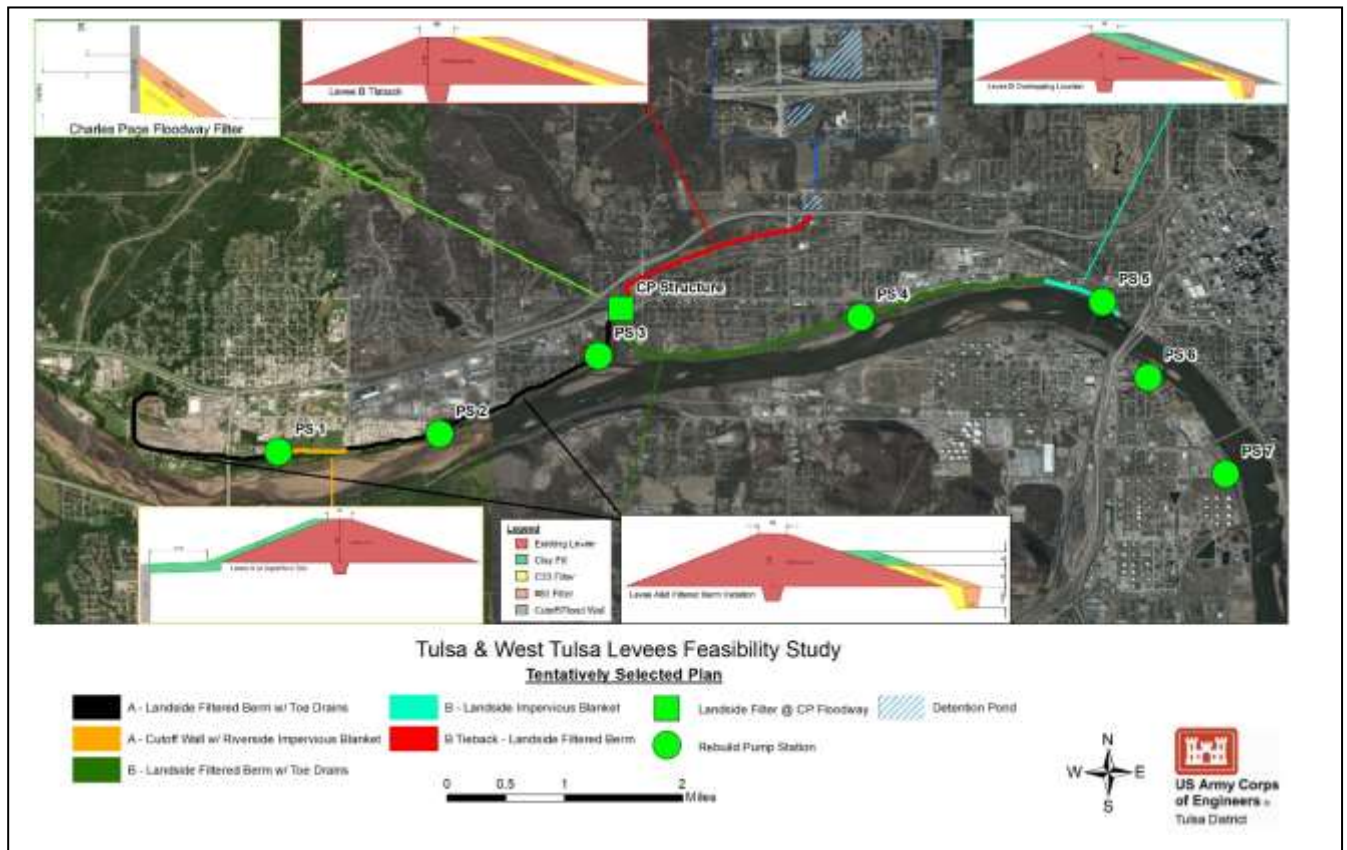
Based on the comparison of these plans, the TSP is Alternative 1E (Filtered Berm with Toe Drains on Levee A and Levee B and reconstruction of Pump Station Nos. 1 through 7). This plan meets study objectives of reducing flood risk and flood damages, reducing flood risk to public health, safety and life, and minimizes residual flood risks to the extent justified.

Alternative 1E is the Preferred Alternative and the Environmentally Preferable Alternative under NEPA. It is also the Least Environmentally Damaging Practicable Alternative under the Clean Water Act (CWA). Structural features of Alternative 1E include (Figure 4-1):

- 13 miles of a filtered berm with toe drain,
- 3,000 feet of cut off wall in Levee A at the Superfund site;
- Filtered floodway structure,
- Two detention ponds at Levee B tieback;
- Impervious blanket armoring on landside at overtopping in Levee B; and,
- Reconstruction of pump station 1 through 7 for system-wide effectiveness and completeness.

Recommendations for addressing residual risk by the non-Federal sponsor include nonstructural features, such as comprehensive flood warning emergency evacuation planning and floodplain management. Specifics of these plans will be included in the language of the Project Partnership Agreement executed between the USACE and non-Federal sponsor.

None of the proposed TSP elements will impact jurisdictional waters other than the proposed detention ponds. As such, from here on, this document will solely focus on the impacts of the detention ponds.



**Figure 3-1: Schematic of the Tentatively Selected Plan Alternative 1 E**

## 3.2 General Description of Dredged or Fill Material

### 3.2.1 General Characteristics of Material

Based on available data, subsurface conditions at proposed detention areas are interbedded alluvial silt, clay, and sand overburden overlying shale bedrock. In some locations, residual clay soils are found overlying the shale.

### 3.2.2 Quantity of Material

Material would only be excavated from the upstream and downstream detention ponds constructed above Levee B Tieback, an approximate total of 2,901,663 cubic feet of soil would be excavated from the combined 9 acres of existing stream, grassland, and woodland parcels of land.

### 3.2.3 Source of Material

No material is anticipated to be placed in the detention areas. Only excavated and shaped to meet the reduction in flood risk.

## 3.3 Description of the Recommended Discharge Site(s)

### 3.3.1 Location

The detention ponds would be constructed on both the north and south sides of the Sand Springs Expressway, between North 49<sup>th</sup> W Avenue and North 45<sup>th</sup> W Avenue in Tulsa, Oklahoma.

### 3.3.2 Size

The combined size of land of both detention sites is nine acres with 1,833 linear feet of creek.

### 3.3.3 Type(s) of Sites

In the case of the detention ponds, the existing parcels of land are mostly grassland and woodland dominated with approximately 1,833 linear feet of Harlow Creek running through the center.

### 3.3.4 Type(s) of Habitat

As discussed previously, creek, woodland, and grassland habitats are to be affected by the construction of the detention ponds. No wetlands or riparian/flooded forests were identified within the construction footprints.

#### 3.3.4.1 Waters/Wetlands

All of the waters within the footprint of the Tentatively Selected Plan construction elements are considered jurisdictional. The 1,833 linear feet of Harlow Creek flow through the proposed detention ponds. No other features of the Tentatively Selected Plan would impact jurisdictional waters.

### 3.3.5 Timing and Duration of Discharge

Construction of each of the restoration measures would be timed to occur during low flow periods to minimize impacts to the aquatic system. A more detailed schedule would be developed during the pre-construction engineering and design phases.

## 3.4 Description of Disposal Method

Heavy construction vehicles and equipment would be needed to excavate the detention ponds. The vehicles and equipment would operate above the high bank of Harlow Creek in upland areas to the extent possible.

An assortment of wheeled and tracked equipment necessary to handle large loads of rock and soil, such as backhoes, track hoes, bulldozers, dump trucks, and front end loaders, would be used for construction. All material excavated would be hauled off and disposed of properly. Project work would take place during safe and low flow conditions.

The temporary staging and storage of construction materials and vehicles would be sited in areas that are currently disturbed or are recommended to be cleared and excavated from the construction of the project components described above. All staging and storage areas would be outside of jurisdictional wetlands. Best management practices (BMPs) in staging areas would include erosion control and spill prevention measures.

## 3.5 Factual Determinations

### 3.5.1 Physical Substrate Determinations

#### 3.5.1.1 Substrate Elevation and Slope

The existing substrate elevation for Harlow Creek within the project area is approximately 615 - 640 feet above mean sea level (msl) with an average bank slope of approximately 2H:1V. The elevation of the creek bed would remain the same in the TSP however the creek banks would be widened to create the storage capacity of the detention pond

#### 3.5.1.2 Sediment Type

The Choska-Severn soil series is the predominant soil series in the area, according to the Natural Resources Conservation Service (NRCS) Soil Survey of Tulsa County, Oklahoma. These soils are characterized as deep, well-drained sandy to silty loam overlying loamy and sandy floodplain alluvium.

Culverts and existing levees have altered this stretch of Harlow Creek. Natural meanders seen upstream of the project area have been removed. Within the proposed detention areas, Harlow Creek is very straight with the adjacent lands maintained.

#### 3.5.1.3 Dredge/Fill Material Movement

Approximately 2,901,663 cubic feet of soil would be removed from the combined 9 acres of woodland, grassland, and creek habitat. The detention ponds would range between five to eight feet deep. After construction is complete, all excavated areas would be planted with native vegetation. Harlow Creek would flow freely through the detention areas as it does now.

#### 3.5.1.4 Physical Effects on Benthos

Under the TSP unavoidable impacts to aquatic habitats would be created from the excavation of material. After construction is complete, the creek would flow through its original path and remain unobstructed, as it is now.

#### 3.5.1.5 Other Effects

Temporary impacts to aquatic organisms and fish could occur during construction from the earthmoving activities with the potential for temporary sedimentation and water quality degradation of downstream habitats during construction. Further coordination with resource agencies is underway to assess the need for relocating any fish and/or amphibians that may occur within the detention areas prior to construction. After construction, fish and wildlife communities would be expected to recolonize area from adjacent habitats.

#### 3.5.1.6 Actions Taken to Minimize Impacts

Impacts would be minimized to the extent possible by scheduling construction to coincide with low flow periods. Cofferdams would be used to divert flows from construction areas, and silt fences and geotextile filters would be placed to minimize sediment transport downstream. Staging and construction access areas would avoid wetlands and aquatic habitats to the extent possible to minimize temporary disturbances and provide distance between aquatic habitats and exposed sediments. Best management practices would be detailed as designs for the different elements of the TSP are prepared. Thus, the existing aquatic organisms and fish found at the construction sites would be temporarily affected during construction and expected to then recover and improve post construction.

## 3.5.2 Water Circulation. Fluctuation and Salinity Determinations

### 3.5.2.1 Salinity

The project would not impact salinity of Harlow Creek. After construction, Harlow Creek would continue to flow through the area unobstructed as it does now.

### 3.5.2.2 Water Chemistry (pH. etc.)

The project would not impact water chemistry of the Harlow Creek.

### 3.5.2.3 Clarity

Temporary disruption to water clarity is expected during construction and future flood events. After the in-stream construction is completed and disturbed areas on the banks revegetated, water clarity would be the same as it is currently.

### 3.5.2.4 Color

No changes in color are anticipated following construction.

### 3.5.2.5 Odor

No changes in odor would occur following construction.

### 3.5.2.6 Taste

Implementation of the detention ponds would not affect the water's taste following completion of the construction.

### 3.5.2.7 Dissolved Gas Levels

No change in dissolved gas levels would occur following construction.

### 3.5.2.8 Nutrients

No change in nutrient levels would occur following construction.

### 3.5.2.9 Eutrophication

No changes as a result of implementation of the TSP would impact eutrophication of the aquatic system of Harlow Creek.

## 3.5.3 Current Patterns and Circulation

### 3.5.3.1 Current Patterns and Flow

Multiple streams were realigned and modified during the construction of the TWT system. These include Harlow Creek, Blackboy Creek (hereafter referred to as Bigheart Creek), Lake Station Drainage Ditch (hereafter referred to as Bigheart Creek Tributary), and Cherry Creek. The three tributary streams on the north side of the Arkansas River (Harlow Creek, Bigheart Creek, and Bigheart Tributary) used to arrive at different confluence locations. However, it became advantageous to combine these three drainage areas into a single outlet on the north side of the Arkansas River. This new confluence was designed to be controlled by the Charles Page Boulevard Floodway Structure which would also allow for the closure and linkage of Levees A and B along with their respective tieback segments.

Bigheart, Harlow, and Parkview Creeks are left bank tributaries of the Arkansas River that drain areas above Levees A and B. The lower reaches of these streams have gentle slopes within the flat Arkansas River floodplain. West Bigheart Creek, a tributary of Bigheart Creek, is separated from the protected area by the Levee A tieback and is largely regulated by Sand Springs Lake. Harlow Creek is separated from the protected area by the Levee B tieback. Bigheart Creek and Harlow Creek both originate in Osage County, and the confluence of both of these streams occurs just upstream from the Charles Page Floodway Structure.

Harlow Creek flows for a total of approximately 3.5 miles. Originally flowing south, stream slopes in the headwater areas approach 25 ft/mi. After passing beneath the US-412 Highway embankment, Harlow Creek flows in a southwesterly direction along the Levee B Tieback embankment with an average slope of approximately 7.5 ft/mi. The largest tributary to Harlow Creek (termed "Harlow Creek Tributary") enters from the north and contributes approximately 2.25 sq. mi. to the seven sq. mi. total drainage area. Starting at West Edison Street, Harlow Creek has been realigned and channelized for its remaining length to the confluence with Bigheart Creek.

#### 3.5.3.2 Velocity

The Federal Emergency Management Agency (FEMA) Flood Insurance Study for Tulsa County and incorporated areas lists several peak discharges associated with a probability of occurrence in any given year for the Arkansas River in the Tulsa area. These peak discharges are:

- 10-percent (10-year event): 90,000 cfs
- 2-percent (50-year event): 155,000 cfs
- 1-percent (100-year event): 205,000 cfs
- 0.2-percent (500-year event): 490,000 cfs

Harlow Creek velocity is highly dependent on upstream rain events. During normal conditions, little flow passes through Harlow Creek.

#### 3.5.3.3 Stratification

Stratification in the project area does not occur now nor would it occur following project implementation.

#### 3.5.3.4 Hydrologic Regime

Little flow passes through Harlow Creek during normal conditions. During large flood events, up to 4,000 cfs can be conveyed downstream. This would remain unchanged with the TSP, however enough water would be detained to relieve flood loading on the Levee B tieback to substantially reduce life risk within Levee B during storms of up to a 100 year event.

#### 3.5.3.5 Normal Water Level Fluctuations

A significant characteristic of the river hydraulics in the study area are high-frequency, large amplitude flow fluctuations resulting from large rain events. Flows within the study area regularly fluctuate from little to no water to large flows from storms.

#### 3.5.3.6 Salinity Gradients

No changes to salinity gradient would occur.

#### 3.5.3.7 Actions That Will Be Taken to Minimize Impacts

In Oklahoma, ODEQ is the permitting authority and administers the NPDES. Operators of construction activities that disturb 5 or greater acres must prepare a Storm Water Pollution Prevention Plan (SWPPP), submit a Notice of Intent to ODEQ and obtain authorization under OKR10, conduct onsite posting and periodic self-inspection, and follow and maintain the requirements of the SWPPP. During construction, the operator shall assure that measures are taken to control erosion, reduce litter and sediment carried offsite (silt fences, hay bales, sediment retention ponds, litter pick-up, etc.), promptly clean-up accidental spills, utilize BMPs onsite, and stabilize site against erosion before completion.

## 3.5.4 Suspended Particulate/Turbidity Determinations

### 3.5.4.1 Expected Changes in Suspended Particulates/Turbidity Levels in Vicinity of Disposal Site

Only minor temporary increases in suspended particulates and turbidity levels would likely occur during construction of the TSP. A Stormwater Pollution Prevention Plan (SWPPP) would be prepared, which would outline site-specific BMPs to minimize erosion and the potential for sediment to enter receiving waters during construction activities. The potential for suspended sediments would be further reduced using measures like a cofferdam, so that in-water construction would not occur. Therefore, except for a large storm event that might occur during project construction, most fill would occur within areas in a dry state. BMPs, such as silt curtains, would be used to reduce impacts.

### 3.5.4.2 Effects (degree and duration) on Chemical and Physical Properties of the Water Column

**Light Penetration:** Changes to light penetration would occur during construction and flood events would be associated with minor to temporary major turbidity increases. Appropriate erosion and sedimentation controls would be implemented to reduce impacts to downstream waters. After project completion and stabilization, the clarity of the stream would return to preconstruction levels.

**Dissolved Oxygen:** Temporary lowering of dissolved oxygen could occur during construction, but would be very temporary in both time and extent. Following construction the operation of the detention ponds, pre-construction conditions would return.

**Toxic Metals and Organics:** No water testing was conducted in the immediate detention pond area. The TSP would not result in the introduction of additional toxics into Harlow Creek or Arkansas River or its sediments over those that currently exist in the watershed. Businesses on the lands surrounding the study area, include oil and petroleum industries, utilities, and manufacturing, recycling, and concrete services, in addition to the usual automobile service centers, tire shops, and gasoline service stations that can be found in any community. In accordance with Resource Conservation and Recovery Act (RCRA), facilities that generate, transport, treat, store, or dispose of hazardous waste must provide information about their activities to state environmental agencies. There were over 100 waste sites identified by EnviroMapper located adjacent to Arkansas River within the project area generated by the businesses listed above. Most of the sites were identified as RCRA sites. According to the 2014 Toxics Release Inventory (TRI), there were 19 RCRA facilities that had releases in 2014. There were two facilities, Petroleum Electronics Mfg, Inc. and Power Electronics Mfg. Inc., which were identified by EnviroMapper as Superfund facilities. Both facilities are located approximately 3.5 miles upstream of the Zink Dam.

The TSP would not result in the introduction of additional HTRW wastes into Harlow Creek or the Arkansas River over those that currently exist through runoff of the surrounding lands. The project sponsor would be responsible to ensure the site is not contaminated prior to construction and would be responsible for reclamation, if necessary.

**Pathogens:** No pathogens would be added to the water column as a result of this project.

**Others as Appropriate:** No other effects to water column are anticipated

### 3.5.4.3 Effects on Biota

Displacement of local biota would occur during construction as mobile species would emigrate to adjacent habitats. Although sessile species would be impacted during construction activities,

over time and upon project completion, it is anticipated that biota would recolonize the project site at the same diversity and density as currently present under pre-project conditions.

**Primary Production, Photosynthesis:** The vegetation at the detention ponds consist of limited aquatic vegetation, maintained grasslands, and upland forest. As a result, little aquatic vegetation would be lost from the project site during implementation of the recommended project. Vegetation loss would be minimized to the extent possible by using BMPs and native grasses would be replanted once construction is complete. While there would be a temporary loss of primary producers as a result of project implementation, the loss is considered less than significant and is anticipated to return to pre-construction conditions.

**Suspension/Filter Feeders:** The presence of suspension/filter feeders in Harlow Creek at the detention pond locations are limited as the severe flow regime fluctuations resulting previous disturbances of channelization, and up and downstream culverts. This degraded aquatic structure has resulted in severely degraded and in some cases almost complete loss of aquatic functions necessary to sustain a riverine ecosystem. Therefore, there would be limited impact to suspension/filter feeders as a result of implementation of the recommended project within the project area. Any suspension/filter feeders that are located within the water of the river channel would simply disperse to undisturbed areas. BMPs would be established to control erosion and sedimentation downstream that may otherwise impact filter feeders. Once the relocated pool structure and other restoration features are constructed, suspension and filter feeders would repopulate to the current level. There would be very limited loss of suspension/filter feeders as a result of project construction, but the loss would be less than significant.

**Sight Feeders:** Sight feeders would be temporarily displaced during construction activities. BMPs would be established to control erosion and sedimentation downstream that may otherwise impact sight feeders. Once the construction is complete, sight feeders would repopulate to the current extent. No net loss of sight feeders is anticipated as the result of the TSP.

#### 3.5.4.4 Actions taken to Minimize Impacts

BMPs would be established to control erosion and sedimentation to minimize impacts to biota in Harlow Creek during construction.

### 3.5.5 Contaminant Determinations

No known contaminants are present within the areas to be excavated.

### 3.5.6 Aquatic Ecosystem and Organism Determinations

As described in Section 2, the TSP was selected after an extensive review of possible flood risk reduction alternatives to meet the Project's purpose and need with the emphasis was on life safety, as well as to be most practicable implementable project. Accordingly, long-term impacts associated with the TSP were determined to have moderate benefits to life safety, and minor adverse effects on water resources, fish and wildlife, and threatened and endangered species.

#### 3.5.6.1 Effects on Plankton and Nekton

Plankton and nekton that current occupy the sediments and water columns in the existing sites of the TSP features would be adversely impacted by fill activities, but it is anticipated that the impact would be temporary and short-term as these species would recolonize the sites once construction is complete.

#### 3.5.6.2 Effects on Benthos

No additional effects other than those previously discussed were identified.

### 3.5.6.3 Effects on Aquatic Food Web

Temporary disruptions to the food web would occur during construction. However, following construction it is anticipated that limited species at all levels of the food web would return to the same level as currently exists in the proposed detention areas. Therefore, no net loss of species or negative impacts to trophic levels are anticipated as the result of the TSP.

### 3.5.6.4 Effects on Special Aquatic Sites

**Sanctuaries and Refuges:** No fish and wildlife sanctuaries or refuges occur within the project area.

**Wetlands:** Harlow Creek flows for approximately 1,833 feet within the proposed detention pond areas. This reach was previously straightened during the construction of Levees A and B and again impacted during the construction of road and highways crossings adjacent to the proposed detention areas. Construction of the detention ponds would result in adverse impacts to the 1,833 linear feet of Harlow Creek to include its creek bed and banks. Upon construction completion the creek would continue to flow as it does now in the same footprint as it exists today. The permanent change would come from the lower creek banks to allow for temporary flood water storage during storm events. Within 24 hours of a storm event passing, creek flows would return to normal. While no permanent net loss of wetland footprint would occur during construction or operation of the detention ponds, coordination with resources agencies is ongoing to determine the appropriate number of mitigation bank credits to offset any loss of stream habitat.

**Mud Flats:** No mud flats were observed in the area to be impacted by the project.

**Vegetated Shallows:** No vegetated shallows were observed in the area to be impacted by the project.

**Coral Reefs:** No coral reefs occur within the project area.

**Riffle and Pool Complexes:** There are degraded riffle and pool complexes in the project area, but the highly variable flows and channelization activities has adversely impacted their habitat value within the project area.

**Riverine Sand Bars:** No riverine sand bar were observed in the area.

**Threatened and Endangered Species:** USACE has determined that the construction and operation of the TSP, particularly the detention ponds may affect, and is likely to adversely affect the American Burying Beetle. A Biological Assessment has been prepared, and submitted to the USFWS Oklahoma Ecological Services Office as part of a request for formal consultation under the Endangered Species Act. In total, up to approximately 9 acres of American Burying Beetle habitat would be semi-permanently removed in the excavation of the detention ponds.

To reduce impacts to the American Burying Beetle, onsite conservation measures within the detention include replanting the area with native grasses, allowing the grass height within the detention ponds to remain at least 8 inches in height and limit mowing, and other ground disturbances, to a minimum. The of purchase credits from an American Burying Beetle conservation bank will reduce the impacts to American Burying Beetle to less than significant. During the PED phase, USACE will conduct USFWS approved ABB surveys to confirm ABB presence. If no American Burying Beetle are detected, USFWS will be consulted with to reevaluate mitigation needs.

**Other Wildlife:** Wildlife inhabiting the aquatic and riparian habitats within the project reach would be temporarily displaced during construction. Mobile species would migrate to adjacent

habitats. Although sessile species would be impacted during construction activities, they would be expected to return to suitable habitat areas following construction.

The potential impacts from the construction of the pool control structure on wildlife within the study area are expected to provide short term, minor adverse impacts from the excavation of the detention ponds.

Short term, adverse impacts are anticipated for biological resources from the construction of the detention ponds. The potential for some temporary sedimentation and water quality degradation of downstream habitats during construction would occur but would be reduced to the extent possible through implementation of best management practices.

#### 3.5.6.5 Other Effects

**Land Use, Transportation, and Utilities:** Temporary, adverse impacts to residential land use, recreation, and transportation may occur near construction areas, construction easements, along haul routes, and in open areas such as parking lots of maintained fields.

Some utilities including water, electricity, sewer, telecommunications, etc may be temporally or permanently relocated, but not cut off entirely, in order to construct the TSP. Temporary, adverse impacts to utilities may occur near construction areas, construction easements, along haul routes, and in open areas such as parking lots of maintained fields as utilities are relocated. During utility relocations, scheduled temporary outages may be needed. These temporary outages would be announced to the public in advance so adequate preparations can be made.

**Cultural Resources:** Potential impacts to cultural resources include disturbance of known or previously undiscovered archaeological material at the detention pond and filtered berm sites, as well as access routes, and construction laydown areas. If it is determined that the levees themselves are eligible for listing in the NRHP, construction impacts to the levees could constitute an adverse effect under Section 106 of the NHPA. In addition to direct impacts that may be caused by construction of the TSP, changes to the viewshed of any historic properties determined to be present may also occur. A draft programmatic agreement (PA) to avoid, minimize, and mitigate potential adverse effects in accordance with 36 CFR 800.14I; is being developed. The executed final PA will be included in the final feasibility report.

### Recommended Disposal Site Determinations

#### 3.5.6.6 Mixing Zone Determination

No mixing is expected to occur within jurisdictional waters. Disposal of material would occur at an offsite location that is not within waters of the United States.

#### 3.5.6.7 Determination of Compliance with Applicable Water Quality Standards

Potential impacts on water quality may occur during construction and post-construction operation detention ponds. During the construction phase, stormwater runoff would have the potential to transport sediment and other pollutants to receiving waters. However, implementation of standard construction BMPs (e.g., silt fences, coffer dams) during construction and revegetation following construction would minimize the risk. The ODEQ stormwater permit (National Pollutant Discharge Elimination System construction permit) would establish practices to be implemented to protect water quality. As result, the potential for adverse impacts on water quality during construction would be short-term and minor.

Long-term, the operation of the detention ponds would facilitate life and property risk reduction by reducing flood loading on the Levee B tieback during large storm events. The 2016 Oklahoma Department of Environmental Quality (ODEQ) 303(d) listings indicate that Harlow Creek (OK120420010170\_00), Bigheart Creek (OK120420010140\_00), and the Arkansas River (OK120420010010\_10 and \_00) are impaired for a variety of water quality standards. Bigheart Creek is listed as impaired for *E. coli*, and fish bioassessments. Harlow Creek is impaired for

benthic macroinvertebrates bioassessments, *E. coli*, and fish bioassessments, The Arkansas River, adjacent to Levees A and B, is impaired for turbidity and cadmium. The TSP would not be expected to change these impairment statuses as normal creek flow would continue as it does in its existing form and flood flows would only be temporarily detained and drain within 24 hours from the detention ponds.

#### 3.5.6.8 Potential Effects on Human Use Characteristics

**Municipal and Private Water Supply:** Municipal and private water supplies in the action area rely on surface water from area reservoirs. While the project area is not located in the vicinity of any of these reservoirs, there are downstream reservoirs on the Arkansas River that serve as water supply for downstream communities. However, implementation of the TSP would have no impact on local water supply.

**Recreational and Commercial Fisheries:** No effects to recreational and commercial fisheries are anticipated.

**Water Related Recreation:** No effects to water related recreation are anticipated.

**Aesthetics:** Minor adverse impacts are expected from the excavation of detention dams due to the clearing of approximately 1.88 acres of trees that would be replanted with native grasses.

**Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Areas, and Similar Preserves:** No impacts to conservation areas are anticipated from the TSP.

### 3.6 Determination of Cumulative Effects on the Aquatic Ecosystem

Two known projects were identified and considered to have potential cumulative effects, mostly due to the overlapping region of influence (ROI) in the study area. They include reconstruction of the existing low water dam and recreational improvements in Zink Lake, and the Arkansas River Corridor Ecosystem Restoration Project.

There would be no significant negative cumulative effects on the aquatic environment. The TSP in combination with other planned projects, either recently completed, ongoing, or proposed within the project area of the TWT levees, are not expected to add significant cumulative effects to natural, physical or human environments with the majority of effects being negligible to slightly adverse in regards to habitat but moderately beneficial in terms of life safety. Cumulative aquatic impacts would be limited to a semi-permanent loss of stream habitat along Harlow Creek.

### 3.7 Determination of Secondary Effects on the Aquatic Ecosystem

BMPs to minimize impacts associated with construction activities have been identified and would be refined during design activities, as would construction timing considerations. BMPs are expected to include schedules of activities, prohibitions of practices, maintenance procedures, structural controls, local ordinances, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control construction site runoff, spills or leaks, waste disposal, or drainage from raw material storage areas. BMPs such as cofferdams, turbidity curtains, and appropriate dewatering measures would be implemented for in-water work. Additional erosion control and stabilization practices may include but are not limited to: establishment of temporary or permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips,

protection of existing vegetation, temporary velocity dissipation devices, flow diversion mechanisms, silt fencing, sediment traps, and the prompt revegetation of disturbed areas. These measures would reduce potential impacts to water quality. Implementation of sediment and erosion controls during construction activities would maintain runoff water quality at levels comparable to existing conditions.

Approximately 1,833 linear feet of Harlow Creek and its creek banks would be excavated during the construction of the detention ponds.

To reduce impacts to less than significant, the appropriate number of credits would be purchased from a local stream mitigation bank. The current stream habitat quality is being evaluated with resource agencies to determine the number of credits needed. Based on the reach of Harlow Creek within the detention areas, existing habitat quality is expected to be moderate at best as the banks are mowed right up to the water's edge and are adjacent to, or bound by culverts passing under local roadways.

### 3.8 Summary of 404(b)(1) Analysis

Section 404 (b)(1) of the Clean Water Act of 1972 requires that any recommended discharge of dredged or fill material into waters of the United States must be evaluated using the guidelines developed by the Administrator of the U.S. Environmental Protection Agency (EPA) in conjunction with the Secretary of the Army. These guidelines are located in Title 40, Part 230 of the Code of Federal Regulations. The Section 404 (b)(1) evaluation in this Appendix analyzes all activities associated with the TSP that involve the discharge of dredged or fill material into waters of the United States.

Under the 404(b)(1) guidelines, no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the recommended discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. 40 CFR 230.10(a)(2).

A comprehensive alternatives analysis was done as part of the Feasibility Study and Integrated Environmental Assessment. The study determined there were four practicable alternatives, including the No Action Alternative, as discussed in Section 2.1 and 2.2 above. Only these alternatives sufficiently meet the overall project purposes (summarized as life and property risk reduction from flooding) to be considered practicable. Alternatives 1E and 3B would have essentially the same environmental impact. See Table 2.3 and Section 2.4 above. However, Alternative 1E would be cost less. Alternative 5, residential buyouts, would not impact jurisdictional waters at all, however Environmental Justice impacts could be significant. Based on life safety, potential terrestrial habitat, cultural, and Environmental Justice impacts, in addition to costs, Alternative 1E was selected as the TSP.

While implementation of the TSP would involve the excavation and reshaping of 1,833 linear feet of Harlow Creek, this excavation would not violate established State water quality standards or the Toxic Effluent Standards of Section 307 of the Clean Water Act of 1977, as amended, nor harm any endangered species or their critical habitat. Implementation of the TSP would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Appropriate steps to minimize potential adverse impacts of discharge in aquatic systems include use of suitable erosion control technologies together with the implementation of procedures to protect against erosion and sedimentation during and after construction.

In Oklahoma, ODEQ is the permitting authority and administers the NPDES. Operators of construction activities that disturb 5 or greater acres must prepare a Storm Water Pollution

Prevention Plan (SWPPP), submit a Notice of Intent to ODEQ and obtain authorization under OKR10, conduct onsite posting and periodic self-inspection, and follow and maintain the requirements of the SWPPP. During construction, the operator shall assure that measures are taken to control erosion, reduce litter and sediment carried offsite (silt fences, hay bales, sediment retention ponds, litter pick-up, etc.), promptly clean-up accidental spills, utilize BMPs onsite, and stabilize site against erosion before completion.



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# **APPENDIX E 5: Other Compliance Tulsa and West-Tulsa Levees Feasibility Study**

**August 2019**

## **Wadlington, Brandon E CIV USARMY CESWF (US)**

---

**From:** Ramos, Roberto (FAA) <Roberto.Ramos@faa.gov>  
**Sent:** Wednesday, August 21, 2019 10:34 AM  
**To:** Wadlington, Brandon E CIV USARMY CESWF (US)  
**Cc:** McMath, Dean (FAA); Siddens, Janny (FAA); Barker, Justin (FAA)  
**Subject:** [Non-DoD Source] Tulsa and West Tulsa Levees Feasibility Study  
**Attachments:** TWT TSP Map.jpg; USACE - RVS.jpg; USACE - TUL.jpg; USACE - OWP.jpg

Good morning Brandon,

Thank you for speaking with me this morning to discuss the Army Corps of Engineers proposed Tulsa and West Tulsa Levees Feasibility Study. I understand the Corps proposes to construct two intermittent detention ponds as shown on the attached figure to handle overflow during storm or flood events; these will normally be dry otherwise.

FAA Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports. For all airports, the FAA recommends a separation distance of 5 statute miles ("Perimeter C") between the farthest edge of the airport's Air Operations Area (AOA) and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace. The proposed location of the detention ponds has been measured in Google Earth for the distance from the AOA of three airports in the Tulsa metropolitan area: Tulsa International Airport (TUL), RL Jones, Jr. Airport (RVS), and William R. Pogue Municipal Airport (OWP) in Sand Springs:

TUL AOA farthest edge to North Detention Pond (proposed pond north of US Highway 412): 8.20 miles - Outside of Perimeter C

RVS AOA farthest edge to South Detention Pond (proposed pond south of US Highway 412): 8.40 miles – Outside of Perimeter C

OWP AOA farthest edge to South Detention Pond: 5.79 miles – Outside of Perimeter C

Since both proposed detention ponds are beyond Perimeter C for each airport's AOA, FAA does not foresee any issues with regards to hazardous wildlife attractants. Thank you for consulting with our office and please advise me should the scope of the proposed levee project change, i.e. additional detention ponds or other locations for the ponds are considered.

Thanks

Robb

Robb Ramos

Environmental Protection Specialist

Arkansas/Oklahoma Airports District Office

(817) 222-5359

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Mailing Address:

DOT/FAA

AR/OK ADO, ASW-630E

10101 Hillwood Parkway

Fort Worth, Texas 76177

-----Original Message-----

From: Wadlington, Brandon E CIV USARMY CESWF (US) <BRANDON.E.WADLINGTON@usace.army.mil>

Sent: Wednesday, August 21, 2019 8:58 AM


To: Ramos, Roberto (FAA) <Roberto.Ramos@faa.gov>

Subject: RE: Tulsa, Oklahoma Area POC

Brandon Wadlington

Biologist

Regional Planning and Environmental Center US Army Corps of Engineers

: 817-886-1720

Cell: 817-609-5131

-----Original Message-----

From: Ramos, Roberto (FAA) [mailto:Roberto.Ramos@faa.gov <mailto:Roberto.Ramos@faa.gov> ]

Sent: Wednesday, August 21, 2019 8:49 AM

To: Wadlington, Brandon E CIV USARMY CESWF (US) <BRANDON.E.WADLINGTON@usace.army.mil  
<mailto:BRANDON.E.WADLINGTON@usace.army.mil> >

Subject: [Non-DoD Source] RE: Tulsa, Oklahoma Area POC

Hi Brandon, yes I am. I'll call shortly if this is a good time.

Robb

Robb Ramos

Environmental Protection Specialist

Arkansas/Oklahoma Airports District Office

(817) 222-5359

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BlockedBlocked<http://www.faa.gov/airports/>

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10101 Hillwood Parkway

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-----Original Message-----

From: Wadlington, Brandon E CIV USARMY CESWF (US) <BRANDON.E.WADLINGTON@usace.army.mil  
<mailto:BRANDON.E.WADLINGTON@usace.army.mil> >

Sent: Wednesday, August 21, 2019 7:37 AM

To: Ramos, Roberto (FAA) <Roberto.Ramos@faa.gov <mailto:Roberto.Ramos@faa.gov> >

Subject: Tulsa, Oklahoma Area POC

Good morning Mr. Ramos

I coordinated a Tulsa, OK area project with you a year or two ago, I've got a couple more in the area. Are you still the FAA POC for that region?


Thanks

Brandon Wadlington

Biologist

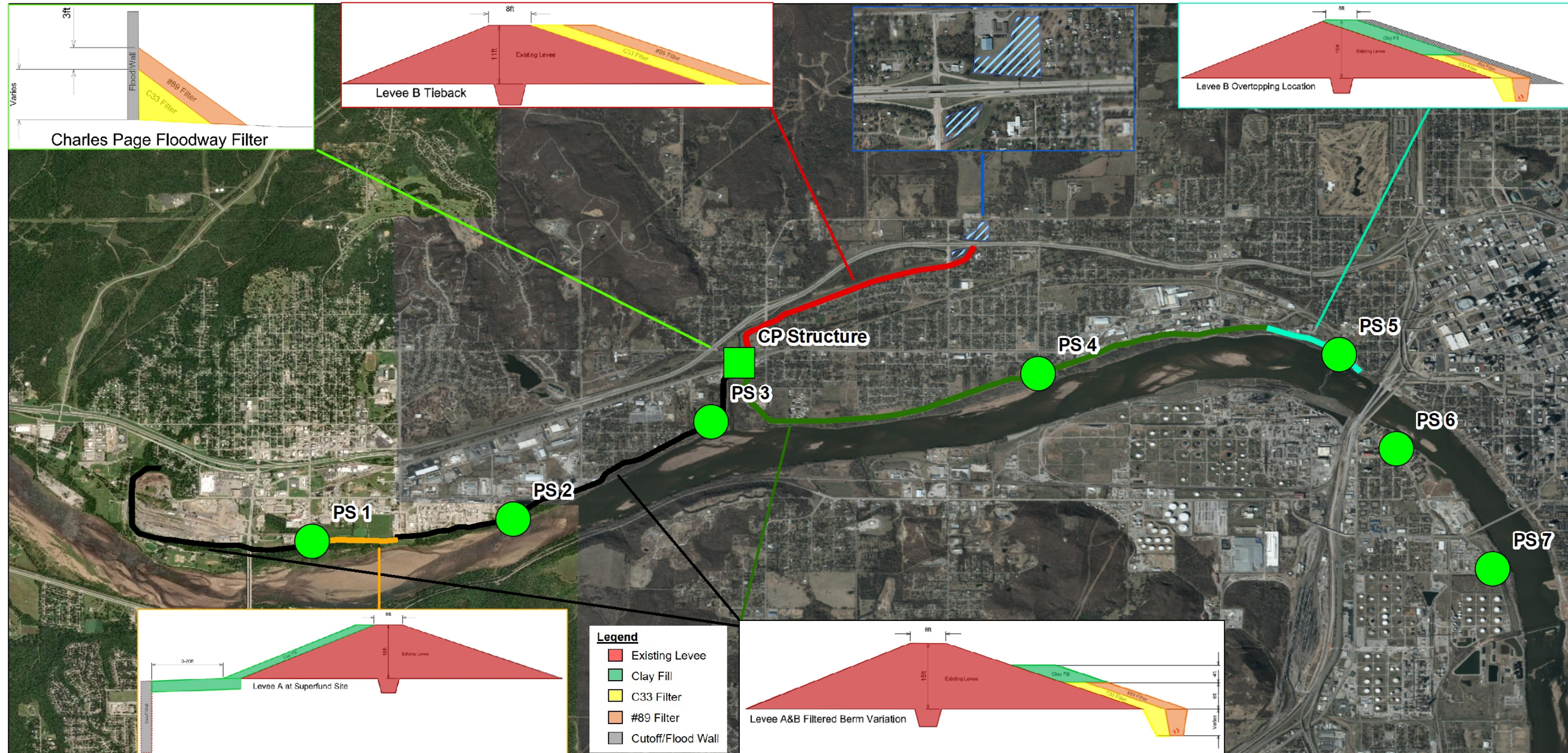
Environmental Branch

Regional Planning and Environmental Center US Army Corps of Engineers

: 817-886-1720

Mobile: 817-609-5131

Brandon.wadlington@usace.army.mil <mailto:Brandon.wadlington@usace.army.mil>

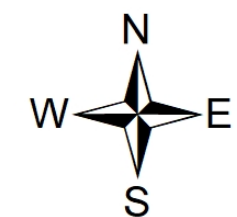


## Tulsa & West Tulsa Levees Feasibility Study

### Tentatively Selected Plan

- |  |   |  |                                    |  |                               |  |                |
|--|---|--|------------------------------------|--|-------------------------------|--|----------------|
|  | A - Landside Filtered Berm w/ Toe Drains        |  | B - Landside Impervious Blanket    |  | Landside Filter @ CP Floodway |  | Detention Pond |
|  | A - Cutoff Wall w/ Riverside Impervious Blanket |  | B Tieback - Landside Filtered Berm |  | Rebuild Pump Station          |  |                |
|  | B - Landside Filtered Berm w/ Toe Drains        |  |                                    |  |                               |  |                |

0 0.5 1 2 Miles





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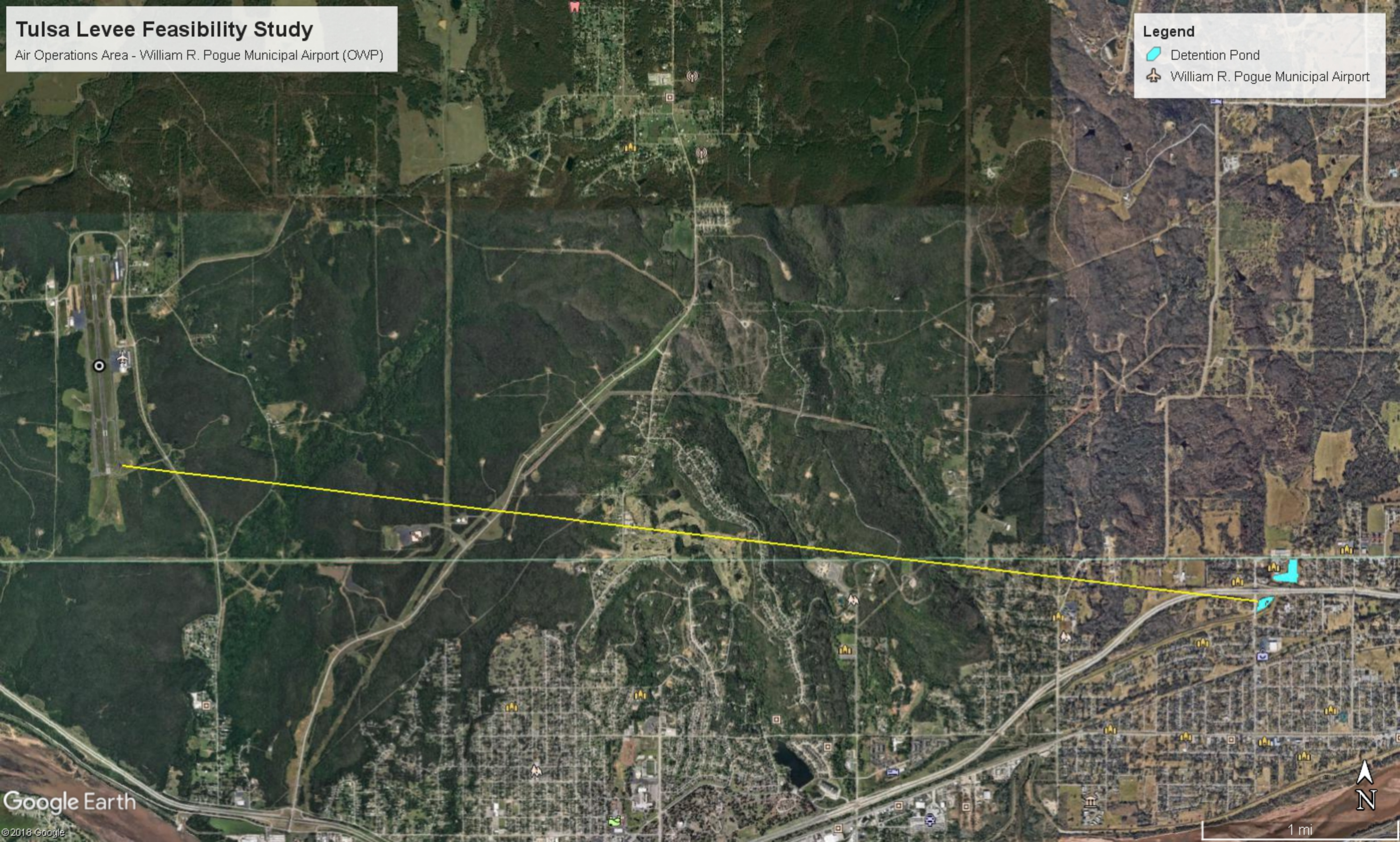
# Tulsa Levee Feasibility Study

Air Operations Area - William R. Pogue Municipal Airport (OWP)

Legend

 Detention Pond



 William R. Pogue Municipal Airport

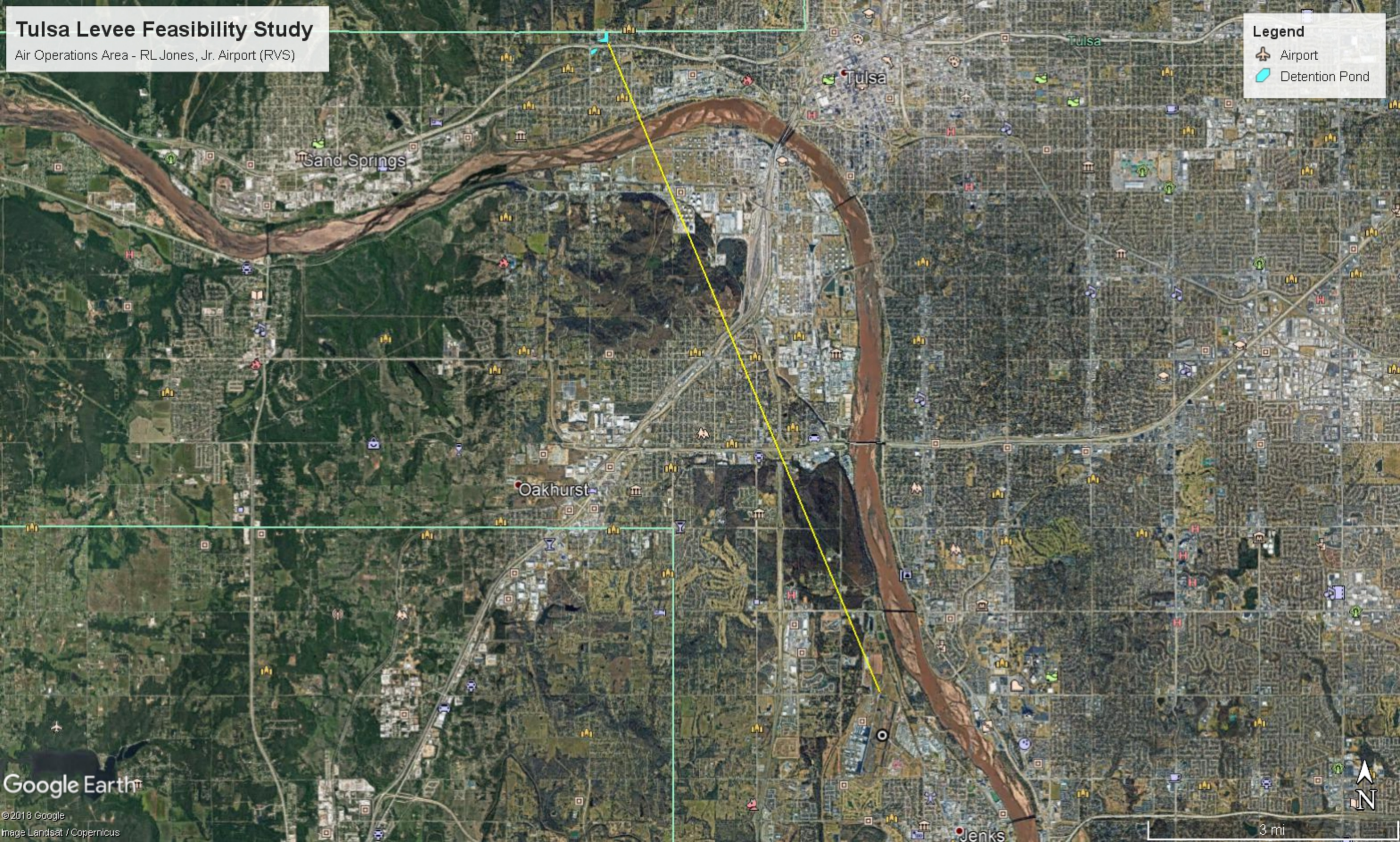


# Tulsa Levee Feasibility Study

Air Operations Area - RL Jones, Jr. Airport (RVS)

## Legend

-  Airport
-  Detention Pond

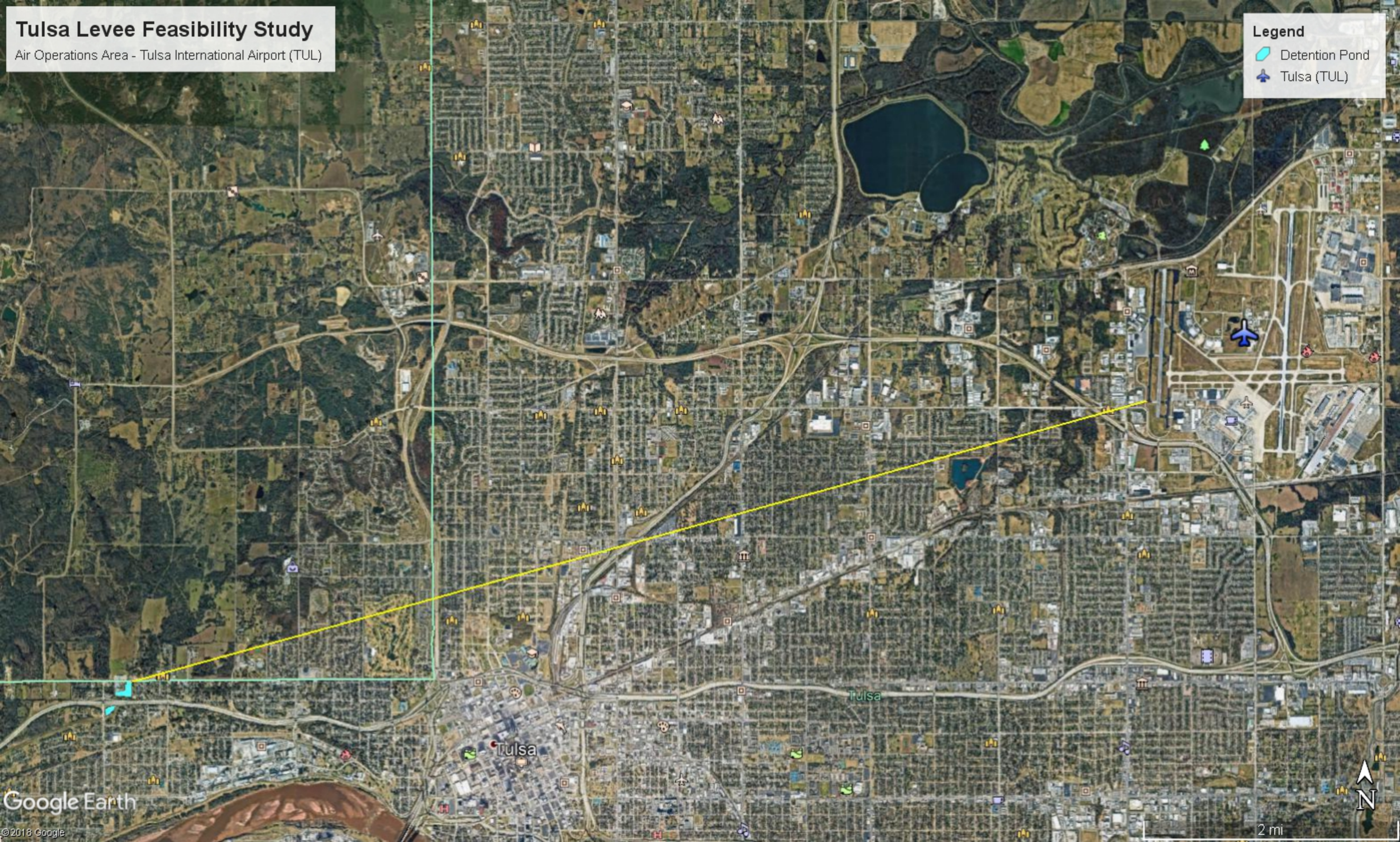


# Tulsa Levee Feasibility Study

Air Operations Area - Tulsa International Airport (TUL)

## Legend

- Detention Pond
- Tulsa (TUL)





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# **APPENDIX E 6: Mitigation Plan Tulsa and West-Tulsa Levees Feasibility Study**

**September 2019**

# **1 AQUATIC HABITAT MITIGATION**

## **1.1 Habitat Impacts**

Approximately 1,833 linear feet of Harlow Creek and its creek banks would be excavated during the construction of the detention ponds. In total, approximately 2.9 million cubic feet would be excavated when including the upland areas within the 9 acres of detention area. Between five to eight feet of depth would be excavated to contain the 1% ACE event and relieve flood load on the Levee B tieback. The creek bed would be widened and bank slopes reduced to create the detention volume. Post-construction, the creek would flow in its existing path. The adjacent banks and detention area would be planted with native vegetation, mostly grasses, with infrequent mowing occurring.

## **1.2 Compensatory Habitat Mitigation**

To reduce impacts to less than significant, the appropriate number of credits would be purchased from a local stream mitigation bank. The current stream habitat quality is being evaluated with resource agencies to determine the number of credits needed. Based on the reach of Harlow Creek within the detention areas, existing habitat quality is expected to be moderate at best as the banks are mowed right up to the water edge and are adjacent to, or bound by culverts passing under local roadways.

Coordination efforts are underway to determine how many credits will be required to fully offset unavoidable, adverse impacts to aquatic habitat within Harlow Creek.

# **2 FEDERALLY THREATENED AND ENDANGERED SPECIES MITIGATION**

## **2.1 Species Impacts**

USACE has determined that the construction and operation of the TSP, particularly the detention ponds may affect, and is likely to adversely affect the American Burying Beetle. A Biological Assessment has been prepared, and submitted to the USFWS Oklahoma Ecological Services Office as part of a request for formal consultation under the Endangered Species Act. In total, up to approximately 9 acres of American Burying Beetle habitat would be semi-permanently removed in the excavation of the detention ponds. No surveys were conducted to confirm presence of American Burying Beetle. As such, occupied, high quality habitat was assumed within the entire 9 acre detention pond area.

## **2.2 Compensatory Species Mitigation**

To reduce impacts to the American Burying Beetle, onsite conservation measures within the detention include replanting the area with native grasses, allowing the grass height within the detention ponds to remain at least 8 inches in height and limit mowing, and other ground disturbances, to a minimum. The purchase of credits from an American Burying Beetle conservation bank will reduce the impacts to American Burying Beetle to less than significant. During the PED phase, USACE will conduct USFWS approved ABB surveys to confirm ABB

presence. If no American Burying Beetle are detected, USFWS will be consulted with to reevaluate mitigation needs.