FINAL REPORT

Timberland and Agricultural Land Impact Assessment
For Selected Water Resource Options in the
Sulphur River Basin

Prepared for:

The Sulphur River Basin Authority (SRBA)

October 20, 2015

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EXECUTIVE SUMMARY

During the summer of 2015, the Sulphur Basin Group (SBG) conducted a series of inspections and analyses for the final assessment of impact for potential pool raise (reallocation) and reservoir construction projects at Wright Patman Lake and the Marvin Nichols 1A damsite within the Sulphur River Basin on timber and other agricultural production at those sites.

An initial assessment was conducted during the first quarter of 2015, limited in geographic scope to the area within the 313.5 feet National Geodetic Vertical Datum (ft-NGVD) contour at the Marvin Nichols site; at the time, it was thought that this was the largest conservation pool that would be likely to be necessary to meet targeted project yields. However, additional information developed during the spring of 2015 indicated that the recent droughts had impacted the estimated firm yield of reservoirs within the Sulphur Basin to a greater extent than anticipated and that a larger scope of the Marvin Nichols project should be evaluated.

This need to expand the analysis, along with newly available aerial imagery, provided an opportunity to better evaluate the study areas with new information and to address concerns developed in the initial assessment relating to the general lack of public access to evaluate certain timber resources. Additionally, we were also able to apply "lessons-learned" from the initial analysis with respect to developing a more robust and flexible GIS data base to better support a future scenario-based assessment. As a result, this final assessment used a more refined approach to evaluate the timber resources. The final assessment includes estimates of the impacted land area, volume/value of timberlands, and area/value of agricultural lands impacted within the following project boundaries:

- Wright Patman Lake Reallocation: Between elevation 242.5 ft-NGVD and 228.64ft-NGVD; and
- Marvin Nichols Reservoir: Below elevation 328 ft-NGVD.

Parcel Impact Analysis

The respective study area boundaries for both the Wright Patman Lake and Marvin Nichols Reservoir projects correspond to the maximum anticipated water supply strategies. The initial timber and agricultural land impact study relied significantly upon County Appraisal District (CAD) parcel appraisal information in developing a database for each parcel appraised for agricultural land or timberland uses. The initial assessment employed digitizing of impacts to verify or modify the CAD appraisal records used. This final impact assessment, while relying upon CAD records somewhat for agricultural land, did not rely on it at all for timberland, instead opting to focus more on supplementing field reconnaissance and use of newly available 2015 digital aerial imagery in a GIS format.

As in the initial assessment, SBG again teamed with professional foresters from Kingwood Forestry Services (KFS). Due to their expertise, KFS performed all impact analysis for the final assessment,

utilizing the newly available 2015 (leaf-off) high resolution digital imagery and helicopter reconnaissance of the study areas to augment the initial field investigations for timberland classifications. Unlike the initial study, in this final impact assessment, KFS established GIS "shape files" of impacted parcels, categorized by size/type of impact within the study area boundaries.

In the case of Wright Patman, the study area represents the difference in acreage between the 242.5 ft-NGVD contour and the 228.64 ft-NGVD contour (top of ultimate rule curve proposed in the Corps contract with the City of Texarkana). CAD information previously obtained for private parcels in Bowie and Cass counties in the initial assessment was again used for comparison with map reviews. All impacts in Morris County were found to occur on government-owned land at Wright Patman Lake, within the White Oak Creek Mitigation Area (WOCMA), so no private parcel impacts were assessed for Morris County. All impacted parcels in Titus, Franklin and Red River counties are in private ownership and additional CAD information was obtained for these parcels between elevation 313.5 ft-NGVD (the limits of initial study) and the 328 ft-NGVD study limits of this final assessment.

Impacts were generally classified by qualities of Hardwood, Mixed Pine and Hardwood, Pine, Range, Crop, Wildlife and Water. General land use for each project boundary derived from this process is shown in Table ES-1 below.

Table ES-1
General Land Use Classification

	WPLR	MNR
Total Impacted Acreage	33,931	66,216
Classification %		
Hardwood	59.0%	63.0%
Mixed	28.2%	0.0%
Pine	5.9%	0.4%
Range	2.2%	33.9%
Crop	0.0%	0.7%
Wildlife	4.0%	0.1%
Non-Ag	0.7%	0.4%
Water	0.0%	1.5%

This schema for itemized land classification was further itemized to reflect the quality/commercial value of the timber in each category generally following the procedures used in the initial efforts. Itemized parcel area impacts used a land cover classification system for timberland of Hardwood (H)(categories 1-4, with 1 being the highest and 4 having little to no merchantable value), Mixed pine and hardwood (M1-M4), and Pine (P1-P4). For agricultural land the system included Rangeland (R1-R4), Tilled cropland (Crop), Wildlife (W1), Water (water covered land) or Other (Non-Ag). All agricultural land classifications for the most part adhered to previous classification approach, based on the CAD appraisal system. Total acres of each classification within the project boundary for Wright Patman Lake and Marvin Nichols are shown in Tables ES-2 and ES-3, respectively.

Table ES-2
Extent of Impacted Land by Classification at Wright Patman Lake (acres)

CLASS	BOWIE	CASS	GOVERNMENT	TOTAL
H1	270	80	13,503	13,853
H2	262	497	2,823	3,582
H3	640	111	1,119	1,870
H4	529	197	0	726
M1	4	56	8,762	8,822
M2	4	30	144	178
M3	68	9	442	519
M4	31	0	6	37
P1	3	0	1,935	1,938
P2	0	0	0	0
P3	32	3	0	35
P4	12	20	0	32
R1	341	56	0	397
R2	6	29	17	52
R3	61	0	0	61
R4	226	0	0	226
CROP	0	0	0	0
W1	0	241	1,102	1,343
NON-AG	9	0	251	260
WATER	0	0	0	0
TOTAL	2,498	1,329	30,104	33,931

*** All values rounded to nearest acre**

Table ES-3
Extent of Impacted Land by Classification at Marvin Nichols Reservoir (acres)

CLASS	RED RIVER	TITUS	FRANKLIN	TOTAL
H1	2,424	835	175	3,434
H2	8,615	3,272	1,833	13,720
H3	8,550	2,763	712	12,025
H4	8,536	2,095	1,896	12,527
M1	28	0	0	28
M2	0	0	0	0
M3	0	0	0	0
M4	0	0	0	0
P1	32	0	0	32
P2	0	0	0	0
P3	166	0	0	166
P4	87	0	0	87
R1	15,933	1,122	159	17,214
R2	2,608	738	16	3,362
R3	605	707	161	1,473
R4	90	251	25	366
CROP	439	0	0	439
W1	0	55	0	55
NON-AG	219	61	37	317
WATER	895	73	3	971
TOTAL	49,227	11,972	5,017	66,216

*** All values rounded to nearest acre**

Valuation Process

For agricultural land impacts (range, pasture or crop lands) on privately owned parcels, the valuation process was based on the "lease value" approach typically in use by all CADs and other agencies. The lease/rental values used for estimating value for areas of impacted agricultural lands were based on selections from the publication "Texas Rural Land Value Trends 2013" as published by the Texas Chapter of the American Society of Farm Managers and Rural Appraisers, Inc. (ASFMRA). There being no readily available guidance or methodology for this type of valuation, the method used was to estimate economic impact based on three times the selected rental/lease value (equivalent to three years of rental/lease).

Market volume impacts to timberland were evaluated by SBG/KFS personnel. In addition to the initial classification and inspection efforts, a helicopter reconnaissance was planned and conducted by KFS professional foresters along a route designed to visit specific stands on both lake study areas which could not be viewed in initial efforts due to lack of access. Helicopter reconnaissance allowed the aerial inspection of stands visited on the ground in previous efforts to be used as a basis of comparison to

other unfamiliar stands. Further, specific stands of various classification types were visited which could not be seen from the ground which also aided in "calibrating" the use of 2015 digital aerial imagery.

The combined use of past inspection efforts, helicopter reconnaissance, and the 2015 digital aerial imagery facilitated KFS being able to establish better estimates of timber volumes than was possible in the initial assessment and to gather photo-documentation of several representative stand types for visual representation in this report to aid in both volume and value estimates by KFS.

Timberland volume estimates were based on both field and aerial inspection within the corresponding stand categories. Based on these inspections, KFS accomplished field volume estimates by general product categories Hardwood Sawtimber (HST), Hardwood Pulpwood (HPW); Pine Sawtimber (PST), and Pine Pulpwood (PPW) which were input into a spreadsheet for analysis and the selection of volumes, subsequently translated to value estimates and tables for each timber classification in the Wright Patman Lake and Marvin Nichols Reservoir study areas. Timber volume assessment by classification types are shown in Table ES-4 and ES-5 for Wright Patman Lake and Marvin Nichols Reservoir, respectively.

Table ES-4
Timber Assessment by Classification Type – Wright Patman Lake (tons)

CLASS	TYPE	BOWIE	CASS	GOVERNMENT	TOTAL
H1	HST	8,100	2,392	405,076	415,568
H1	HPW	10,801	3,189	540,101	554,091
H2	HST	3,932	7,453	42,346	53,731
H2	HPW	11,795	22,358	127,037	161,190
H3	HPW	9,596	1,663	16,791	28,050
H4	HPW	15,858	5,921	-	21,779
M1	HST	40	560	87,617	88,217
M1	HPW	159	2,241	350,466	352,866
M1	PST	80	1,120	175,233	176,433
M1	PPW	20	280	43,808	44,108
M2	HPW	54	443	2,164	2,661
M2	PST	89	739	3,607	4,435
M2	PPW	18	148	721	887
M3	HPW	1,017	135	6,623	7,775
M3	PPW	678	90	4,415	5,183
M4	HPW	309	-	61	370
M4	PPW	309	-	61	370
P1	HST	14	-	9,674	9,688
P1	HPW	41	1	29,021	29,063
P1	PST	247	4	174,128	174,379
P1	PPW	41	1	29,021	29,063
P3	HPW	320	30	-	350
P3	PPW	1,922	178	-	2,100
P4	HPW	59	102	-	161
P4	PPW	296	511	-	807
TOTALS		65,795	49,559	2,047,971	2,163,325

*** All values rounded to nearest ton**

Table ES-5
Timber Assessment by Classification Type – Marvin Nichols Reservoir (tons)

CLASS	TYPE	RED RIVER	TITUS	FRANKLIN	TOTAL
H1	HST	72,726	5,247	25,044	103,017
H1	HPW	60,605	4,373	20,870	85,848
H2	HST	86,145	18,330	32,721	137,196
H2	HPW	301,509	64,154	114,525	480,188
H3	HST	42,750	3,559	13,816	60,125
H3	HPW	171,002	14,236	55,265	240,503
H4	HPW	85,364	18,965	20,952	125,281
M1	HST	285	-	-	285
M1	HPW	570	-	-	570
M1	PST	570	-	-	570
M1	PPW	142	-	-	142
P1	HPW	162	-	-	162
P1	PST	1,625	-	-	1,625
P1	PPW	325	-	-	325
P3	HPW	1,662	-	-	1,662
P3	PPW	8,310	-	-	8,310
P4	PPW	2,187	-	-	2,187
TOTALS		835,939	128,864	283,193	1,247,996

*** All values rounded to nearest ton**

Timberland value per acre was estimated for each land cover classification based on "Stumpage" ($/ton) and estimated density in tons per acre. The timber density values differ for each project site based on the inspection efforts. The resulting "value per acre estimates" within the Wright Patman Lake and Marvin Nichols Reservoir study areas, as well as the estimated values per acre for range/cropland and wildlife/wetland areas, are provided in Table ES-6 and ES-7, respectively. On the basis of these land cover unit values, a summary of the overall estimated value of timber and agriculture on impacted lands within the Wright Patman Lake Reallocation and Marvin Nichols Reservoir project areas is provided in Table ES-8 and ES-9, respectively.

Table ES-6
Value per Acre by Classification Type – Wright Patman Lake

WRIGHT PATMAN LAKE - DENSITIES & UNIT VALUES					
STUMPAGE ($/TON)	$35.00	$15.00	$30.00	$8.00	VALUE
PRODUCT (TONS/ACRE)	HST (TONS/AC)	HPW (TONS/AC)	PST (TONS/AC)	PPW (TONS/AC)	($/ACRE)
CATEGORY					
H1	30	40			$ 1,650
H2	15	45			$ 1,200
H3		30			$ 450
H4		15			$ 225
M1	10	40	20	5	$ 1,590
M2		15	25	5	$ 1,015
M3		15		10	$ 305
M4		10		10	$ 230
P1	5	15	90	15	$ 3,220
P2	5	15	50	30	$ 2,140
P3		10		60	$ 630
P4		5		25	$ 275
R1					$ 180
R2					$ 120
R3					$ 75
R4					$ 45
W1					$ 450
WATER & NON					$ -

Table ES-7
Value per Acre by Classification Type – Marvin Nichols Reservoir

MARVIN NICHOLS RESERVOIR - DENSITIES & UNIT VALUES					
STUMPAGE ($/TON)	$35.00	$15.00	$30.00	8.00	TOTAL
PRODUCT (TONS/ACRE)	HST	HPW	PST	PPW	($/ACRE)
CATEGORY					
H1	30	25			$ 1,425
H2	10	35			$ 875
H3	5	20			$ 475
H4		10			$ 150
M1	10	20	20	5.00	$ 1,290
M2	5	30	5	10.00	$ 855
M3		30			$ 450
M4		10		5.00	$ 190
P1		5	50	10.00	$ 1,655
P2		10	25	30.00	$ 1,140
P3		10		50.00	$ 550
P4				25.00	$ 200
R1					$ 180
R2					$ 120
R3					$ 75
R4					$ 45
CROP					$ 225
W1					$ 450
WATER & NON					$ -

Table ES-8

Estimated Value of Timber and Agriculture on Impacted Lands in Wright Patman Lake

PARCELS	TOTAL	HST	HPW	PST	PPW	AGRICULTURE	WILDLIFE
Bowie	$ 1,288,720	$ 423,010	$ 750,135	$ 12,480	$ 26,272	$ 76,823	$ -
Cass	$ 1,092,882	$ 364,175	$ 541,245	$ 55,890	$ 9,664	$ 13,597	$ 108,311
Government	$ 46,860,189	$ 19,064,955	$ 16,083,960	$ 10,589,040	$ 624,208	$ 1,998	$ 496,028
Totals	**$ 49,241,791**	**$ 19,852,140**	**$ 17,375,340**	**$ 10,657,410**	**$ 660,144**	**$ 92,418**	**$ 604,339**

Table ES-9

Estimated Value of Timber and Agriculture on Impacted Lands in Marvin Nichols Reservoir

PARCELS	TOTAL	HST	HPW	PST	PPW	AGRICULTURE	WILDLIFE
Red River	$ 19,763,711	$ 7,066,710	$ 9,313,110	$ 65,850	$ 87,712	$ 3,230,329	$ -
Titus	$ 2,519,540	$ 949,760	$ 1,525,920	$ -	$ -	$ 43,860	$ -
Franklin	$ 6,059,032	$ 2,505,335	$ 3,174,180	$ -	$ -	$ 354,796	$ 24,721
Totals	**$ 28,342,283**	**$ 10,521,805**	**$ 14,013,210**	**$ 65,850**	**$ 87,712**	**$ 3,628,985**	**$ 24,721**

Tables ES-8 and ES-9 indicate that the majority of impacted value within the respective study areas is the result of timberland impacts. Based on these two tables, the impact to total timber and agriculture value within the WPLR is significantly higher than the value of that within the MNR. As previously stated, these are unadjusted figures and area based on the assumption that all of the timber would be considered "in the market".

Summary and Conclusions

Table ES-10 summarizes the impacted values on a percentage basis, both from the perspective of total area of impact and the estimated value of that impact.

Table ES-10
Comparison of Impact Areas & Values

Impact	Impact Area (Acres)				Impact Value ($)			
Location	Total	Timber	Agriculture	Other	Total Value	Timber Value	Agriculture	Wildlife
Bowie	2,498	1,855	634	9	$ 1,288,720	$ 1,211,897	$ 76,823	$ -
Cass	1,329	1,003	85	241	$ 984,571	$ 970,974	$ 13,597	$ 108,311
Government	30,104	28,734	17	1,353	$ 46,364,161	$ 46,362,163	$ 1,998	$ 496,028
WPLR Total	**33,931**	**31,592**	**736**	**1,603**	**$ 49,241,791**	**$ 48,545,034**	**$ 92,418**	**$ 604,339**
Red River	49,227	28,438	19,675	1,114	$ 19,763,711	$ 16,533,382	$ 3,230,329	$ -
Titus	11,972	8,965	2,818	189	$ 2,519,540	$ 2,475,680	$ 43,860	$ -
Franklin	5,017	4,616	361	40	$ 6,034,311	$ 5,679,515	$ 354,796	$ 24,721
MNR Total	**66,216**	**42,019**	**22,854**	**1,343**	**$ 28,342,283**	**$ 24,688,577**	**$ 3,628,985**	**$ 24,721**
COMBINED TOTAL	100,147	73,611	23,590	2,946	$ 77,584,074	$ 73,233,611	$ 3,721,403	$ 629,060
WPLR PERCENTAGE	33.9%	42.9%	3.1%	54.4%	63.5%	66.3%	2.5%	96.1%
MNR PERCENTAGE	66.1%	57.1%	96.9%	45.6%	36.5%	33.7%	97.5%	3.9%

Based on the information summarized in the upper portion of Table ES-10, it is estimated that an area of 33,931 acres would be impacted by a Wright Patman Lake pool raise from the top of the rule curve at 228.64 ft-NGVD to the 242.5 ft-NGVD study elevation. This impact corresponds to 33.9% of the combined total impact area of the Wright Patman Lake and Marvin Nichols Reservoir study areas; however, the impacted area accounts for 63.5%, of the total value impact within the limits of the two projects. In general, impacts to timber value are larger (66.3% of total) for the Wright Patman Lake project and impacts to agricultural value are larger (97.5%) for the Marvin Nichols Reservoir project.

Further, as relates to timber and as discussed in Section 5 of this report, the summary finding of the Wright Patman Lake project accounting for 66.3% of timber impact is fairly consistent with the 2013 Harvest Trends cited therein, which indicates that of the counties in which the study areas are located, 73.2% of 2013 stumpage-based harvest values were harvested from Bowie and Cass Counties, in which the largest portion of Wright Patman Lake is located.

1 Introduction

Under a Master Agreement and further authorized by Work Order Number One, both executed and authorized on January 20, 2015 and subsequently amended, the Sulphur Basin Group PLLC (SBG) was authorized and tasked by the Sulphur River Basin Authority (SRBA) to identify potential impacts to timber production and other important agricultural activities. The identification of impacts was within the limits of a proposed Wright Patman Lake Reallocation (WPLR) and Marvin Nichols Reservoir (MNR) project limits.

1.1 Initial Assessment

This initial assessment was scoped to include an estimation of the impacted land area, volume/value of timberlands, and value of agricultural lands within study boundaries defined as follows:

- Wright Patman Lake Reallocation (WPLR): Boundary limits are between elevation 242.5 feet National Geodetic Vertical Datum (ft-NGVD) and 227.5 ft-NGVD; and
- Marvin Nichols Reservoir (MNR): Boundary limit is elevation 313.5 ft-NGVD.

The upper limit of each reservoir was chosen as a result of analyses performed during the period 2011-2014 by a variety of parties and suggested that those elevations represented the approximate scale of each reservoir component necessary, in combination, to deliver the target yield for a Sulphur River Basin Supply strategy. In the case of Wright Patman Lake, elevation 227.5 was a proxy for the existing level of inundation of the reservoir. This elevation was developed in a prior study and was derived from the average of the actual water surface elevation of the lake on a daily basis from February 2006 to February 2013. The difference between 227.5' elevation and 242.5' represents the area that would be newly impacted by implementation of a reallocation project. Both government-owned and privately held parcels are found between these two elevations at Wright Patman Lake.

In order to fully understand and assess these impacts, the general tasks included the SBG accomplishing the following:

- Research County Appraisal District (CAD) parcel appraisal information to develop a database for each parcel appraised for agricultural land or timberland uses and extract classification and appraisal information, generally following methods that approximate the accepted State of Texas format for type (Pine, Hardwood, or Mixed), age (variations of Mature, Intermediate, New), agricultural lands, and other relevant information;
- Meet with the Corps of Engineers to identify the location, amount, and value for timber harvesting or agricultural production conducted by the Federal Government for fee-owned lands at Wright Patman Lake;
- Assess the impact to the regional markets by removal of inundated land, categorized by land cover (timberland & agricultural range, pasture or crops) using CAD records and other available

information, as well as studies and individuals/organizations with experience in these markets, developing a geo-referenced parcel map for the footprint of the WPLR & MNR study areas; and

- Meet with up to three major timber users in the region to discuss the current distribution of their timber sources, both inside and outside of the Sulphur River Basin.

The results of this initial assessment were produced in a draft report dated April 4, 2015. In order to obtain input from the SRBA Board, a visual only presentation was made in the regularly scheduled SRBA board meeting on May 19, 2015. During this presentation, some potential issues were noted by the board members and others. Primarily these issues were associated with the degree of accuracy of the CAD appraisal data and the often dated nature of same, as well as the inability to do field inspections/verifications or impact classifications in the MNR study area.

Although these issues could not be addressed, a "final draft" of the initial assessment with corrections from internal reviews dated July 29, 2015 was produced. All of the data and assessment methodologies of the initial assessment/report "final draft" have been superseded. Therefore, no further discussion is given to this initial assessment herein.

1.2 Final Assessment

As previously mentioned, the initial assessment was limited in geographic scope to the area within the 313.5 contour at the Marvin Nichols site; at the time, it was thought that this was the largest conservation pool that would be likely to be necessary to meet targeted project yields. However, additional information developed during the spring of 2015 indicated that the recent droughts had impacted the estimated firm yield of reservoirs within the Sulphur Basin to a greater extent than anticipated and that a larger scope of the Marvin Nichols project should be evaluated.

This need to expand the analysis along with newly available aerial imagery, provided an opportunity to better evaluate the study areas with new information and to address concerns developed in the initial assessment relating to the general lack of public access to evaluate certain timber resources. Additionally, the assessment team was also able to apply "lessons-learned" from the initial analysis with respect to developing a more robust and flexible GIS data base to better support future scenario-based assessment.

Although the initial timber and agricultural land impact assessment relied significantly upon CAD appraisal information the final assessment study does not rely upon this data for land classifications. Instead SBG teamed with professional foresters from Kingwood Forestry Service (KFS) and utilized newly available 2015 high resolution leaf-off digital imagery combined with a helicopter reconnaissance of the study areas to augment previous field investigations made in the initial assessment, as basis for classifications.

SBG was authorized for the final assessment timber and agricultural land impact study by the action of the SRBA Board in the "Second Modification to Professional Services" dated June 15, 2015. This final assessment uses a more refined approach to evaluate the timber resources and includes estimates of the impacted land area, volume/value of timberlands, and area/value of agricultural lands impacted within the following project boundaries:

- Wright Patman Lake Reallocation: Between elevation 242.5 feet National Geodetic Vertical Datum (ft-NGVD) and 228.64 ft-NGVD; and
- Marvin Nichols Reservoir: Below elevation 328 ft-NGVD.

The scope of activities under the final assessment included:

- Generate the study area shape files for WPLR and MNR;
- Using the study area shape file for WPLR and MNR:
    - Generate the impacted privately-owned parcel shape file for the WPLR and MNR Study Areas;
    - Resolve conflicts between private and government-owned parcels and any other apparent conflicts;
    - Prior to classification of land coverage within the impacted parcels, determine classification method for mixed land coverage (different from typical CAD methods):
        - Private:
            - Predominately range with just a few trees = pasture; and
            - Continuous range within a forest will be addressed;
        - Government –method worked out by SBG, KFS & the Corps of Engineers in the initial efforts which was not changed for the final assessment; and
        - Pictorial example of each type of classification per study area.
- With the classification system established, accomplish the classification of the impacted parcels within each type of ownership per county/government and per study area, and develop attribute tables for the maximum study area for both WPLR and MNR, including :
    - MNR Attribute Tables for impacted parcels within the Study area for
        - Red River County;
        - Titus County;
        - Franklin County;
    - WPLR Attribute Tables for impacted parcels within the Study area for:
        - Bowie County;
        - Cass County;
        - Government Owned – Wright Patman Lake Fee Ownership;
    - Parcel Identification
        - Private: CAD Parcel ID;
        - Government: Common Name of Land Cover for Fee-owned parcels
    - Areas - Individual Classification Shapefiles for each Impacted Parcel, including:
        - H1, H2, H3 & H4;
        - P1, P2, P3 & P4;
        - M1, M2 M3 & M4;
        - R1, R2, R3 & R4; and
        - Crop, Wildlife and other classifications.

- Classification Specific Density Assessment - For verification and adjustment of previous inspections/assumptions, a 6 hour videotaped helicopter tour will be conducted over areas selected from the GIS work described above for each classification followed by revisiting all values for each classification on this basis.
- Provide analysis & valuation in each study area with tabular summaries for:
    - Impacted Area (Acres) Assessment;
    - Density (Tons/Acre) Assessment;
    - Unit Value ($/Acre) Assessment (based on density);
    - Volume (Tons) Assessment (based on density); and
    - Total Value (Present Summer Dollars) Assessment (based on unit value).

2 Collection of Available Data

Data for the final study included:

- CAD "appraisal data cards" for the increased study area for MNR (no new information required for WPLR as study area remained the same);
- 2015 digital imagery from Texas Natural Resource Information Service (TNRIS);
- Helicopter reconnaissance and video recording of the study areas by professional foresters ;
- Previously conducted forester assessments of WPLR and MNR;
- Previously obtained GIS parcel data for privately owned parcels;
- Previously obtained government-owned parcel data within the WPLR study area and subsequent jointly agreed upon interpretations of same (Note: Confidentiality agreement for such data remains in effect and is provided as Appendix A); and
- Analyze and generate the various study area limits; e.g., 328 ft-NGVD for MNR and both 228.64 ft-NGVD and 242.5 ft-NGVD for WPLR, based on Digital Elevation Models (DEMs) prepared from previously collected LiDAR data, in accordance with National Map Accuracy Standards for DEMs.

All GIS data and analysis was conducted in ArcMap (ArcGIS 10.3) in the following projection:

Projection:	Lambert Conformal Conic
Zone:	Texas North Central (FIPS 4202)
Datum:	NAD83
Planar Units:	Feet (U.S. Survey)

All helicopter reconnaissance video is stamped with latitude and longitude location information which depicts the location of all recorded video data.

3 Parcel Area Impact

Both the WPLR and MNR water resource options impact timberland and agricultural land. The processes used to assess impacts to timberland and agricultural land, whether private or government-owned, are covered herein with summaries of findings. The respective study area boundaries for both WPLR and MNR correspond to the maximum anticipated water supply strategies stipulated by SRBA and partner agencies when the scope of services was developed for this effort. This final impact assessment establishes impact GIS "shape files" categorized by size/type of impact within the study area boundaries. With shape files of impact accomplished, in the future, water supply strategies of lesser size can be analyzed through a much more streamlined process and impacts assessed.

The process for determining impacts to privately owned parcels for final studies is summarized as follows:

- In GIS, intersect the study area boundaries with private and/or government owned parcel maps to generate an impacted parcel database, as follows:
    - WPLR Study Boundaries: A 33,922 acre area between the 228.64 ft-NGVD and 242.5 ft-NGVD contours shown as Figure 1.
    - MNR Study Boundary: A 66,220 acres area within the 328 ft-NGVD contour shown as Figure 2.
    - It should be noted that there were small areas (islands) within both the WPLR and MNR Study Areas that exceeded the study area elevation basis. These areas were included in the overall Study Area.

- The resulting impacted parcel map for privately owned parcels within the WPLR Study Area is shown as Figure 3 and for the MNR Study Area is shown as Figure 4.

- A map of Government-owned Parcels and Easements within the WPLR is shown as Figure 5.

- The impacted parcel database was exported to an Excel spreadsheet;

- Land Cover (timber stand or range type) based evaluation of impacted properties was conducted based on the general approach as follows:
    - Correcting boundary overlaps and gaps.
    - Delineating each tract with designated timber stand type or agricultural range type categories and creating type/size impact shape files based on 2015 aerial imagery calibrated by field and helicopter reconnaissance;
    - The route of helicopter reconnaissance is shown as Figure 6; and
    - The goal of all impact assessment efforts was to insure that all impacts within the study areas were accounted.

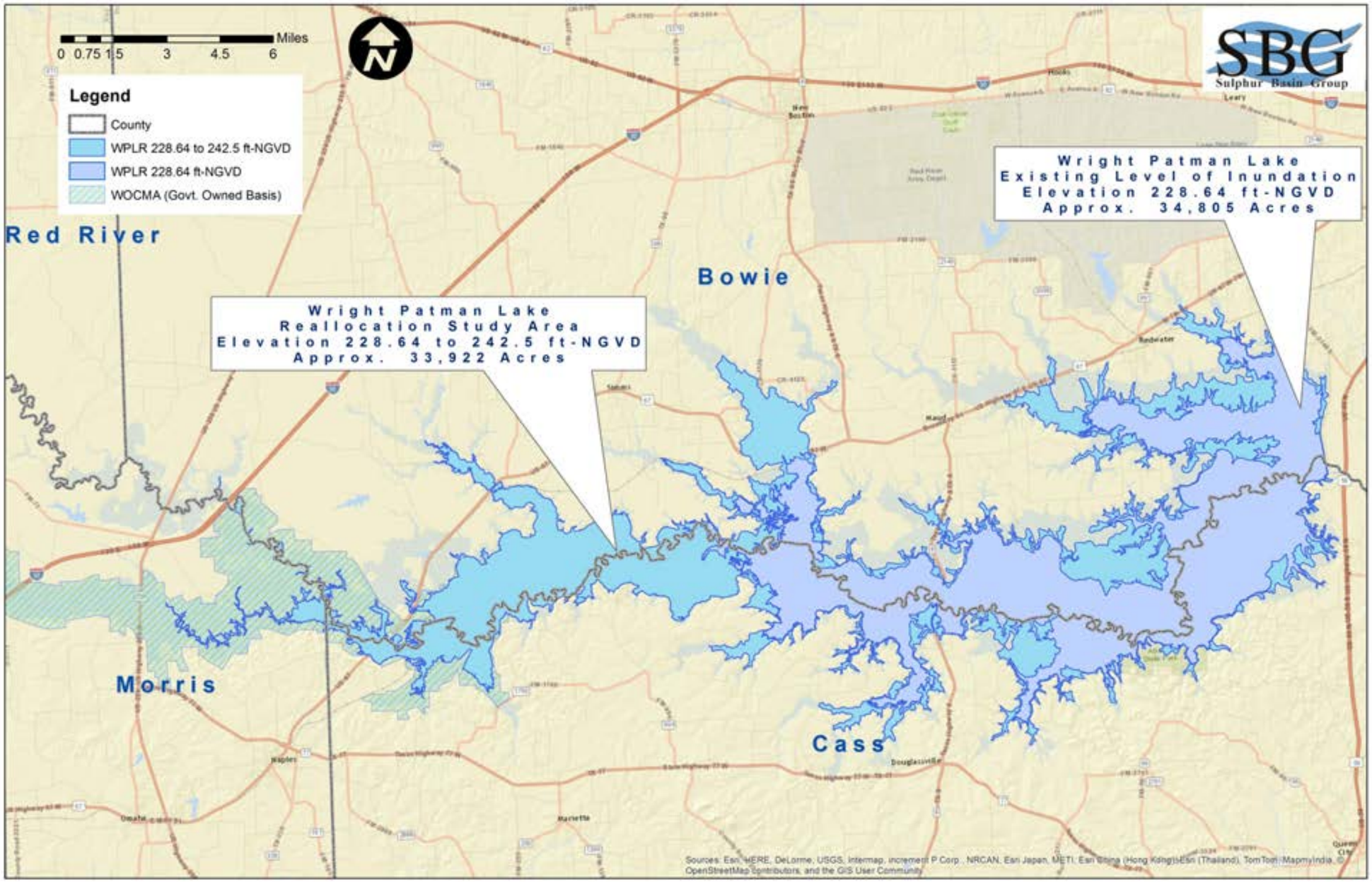

Figure 1 - WPLR Study Boundaries

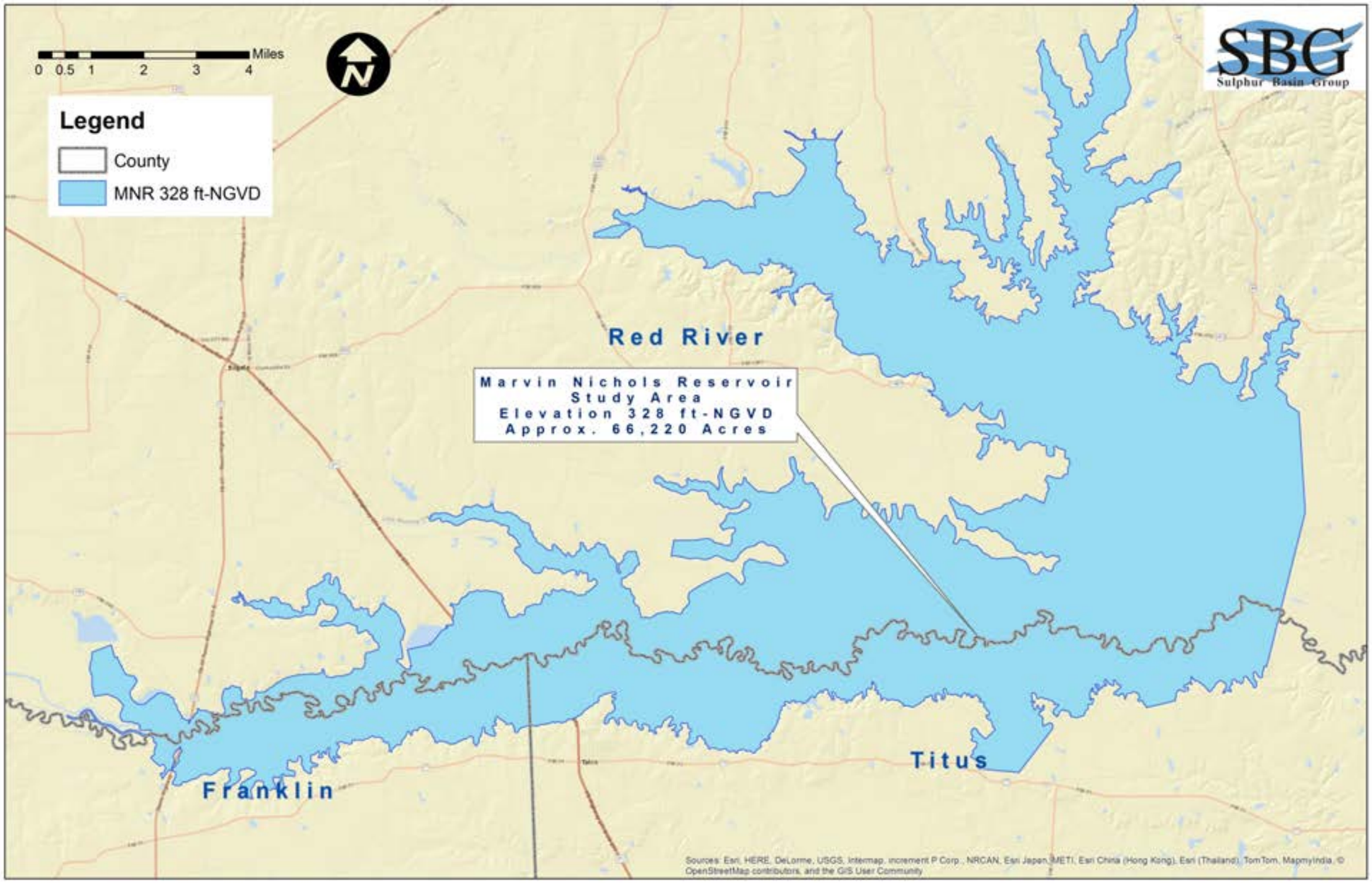

Figure 2 - MNR Study Boundary

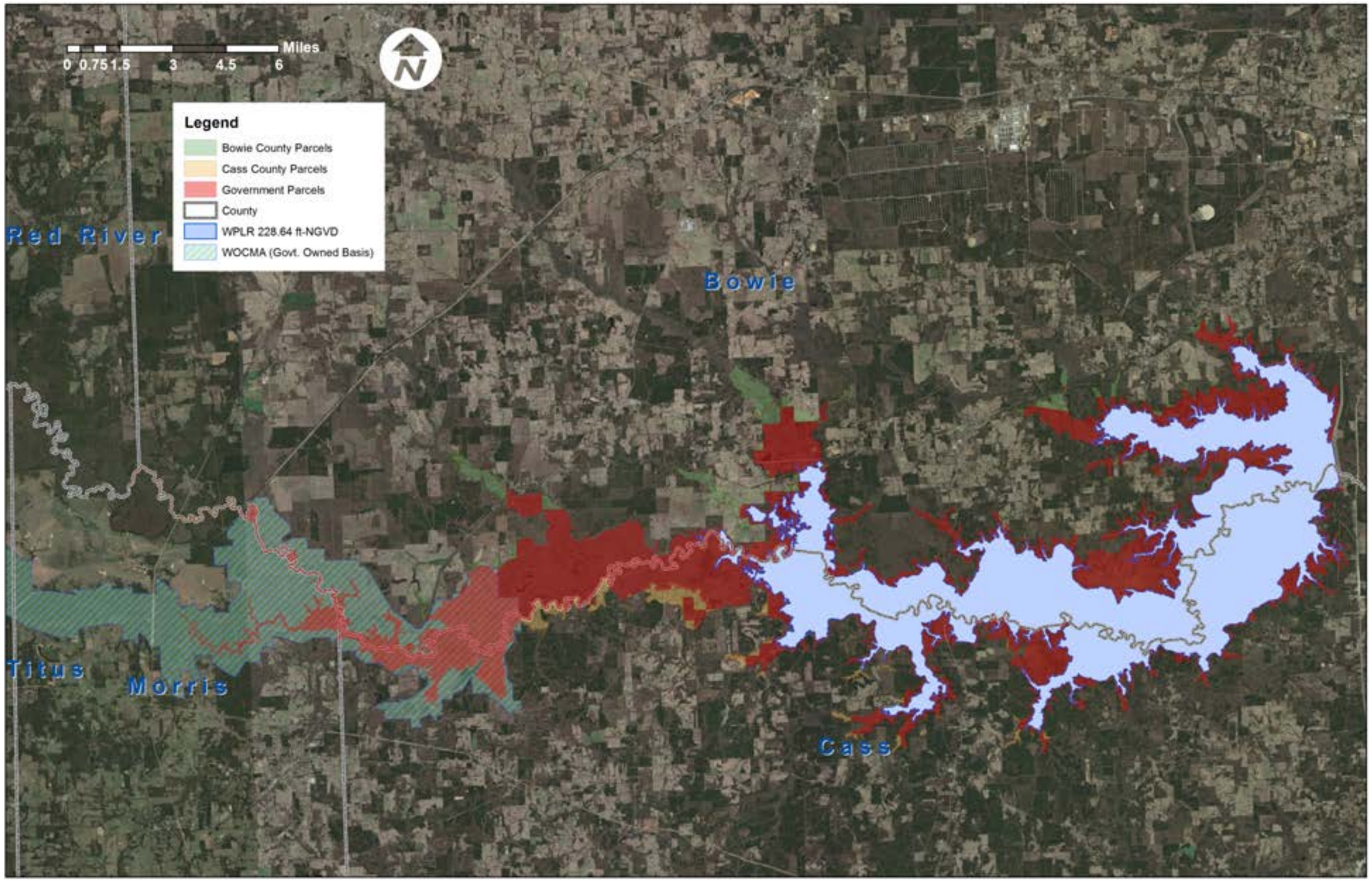

Figure 3 - WPLR Impacted Private Parcels

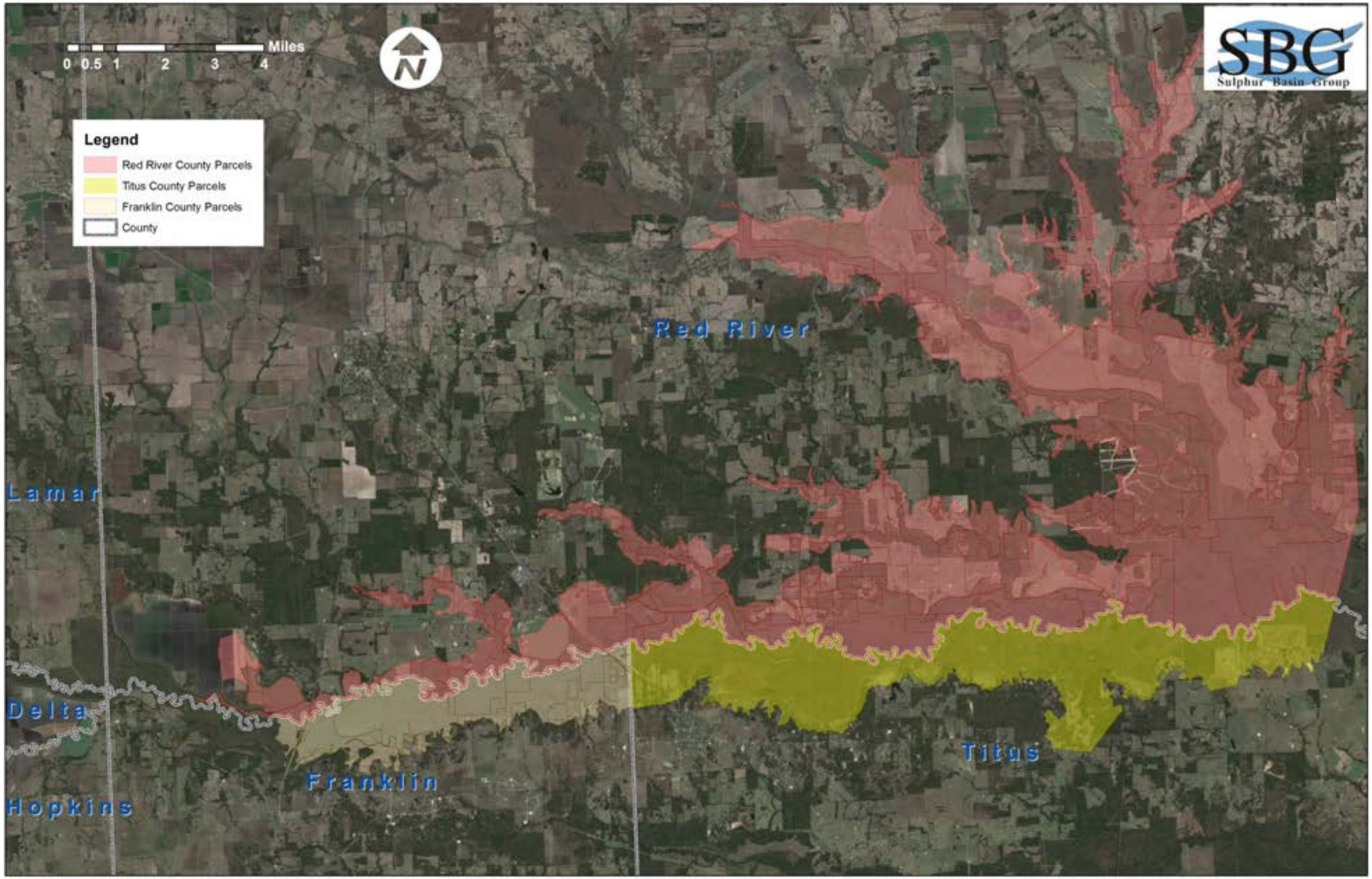

Figure 4 - MNR Impacted Private Parcels

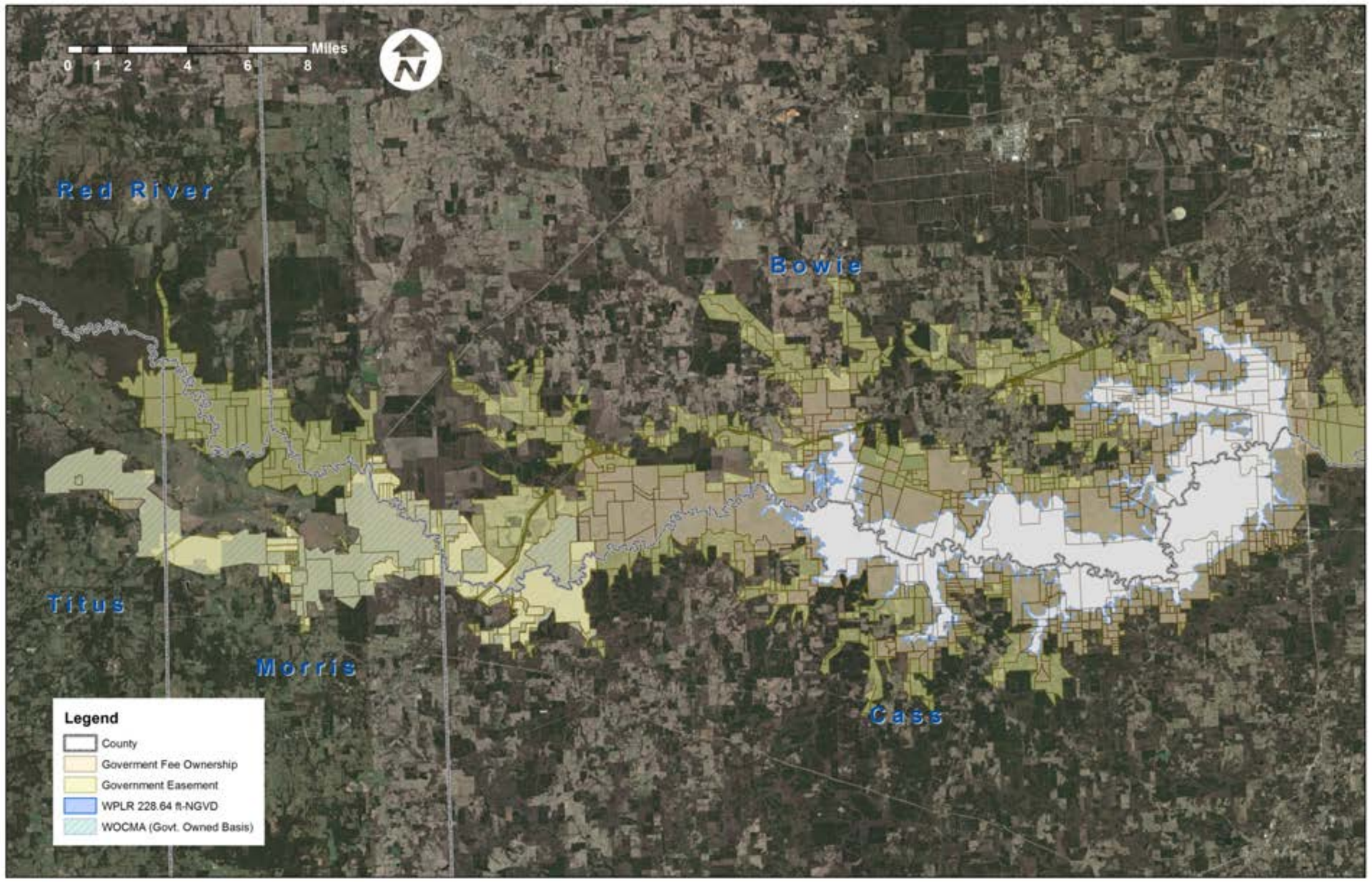

Figure 5 – Government-Owned Parcels & Easements

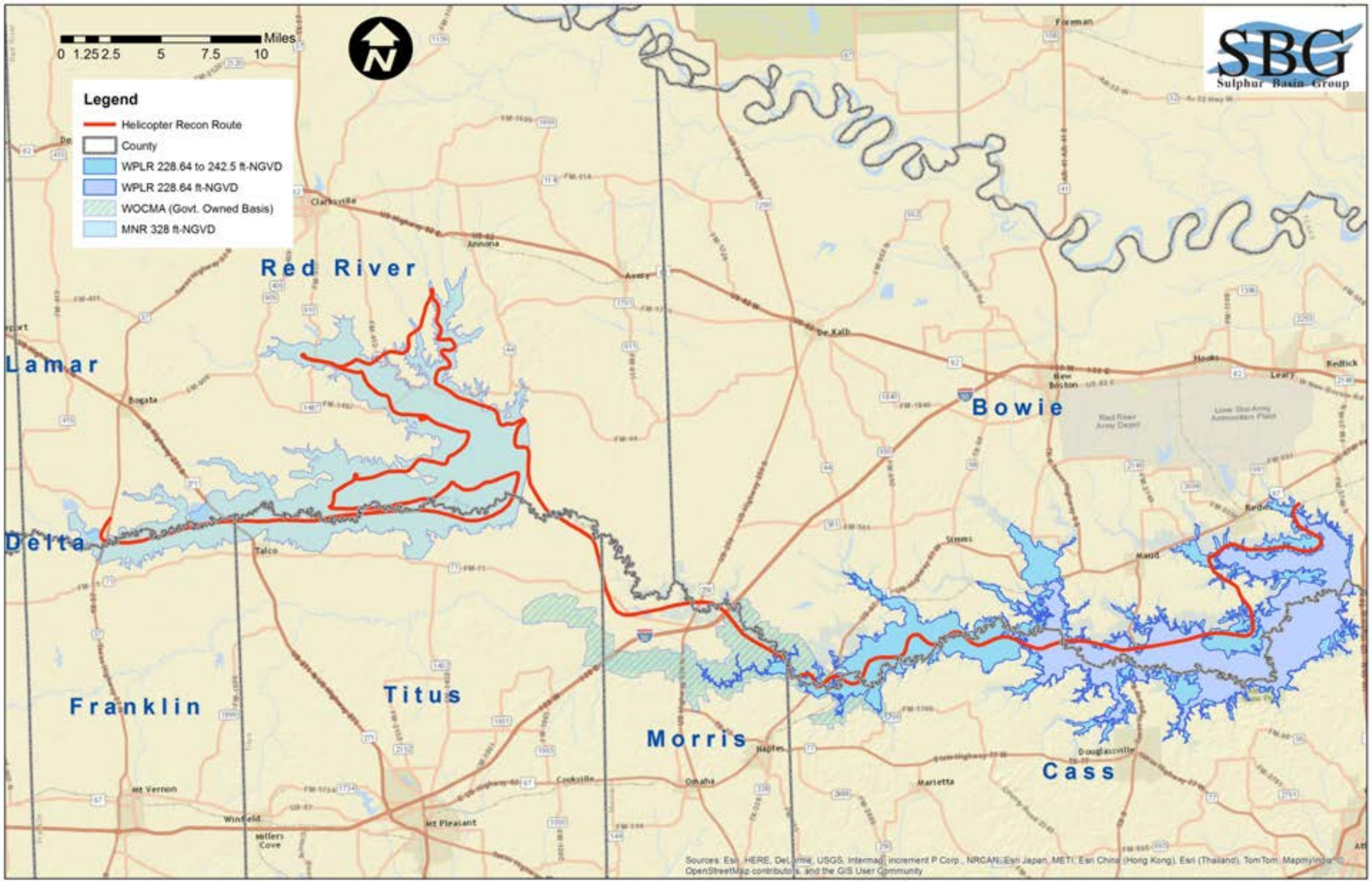

Figure 6 - Helicopter Reconnaissance Route

- Impact results were incorporated into a spreadsheet and GIS database, as follows:
    - GIS Area of the Impacted lands based on intersection; and
    - GIS Classification of Impact Areas & Summations:
        - Hardwood impacts (maximally 4 classes);
        - Pine, (maximally 4 classes);
        - Mixed, (maximally 4 classes);
        - Range (pasture) or Cropland with some types of class designation; and
        - Other Classifications.

- In order to insure a proper and consistent evaluation of the government-owned timberlands, SBG teamed with KFS. After several meetings between local Corps of Engineers timber management personnel, SBG and KFS representatives, the timberland classification process jointly established by local Corps of Engineers timber management personnel and the SBG Team for the government-owned parcels which resulted in intersecting GIS shape files for government-owned (fee ownership) parcels and land cover classifications with the 242.5 ft-NGVD upper limits outline and the 228.64 ft-NGVD lower limits outline to generate impacted stand type database.

- Assessment of Affected Landcover Parcels was accomplished by SBG/KFS, as follows:
    - After evaluating Government provided shape files, it was decided to merge shapes based on the "Common Name" field.
        - Merged shapes, after aerial interpretation, into their unique Common Name for consistent stand cover types.
        - Not all stands are consistently stocked and some stand types are incorrect in the database. Initial inspections estimated that the largest stands have as much as 25% of swamp/water/buttonbush type of cover that will contribute no merchantable value. Other stands are similar or have more variation, as much as 50% difference. However, most of these differences occur on small acreage stands, so statistically, the impact is minor.
        - Viewed most major acreages in each "Common Name" and ranked them relative to all other Common Names in this shapefile. Rankings were given similar to CAD land classifications and are as follows;
            - Pine (P)
            - Mixed pine and hardwood (M)
            - Hardwood (H)
            - Value of stands from 1-4 with 1 being highest and 4 having little merchantable value.
        - Analyzed the relative usable acreage based on ten 35 acre sample plots to help determine how much acreage is in swamp/open water/brush on the largest stand on Government lands. Found as much as 25% in non-timber acreage.
    - Additional coordination with Corps of Engineers
        - Provided the above evaluation to the Corps of Engineers;
        - Laid out inspection sites on USACE and private tracts in Bowie, Cass and Red River Counties. (i.e. to compare H1 Bowie Co to H1 Red River County)

        - Visited with Corps to gain access and find best representative volume locations on Corps property.
    - Conducted field inspections on Corps land, Bowie, Cass, Red River, Titus and Franklin Counties by truck, ATV and boat of the major stand types of significant size and most value potential, as well as the helicopter reconnaissance.
    - Took field notes of volumes based on both field and aerial inspection and within the corresponding stand categories Hardwood Sawtimber (HST), Hardwood Pulpwood (HPW); Pine Sawtimber (PST), and Pine Pulpwood (PPW). Pictures of the most representative sites for various stands were taken to illustrate these volumes pictorially. GIS Aerial Imagery and pictures taken on the ground are from first quarter 2015 (leaf off). Pictures taken from helicopter reconnaissance are Summer 2015 (leaf on).
    - Field notes of volume estimates per acre for various products were put into Excel to indicate volumes that will later be used to translate to a value.
    - Created GIS shape files, dividing each impacted parcel by stand type classification, using a combination of field inspections and the 2015 digital aerials;;
    - Confirmed this process with Corps of Engineers and got their agreement with this process.

A summary of impacted acreage (private or government owned) within the WPLR and MNR study areas is provided in Table 1 and Table 2, respectively.

In both of these tables, a “checksum” is shown to compare the sum of the impacted areas to the total area of each respective Study Area. In the WPLR study area, the checksum was within 0.03% of agreement and in the MNR study area it was within 0.01% of agreement. In both instances the relatively low fraction of difference was considered statistically insignificant.

Timber stand and agricultural range area impacts (rounded to the nearest acre) in these same study areas are summarized by classification in Table 3 and Table 4, respectively. In Table 3 and Table 4, the “Class” column is the land cover classification system. “H” is predominantly hardwood, “M” is mixed pine and hardwood with neither being the predominant type, “P” is predominantly pine, “R” is range, “W1” is a wildlife classification, “Crop” is tilled, and “Water” is Water covered land (ponds). These classifications are further shown for WPLR and MNR study areas in Figure 7 and Figure 8 (rounded to the nearest acre), respectively. Pictorial examples of the KFS analysis of impacts are provided in Appendix B. Quality Control and Assurance measures are contained in Appendix C.

The numbers and letters next to the classification labels indicate a quality designation that originated with CADs but was further quantified/defined by KFS. “1” was generally the highest category and refers to mature timber, “2” is considered intermediate timber, “3” is considered regeneration or young growth and “4” is considered to be the poorest category and generally means pre-merchantable, cutover or poorly established timber.

Table 1 - WPLR Parcel Area Impact Summary (Acres)

CATEGORY	TOTAL	HARDWOOD	MIXED	PINE	RANGE	CROP	WILDLIFE	NON-AG	WATER
Bowie	2,498	1,701	107	47	634	-	-	9	-
Cass	1,329	885	95	23	85	-	241	-	-
Government	30,104	17,445	9,354	1,935	17	-	1,102	251	-
Totals	33,931	20,031	9,556	2,005	736	-	1,343	260	-
Checksum	(9)								
STUDY AREA	33,922								

Table 2 - MNR Parcel Area Impact Summary (Acres)

CATEGORY	TOTAL	HARDWOOD	MIXED	PINE	RANGE	CROP	WILDLIFE	NON-AG	WATER
Red River	49,227	28,125	28	285	19,236	439	-	219	895
Titus	11,972	8,965	-	-	2,818	-	55	61	73
Franklin	5,017	4,616	-	-	361	-	-	37	3
Totals	66,216	41,706	28	285	22,415	439	55	317	971
Checksum	4								
STUDY AREA	66,220								

Table 3 - WPLR Itemized Parcel Area Impact (Acres)

CLASS	BOWIE	CASS	GOVERNMENT	TOTAL
H1	270	80	13,503	13,853
H2	262	497	2,823	3,582
H3	640	111	1,119	1,870
H4	529	197	0	726
M1	4	56	8,762	8,822
M2	4	30	144	178
M3	68	9	442	519
M4	31	0	6	37
P1	3	0	1,935	1,938
P2	0	0	0	0
P3	32	3	0	35
P4	12	20	0	32
R1	341	56	0	397
R2	6	29	17	52
R3	61	0	0	61
R4	226	0	0	226
CROP	0	0	0	0
W1	0	241	1,102	1,343
NON-AG	9	0	251	260
WATER	0	0	0	0
TOTAL	2,498	1,329	30,104	33,931

*** All values rounded to nearest acre**

Table 4 - MNR Itemized Parcel Area Impact (Acres)

CLASS	RED RIVER	TITUS	FRANKLIN	TOTAL
H1	2,424	835	175	3,434
H2	8,615	3,272	1,833	13,720
H3	8,550	2,763	712	12,025
H4	8,536	2,095	1,896	12,527
M1	28	0	0	28
M2	0	0	0	0
M3	0	0	0	0
M4	0	0	0	0
P1	32	0	0	32
P2	0	0	0	0
P3	166	0	0	166
P4	87	0	0	87
R1	15,933	1,122	159	17,214
R2	2,608	738	16	3,362
R3	605	707	161	1,473
R4	90	251	25	366
CROP	439	0	0	439
W1	0	55	0	55
NON-AG	219	61	37	317
WATER	895	73	3	971
TOTAL	49,227	11,972	5,017	66,216

*** All values rounded to nearest acre**

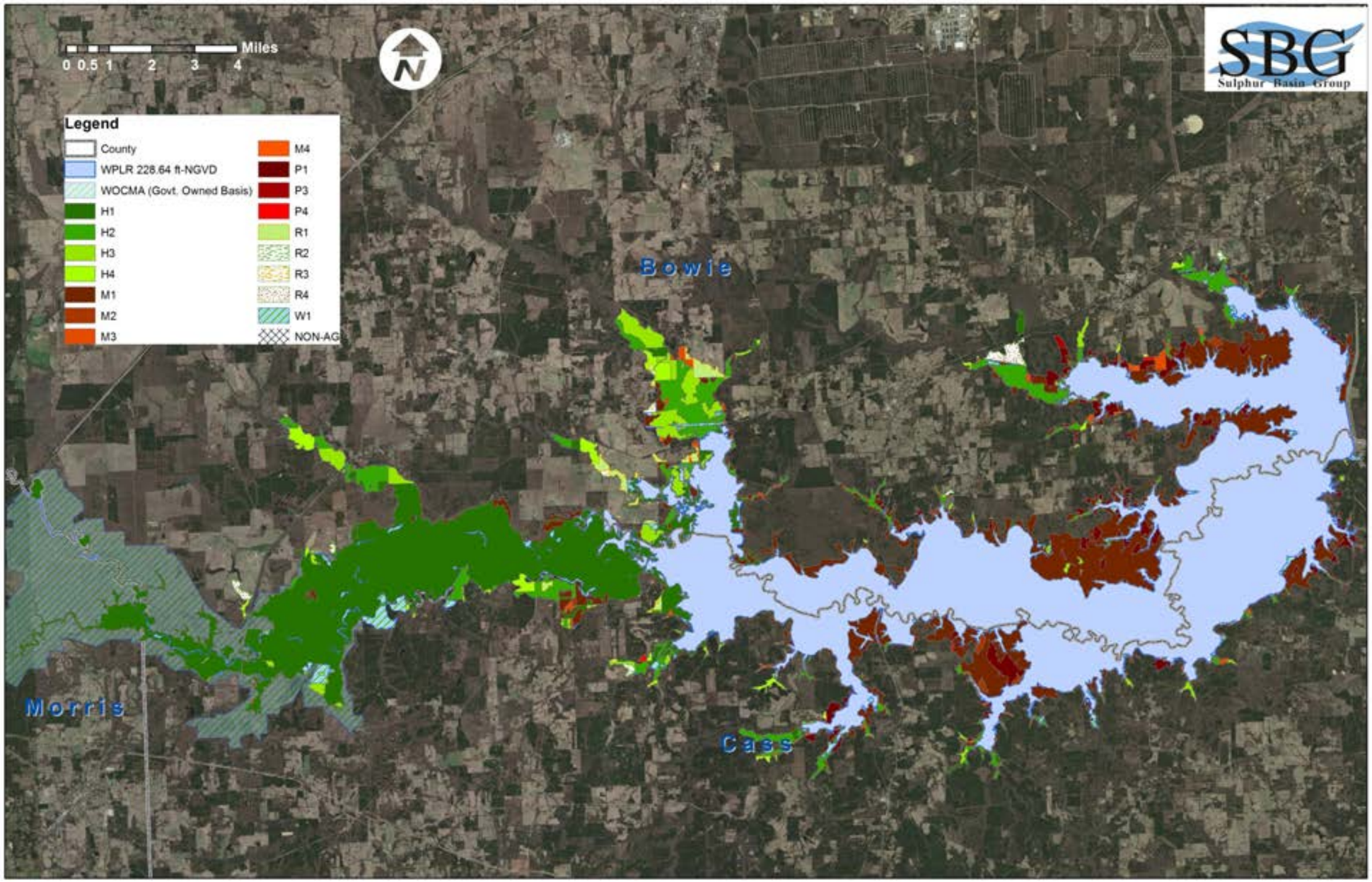

Figure 7 - WPLR Impact Classifications

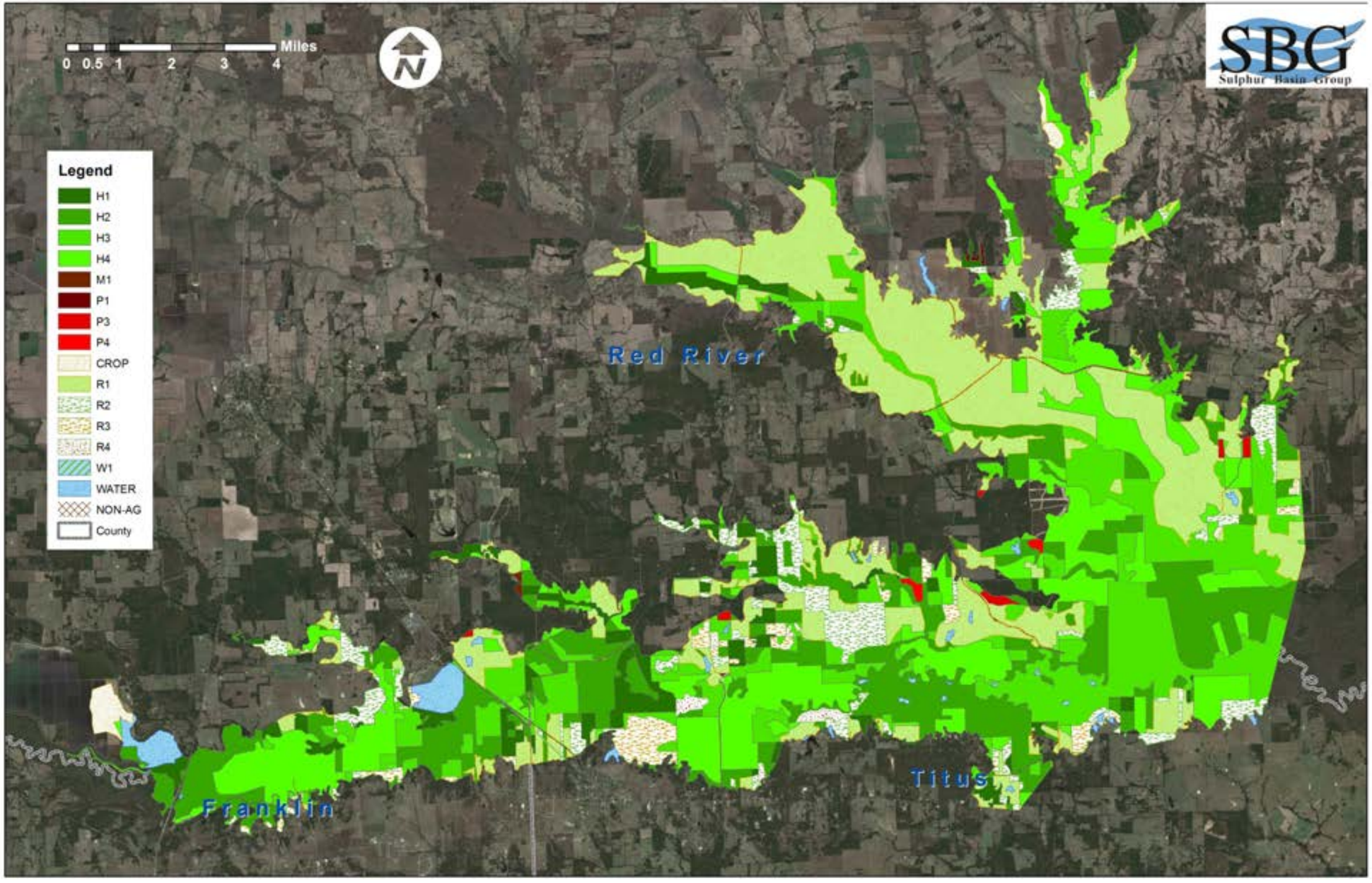

Figure 8 - MNR Impact Classifications

4 Market Volume and Value Impact

For agricultural land impacts (range, pasture or crop lands) on privately owned parcels, the valuation process was based on the "lease value" approach typically in use by all CADs and other agencies. The lease/rental values used for estimating value for areas of impacted agricultural lands was based on selections from the publication "Texas Rural Land Value Trends 2013" as published by the Texas Chapter of the American Society of Farm Managers and Rural Appraisers, Inc. (ASFMRA). There being no readily available guidance or methodology for this type of valuation, the method used was to estimate economic impact based on three times the selected rental/lease value (equivalent to three years of rental/lease). It should also be again noted that the Corps of Engineers GIS database predominately addressed timberland classifications, with no indication of any market activity associated with pasture, range or croplands, therefore no analysis of volume or value was performed on government-owned lands regarding these classifications. Any impacts from the Wright Patman reallocation on pasture, range, or croplands on Government property are accordingly under-represented in this analysis.

As previously noted, the professional services of KFS insured a proper and consistent estimate of timberland volume and valuation for all private and government-owned impacted parcels within the study areas. Timber market volume impacts, as related herein are the professional opinion of KFS, based on their extensive experience with timber in this region. Similarly, value impacts for timberland are based on the volume estimates and market rates observed and recommended by KFS.

A summary of the resulting process for estimating timberland volumes and valuations is as follows:

- Ground Inspections;
- Helicopter reconnaissance was planned and conducted by KFS professional foresters along the route depicted in Figure 6;
- Planned and conducted activities by KFS professional foresters during and after the helicopter reconnaissance included:
    - Inspect stands which had been inspected from the ground to use as a basis of comparison to other unfamiliar stands;
    - Identify several specific stands, within flight time limitations, that could not be seen from the ground;
    - Establish a better estimate of MNR timber volumes and photograph several representative stand types for visual representation in this report;
    - Identify and photograph several sites from the air for comparison with ground photos;
    - Adjust any estimates to timber volumes; and
    - Adjust any estimates to stand type categories that may be different than what appeared in previous aerial imagery.

- Volume Estimates
    - Volume estimates were based on both field and aerial inspection and the corresponding stand categories;
    - Field note volume estimates per acre for various products were input into a spreadsheet for analysis and selection of volumes which were translated to value estimates;
    - Based on KFS's extensive expertise in such estimates and valuations, field notes were recorded regarding field volume estimates by general product categories (1) Hardwood Sawtimber (HST), Hardwood Pulpwood (HPW); Pine Sawtimber (PST), and Pine Pulpwood (PPW); and
    - Tables were developed for indicated timber volume and value for each timber classification in each county for Wright Patman Lake and Marvin Nichols Reservoir study areas.

The timber market volume within the WPLR and MNR study areas are summarized in Table 5 and Table 6, respectively (rounded to the nearest ton). Itemized market volume and value impacts in these same study areas are provided in Table 7 and Table 8, respectively (rounded to the nearest ton).

Table 5 - WPLR Market Volume Impact Summary (Tons)

PRODUCT	HST	HPW	PST	PPW
ESTIMATED TONS	567,204	1,158,356	355,247	82,518

* All values rounded to the nearest ton

Table 6 - MNR Market Volume Impact Summary (Tons)

PRODUCT	HST	HPW	PST	PPW
ESTIMATED TONS	300,623	934,214	2,195	10,964

* All values rounded to the nearest ton

For value estimates, adjustments were made for merchantability of the timber for summer-time access only, which is typically slightly lower in value than all weather accessibility, and resulting values are based on historical timber sale experience for similar summer-time accessible timber. Sawtimber markets have remained steady and are expected to stay that way, so no adjustment was made. As with any inventory estimate, actual volumes will be somewhat different from estimated volumes, especially on a project of this scale and with generalizations of the various timber volumes for each land impact classification.

Table 7 - WPLR Itemized Market Volume Impact (Tons)

CLASS	TYPE	BOWIE	CASS	GOVERNMENT	TOTAL
H1	HST	8,100	2,392	405,076	415,568
H1	HPW	10,801	3,189	540,101	554,091
H2	HST	3,932	7,453	42,346	53,731
H2	HPW	11,795	22,358	127,037	161,190
H3	HPW	9,596	1,663	16,791	28,050
H4	HPW	15,858	5,921	-	21,779
M1	HST	40	560	87,617	88,217
M1	HPW	159	2,241	350,466	352,866
M1	PST	80	1,120	175,233	176,433
M1	PPW	20	280	43,808	44,108
M2	HPW	54	443	2,164	2,661
M2	PST	89	739	3,607	4,435
M2	PPW	18	148	721	887
M3	HPW	1,017	135	6,623	7,775
M3	PPW	678	90	4,415	5,183
M4	HPW	309	-	61	370
M4	PPW	309	-	61	370
P1	HST	14	-	9,674	9,688
P1	HPW	41	1	29,021	29,063
P1	PST	247	4	174,128	174,379
P1	PPW	41	1	29,021	29,063
P3	HPW	320	30	-	350
P3	PPW	1,922	178	-	2,100
P4	HPW	59	102	-	161
P4	PPW	296	511	-	807
TOTALS		65,795	49,559	2,047,971	2,163,325

*** All values rounded to nearest ton**

Table 8 - MNR Itemized Market Volume Impact (Tons)

CLASS	TYPE	RED RIVER	TITUS	FRANKLIN	TOTAL
H1	**HST**	72,726	5,247	25,044	103,017
H1	**HPW**	60,605	4,373	20,870	85,848
H2	**HST**	86,145	18,330	32,721	137,196
H2	**HPW**	301,509	64,154	114,525	480,188
H3	**HST**	42,750	3,559	13,816	60,125
H3	**HPW**	171,002	14,236	55,265	240,503
H4	**HPW**	85,364	18,965	20,952	125,281
M1	**HST**	285	-	-	285
M1	**HPW**	570	-	-	570
M1	**PST**	570	-	-	570
M1	**PPW**	142	-	-	142
P1	**HPW**	162	-	-	162
P1	**PST**	1,625	-	-	1,625
P1	**PPW**	325	-	-	325
P3	**HPW**	1,662	-	-	1,662
P3	**PPW**	8,310	-	-	8,310
P4	**PPW**	2,187	-	-	2,187
TOTALS		835,939	128,864	283,193	1,247,996

*** All values rounded to nearest ton**

The above estimated volume impacts and associated values estimated hereafter are provided with the following qualifiers and limitations by SBG/KFS:

- SBG/KFS has not conducted land surveys of the subject properties and cannot attest to either the accuracy of the property lines or the total acreage. All acreages are based on study area and parcel map shape files in GIS.
- As with any inventory estimate, actual volumes will be somewhat different from estimated volumes. This situation is further emphasized due to parcels that could not be viewed through this process and the fact this was an ocular based assessment.
- The values appraised herein are based upon the assumption that the subject timber is prudently managed for sale using conventional management practices as exercised by knowledgeable timberland owners. Imprudent management or timber marketing practices may result in a substantial reduction in value without offsetting cash realizations.
- Use of any part of this report out of context or apart from the whole is potentially misleading and therefore is prohibited by Kingwood Forestry Services, Inc.
- SBG/KFS has not conducted a Phase I environmental study of the subject properties and makes no judgments in respect to possible environmental hazards or contaminants. There are no environmental problems on the subject properties known to or observed by Kingwood. For this report, it is assumed that no environmental hazards or contaminants exist on the subject properties.

- SBG/KFS, Inc. takes no responsibility for matters legal in nature, which may exist in connection with the properties such as senior contractual obligations, tax issues, etc.
- The liability of SBG/KFS and employees is limited to the fee collected. There is no accountability, obligation, or liability to any third party. Kingwood assumes no responsibility for any cost incurred to discover or correct any deficiencies present in the properties.
- The valuation assessment was not based on a requested minimum or maximum valuation, or a specific valuation.
- SBG/KFS has no present or prospective interest in the properties that are the subject of this report, and we have no personal interest or bias with respect to the parties involved.
- Employment in and compensation for this assessment was not contingent upon the reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.

Based on all of the aforementioned qualifiers and limitations, an estimated value per acre was performed for various land cover classifications in the Wright Patman Lake and Marvin Nichols Reservoir study areas, based on "Stumpage" ($/ton) and estimated volume (density) in tons per acre. It should be noted that the volume (density) values differ between the project areas as a result of the inspection. This difference is consistent with what is known to be typical of the respective locations. The resulting land cover area value per acre estimates within the Wright Patman Lake Reallocation and Marvin Nichols Reservoir study areas are provided in Table 9 and Table 10, respectively.

On the basis of these land cover unit values, a summary of the overall estimated value of hardwood and pine sawtimber and pulpwood within the Wright Patman Lake Reallocation and Marvin Nichols Reservoir study areas is provided in Table 11 and Table 12, respectively (rounded to the nearest dollar).

Table 9 - WPLR Land Cover Category Value Per Acre

WRIGHT PATMAN LAKE - DENSITIES & UNIT VALUES					
STUMPAGE ($/TON)	$35.00	$15.00	$30.00	$8.00	**VALUE**
PRODUCT (TONS/ACRE)	HST (TONS/AC)	HPW (TONS/AC)	PST (TONS/AC)	PPW (TONS/AC)	**($/ACRE)**
CATEGORY					
H1	30	40			$ 1,650
H2	15	45			$ 1,200
H3		30			$ 450
H4		15			$ 225
M1	10	40	20	5	$ 1,590
M2		15	25	5	$ 1,015
M3		15		10	$ 305
M4		10		10	$ 230
P1	5	15	90	15	$ 3,220
P2	5	15	50	30	$ 2,140
P3		10		60	$ 630
P4		5		25	$ 275
R1					$ 180
R2					$ 120
R3					$ 75
R4					$ 45
W1					$ 450
WATER & NON					$ -

Table 10 - MNR Land Cover Category Value Per Acre

MARVIN NICHOLS RESERVOIR - DENSITIES & UNIT VALUES					
STUMPAGE ($/TON)	$35.00	$15.00	$30.00	8.00	TOTAL
PRODUCT (TONS/ACRE)	HST	HPW	PST	PPW	($/ACRE)
CATEGORY					
H1	30	25			$ 1,425
H2	10	35			$ 875
H3	5	20			$ 475
H4		10			$ 150
M1	10	20	20	5.00	$ 1,290
M2	5	30	5	10.00	$ 855
M3		30			$ 450
M4		10		5.00	$ 190
P1		5	50	10.00	$ 1,655
P2		10	25	30.00	$ 1,140
P3		10		50.00	$ 550
P4				25.00	$ 200
R1					$ 180
R2					$ 120
R3					$ 75
R4					$ 45
CROP					$ 225
W1					$ 450
WATER & NON					$ -

Table 11 - WPLR Overall Estimated Value

VALUE	HST	HPW	PST	PPW	TOTAL
ESTIMATED VALUE	$ 19,852,140	$ 17,375,340	$ 10,657,410	$ 660,144	**$ 48,545,034**

Table 12 - MNR – Overall Estimated Value

VALUE	HST	HPW	PST	PPW	TOTAL
ESTIMATED VALUE	$ 10,521,805	$ 14,013,210	$ 65,850	$ 87,712	**$ 24,688,577**

Itemized timber market values in these same study areas are provided in Table 13 and Table 14, respectively (rounded to the nearest dollar).

Table 13 - WPLR Itemized Timber Market Values

CLASS	TYPE	BOWIE	CASS	GOVERNMENT	TOTAL
H1	HST	$ 283,500	$ 83,720	$ 14,177,660	$ 14,544,880
H1	HPW	$ 162,015	$ 47,835	$ 8,101,515	$ 8,311,365
H2	HST	$ 137,620	$ 260,855	$ 1,482,110	$ 1,880,585
H2	HPW	$ 176,925	$ 335,370	$ 1,905,555	$ 2,417,850
H3	HPW	$ 143,940	$ 24,945	$ 251,865	$ 420,750
H4	HPW	$ 237,870	$ 88,815	$ -	$ 326,685
M1	HST	$ 1,400	$ 19,600	$ 3,066,595	$ 3,087,595
M1	HPW	$ 2,385	$ 33,615	$ 5,256,990	$ 5,292,990
M1	PST	$ 2,400	$ 33,600	$ 5,256,990	$ 5,292,990
M1	PPW	$ 160	$ 2,240	$ 350,464	$ 352,864
M2	HPW	$ 810	$ 6,645	$ 32,460	$ 39,915
M2	PST	$ 2,670	$ 22,170	$ 108,210	$ 133,050
M2	PPW	$ 144	$ 1,184	$ 5,768	$ 7,096
M3	HPW	$ 15,255	$ 2,025	$ 99,345	$ 116,625
M3	PPW	$ 5,424	$ 720	$ 35,320	$ 41,464
M4	HPW	$ 4,635	$ -	$ 915	$ 5,550
M4	PPW	$ 2,472	$ -	$ 488	$ 2,960
P1	HST	$ 490	$ -	$ 338,590	$ 339,080
P1	HPW	$ 615	$ 15	$ 435,315	$ 435,945
P1	PST	$ 7,410	$ 120	$ 5,223,840	$ 5,231,370
P1	PPW	$ 328	$ 8	$ 232,168	$ 232,504
P3	HPW	$ 4,800	$ 450	$ -	$ 5,250
P3	PPW	$ 15,376	$ 1,424	$ -	$ 16,800
P4	HPW	$ 885	$ 1,530	$ -	$ 2,415
P4	PPW	$ 2,368	$ 4,088	$ -	$ 6,456
TOTALS		$ 1,211,897	$ 970,974	$ 46,362,163	$ 48,545,034

*** All values rounded to nearest dollar**

Table 14 - MNR Itemized Timber Market Values

CLASS	TYPE	RED RIVER	TITUS	FRANKLIN	TOTAL
H1	HST	$ 2,545,410	$ 183,645	$ 876,540	$ 3,605,595
H1	HPW	$ 909,075	$ 65,595	$ 313,050	$ 1,287,720
H2	HST	$ 3,015,075	$ 641,550	$ 1,145,235	$ 4,801,860
H2	HPW	$ 4,522,635	$ 962,310	$ 1,717,875	$ 7,202,820
H3	HST	$ 1,496,250	$ 124,565	$ 483,560	$ 2,104,375
H3	HPW	$ 2,565,030	$ 213,540	$ 828,975	$ 3,607,545
H4	HPW	$ 1,280,460	$ 284,475	$ 314,280	$ 1,879,215
M1	HST	$ 9,975	$ -	$ -	$ 9,975
M1	HPW	$ 8,550	$ -	$ -	$ 8,550
M1	PST	$ 17,100	$ -	$ -	$ 17,100
M1	PPW	$ 1,136	$ -	$ -	$ 1,136
P1	HPW	$ 2,430	$ -	$ -	$ 2,430
P1	PST	$ 48,750	$ -	$ -	$ 48,750
P1	PPW	$ 2,600	$ -	$ -	$ 2,600
P3	HPW	$ 24,930	$ -	$ -	$ 24,930
P3	PPW	$ 66,480	$ -	$ -	$ 66,480
P4	PPW	$ 17,496	$ -	$ -	$ 17,496
TOTALS		$ 16,533,382	$ 2,475,680	$ 5,679,515	$ 24,688,577

*** All values rounded to nearest dollar**

This report did not adjust for several factors that will likely have an impact on the value and merchantability of timber. The broad assumption of this report is that all timber is considered "in the market" and that it could be harvested under normal conditions using usual and customary practices. Due to scope and data limitations, no adjustments were made for the following factors:

- Minimum merchantable harvest acreage - For landowners with timber on less than approximately 10 acres, this small amount of timber is not typically considered merchantable due to the excessive cost to harvest that reduces the value of the timber. The exception to this is if an adjacent, ongoing timber harvest is occurring that might allow the small timber acreage to be harvested.

- Accessibility - Much of the timber to be harvested is in seasonally flooded areas. This is depicted in a few of the pictures taken around Wright Patman where the lake level was at 232 ft-NGVD. Accessing and harvesting timber would have to be done during dry or drought conditions due to the many small streams and creeks that would need to be crossed to access much of the timber. Again, timber values should be less than reported due to resultant increased harvest costs.

- Timber market fluctuations - Markets are fluid and change with supply and demand. For example, expectations in 2016 are for a significant reduction in hardwood pulpwood consumption in the market areas, so it reasonable to assume future hardwood pulpwood markets will decline dramatically from the recent historical price range. Other products vary over time and since history is our only gauge to anticipate future markets, there are clearly limitations on the timber market values.

- Amount of affected timber considered "in the market" - The assumption in this report is that all timber is "in the market". Based on observations throughout this study, on private owned lands, much more of the timber is considered "in the market" than on government lands. Typically, private landowners will promptly harvest timber when it becomes financially prudent to do so, whereas the government delays these harvests based on other considerations. As a result, government lands generally have a much higher percentage of higher value timber than on private lands, and the timber on private lands is more typically and promptly harvested whereas a considerable amount of timber on government land is allowed to die naturally.

The conclusion to be drawn from these points is that all government-owned and privately owned timber is assumed to be "in the market" and the amount of timber and value of timber is considered an un-adjusted figure. Additional data collection would be required to better estimate the volume and value impact of these two study areas, but this methodology provides a best available estimate without significant further investigation.

5 Timber Resource User Impact

The work scope for this item required consultation with up to three major timber users in the region to discuss the current distribution of their timber sources, both inside and outside of the Sulphur River Basin. The timber users selected for contact and information regarding same are:

- International Paper – Texarkana Mill, 9978 FM 3129, Domino, TX 75572
    - Construction of the Texarkana Mill began in 1969 and the mill came on line in November 1972.
    - The mill was initiated to supply coated bleached board and liquid packaging board to International Paper's converting divisions and bleached pine pulp to produce disposable diaper pulp.
    - Today, the mill produces bleached board for packaging, hot and cold drink cupstock and folding cartons.

- Domtar - Ashdown Mill, 285 Hwy 71 South, Ashdown, AR 71822
    - Original mill opened in 1968.
    - Second paper machine added in 1975.
    - Third paper machine and new pulp line added in 1979.
    - Fourth paper machine and new pulp line added in 1991.
    - Became part of Domtar Inc. in 2001.

- West Fraser – New Boston Lumber Mill, Highway 82 East, P.O. Box 578, New Boston, TX 75570
    - SIC Code 2421, Sawmills and Planing Mills.
    - NAICS Code 2191201, Cut Stock, Resawing Lumber & Planing.
    - Business Category: Lumber (Rough, Sawed or Planed).

Attempts were made to meet and/or obtain timber resource distribution data from these three users. Only West Fraser provided the requested data, with the provision that the "*…information cannot be shared with any competitors, consultants or appear in any publication, journal or public information identifying West Fraser as the source of this information.*" Both International Paper – Texarkana Mill and Domtar – Ashdown Mill declined to provide data, citing matters of business confidentiality and, instead, recommended a document produced by the Texas A&M Forest Service entitled "Harvest Trends 2013," dated September 2014. They indicated that data contained in Table 1 of this document was representative of the region. Due to the confidentiality requirement of West Fraser, even this data could not be published or even referenced by percentages within the Sulphur River Basin.

With no data from the local timber interests, all that is available is this overview of volumes and harvest values of both pine and hardwood timber from the counties within the study areas for the year 2013, based on the aforementioned "Harvest Trends 2013," the results of which are presented in the tables, as follows.

Table 15 - Analysis of "Harvest Trends 2013" Table Excerpts

	Volume Harvested (cubic feet)					
County	Pine		Hardwood		Total	
Bowie	7,977,449	23.3%	6,612,207	26.5%	14,589,656	24.7%
Cass	18,477,965	54.0%	9,310,599	37.3%	27,788,564	47.0%
Franklin	326,276	1.0%	1,144,085	4.6%	1,470,361	2.5%
Morris	1,896,567	5.5%	1,160,139	4.7%	3,056,706	5.2%
Red River	4,509,199	13.2%	5,140,016	20.6%	9,649,215	16.3%
Titus	1,001,683	2.9%	1,566,883	6.3%	2,568,566	4.3%
Total	**34,189,139**	**100.0%**	**24,933,929**	**100.0%**	**59,123,068**	**100.0%**

	Harvest Value (thousand dollars)			
County	Stumpage		Delivered	
Bowie	6,181	26.6%	16,175	25.3%
Cass	10,845	46.6%	29,629	46.4%
Franklin	539	2.3%	1,616	2.5%
Morris	1,078	4.6%	3,182	5.0%
Red River	3,546	15.2%	10,366	16.2%
Titus	1,077	4.6%	2,891	4.5%
Total	**23,266**	**100.0%**	**63,859**	**100.0%**

The following observations can be made based on this data:

- The predominate harvesting of pine and hardwood timber within the two areas of study fall within Bowie and Cass Counties, comprising the majority of the Wright Patman Lake Reallocation study area; and
- Bowie and Cass County accounted for:
    - 63.8% of harvested hardwood timber;
    - 77.3% of harvested pine timber;
    - 73.2% of stumpage based harvest value; and
    - 71.7% of delivery based harvest value.

Based on “Harvest Trends 2013” and the above table excerpts, it can be concluded that in 2013, timber from within the Wright Patman Reallocation study area likely had a much higher volume and value than that within the Marvin Nichols Reservoir study area. This lines up fairly well with what was observed in the market volume portion of this report, above.

6 Conclusions

6.1 Market Value Conclusions

The estimated market value impact to timberland and agricultural land is summarized in the following Tables 16 and 17:

Table 16 - WPLR Total Timberland & Agricultural Market Value Impact Summary

PARCELS	TOTAL	HST	HPW	PST	PPW	AGRICULTURE	WILDLIFE
Bowie	$ 1,288,720	$ 423,010	$ 750,135	$ 12,480	$ 26,272	$ 76,823	$ -
Cass	$ 1,092,882	$ 364,175	$ 541,245	$ 55,890	$ 9,664	$ 13,597	$ 108,311
Government	$ 46,860,189	$ 19,064,955	$ 16,083,960	$ 10,589,040	$ 624,208	$ 1,998	$ 496,028
Totals	**$ 49,241,791**	**$ 19,852,140**	**$ 17,375,340**	**$ 10,657,410**	**$ 660,144**	**$ 92,418**	**$ 604,339**

Table 17 - MNR Total Timberland & Agricultural Market Value Impact Summary

PARCELS	TOTAL	HST	HPW	PST	PPW	AGRICULTURE	WILDLIFE
Red River	$ 19,763,711	$ 7,066,710	$ 9,313,110	$ 65,850	$ 87,712	$ 3,230,329	$ -
Titus	$ 2,519,540	$ 949,760	$ 1,525,920	$ -	$ -	$ 43,860	$ -
Franklin	$ 6,059,032	$ 2,505,335	$ 3,174,180	$ -	$ -	$ 354,796	$ 24,721
Totals	**$ 28,342,283**	**$ 10,521,805**	**$ 14,013,210**	**$ 65,850**	**$ 87,712**	**$ 3,628,985**	**$ 24,721**

Tables 16 and 17 indicate that the majority of impacts within the respective study areas, are the result of timberland impacts. Based on these two tables, the impact to total timber and agriculture value within the WPLR would be on the order of almost two times the value of that within the MNR. As previously stated, these are unadjusted figures and area based on the assumption that all of the timber would be considered "in the market".

6.2 User Impact Additional Conclusions

In section "5 Timber Resource User Impact," above, the Texas A&M Forest Service publication, "Harvest Trends 2013," was used as the basis of observations on impacts on the timber users that depended upon the resources of Bowie, Cass, Red River, Titus and Franklin Counties. Using the quantities of estimated hardwood and pine sawtimber and pulpwood in tons, the following Table 18 summarizes a similar impact analysis for the combined WPLR and MNR study areas:

Table 18 - Resource Impact Analysis/Comparison

Impact	Impact Area (Acres)				Impact Value ($)			
Location	Total	Timber	Agriculture	Other	Total Value	Timber Value	Agriculture	Wildlife
Bowie	2,498	1,855	634	9	$ 1,288,720	$ 1,211,897	$ 76,823	$ -
Cass	1,329	1,003	85	241	$ 984,571	$ 970,974	$ 13,597	$ 108,311
Government	30,104	28,734	17	1,353	$ 46,364,161	$ 46,362,163	$ 1,998	$ 496,028
WPLR Total	**33,931**	**31,592**	**736**	**1,603**	**$ 49,241,791**	**$ 48,545,034**	**$ 92,418**	**$ 604,339**
Red River	49,227	28,438	19,675	1,114	$ 19,763,711	$ 16,533,382	$ 3,230,329	$ -
Titus	11,972	8,965	2,818	189	$ 2,519,540	$ 2,475,680	$ 43,860	$ -
Franklin	5,017	4,616	361	40	$ 6,034,311	$ 5,679,515	$ 354,796	$ 24,721
MNR Total	**66,216**	**42,019**	**22,854**	**1,343**	**$ 28,342,283**	**$ 24,688,577**	**$ 3,628,985**	**$ 24,721**
COMBINED TOTAL	100,147	73,611	23,590	2,946	$ 77,584,074	$ 73,233,611	$ 3,721,403	$ 629,060
WPLR PERCENTAGE	33.9%	42.9%	3.1%	54.4%	63.5%	66.3%	2.5%	96.1%
MNR PERCENTAGE	66.1%	57.1%	96.9%	45.6%	36.5%	33.7%	97.5%	3.9%

Based on the information summarized in the upper portion of Table 18, it is estimated that an area of 33,931 acres would be impacted by a Wright Patman Lake pool raise from the top of the rule curve at 228.64 ft-NGVD to the 242.5 ft-NGVD study elevation. This impact corresponds to 33.9% of the combined total impact area of the Wright Patman Lake and Marvin Nichols Reservoir study areas; however, the impacted area accounts for 63.5%, of the total value impact within the limits of the two projects. In general, impacts to timber value are larger (66.3% of total) for the Wright Patman Lake project and impacts to agricultural value are larger (97.5%) for the Marvin Nichols Reservoir project.

Further, as relates to timber and as discussed in Section 5 of this report, the summary finding of the Wright Patman Lake project accounting for 66.3% of timber impact is fairly consistent with the 2013 Harvest Trends cited therein, which indicates that of the counties in which the study areas are located, 73.2% of 2013 stumpage-based harvest values were harvested from Bowie and Cass Counties, in which the largest portion of Wright Patman Lake is located.

APPENDICES

Appendix A – Confidentiality Agreement

Confidentiality Agreement

This Confidentiality Agreement ("Agreement") is made and entered into by and between *U.S. Army Corps of Engineers* ("Government") and Murray, Thomas & Griffin, Inc. ("MTG").

Recitals:

I. GOVERNMENT and MTG desire to discuss a possible business relationship relating to Government GIS data relating to vegetative cover and Government ownership of real property at Wright-Patman Lake for the Sulphur River Basin Authority ("SRBA") study (the "Project") and GOVERNMENT may find it desirable or necessary to provide certain confidential information to MTG for work related to this Project.

II. GOVERNMENT is willing to provide such confidential information pursuant to the terms of this Agreement.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, the parties agree as follows:

Section 1. Definitions.

1.1. "Confidential Information" means any information that is disclosed by GOVERNMENT or its Representatives to the MTG or its Representatives in connection with the Project, whether before or after the date hereof and irrespective of the format in which the information is provided. "Confidential Information" includes any Evaluation Material and Mapping prepared by MTG. "Confidential Information" does not include information which:

(a) is, or subsequent to disclosure becomes, part of the public domain through no fault of the MTG;
(b) is lawfully disclosed to the MTG by a third party without any confidentiality obligation to GOVERNMENT;
(c) was in the possession of the MTG prior to disclosure by GOVERNMENT;
(d) is lawfully and independently developed by the MTG without use of the Confidential Information disclosed by GOVERNMENT and such independent development can be demonstrated through documentation.

1.2. "Evaluation Material" means notes, reports or other documents or materials which reflect, interpret, evaluate, include or are derived from the Confidential Information.

1.3. "Representatives" means a party's employees, officers, directors, attorneys, accountants and agents, and its affiliates and the employees, officers, directors, attorneys, accountants and agents thereof.

Section 2. Confidentiality. Except as provided in Section 5, MTG hereby agrees that the Confidential Information will be kept strictly confidential during the term of this Agreement. MTG also agrees that without the prior written consent of GOVERNMENT, the Confidential Information will not be disclosed by the MTG, 'in whole or in part, to any other person except as provided herein. MTG shall use the same care in protecting the Confidential Information as it uses to protect its own confidential information, provided that MTG shall not use less than reasonable efforts to protect the Confidential Information. The MTG may only disclose Confidential Information to those Representatives whose access is necessary and who have agreed to hold the Confidential Information in confidence by terms no less restrictive than those set forth herein. MTG agrees to be responsible for any unauthorized disclosures by its Representatives. Notwithstanding the above, MTG can disclose such confidential information as need to the SRBA.

Section 3. Ownership and Use of Confidential Information. All Confidential Information shall remain the property of GOVERNMENT and its assigns. No license or other rights under any patents, trademarks, copyrights or other proprietary rights is granted or implied by the disclosure of the Confidential Information. MTG shall not use the Confidential Information for any purpose other than for the study and evaluations relating to the Project.

Section 4. Disposition of Confidential Information. The MTG, upon written request from GOVERNMENT, shall promptly return or destroy all Confidential Information in its possession. If requested by GOVERNMENT, the MTG shall provide GOVERNMENT with a certificate that all Confidential Information has been returned or destroyed. The return or destruction of the Confidential Information shall not extinguish any rights or obligations hereunder with respect to the Confidential information.

Section 5. Legally Required Disclosures. If MTG is legally compelled to disclose any of the Confidential Information, MTG shall promptly notify GOVERNMENT of the disclosure. In such cases, MTG shall reasonably cooperate with GOVERNMENT to obtain a protective order or other reasonable assurance that the Confidential Information will be accorded confidential treatment. If MTG is nonetheless legally required to disclose the Confidential Information, then MTG may disclose the information without liability hereunder provided that the party may only furnish that portion of the Confidential Information which is legally required or necessary.

Section 6. Term. The confidentiality obligations of this Agreement shall expire five (5) years form the final date all deliverables are provided to the GOVERNMENT.

Section 7. No Warranties; Limitation of Liability. GOVERNMENT makes no representations or warranties as to the reliability, accuracy or completeness of the Confidential Information. *GOVERNMENT* shall not be subject to any liability to the MTG based on the MTG's use of the Confidential Information. In no event shall GOVERNMENT be liable to MTG for any incidental, indirect, special, punitive or consequential damages (including without limitation damages for lost profits).

Section 8. Remedies. MTG acknowledges that improper or unauthorized use or disclosure of Confidential Information could cause irreparable harm to GOVERNMENT and that monetary damages would not be an adequate remedy for a breach of this Agreement. In the event of any breach or threatened breach of this Agreement, GOVERNMENT shall be entitled to pursue injunctive and other equitable relief, and MTG agrees to waive any requirement for the

posting of a bond in connection with such remedy and any defense that GOVERNMENT may have an adequate remedy at law. Such injunctive and equitable relief shall not be deemed to be the exclusive remedy for a breach of this Agreement, but shall be in addition to all other available remedies.

Section 9. Relationship of Parties. The GOVERNMENT shall have no obligation to commence or continue discussions or negotiations, to exchange any Confidential Information, to reach or execute any agreement with the MTG, to refrain from engaging at any time in any business whatsoever, or to refrain from entering into or continuing any discussions, negotiations or agreements at any time with any third party, until each party executes a definitive agreement. Until such definitive agreement is executed, neither party shall have any liability to the other party with respect to the Project except as set forth in this Agreement. Neither party shall have any liability to the other party in the event that, for any reason whatsoever, no such definitive agreement is executed.

Section 10. Public Disclosure. Except as may be required by law, MTG shall not make any press release or other public disclosure regarding this Agreement, the Project or the negotiations concerning the Project Agreement without the prior written consent of GOVERNMENT.

Section 11. General.

11.1. Governing Law. This Agreement shall be construed and enforced in accordance with applicable Federal laws.

11.2. Entire Agreement. This Agreement constitutes the entire Agreement between the parties, supersedes any prior understandings or representations relating to the confidential treatment of the Confidential Information, and shall not be modified except by a written agreement signed by both parties.

11.3. Assignability. This Agreement may not be assigned by MTG.

11.4. Severability. All provisions of this Agreement are severable, and the unenforceability of any of the provisions of this Agreement shall not affect the validity or enforceability of the remaining provisions of this Agreement.

11.5. No Waiver. Failure of either party to insist upon strict performance of any of the terms and conditions shall not be deemed to be a waiver of those tem1s and conditions.

11.6. Counterparts and Faxed Signatures. This Agreement may be executed in counterparts, and in the absence of an original signature, faxed signatures will be considered the equivalent of an original signature.

11.7. Notices. Notices shall be in writing and shall be sent to the addresses listed below, either by personal delivery, by the U.S. Mail, overnight mail, fax or other similar means. All notices shall be effective upon receipt.

The parties have signed this Agreement effective as of the later signature date set forth below.

By: _____

Print Name: Bob Murray

Title: President

Date: 2/20/2015

MTG Address:

5930 Summerfield Rd
Texarkana, TX 75503

Notice to the GOVERNMENT:

U.S. Army Corps of Engineers
819 Taylor Street
Room 2A-06
Fort Worth, TX 76102

Attn: Lucas Cecil

Appendix B

Pictorial Examples of Land Classifications

KFS PHOTOS

Pictures of the most representative sites for various stands were taken to illustrate these volumes pictorially. GIS Aerial Imagery and pictures taken on the ground are from first quarter 2015 (leaf off). Pictures taken from helicopter reconnaissance are Summer 2015 (leaf on).

Wright Patman Lake Examples

Aerial Imagery – H1

Most representative view of fully stocked H1

Typical H1

H1 with holes

Typical view of WPL edge showing Corps classification of H1

H1 open water with some H2 and H4 characteristics

H1 with open water with some H2 and H4 characteristics

Open water within H1

Open water within H1

View of the main power line on upper end of lake at 242 level

H1 next to Sulphur River

Typical H1 – Wright Patman Lake

Open water surrounded by H1

White Oak Management H1

White Oak Management H1

Typical view of H1 land classification on Corp. of Engineers property

Typical view of H1 land classification on Corp. of Engineers property.

Typical view of H1 land classification on Corp. of Engineers property.

Typical view of H1 land classification on Corp. of Engineers property.

Typical view of H1 land classification on Corp. of Engineers property.

Aerial Imagery of H2

H2 and H3 along Sulphur River on private tracts

Typical view of H2 land classification on Corp. of Engineers property

Typical view of H2 land classification on Corp. of Engineers property.

Typical view of H2 land classification on Corp. of Engineers property.

Aerial Imagery H3

H3 – Pure Ash Stand

Typical view of H3 land classification on Corp. of Engineers property.

Typical view of H3 land classification on Corp. of Engineers property with Wright Patman at 232 foot lake level.

Typical view of H3 land classification of private property in Bowie and Cass Counties, Texas.

Aerial Imagery H4

Typical view of H4 land classification of private property in Bowie and Cass Counties, Texas.

Aerial Imagery P1

Typical view of P1 land classification on Corp. of Engineers property.

Typical view of P1 land classification on Corp. of Engineers property.

Typical view of P1 land classification on Corp. of Engineers property.

Aerial Imagery P3

Aerial Imagery P4

Aerial Imagery M1

Typical view of M1 land classification on Corp. of Engineers property.

Typical view of M1 land classification on Corp. of Engineers property.

Typical view of M1 land classification on Corp. of Engineers property.

Typical view of M1 land classification on Corp. of Engineers property.

Aerial Imagery M2

Typical view of M2 land classification of private property in Bowie and Cass Counties, Texas.

Aerial Imagery M3

Aerial Imagery M4

Marvin Nichols Reservoir Examples

Aerial Imagery H1

H1 in foreground and H4 in background

H1

H1

H1

H1 on the Sulphur River

Typical view of H1 land classification of private property in Titus and Franklin Counties, Texas

Aerial Imagery H2

Typical view of H2 (Note: gaps and smaller trees)

MNR Dam- H2 at the proposed dam location

H2

Poor quality H2

Poor quality H2

Typical view of H2 land classification of private property in Red River and Franklin Counties, Texas.

Aerial Imagery H3

Most typical view of an H3

H3 – Ash

H3 – recently thinned

H3 – recently thinned

H3 foreground and H4 background

Aerial Imagery H4

H4

H4 foreground and H2 background

H4 foreground and H1 on the river

H4

Typical view of H1 land classification of private property in Titus County, Texas.

Recently cut and flooded H4

Aerial Imagery P1

Aerial Imagery P3

Aerial Imagery P4

Aerial Imagery M1

Typical view of M1 land classification of private property in Red River County, Texas.

Appendix C – QA/QC Process

Timberland and Agricultural Impact Assessment
For Selected Water Resource Options in the
Sulphur River Basin

Quality Assurance & Quality Control Process

- Area Assessment - Quality Control Measures:
  - Wright Patman Lake Reallocation Study Area
    - Bowie & Cass County
      - In GIS, deleted overlaps found in Private Owned parcels over Government ownership;
      - Established guidelines for dividing land classifications.
      - In GIS, divided parcels along major land classifications based on 2015 imagery. Peer review of approximately 30% of each county's major land classifications.
      - Recalculated acreage upon completion using ArcMap calculation methods.
      - This acreage was copied into Excel data for use.
      - All tables were cross-referenced and check-summed.
    - Government-Owned Parcels
      - In GIS, the elevation between 228.64 and 242.5 was evaluated based on Government provided GIS data in Bowie and Cass Counties.
      - Merged individual stand shapefiles into similar CAD land classification system by utilizing provided shapefile data. The category selected from the tabular data from the government was the "Common Name" categories.
      - A meeting was held with the government to agree to the land classifications.
      - This acreage was copied into Excel data for use.
      - All tables were cross-referenced and check-summed.
  - Marvin Nichols Reservoir Study Area
    - Red River, Franklin and Titus Counties
      - In GIS, deleted overlaps found between county parcel ownership;
      - In GIS, deleted "out" islands to include these in the data. These islands resulted from elevations higher than 328 but were located within the perimeter elevation, so needed to be included.
      - Established guidelines for dividing land classifications.
      - In GIS, divided parcels along major land classifications based on 2015 imagery. Peer review of approximately 30% of each county's major land classifications.
      - Recalculated acreage upon completion using ArcMap calculation methods.
      - This acreage was copied into Excel data for use.
      - All tables were cross-referenced and check-summed.

- Market Value Assessment - Quality Control Measures:
  - Process for assigning market value and volume estimates on Private Owned and Government Owned Parcels is as follows:
    - Several sites visited on the ground were chosen for aerial inspection to provide a baseline understanding of comparison of aerial observation to ground observation. Two KFS foresters performed this task to agree to observations.
    - Updated volume estimates to MNR study area for H1 & H2 categories to more accurately reflect the higher timber volumes observed from the aerial inspection.
    - Utilization of previous on-the-ground inspections to observe general forest conditions, quality and estimate volumes from most of the publically accessible sites.
    - On the Corps property, we were able to calculate that approximately 94% of the stands classifications were previously inspected.
    - Volume estimates were based on ocular estimates comparing experience with timber inventory, timber harvests and timber appraisals of similar quality timber in the market area.
      - Estimates were copied into Excel data for use.
      - All tables were cross-referenced and check-summed.
    - Two KFS professional foresters jointly inspected several different stand types to ensure quality control of ground versus aerial observation.
    - Timber values were derived from a combination of
      - KFS experience in the market selling similar quality timber,
      - Knowledge of other timber sales from buyers and sellers,
      - Conversations with local timber buyers and mills,
      - Adjustments for quality of timber observed,
    - Adjustments were made for summer-time accessibility only.