DRAFT
Phase 2 (Final) Timberland and Agricultural Land Impact Assessment

prepared for the

SRBA
Sulphur River Basin Authority

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Authorization & Scope

- The Phase 1 Study followed an “appraisal district approach” for assessing timberland & agricultural land impacted by proposed projects.
  - Authorized by original agreement.
  - Wright Patman Lake impacts between 227.5 and 242.5 ft-NGVD.
  - Marvin Nichols Reservoir impacts at 313.5 ft-NGVD.

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Phase I Methodology

- Original plan of study relied on county appraisal district information to identify quantity and value of timber
  - Reasonably adequate for quantity but not for value
  - Engaged Kingwood Forestry Service to estimate values
- KFS Phase I estimates constrained by ability to visually inspect impacted timber
  - Access reasonably adequate for Wright Patman Lake
  - Access constrained at Marvin Nichols Reservoir site
  - As a result, Marvin Nichols Reservoir estimates more uncertain

Reasons for Phase 2 Study

- Expand geographic scope to elevation 328 ft-NGVD at Marvin Nichols Reservoir.
- Address concerns about limited visual inspection at Marvin Nichols via helicopter overflight.
- Take advantage of newly available digital imagery to augment visual inspection.
- Implement “lessons learned” from Phase I with respect to GIS files in order to facilitate future scenario-based evaluations.

Study Area Limits

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Study Limits

- Estimation of the area, volume/value of timberlands, and value of agricultural lands impacted was within the following study boundaries:
  - WPLR: Between elevation 242.5 ft-NGVD and 227.5 ft-NGVD; and
  - MNR: Increased to within elevation 328 ft-NGVD.
- Upper limits selection was based on previous studies.

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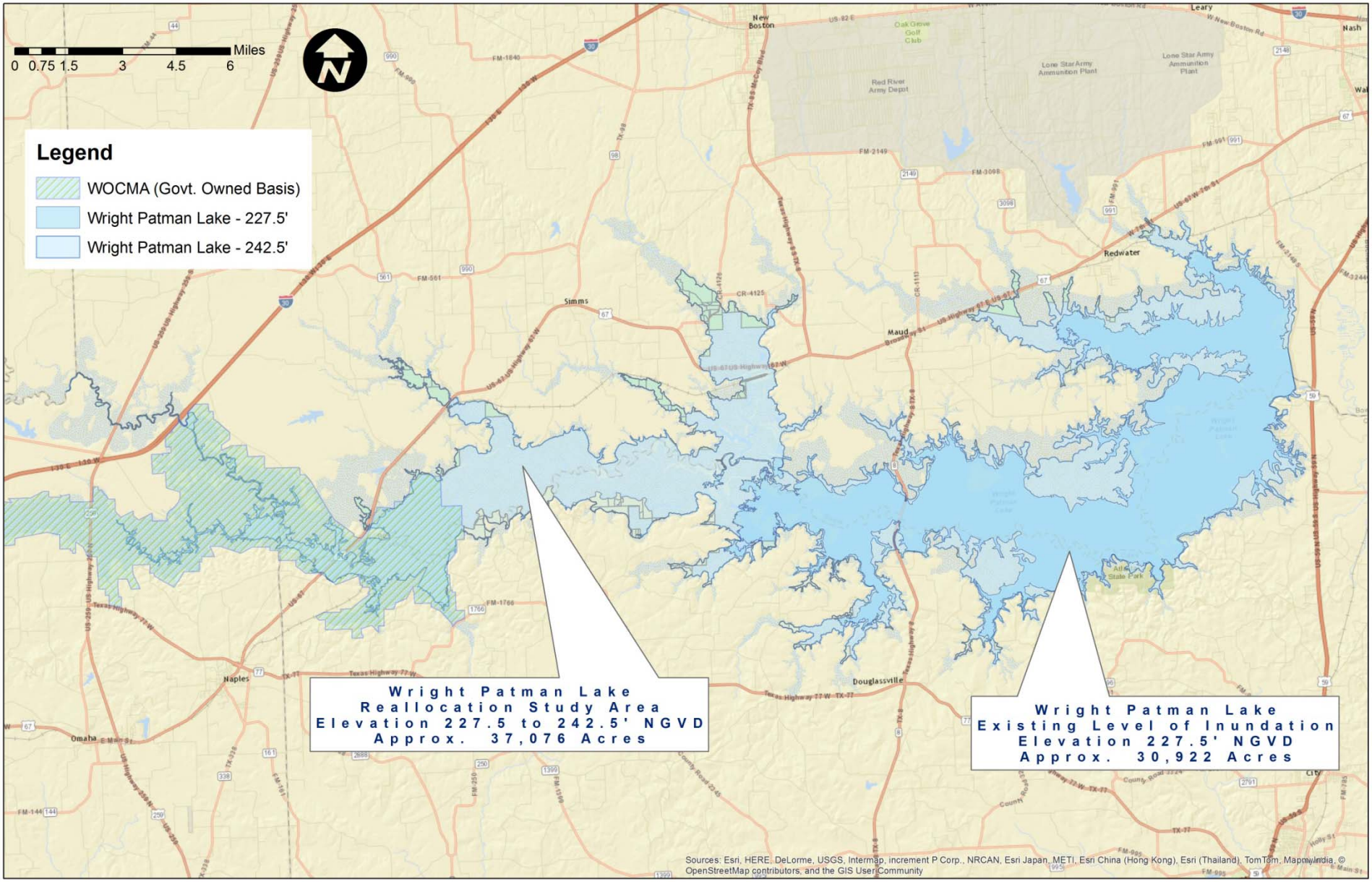
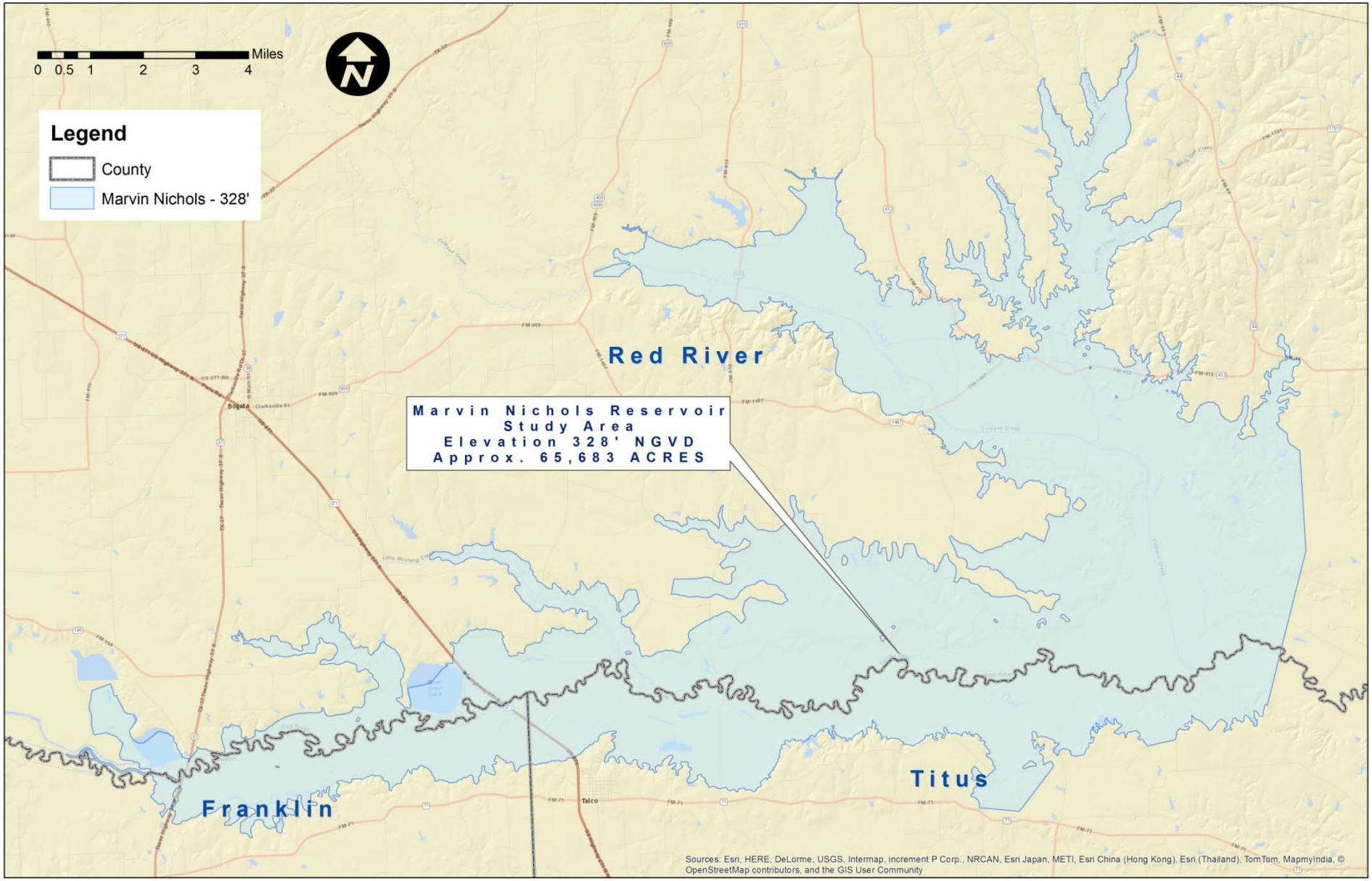

Miles
0 0.75 1.5 3 4.5 6
Legend
WOCMA (Govt. Owned Basis)
Wright Patman Lake - 227.5'
Wright Patman Lake - 242.5'
Wright Patman Lake
Reallocation Study Area
Elevation 227.5 to 242.5' NGVD
Approx. 37,076 Acres
Wright Patman Lake
Existing Level of Inundation
Elevation 227.5' NGVD
Approx. 30,922 Acres
Redwater
Simms
Maud
Douglassville
Naples
Omaha
New Boston
Leary
Nash
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community


Miles
0 0.5 1 2 3 4
Legend
County
Marvin Nichols - 328'
Red River
Marvin Nichols Reservoir
Study Area
Elevation 328' NGVD
Approx. 65,683 ACRES
Franklin
Titus
Talco
Bogata
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Timberland & Agricultural Land Impact Assessment Methodology

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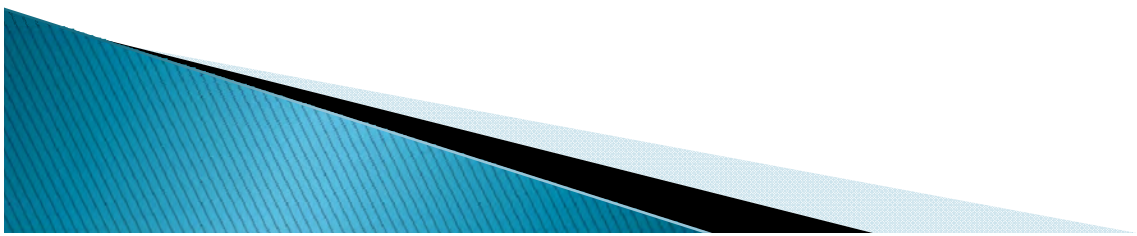
Impact Area Assessment

Area & Quantity of
Each Type of Timber Affected



Assessment of Impact Area

- Phase 1 relied significantly on Appraisal District parcel appraisal information.
- Although Appraisal District information was updated, Phase 2 does not significantly rely upon this data for land impact classifications.
- Instead, a team of engineers and foresters utilized newly available 2015 high resolution leaf-off digital imagery combined with a helicopter reconnaissance of the study areas to augment previous Phase 1 field investigations as basis for classifications.

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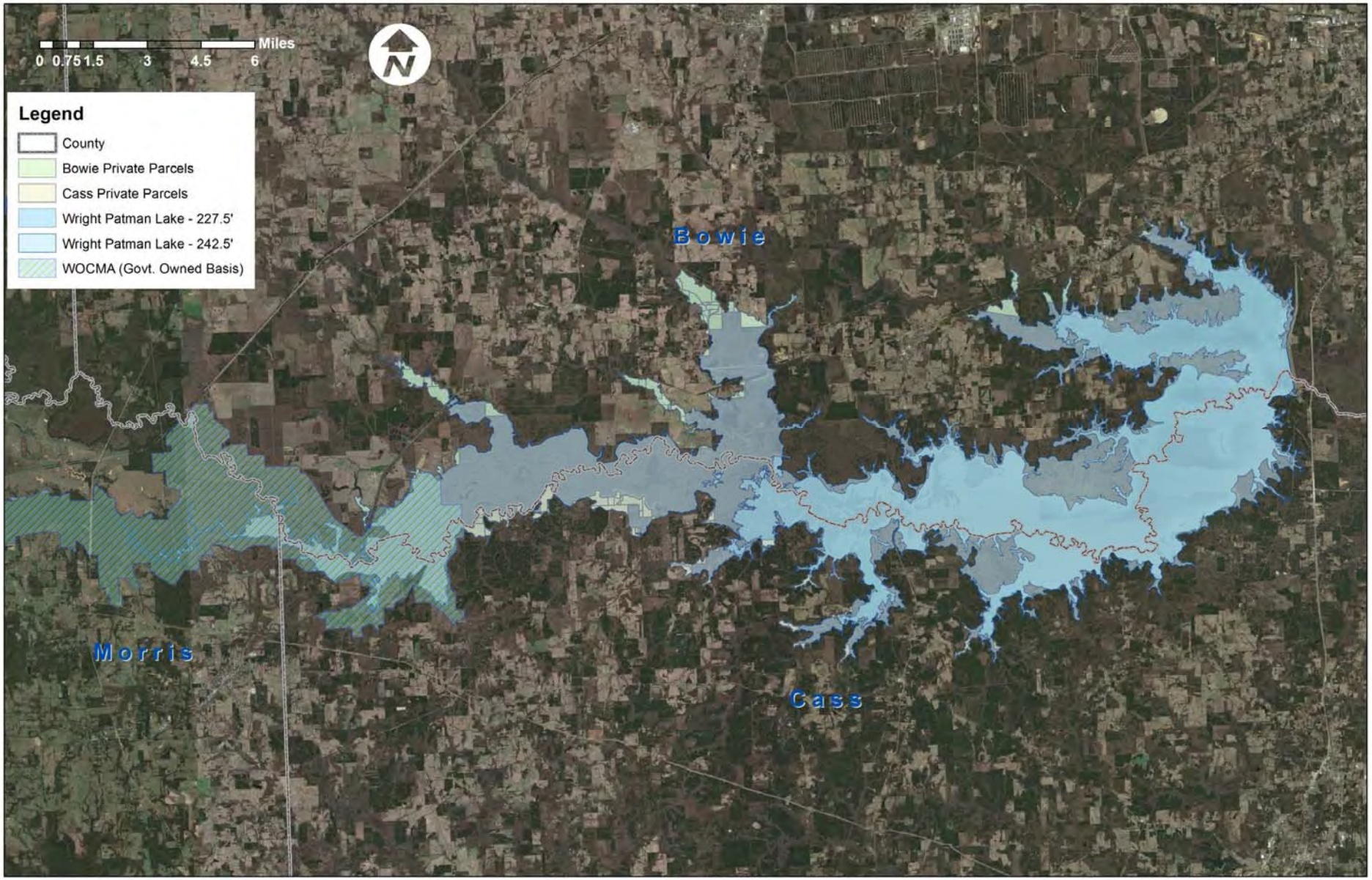
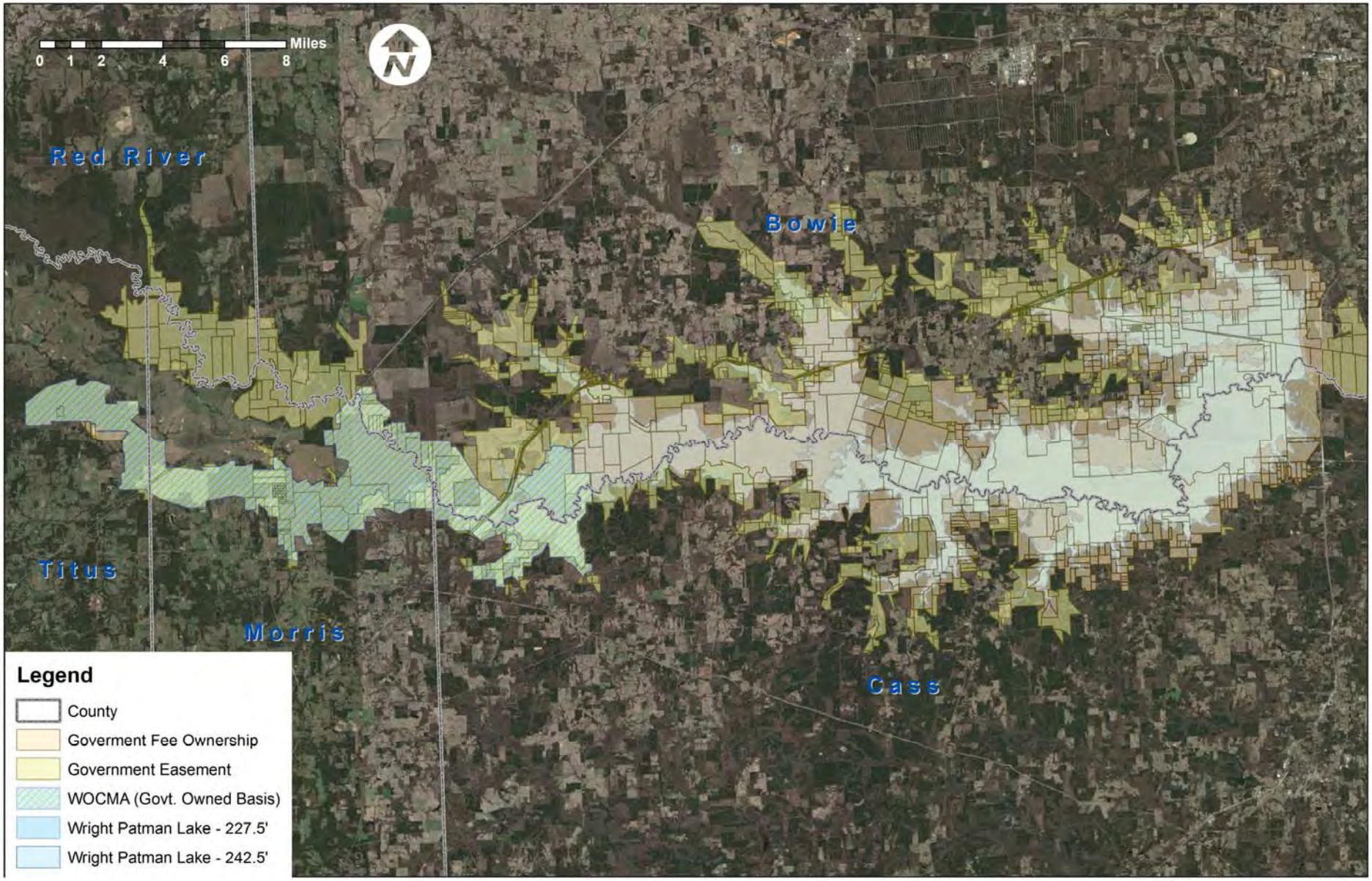
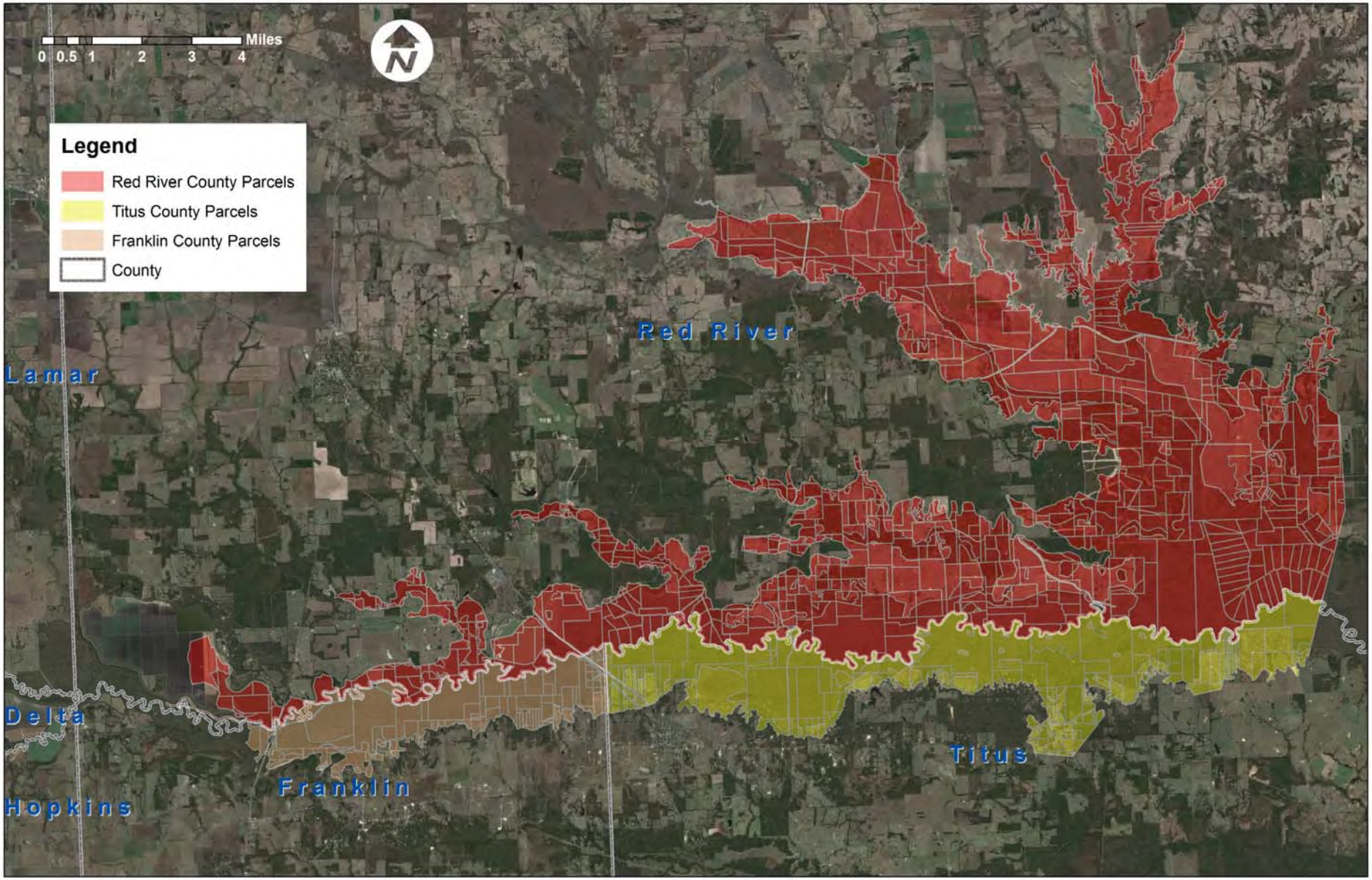


Wright Patman Lake
Private Parcel Impacts



Wright Patman Lake
Government Parcel Impacts



Marvin Nichols Reservoir
Private Parcel Impacts

Assessment of Impact Area

- General land use for each project study area boundary derived from this process is below:

	WPLR	MNR
Study Area (acres)	37,075.8	65,683.2
Classification by percentage		
Hardwood	61.58%	63.18%
Mixed	26.47%	0.04%
Pine	5.47%	0.44%
Range	1.92%	34.12%
Crop	0.00%	0.67%
Wildlife	4.56%	0.08%
Water	0.00%	1.47%

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Assessment of Impact Area

Wright Patman Lake 227.5 to 242.5 ft-NGVD

All impacts shown are in acres

CLASS	BOWIE	CASS	GOVERNMENT	TOTAL
H1	285.4	79.8	16,034.1	16,399.3
H2	262.2	498.8	2,747.3	3,508.3
H3	597.2	121.0	1,476.7	2,194.9
H4	527.7	199.4	0.0	727.1
M1	4.0	56.1	9,073.8	9,133.9
M2	3.5	31.1	144.3	178.9
M3	67.9	9.0	395.4	472.3
M4	27.1	0.0	0.0	27.1
P1	2.7	0.0	1,956.5	1,959.2
P2	0.0	0.0	0.0	0.0
P3	32.1	3.0	0.0	35.1
P4	11.8	20.5	0.0	32.3
R1	343.9	56.2	0.0	400.1
R2	6.2	29.0	0.0	35.2
R3	51.0	0.0	0.0	51.0
R4	226.1	0.0	0.0	226.1
CROP	0.0	0.0	0.0	0.0
W1	0.0	283.9	1,410.9	1,694.8
WATER	0.0	0.0	0.0	0.0
TOTAL	2,448.8	1,387.8	33,239.0	37,075.6

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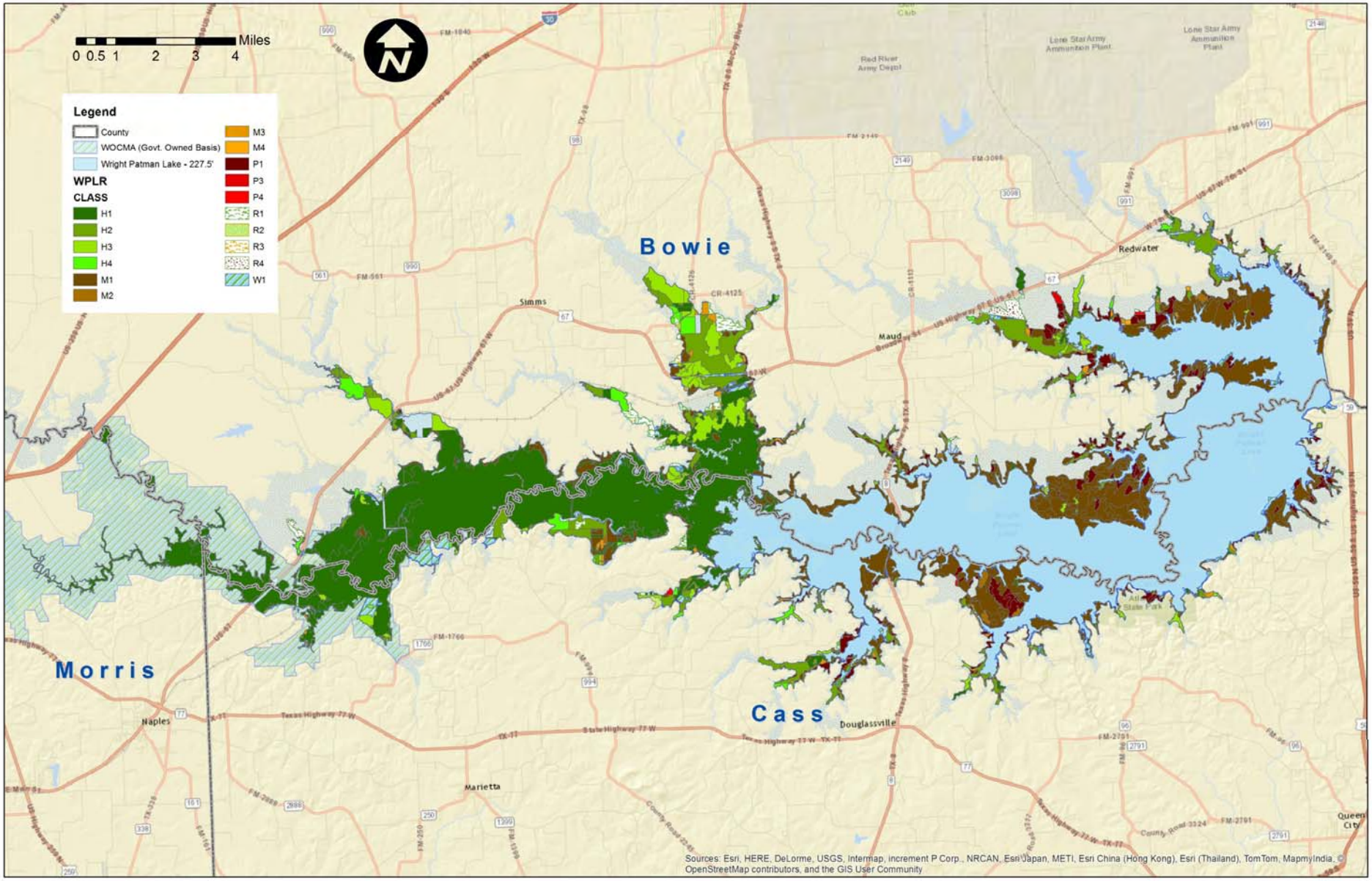

Assessment of Impact Area
Wright Patman Lake
227.5 to 242.5 ft-NGVD

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Assessment of Impact Area

Marvin Nichols
Reservoir
328 ft-NGVD

All impacts shown
are in acres

CLASS	RED RIVER	TITUS	FRANKLIN	TOTAL
H1	2,421.0	832.3	174.0	3,427.3
H2	8,560.2	3,275.0	1,769.6	13,604.8
H3	8,518.3	2,761.3	707.6	11,987.2
H4	8,525.0	2,093.1	1,858.1	12,476.2
M1	28.5	0.0	0.0	28.5
M2	0.0	0.0	0.0	0.0
M3	0.0	0.0	0.0	0.0
M4	0.0	0.0	0.0	0.0
P1	32.5	0.0	0.0	32.5
P2	0.0	0.0	0.0	0.0
P3	166.0	0.0	0.0	166.0
P4	87.4	0.0	0.0	87.4
R1	15,928.9	1,121.4	159.5	17,209.8
R2	2,607.2	737.7	16.3	3,361.2
R3	605.2	706.7	160.6	1,472.5
R4	90.3	250.3	25.4	366.0
CROP	438.4	0.0	0.0	438.4
W1	0.0	54.9	0.0	54.9
WATER	894.9	72.9	2.7	970.5
TOTAL	48,903.8	11,905.6	4,873.8	65,683.2

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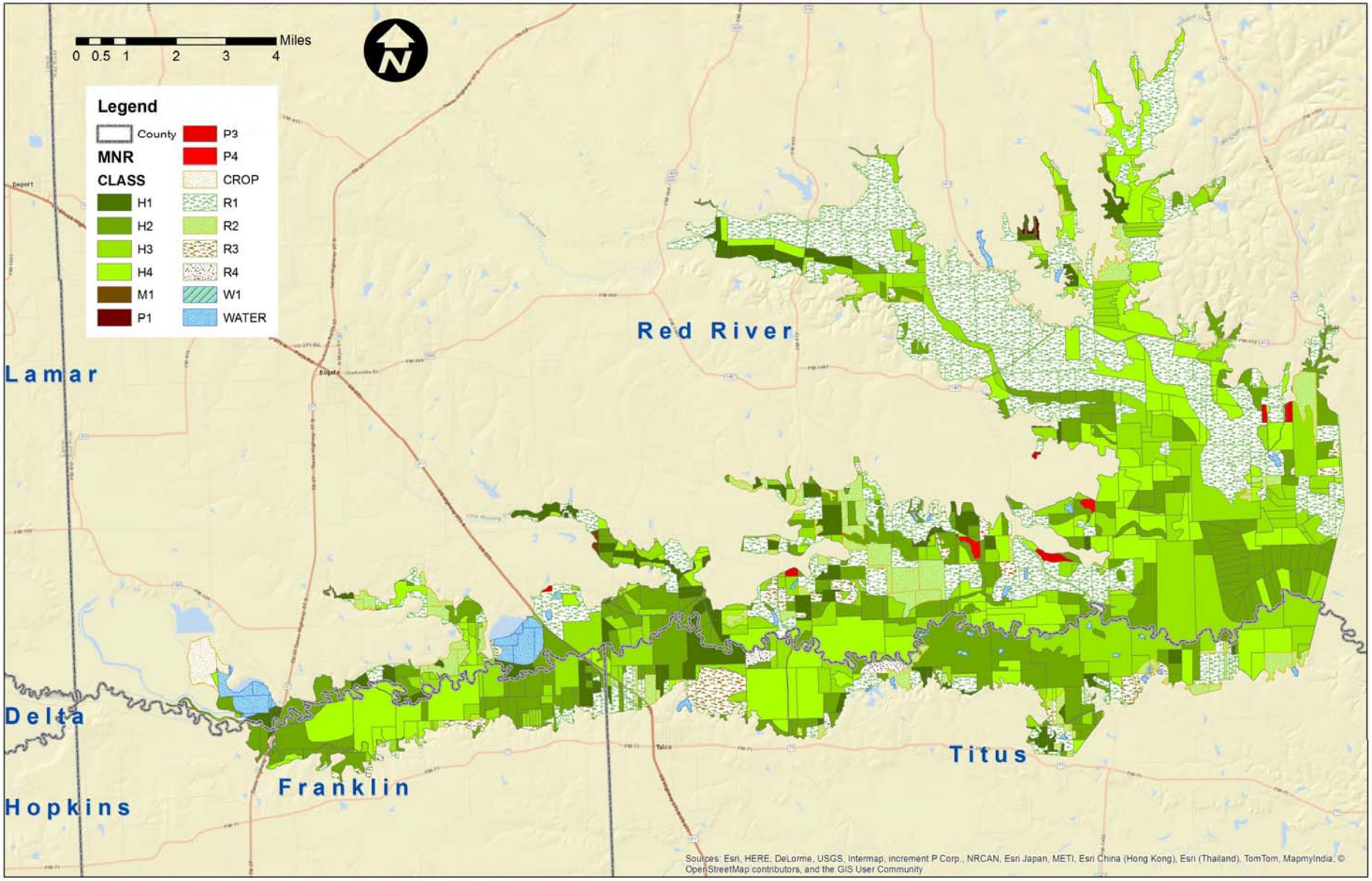

Assessment of Impact Area
Marvin Nichols Reservoir
328 ft-NGVD

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Valuation Process for Timberland & Agricultural Land Impact Assessment (Quality/Value)

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Valuation Process

- To assist with the quality/value process, SBG augmented Phase I information with additional resources including:
  - Agricultural Land – American Society of Farm Managers & Rural Appraisers (ASFMRA);
  - Timberland – Kingwood Forestry Services (KFS);
    - Phase 1 Field Inspections;
    - Helicopter Reconnaissance; and
    - 2015 TNRIS Imagery.

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Valuation Process

- Agricultural Land
  - The valuation process was based on the “lease value” approach typically in use by all CADs and other agencies.
  - Values used for estimating value of impacted agricultural lands were adapted from ASFMRA’s publication “Texas Rural Land Value Trends 2013.”
  - Used a factor of three times the values selected for rental/lease value (equivalent to three years of rental/lease).

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Valuation Process

- Timberland
  - Timber "density" and value of each timber classification was based on estimation and visual inspection by KFS.
  - On the government-owned property, the sites inspected represented 94% of the classification types.
  - Privately-held property was previously inspected where public access was available; this work was augmented both with helicopter inspection and 2015 aerial imagery to assess parcel similarities.

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Valuation Process

- Timberland (continued)
  - Helicopter reconnaissance and 2015 digital imagery substantially improved confidence in MNR impact estimates.
  - The resulting estimated volumes of timber are expressed in tons and classified as Hardwood Sawtimber (HST), Hardwood Pulpwood (HPW), Pine Sawtimber (PST) & Pine Pulpwood (PPW).

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Valuation Process

Wright Patman Lake
Timber Impacts
(tons)

CLASS	TYPE	BOWIE	CASS	GOVERNMENT	TOTAL
H1	HST	8,562.0	2,394.0	481,023.0	491,979.0
H1	HPW	11,416.0	3,192.0	641,364.0	655,972.0
H2	HST	3,933.0	7,482.0	41,209.5	52,624.5
H2	HPW	11,799.0	22,446.0	123,628.5	157,873.5
H3	HPW	8,958.0	1,815.0	22,150.5	32,923.5
H4	HPW	15,831.0	5,982.0	-	21,813.0
M1	HST	40.0	561.0	90,738.0	91,339.0
M1	HPW	160.0	2,244.0	362,952.0	365,356.0
M1	PST	80.0	1,122.0	181,476.0	182,678.0
M1	PPW	20.0	280.5	45,369.0	45,669.5
M2	HPW	52.5	466.5	2,164.5	2,683.5
M2	PST	87.5	777.5	3,607.5	4,472.5
M2	PPW	17.5	155.5	721.5	894.5
M3	HPW	1,018.5	135.0	5,931.0	7,084.5
M3	PPW	679.0	90.0	3,954.0	4,723.0
M4	HPW	271.0	-	-	271.0
M4	PPW	271.0	-	-	271.0
P1	HST	13.5	-	9,783.0	9,796.5
P1	HPW	40.5	-	29,349.0	29,389.5
P1	PST	243.0	-	176,094.0	176,337.0
P1	PPW	40.5	-	29,349.0	29,389.5
P3	HPW	321.0	30.0	-	351.0
P3	PPW	1,926.0	180.0	-	2,106.0
P4	HPW	59.0	102.5	-	161.5
P4	PPW	295.0	512.5	-	807.5
TOTALS		66,134.5	49,968.0	2,250,864.0	2,366,966.5

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Valuation Process

Marvin Nichols Reservoir Timber Impacts (tons)

CLASS	TYPE	RED RIVER	TITUS	FRANKLIN	TOTAL
H1	HST	72,630.0	24,969.0	5,220.0	102,819.0
H1	HPW	60,525.0	20,807.5	4,350.0	85,682.5
H2	HST	85,602.0	32,750.0	17,696.0	136,048.0
H2	HPW	299,607.0	114,625.0	61,936.0	476,168.0
H3	HST	42,591.5	13,806.5	3,538.0	59,936.0
H3	HPW	170,366.0	55,226.0	14,152.0	239,744.0
H4	HPW	85,250.0	20,931.0	18,581.0	124,762.0
M1	HST	285.0	-	-	285.0
M1	HPW	570.0	-	-	570.0
M1	PST	570.0	-	-	570.0
M1	PPW	142.5	-	-	142.5
P1	HPW	162.5	-	-	162.5
P1	PST	1,625.0	-	-	1,625.0
P1	PPW	325.0	-	-	325.0
P3	HPW	1,660.0	-	-	1,660.0
P3	PPW	8,300.0	-	-	8,300.0
P4	PPW	2,185.0	-	-	2,185.0
TOTALS		832,396.5	283,115.0	125,473.0	1,240,984.5

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Per Acre Valuation

- Estimated value for each land cover classification was based on "Stumpage" ($/ton) and estimated density in tons per acre.
- Density values differ for each project site based on the inspection effort.
- Estimates provided in the following tables:

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Per Acre Valuation

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			1,650.00
H2	15	45			1,200.00
H3		30			450.00
H4		15			225.00
M1	10	40	20	5	1,590.00
M2		15	25	5	1,015.00
M3		15		10	305.00
M4		10		10	230.00
P1	5	15	90	15	3,220.00
P2	5	15	50	30	2,140.00
P3		10		60	630.00
P4		5		25	275.00
R1					180.00
R2					120.00
R3					75.00
R4					45.00
WILD					450
WATER					0

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Per Acre Valuation

MARVIN NICHOLS RESERVOIR - DENSITIES & UNIT VALUES					
STUMPAGE ($/TON)	$35.00	$15.00	$30.00	8.00	**TOTAL ($/ACRE)**
PRODUCT (TONS/ACRE)	HST	HPW	PST	PPW	
CATEGORY					
H1	30	25			1,425.00
H2	10	35			875.00
H3	5	20			475.00
H4		10			150.00
M1	10	20	20	5.00	1,290.00
M2	5	30	5	10.00	855.00
M3		30			450.00
M4		10		5.00	190.00
P1		5	50	10.00	1,655.00
P2		10	25	30.00	1,140.00
P3		10		50.00	550.00
P4				25.00	200.00
R1					180.00
R2					120.00
R3					75.00
R4					45.00
CROP					225
W1					450
WATER					0

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Per Acre Valuation

Estimated Values – Lake Wright Patman

PARCELS	TOTAL	HST	HPW	PST	PPW	AGRI
Bowie	$ 1,318,685.00	$ 439,197.50	$ 748,897.50	$ 12,315.00	$ 25,992.00	$ 92,283.00
Cass	$ 1,101,934.00	$ 365,295.00	$ 546,195.00	$ 56,985.00	$ 9,748.00	$ 123,711.00
Government	$ 52,047,145.50	$ 21,796,372.50	$ 17,813,092.50	$ 10,835,325.00	$ 635,148.00	$ 967,207.50
Totals	$ 54,467,764.50	$ 22,600,865.00	$ 19,108,185.00	$ 10,904,625.00	$ 670,888.00	$ 1,183,201.50

Estimated Values – Marvin Nichols Reservoir

PARCELS	TOTAL	HST	HPW	PST	PPW	AGRI
Red River	$ 19,792,534.50	$ 7,038,797.50	$ 9,272,107.50	$ 65,850.00	$ 87,620.00	$ 3,328,159.50
Titus	$ 6,056,582.0	$ 2,503,392.5	$ 3,173,842.5	$ -	$ -	$ 379,347.0
Franklin	$ 2,455,029.0	$ 925,890.0	$ 1,485,285.0	$ -	$ -	$ 43,854.0
Totals	$ 28,304,145.5	$ 10,468,080.0	$ 13,931,235.0	$ 65,850.0	$ 87,620.0	$ 3,751,360.5

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Timberland & Agricultural Land Impact Assessment

Summary & Conclusions

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Summary & Conclusions

LOCATION	ACRES	TIMBER VALUE	HST VALUE	HPW VALUE	PST VALUE	PPW VALUE
BOWIE	2,449	1,226,402	439,198	748,898	12,315	25,992
CASS	1,388	978,223	365,295	546,195	56,985	9,748
GOVERNMENT	33,239	51,079,938	21,796,373	17,813,093	10,835,325	635,148
WPLR TOTAL	**37,076**	**53,284,563**	**22,600,865**	**19,108,185**	**10,904,625**	**670,888**
RED RIVER	48,904	16,464,375	7,038,798	9,272,108	65,850	87,620
TITUS	11,906	5,677,235	2,503,393	3,173,843	-	-
FRANKLIN	4,874	2,411,175	925,890	1,485,285	-	-
MNR TOTAL	**65,683**	**24,552,785**	**10,468,080**	**13,931,235**	**65,850**	**87,620**
COMBINED TOTAL	**102,759**	**$ 77,837,348**	**$ 33,068,945**	**$ 33,039,420**	**$ 10,970,475**	**$ 758,508**
WPLR PERCENTAGE	**36.1%**	**68.5%**	**68.3%**	**57.8%**	**99.4%**	**88.4%**
MNR PERCENTAGE	**63.9%**	**31.5%**	**31.7%**	**42.2%**	**0.6%**	**11.6%**

Timberland Impact Conclusions

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Summary & Conclusions

LOCATION	ACRES	VALUE
Bowie	627.2	$ 92,283.0
Cass	369.1	$ 123,711.0
Government	1,410.9	$ 967,207.5
WPLR Total	**2,407.2**	**$ 1,183,201.5**
Red River	19,670.0	$ 3,328,159.5
Titus	2,871.0	$ 379,347.0
Franklin	361.8	$ 43,854.0
MNR Total	**22,902.8**	**$ 3,751,360.5**
Combined Total	**25,310**	**$ 4,934,562.0**
WPLR Percentage	**9.5%**	**24.0%**
MNR Percentage	**90.5%**	**76.0%**

Agricultural Land Impact Conclusions

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Comparisons of Phase 1 & 2

Wright Patman Lake Reallocation	HST	HPW	PST	PPW	AGRICULTURE	TOTAL IMPACT
Phase 1 Study Totals	$ 19,262,602.85	$ 17,379,554.35	$ 11,397,617.00	$ 723,931.68	$ 3,422,421.04	**$ 52,186,126.92**
Phase 2 Study Totals	$ 22,600,865.00	$ 19,108,185.00	$ 10,904,625.00	$ 670,888.00	$ 1,183,201.50	**$ 54,467,764.50**
Variance	$ 3,338,262.15	$ 1,728,630.65	$ (492,992.00)	$ (53,043.68)	$ (2,239,219.54)	**$ 2,281,637.58**

1. Some of the variance was due to eliminations of additional overlaps we found in GIS parcel boundaries.
2. Other reasons for variance was due to improved methodology resulting in better valuations of timber.

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Comparisons of Phase 1 & 2

Marvin Nichols Reservoir	HST	HPW	PST	PPW	AGRICULTURE	TOTAL IMPACT
Phase 1 Study Totals	$ 4,855,340.69	$ 10,560,656.69	$ 295,282.72	$ 147,409.25	$ 698,891.68	**$ 16,557,581.03**
Phase 2 Study Totals	$ 10,468,080.00	$ 13,931,235.00	$ 65,850.00	$ 87,620.00	$ 3,751,360.50	**$ 28,304,145.50**
Variance	$ 5,612,739.31	$ 3,370,578.31	$ (229,432.72)	$ (59,789.25)	$ 3,052,468.82	**$ 11,746,564.47**

1. A large portion of the variance due to the increase in footprint size.
2. There was also significant change; however, due to the improved methodology resulting in better valuations of the timber

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End of Presentation

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