

August J. Levert, Jr., Family, LLC, et al v. BP America Production Company
18th Judicial District Court, Parish of Iberville
DNR Legacy Case No. 018-028-001
DAL Docket No. 2022-8332-DNR-OOC

Root Zone Investigation
Conducted by Matthew L. Greene

January 9, 2023

HYDRO-ENVIRONMENTAL TECHNOLOGY, INC.



Qualifications of Matthew L. Greene

- Environmental and Soil Scientist with Hydro-Environmental Technology, Inc. (past 8 years)
- Nationally Certified Professional Soil Scientist (CPSS No. 495789)
- Extensive training under Mr. B. Arville Touchet (former Louisiana State Soil Scientist) and contributed to fifteen (15) root zone investigations (including IPSB) with Dr. Luther Holloway (qualified root zone expert)
- Conducted fourteen (14) individual root zone investigations
- Individual root zone investigations have been approved by the LDNR as part of overall site assessment work
 - LDNR issued letters of no objection to root zone reports issued by Matthew L. Greene
 - LDNR issued NFA-ATT for overall assessments that included root zone investigations

Purpose

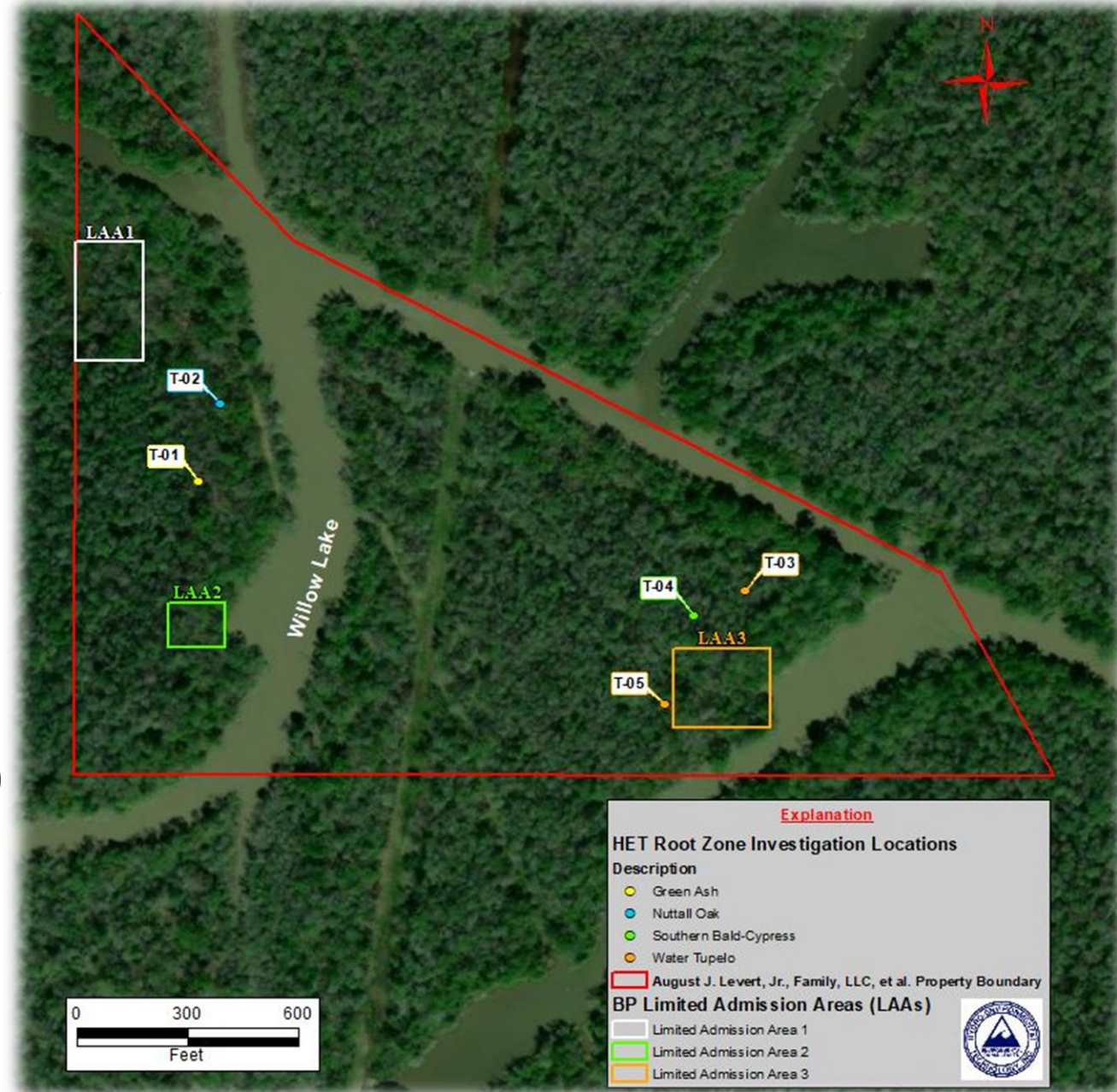
- The investigation was conducted to determine the effective root zone (ERZ) depth of the representative tree vegetation on the Property to support assessment activities performed to date and pit closure activities to be conducted in the LAAs.

Effective Root Zone

- The ERZ of a plant is the area within the soil that is essential for plant growth and maturation process.
- The ERZ is the location where the vast majority (approximately eighty (80) percent) of the roots reside, the majority of the water is extracted by the plant (soil water solution), and the most available nutrients reside.

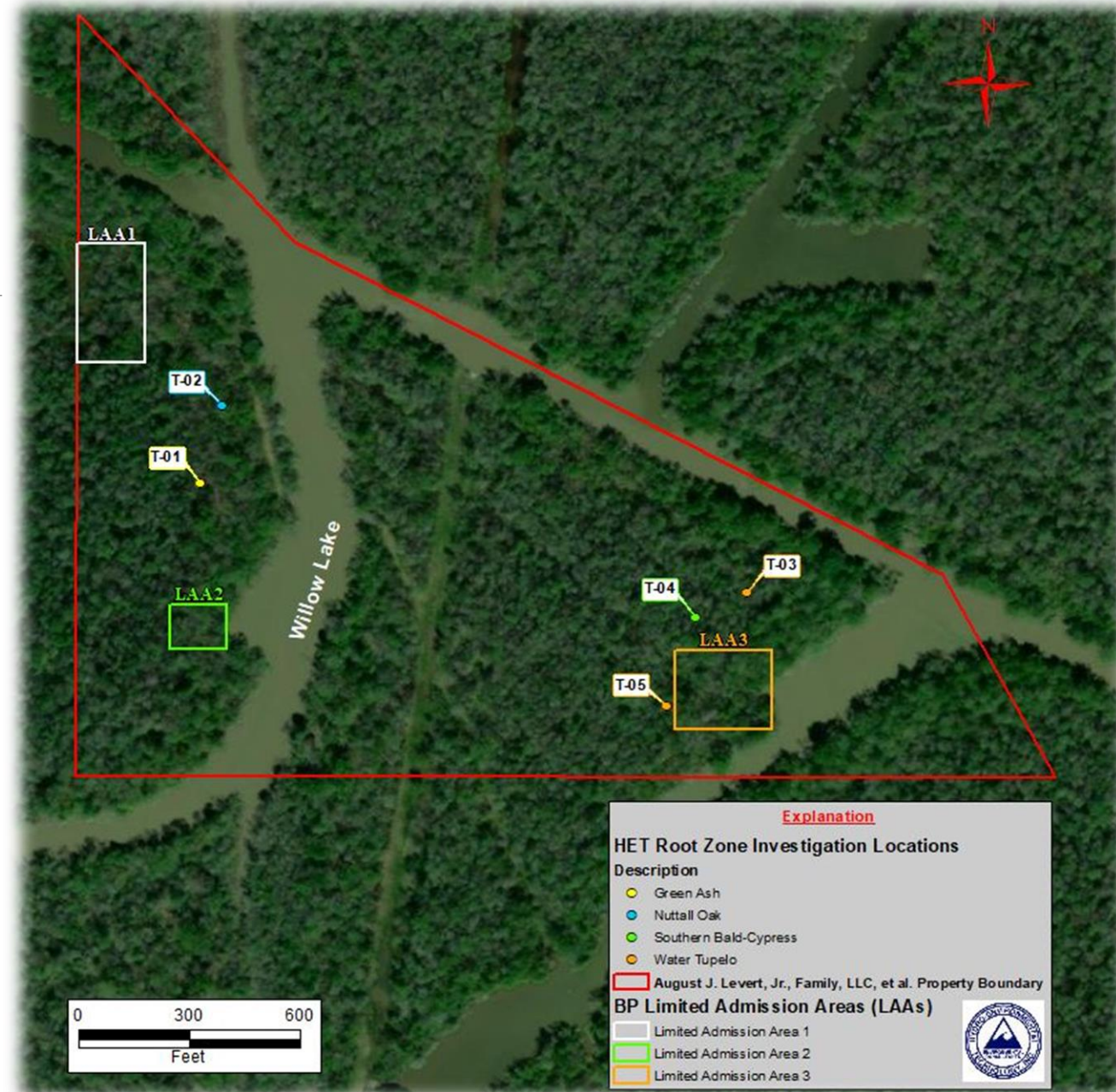
Methodology

- Visual site inspection noting vegetative transitions
- Identify and select dominant plant species
- Locate, mark, and photograph lateral extent of the tree roots by probing and flagging the top of the roots
- Evaluation of rooting depths
- Characterization of soil types (portions of Property)

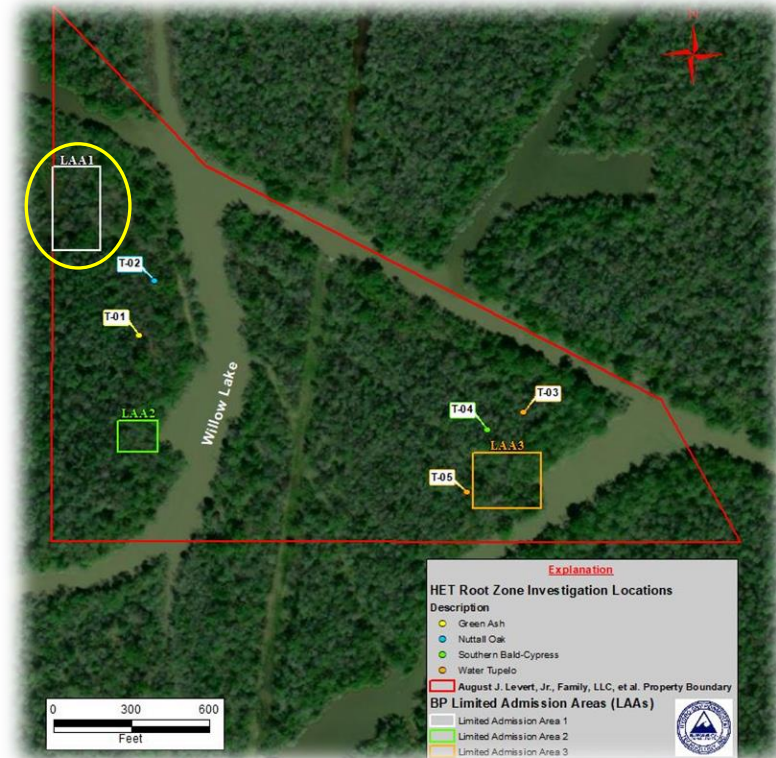


Methodology

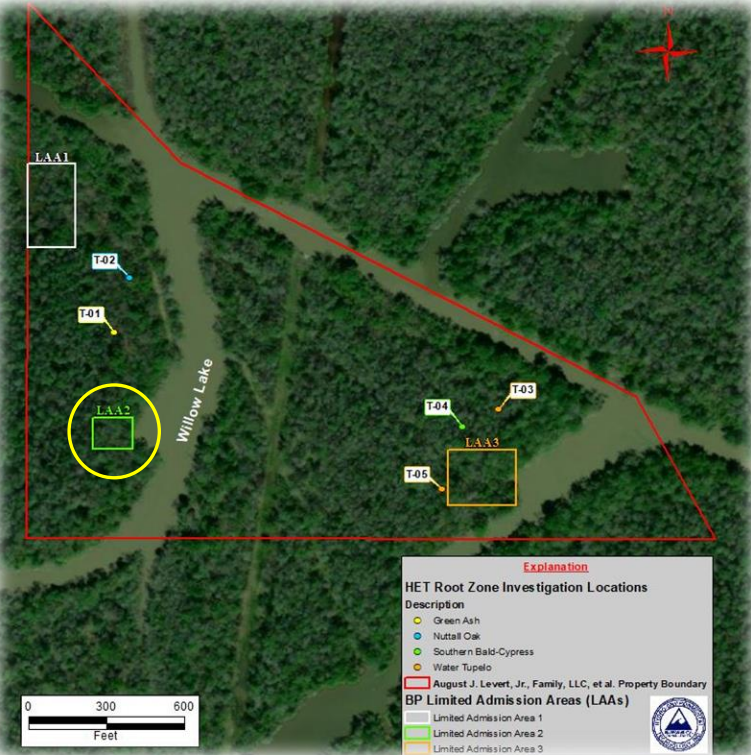
- Visual site inspection noting vegetative transitions
- Identify and select dominant plant species



LAA 1

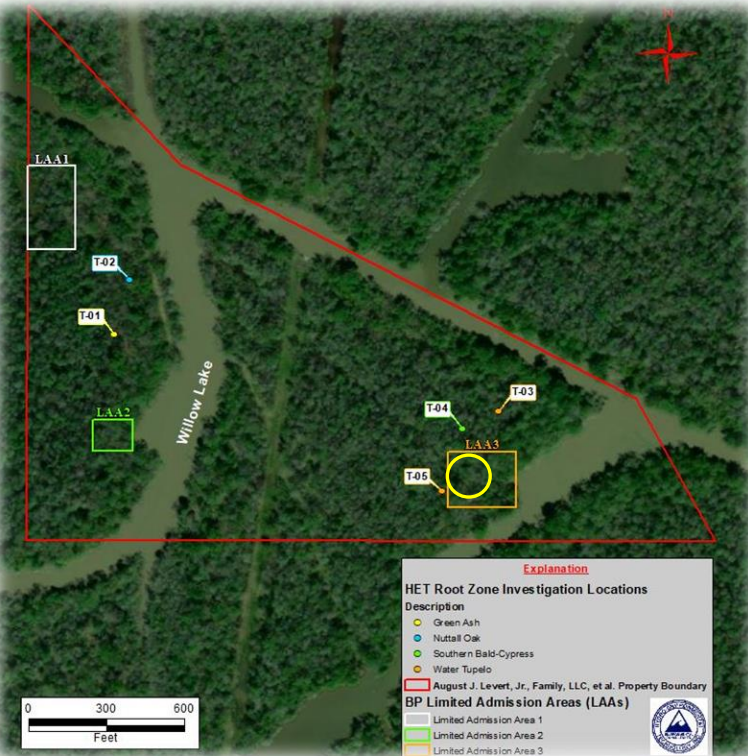


LAA 2



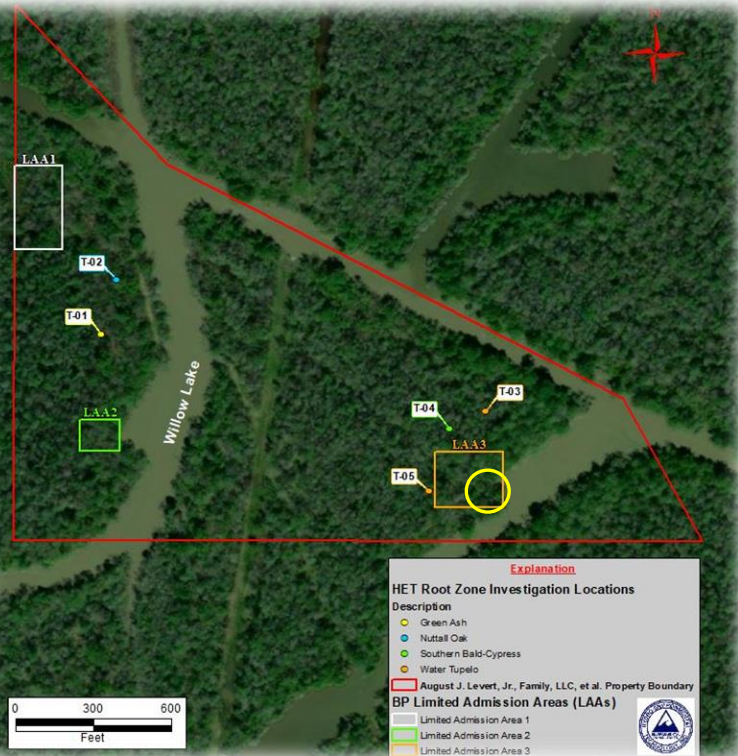
LAA 3

West



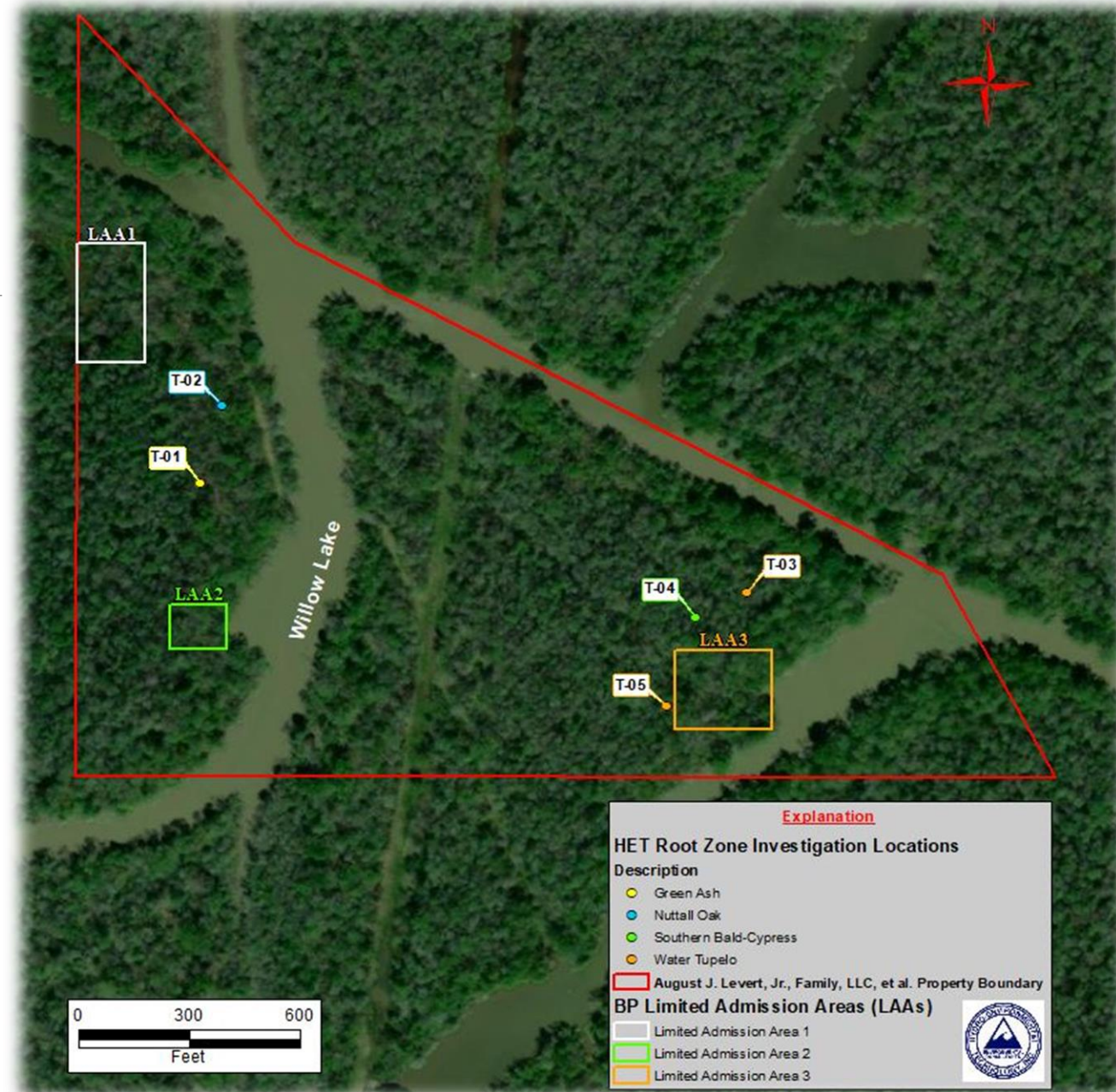
LAA 3

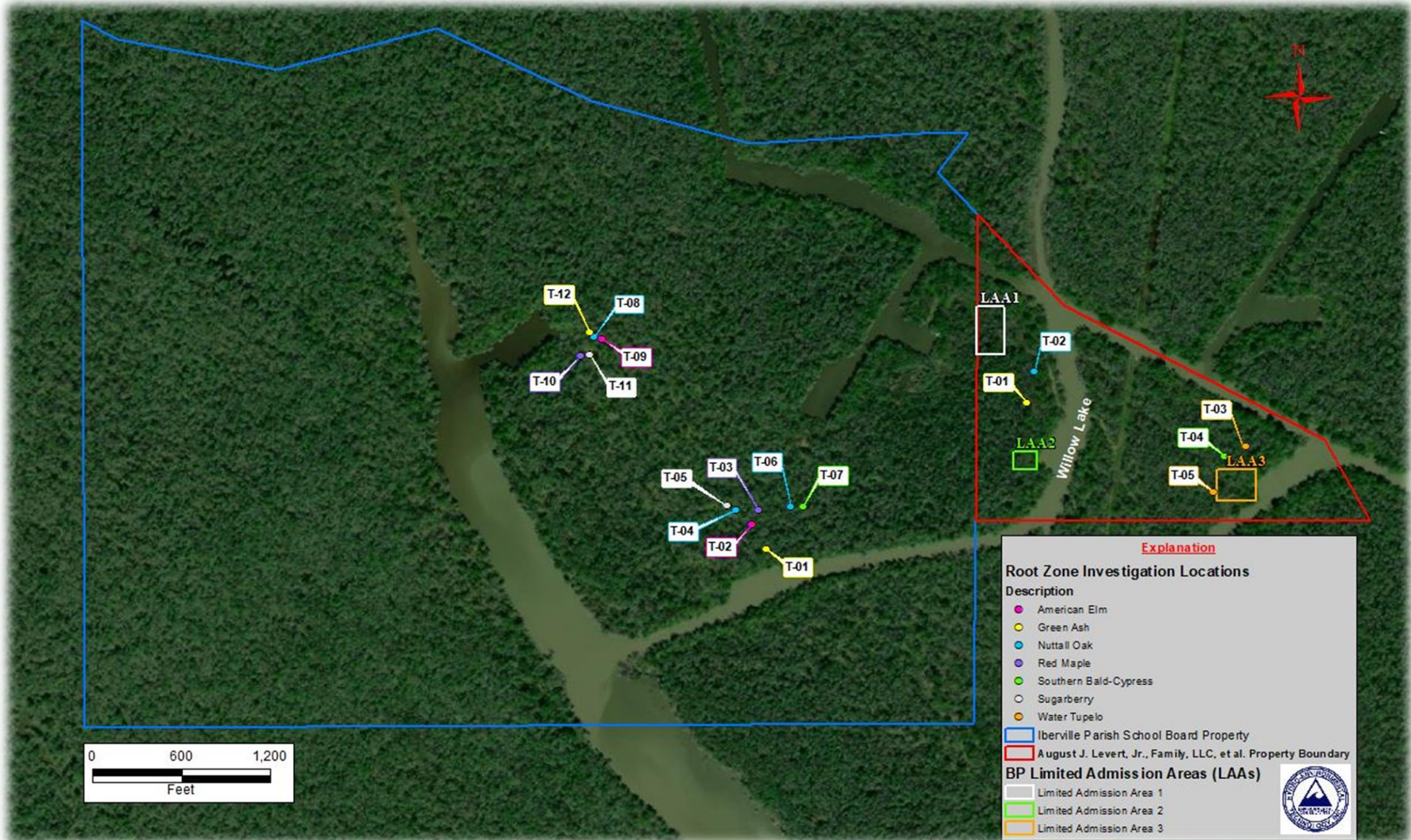
East



Methodology

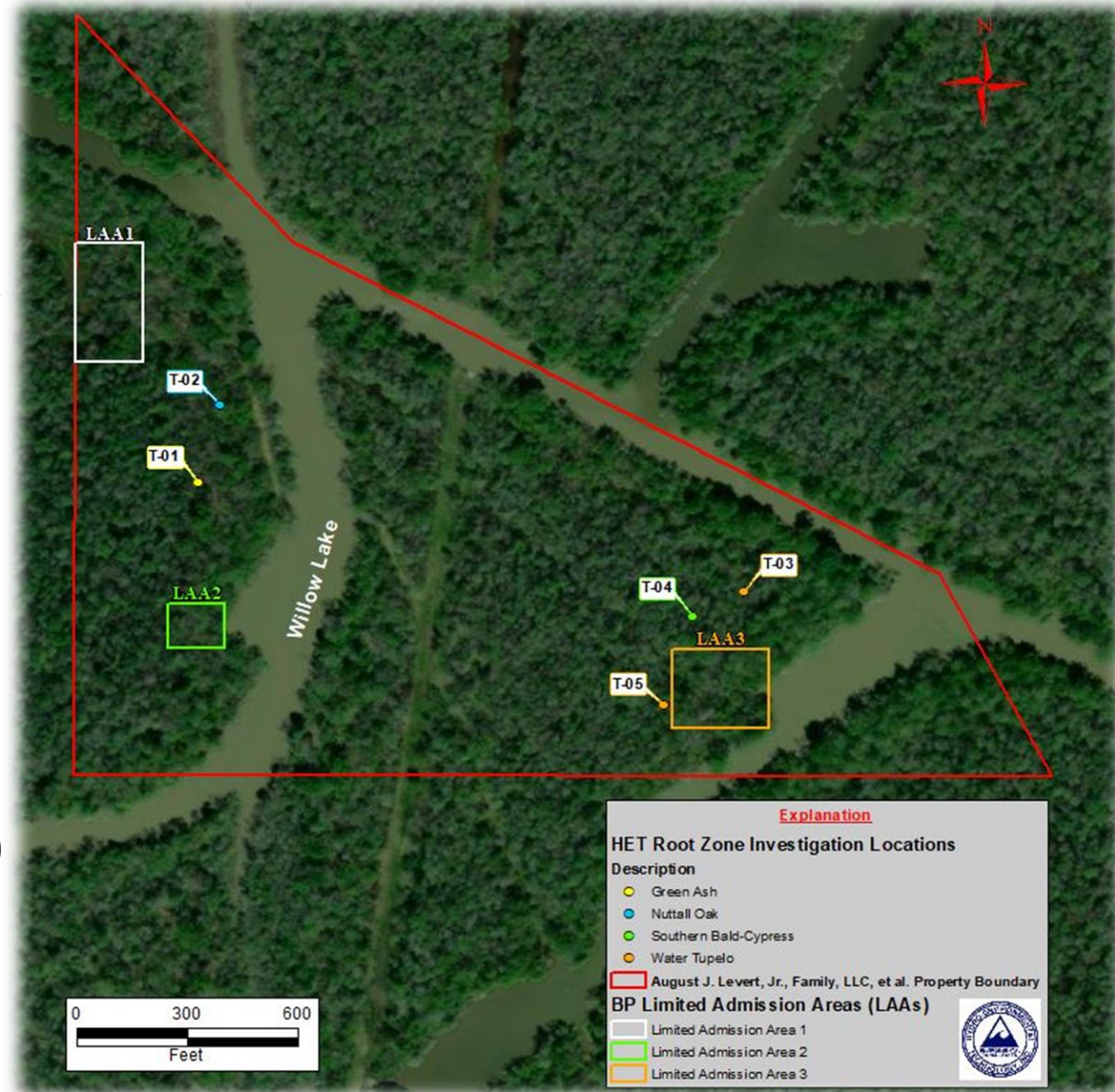
- Visual site inspection noting vegetative transitions
- Identify and select dominant plant species





Methodology

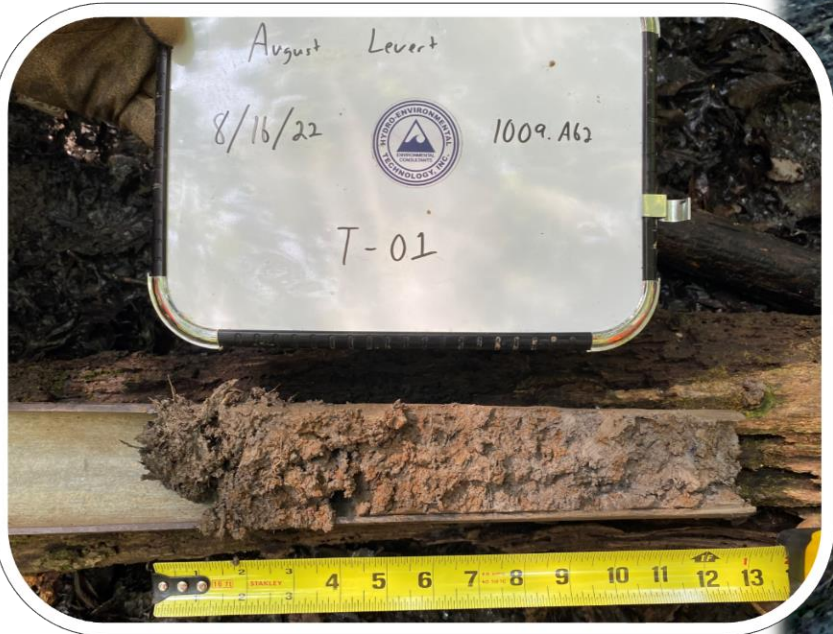
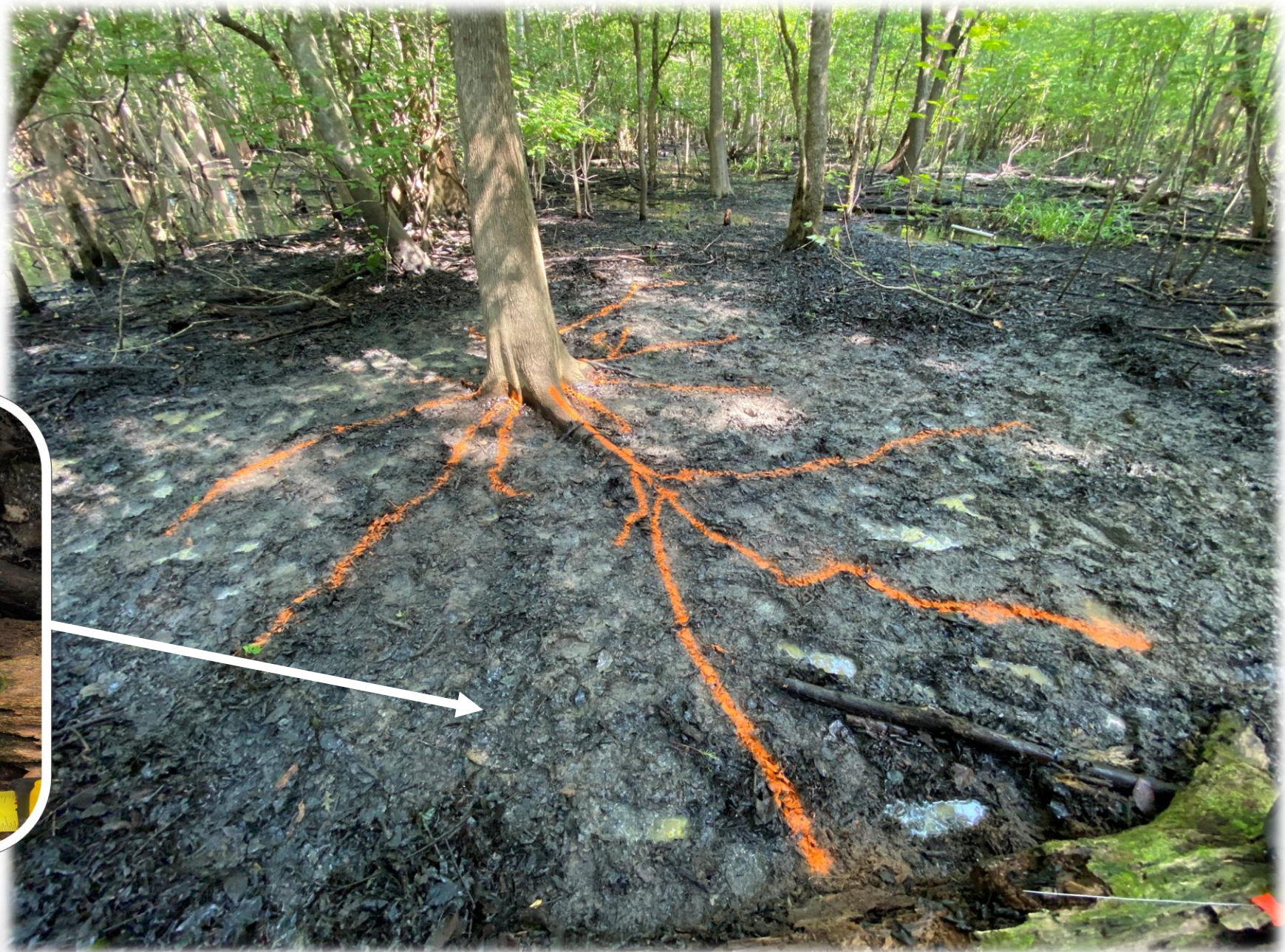
- Locate, mark, and photograph lateral extent of the tree roots by probing and flagging the top of the roots
- Evaluation of rooting depths
 - Observe root properties and distribution
 - Measure depths and lengths
 - Data Collection (HET Data Form)
 - Analyze Data
- Characterization of soil types (portions of Property)



T-01 Green Ash



T-01 Green Ash



Fausse clay (west)

T-04 Cypress



T-04 Cypress



Barbary muck (east)



T-01 Green Ash

State: LA	Parish: Iberville	Section: 15	Township: 10S	Range: 11E	Date: 8/16/22	Location: T-01					
Project/Site: August Levert (1009.A62)			Investigator(s): Matthew Greene								
Latitude: 30.19658		Longitude: -91.34175		Datum: NAD83		Other Info:					
TREE SPECIES: Fraxinus pennsylvanica - Green Ash											
				Circumference: 38.5"		DBH: 12.25"					
Root Number	Total Length	Distance to deepest point	Depth BLS	Random Distance (RD)	Depth BLS	Root Number	Total Length	DDP	Depth BLS	RD	Depth BLS
	(Inches)	(Inches)	(Inches)	(Inches)	(Inches)		(Inches)	(Inches)	(Inches)	(Inches)	(Inches)
1	71	50	3.5	40	1.5	9	52	32	8		
1A	48	48	4			10	137	105	3		
1B	48	48	3								
2	58	30	9	46	4						
3	31	25	4								
4	125	68	3.5	118	1.5						
4A	137	112	3.5	68	0.5						
4B	111	100	5	60	4.5						
5	39	32	1.5								
6	80	32	3	64	1.5						
7	74	39	9	62	2.5						
8	25	21	3.5								
Illustration/Remarks:											
1. 0.5" Surface Water											
SOIL PROFILE PROPERTIES											
Soil Type: Fausse clay											
Depth BLS (inches)	Matrix			Redox Features				Texture	Horizon	Remarks	N-Value
	Color (moist)	%		Color (moist)	%	Type	Loc				
0-2	10YR 3/2	100						Muck	Oa		0.8
2-8	10YR 5/2	60		7.5YR 4/6	40	C	M	Clay	A		0.77
8-13	5Y 5/1	80		7.5YR 4/6	20	C	M	Clay	Bg		0.77
Additional Colors:											
Restrictive Layer(if observed): Type: Depth (inches):											



T-04 Cypress

State: LA	Parish: Iberville	Section: 15	Township: 10S	Range: 11E	Date: 8/17/22	Location: T-04					
Project/Site: August Levert (1009.A62)			Investigator(s): Matthew Greene								
Latitude: 30.19559		Longitude: -91.33808		Datum: NAD83		Other Info:					
TREE SPECIES: Taxodium distichum - Southern Bald-Cypress											
				Circumference: 66.0"		DBH: 21.0"					
Root Number	Total Length	Distance to deepest point	Depth BLS	Random Distance (RD)	Depth BLS	Root Number	Total Length	DDP	Depth BLS	RD	Depth BLS
	(Inches)	(Inches)	(Inches)	(Inches)	(Inches)		(Inches)	(Inches)	(Inches)	(Inches)	(Inches)
1	189	64	7	156	4	9	35	27	13		
1A	219	54	26	100	6	10	52	22	26		
2	28	23	22			11	151	105	17	44	12
3	215	51	17	178	16						
3A	129	98	7								
3B	162	136	12								
3C	170	159	4								
4	105	84	14	47	9						
5	87	35	22	60	14						
6	150	54	22	109	8						
7	182	33	9	106	8						
8	190	57	14	116	6						
Illustration/Remarks:											
1. 2.0 - 3.0" Surface Water											
2. Slough Grass											
SOIL PROFILE PROPERTIES											
Soil Type: Barbary muck											
Depth BLS (inches)	Matrix			Redox Features				Texture	Horizon	Remarks	N-Value
	Color (moist)	%		Color (moist)	%	Type	Loc				
0-2	10YR 3/2	100						Muck	Oa		0.85
2-8	10YR 4/2	80		7.5YR 4/6	20	C	M	Mucky Clay	A		0.8
8-18	5Y 5/1	70		7.5YR 4/6	30	C	M	Clay	Cg		0.77
Additional Colors:											
Restrictive Layer(if observed): Type: Depth (inches):											

Effective Root Zones

- ERZ West of Willow Lake: 0-14 inches BLS
- ERZ East of Willow Lake: 0-24 inches BLS

Effective Root Zone (ERZ) of Select Species

Location ID	Common Name	Effective Root Zone (Inches)
August Levert, Jr., et al. Property		
T-01	Green Ash	0-7
T-02	Texas Red Oak (Nuttall Oak)	0-6
T-03	Water Tupelo	0-18
T-04	Southern Bald-Cypress	0-24
T-05	Water Tupelo	0-24
IPSB Property		
T-01	Green Ash	0-14
T-02	American Elm	0-6
T-03	Red Maple	0-7
T-04	Texas Red Oak (Nuttall Oak)	0-9
T-05	Sugarberry	0-7
T-06	Texas Red Oak (Nuttall Oak) (blow-down)	0-9
T-07	Southern Bald-Cypress	0-11
T-08	Texas Red Oak (Nuttall Oak)	0-7
T-09	American Elm	0-6
T-10	Red Maple	0-5
T-11	Sugarberry	0-6
T-12	Green Ash	0-9

SUMMARY OF OPINIONS

- Dominant species within the vegetative communities exhibited shallow distributions of roots.
 - ERZ of zero (0) to fourteen (14) inches for trees west of Willow Lake.
 - ERZ of zero (0) to twenty-four (24) inches for trees east of Willow Lake.
- Vegetation on the Levert property, including Limited Admission Areas 1, 2, and 3, was observed as healthy (excellent growth) with no vegetative impacts observed.
- In the unlikely event that any restoration is deemed necessary with regard to salinity, the above effective root zones (ERZ) should be taken into account during any potential restoration planning. Remediation at depths deeper than the ERZ is unnecessary with regard to vegetative growth.
- This investigation will be utilized during overall pit closure activities to re-establish vegetative growth.