1604 EATON BRANCH @
CEMETARY ROAD
(LEADWOOD CEMETARY ROAD)
OFF HWY 8
STREAM PASSES THROUGH
COW PASTURE. DOWNSTREAM
(↑ UPSTREAM) LOOKS LIKE THERE IS
BEDROCK OUTCROP ON
RIGHT LOW BANK (4-5 FT)
MURKY WATER, ALOT OF ALGAE.

1735 ATTEMPTED ACCESS TO
OWL CREEK, APPEARS
ALL ACCESS IS PRIVATE

END 15 MAR 12 BLS

3/16/12 8:00AM START VISUAL
Survey from HWY K
Access
IAN Stupakoff
Robin Dingle
Ben Starr
Overnight significant
rains (t-storms)
Water level noticeably
higher - current fast
Check gage tonight
Gage (internal) at
Cherokee Landing may
show 1-1½ FT rise since
yesterday.
Overcast today 40% chance
More rain

0902 Water is turbid &
cannot see bottom
bank soils have changed
consistency
fine to med sand w/
silt - more organic material
and fines dark brown color

see pictures of trib.
w/ close time stamp

0908 passing steep ~20FT
Cut bank on right
Sands consistent w/
soils observed yesterday
+ ATTN days upstream
0915 Terre Bleue tributary
suspended sediment plume
visible from trib @
confluence
banks 15-25' w/
adjacent wooded floodplain
soils loamy/silty/sand
observed earlier
a lot of woody debris
on banks @ confluence
1030 Coonville Creek
noticeable plume of
sediment in flow
from creek
water depth 2-2.5'
bottom appear gravel /
cobble based on probe

No visibility - turbid
water.

1100 Return to Cherokee
Landing → exited
river @ Cherokee
Landing
Water level ~5.5
on Cherokee gauge
Christy (owner) indicated
water level 3-4
this AM (~7AM.)

Difficult to take
many notes today
w/ swift + high water,
turbid conditions.

1308 Elvins / RIVERMINES PICE
3 2 settling ponds at
base of pile treat runoff
potential discharge quality?
outflow crosses Business 52
AND UNDER RR - Series
of culverts.

Where ELVINS/RIVERMINES
DRAINAGE ENTERS FLAT
RIVER CREEK
NOTICEABLE DIFFERENCE
IN TURBIDITY (OUTFLOW
FROM TREATMENT CELLS
HAS GREATER TURBIDITY)

BANK OF FLAT RIVER CREEK
APPEARS COMPOSED OF
SILTY SAND w/ organic
material
BED OF CREEK IS NOT
VISIBLE
BAR IS GRAVEL & COBBLES

THERE IS A BROAD, FLAT
FLOODPLAIN IMMEDIATELY
DOWNSTREAM OF
RR TRACKS ON
RIVERMINES OUTFLOW
CHANNEL
GROUND V. SOFT RED SILT/
CLAY MATERIAL PLACED.
OVERBURDEN MATERIAL FROM QUARRY

2-3" RED SILT/CLAY MATERIAL
IN OUTFLOW CHANNEL
UNDERLAIN BY GRAVEL

1522 FINISHED TOUR OF
FLAT RIVER CREEK AT
SEVERAL LOCATIONS AT
TOE OF NATIONAL PILE

NATIONAL PILE REMEDIATION
IS CONTINUING - ALMOST
FINISHED?

TEMPORARY HAUL ROAD CONSTRUCTED
WITH OR ON MINE WASTE?

TWO OUTFALLS ON NATIONAL
PILE W/ STORM WATER?
FLOWING

THERE IS SILT + ANGULAR
FINE GRAVEL IN OUTFLOW
CHANNEL LEADING TO
FLAT RIVER

FLAT RIVER — SWIFT
MOVING WATER, ~~APPEARS~~
DEEP & IS TURBID

BANK ON TOWN SIDE
IS BEDROCK OUTCROP

1544 VISITED SHAW BRANCH

THERE IS FLOW IN SHAW
BRANCH ~ 6" max
on AVE. Deeper pools
near confluence
w/ FLAT RIVER

GRAVEL BED ~~SUBSTRATE~~ SUBSTRATE

1612 END FOR TODAY

BS 16 MAR 12

17 MAR 12
0700 USGS gage below Bonne Terre indicates water level ~9.7 FT
0730 Gage (informal) at Cherokee Landing ~ 7.8 FT
water line on trees indicates water ~ 3 FT + higher overnight

water too swift and deep to conduct visual survey

0840 Visited Bore Hole access to look at higher water conditions

USGS gage height at Leadwood is 4.51 FT as of 0815 CDT
gage height at location below Bonne Terre is 8.51 as of 0730 CDT

Evidence of fine sediment deposition on lower end of access road just before water crossing

BIS 17 MAR 12

18 MAR 12
0900 Visited Mill Creek at Hwy 47 bridge crossing
At crossing creek is ~100-120 FT in width
water is turbid, but submerged bars are visible.

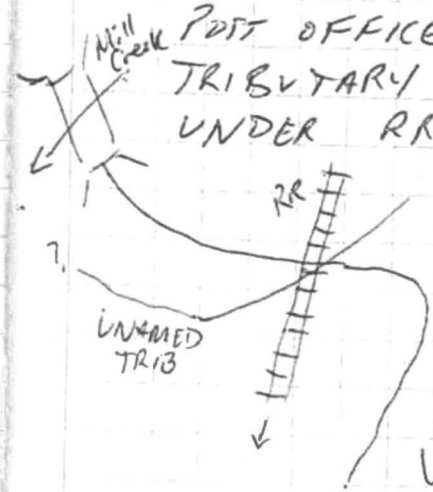
gravel bar 3/4 to 2" gravel w/ larger cobbles

ON/NEAR LEFT BANK SEDIMENTS PREDOMINANTLY MED to COARSE SAND w/ Gravel and FINES
SAND MOSTLY COARSE w/ ANGULAR PARTICES

MATERIAL HAS RED/REDDISH BROWN COLOR

1010 Observed Mill Creek from road crossing in TIFF
bottom substrate appears to be gravel (fine to med) w/ coarse sands
reddish brown color
0.5cm to 3cm diam → gravel

1030 FROM TIFF, JUST EAST BEND IN ROAD, EAST POST OFFICE, UNNAMED TRIBUTARY PASSING UNDER RR TRACKS



WE VISITED THIS TRIB IN OCT 2011 w/ JOHN CARTER (JOE RUN) THINKING AT TIME IT WAS MILL CREEK.

1045 FOLLOWED RR TRACKS
TOWARDS NEXT CROSSING
OF MILL CREEK
RR GRADE BUILT IN FLOODPLAIN
OF MILL CREEK
CROSSING ~200 FT BTWN
TRESTLE ABUTMENTS
RR GRADE CONSTRICTS
FLOODPLAIN
CHANNEL HAS ERODED
IN VICINITY OF
CROSSING
VISIBLE EROSION ON
SLOPES ADJACENT TO
TRESTLE ABUTMENT/
EMBANKMENT
REDDISH BROWN SANDS
AND GRAVEL (FINE) MIGRATING
FROM BEHIND CREOSOTE
TIMBER RETAINING WALL.
WITH EXCEPTION OF RIVER
CROSSING, RR GRADE WELL
ARMORED W/ GRAVEL AND
VEGETATION.

1108 3rd RR CROSSING OVER
MILL CREEK
* SLIGHT TRAILS DOWN
EMBANKMENTS ON EITHER
SIDE. SLOPES PRETTY STABLE
LARGE PILE VISIBLE DOWNSTREAM.
* WHERE FOOT PATH DISPLACED
ARMOR STONE, 3/4" UNIFORM
REDDISH BROWN GRAVEL IS
VISIBLE.

1122 Continued from Tiff
over Mill Creek via
above described crossing
(~~low head dam~~ road crossing)

road passes over large
tributary. Poor map
coverage will mark
coords. and identify later
tributary wide at bridge
crossing ~200 FT
upstream left bank
horse/cattle pasture

downstream banks wooded
floodplain
40-50 FT from road
deck to water surface.

Very large mine waste
pile visible on
downstream ~~bank~~.
left bank hillside. just
visible through trees

1415 visited RR crossing of
Mill Creek from
Blackwell
From RR trestle - a
low water crossing
visible immediately
downstream
this one does appear
to serve as a low-head
dam - has pool
behind.
RR grade embankment
generally well armored
w/ quarry spalls 2-4"

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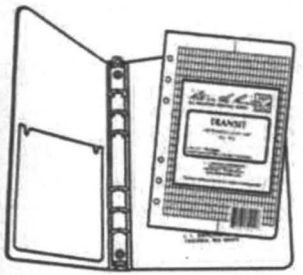
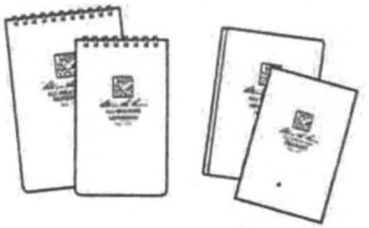
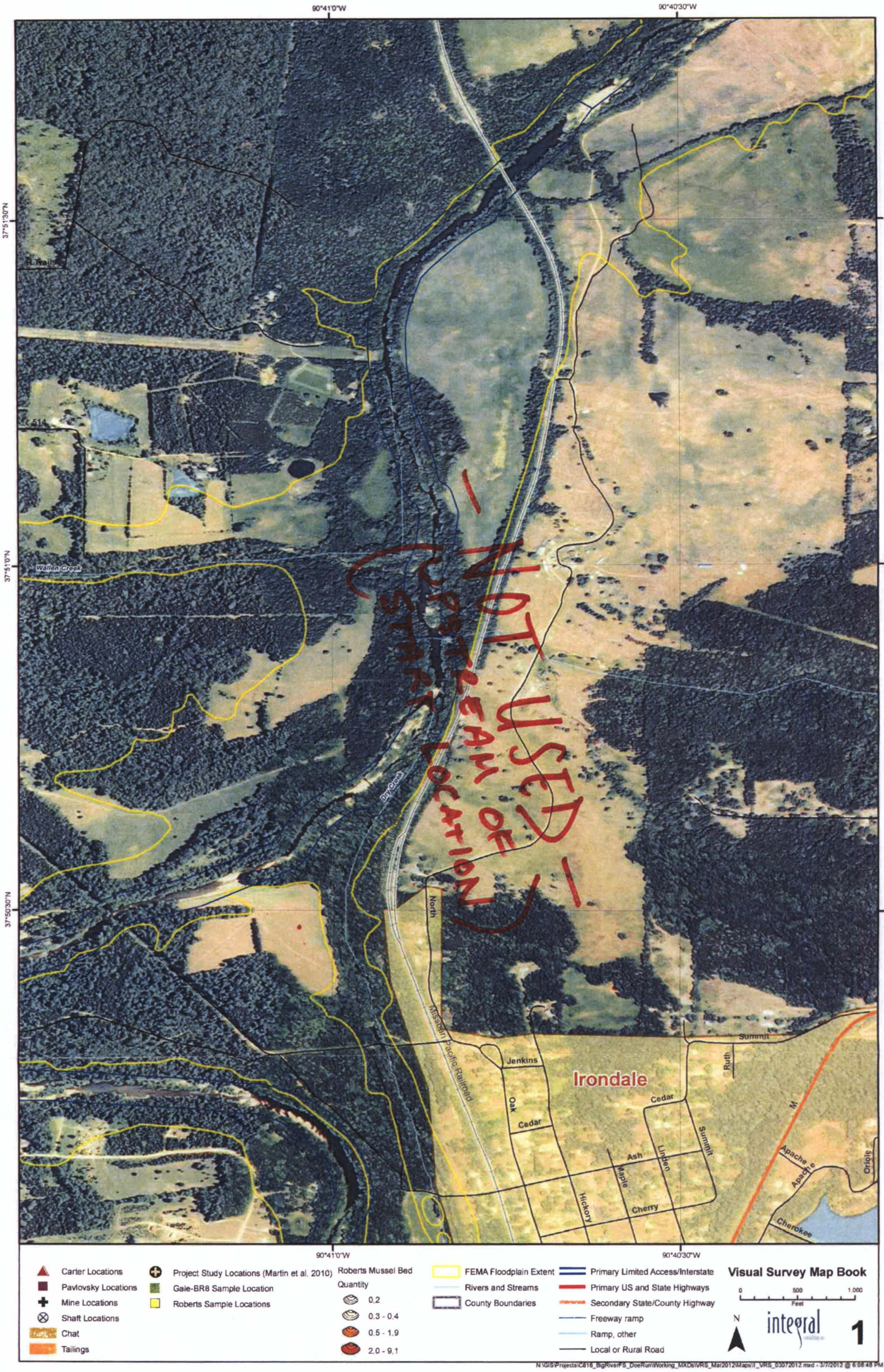

Loose Leaf / Ring Binders


Memo Books

All-Weather Pens

Notebooks

www.RiteintheRain.com


90°41'0"W
90°40'30"W
37°51'30"N
37°51'0"N
37°50'30"N
Wallen Creek
Dry Creek
Missouri Pacific Railroad
Irondale
Jenkins
Oak
Cedar
Ash
Maple
Hickory
Linden
Cherry
Summit
Ruth
Apache
Oriole
Cherokee
North
NOT USED - UPSTREAM OF START LOCATION
BEN STARR, INTEGRAL CONSULTING
3/12/2012 BIG RIVER VISUAL SURVEY
Carter Locations
Pavlovsky Locations
Mine Locations
Shaft Locations
Chat
Tailings
Project Study Locations (Martin et al. 2010)
Gale-BR8 Sample Location
Roberts Sample Locations
Roberts Mussel Bed Quantity
0.2
0.3 - 0.4
0.5 - 1.9
2.0 - 9.1
FEMA Floodplain Extent
Rivers and Streams
County Boundaries
Primary Limited Access/Interstate
Primary US and State Highways
Secondary State/County Highway
Freeway ramp
Ramp, other
Local or Rural Road
Visual Survey Map Book
0 500 1,000
Feet
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1
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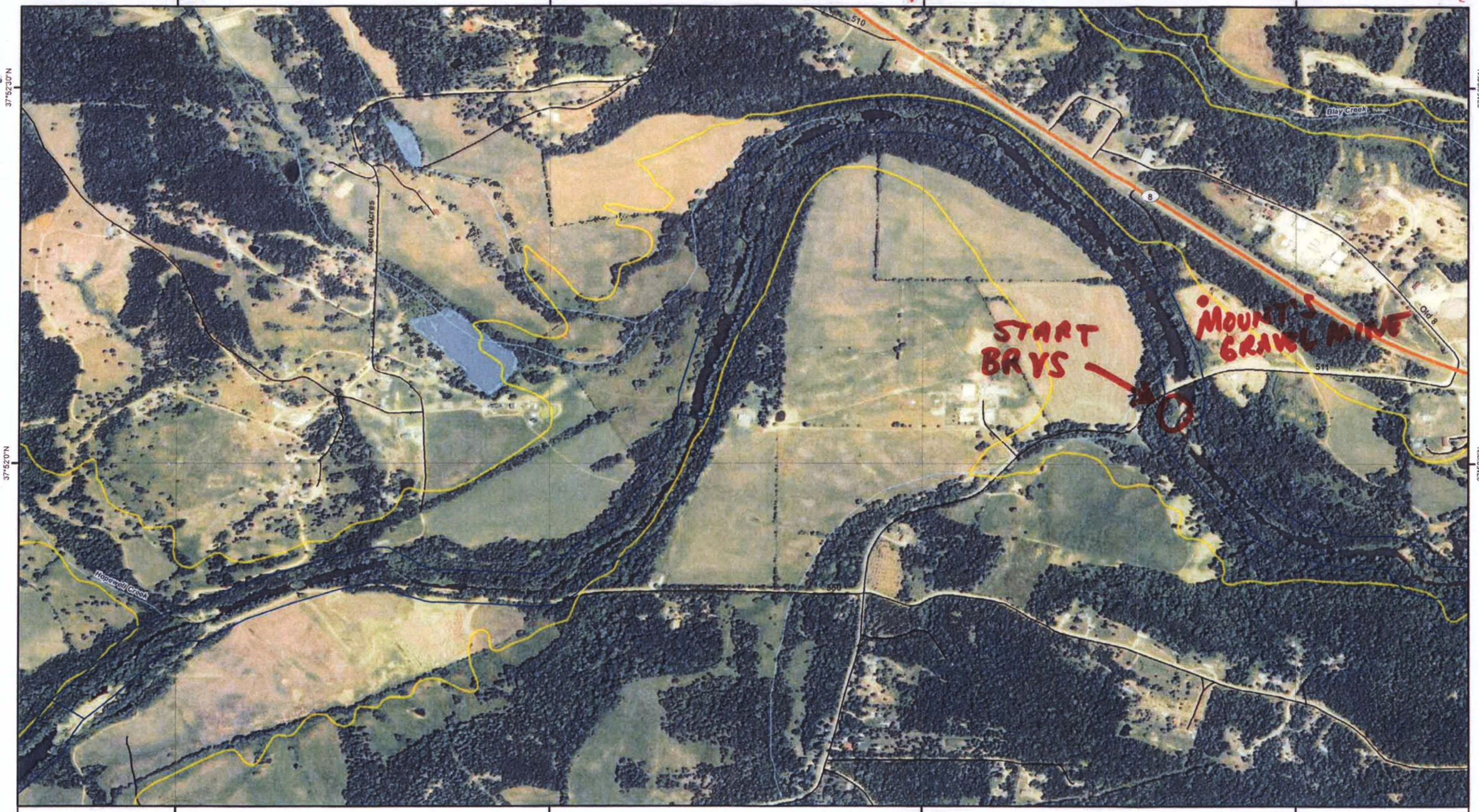
3/12/2012 BIG RIVER VISUAL SURVEY (BRVS)



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3/12/2012 BRVS

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Feet

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3

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0 500 1,000 Feet

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4

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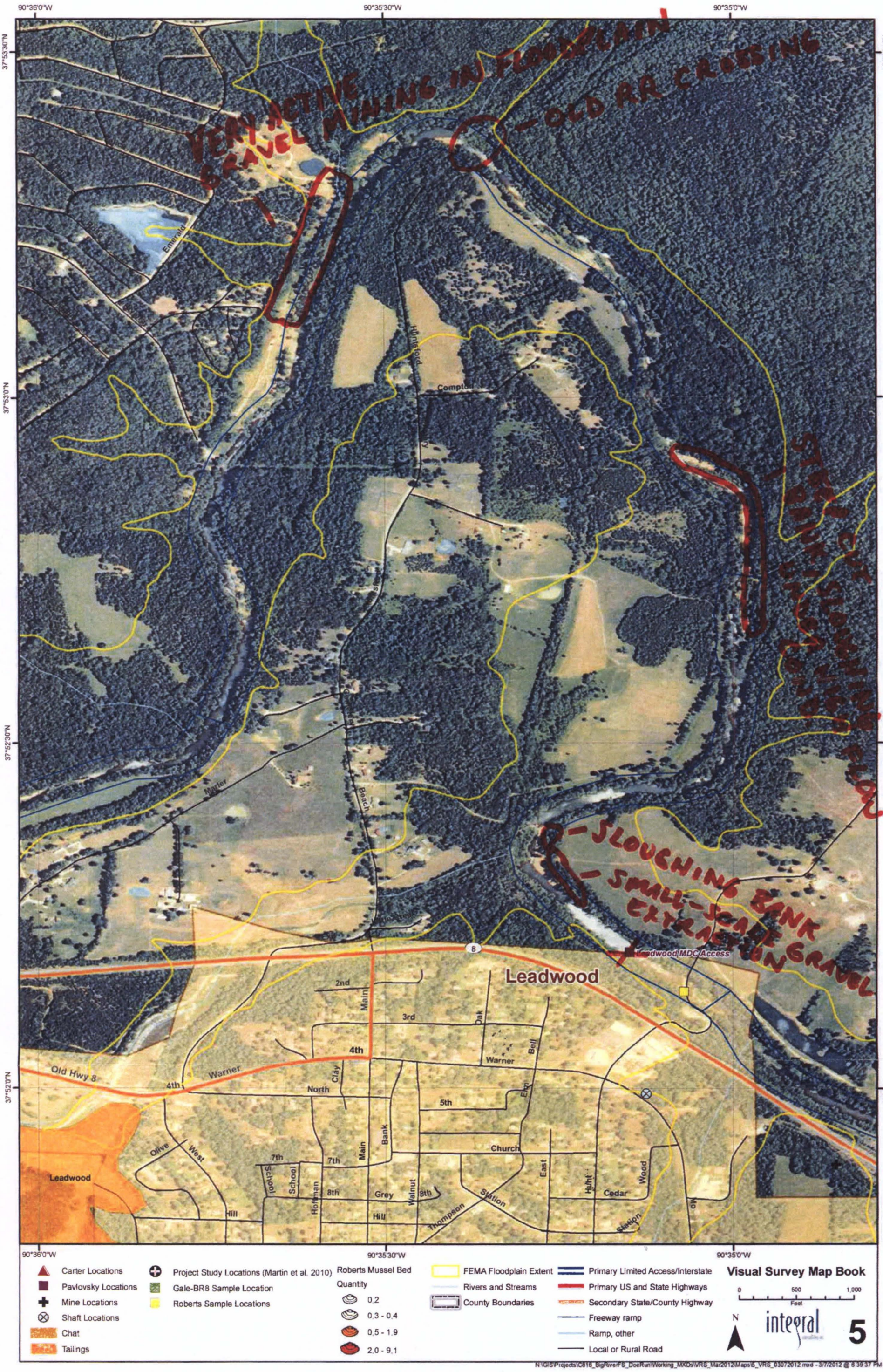

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3/12/2012 BRVS

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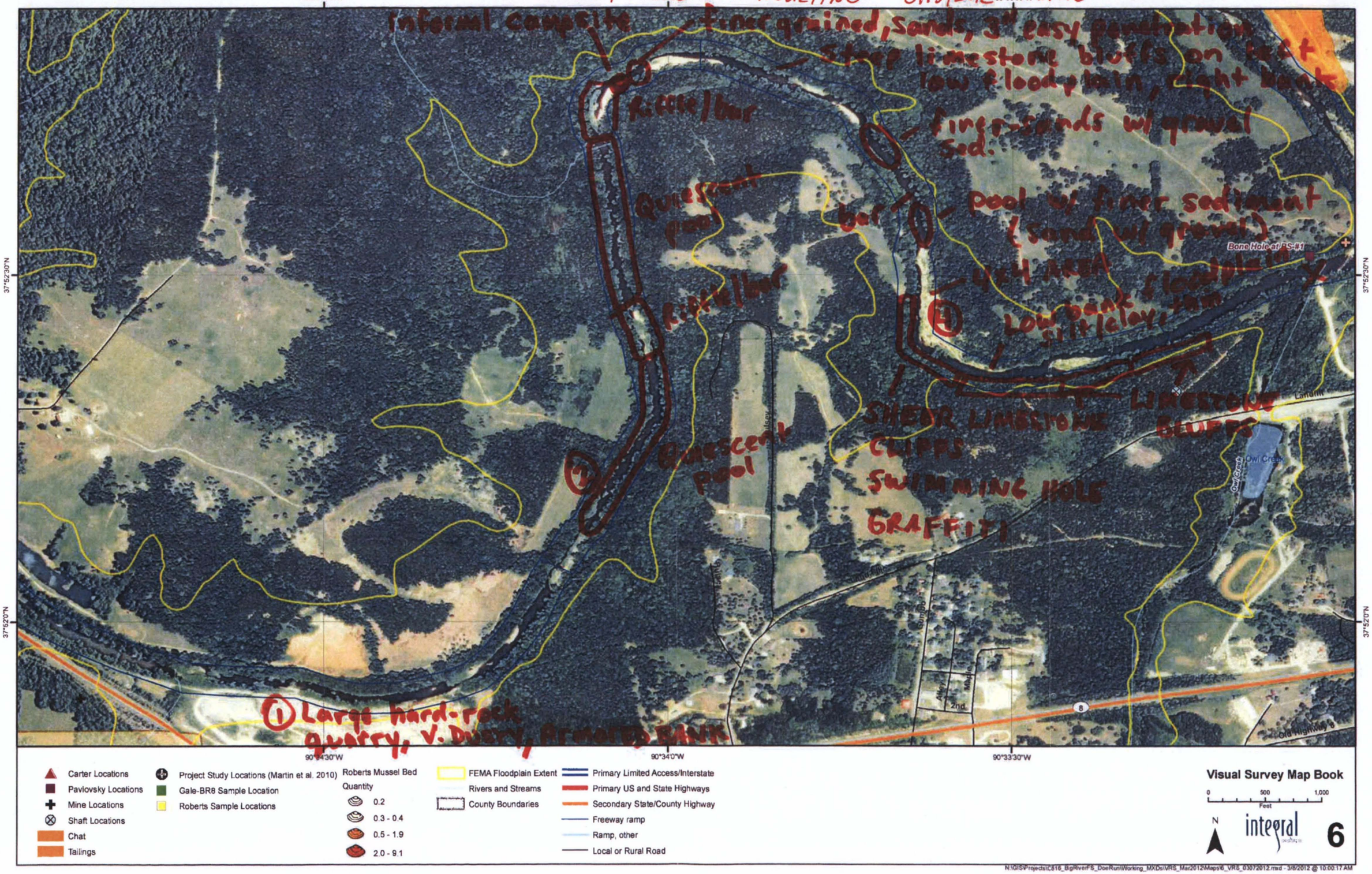

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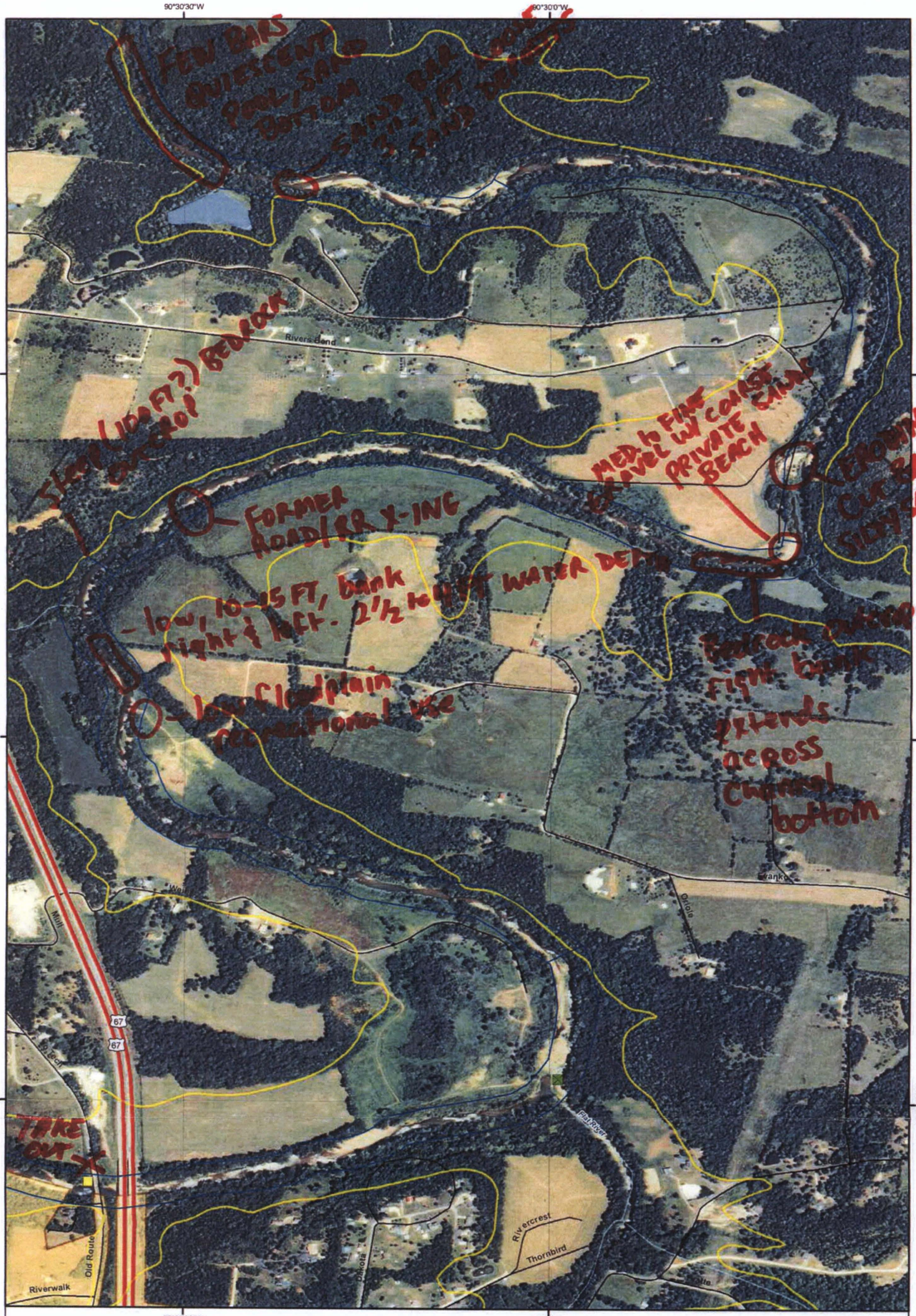
90°30'30"W
90°30'0"W
37°54'30"N
37°54'0"N
37°53'30"N
Rivers Bend
Riverwalk
Old Route
Mill
Dakota
Oriole
Rivercrest
Thornbird
Flat River
67
FEW BARS
QUIESCENT
POOL, SAND
BOTTOM
SANDY BAR
4-6 - 1 FT
& SAND
BEDROCK
MED to FINE
GRAVEL W/ COARSE
PRIVATE
BEACH
SAND
EROSIONAL
CUT BANK
SIDE
FORMER
ROADBED X-ING
10-15 FT, bank
low, right & left - 2 1/2 to 4 FT WATER DEPTH
floodplain
recreational use
Bedrock outcrop
Right bank
extends
across
channel
bottom
TAKE
OUT
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3/15/2012 BRVS
Carter Locations
Pavlovsky Locations
Mine Locations
Shaft Locations
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Freeway ramp
Ramp, other
Local or Rural Road
Visual Survey Map Book
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11

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0 500 1,000
Feet

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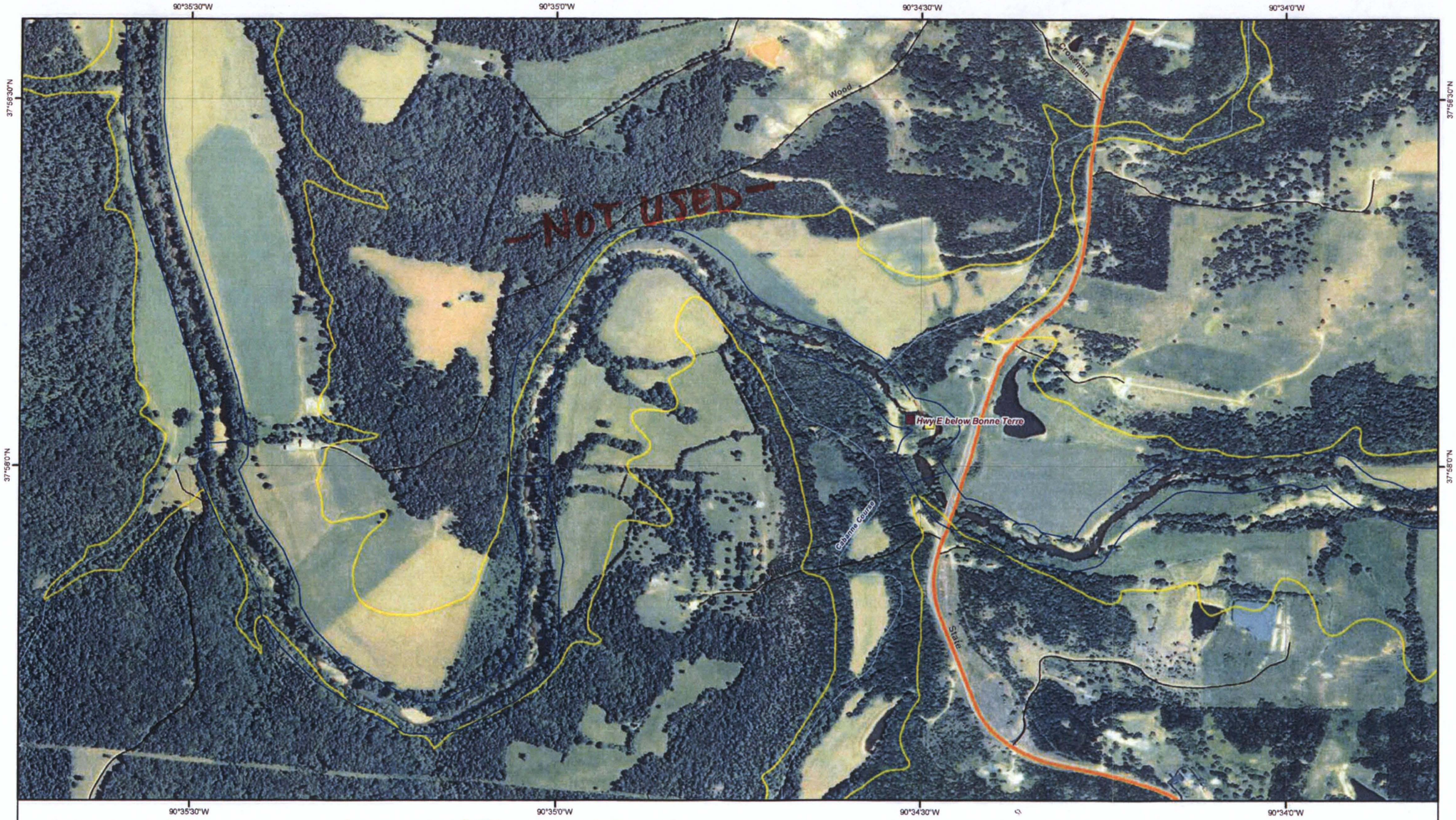

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13

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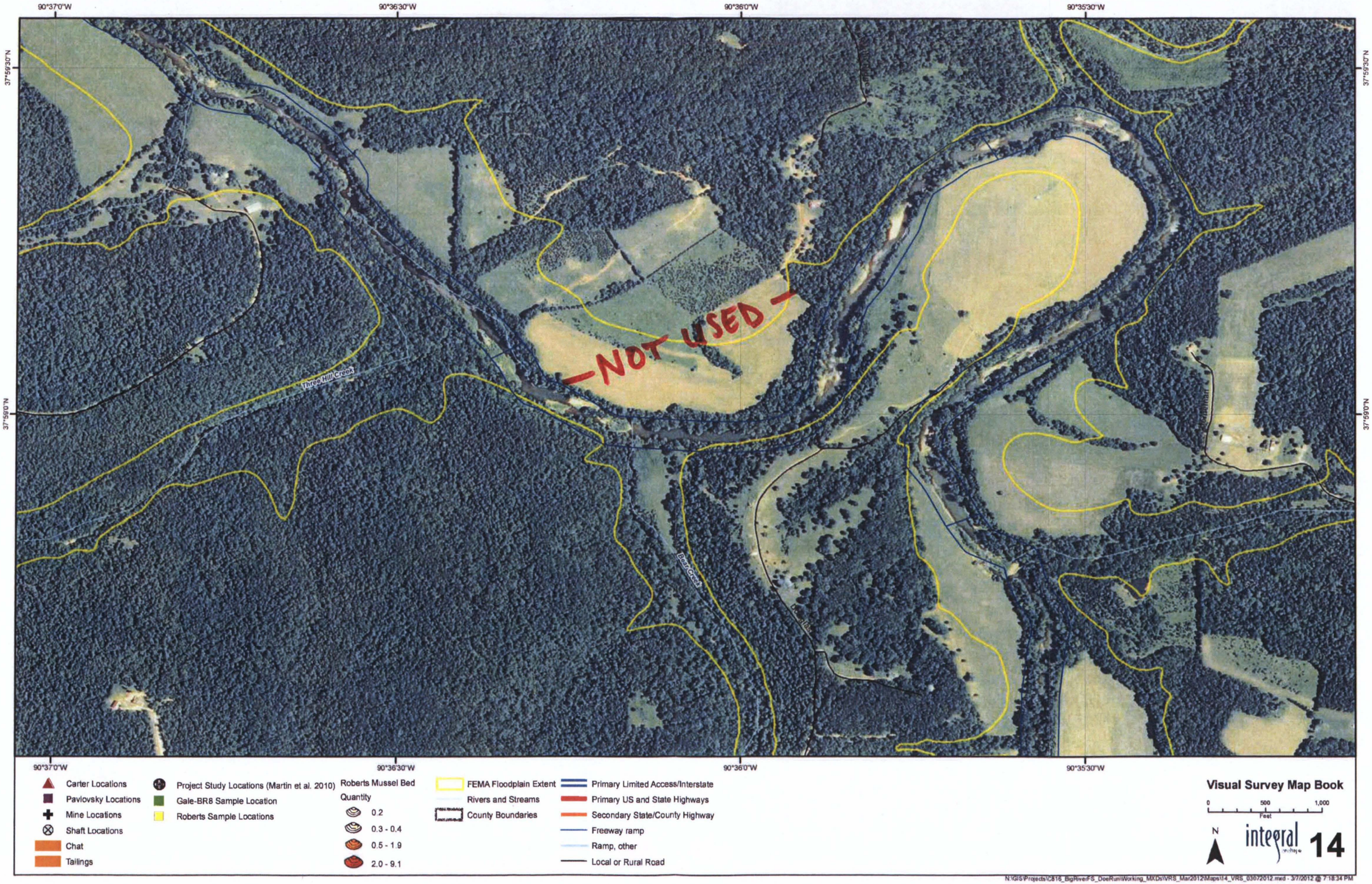
90°37'0"W
90°36'30"W
90°36'0"W
90°35'30"W
37°59'30"N
37°59'0"N
NOT USED
Three Hill Creek
Bear Creek
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Pavlovsky Locations
Mine Locations
Shaft Locations
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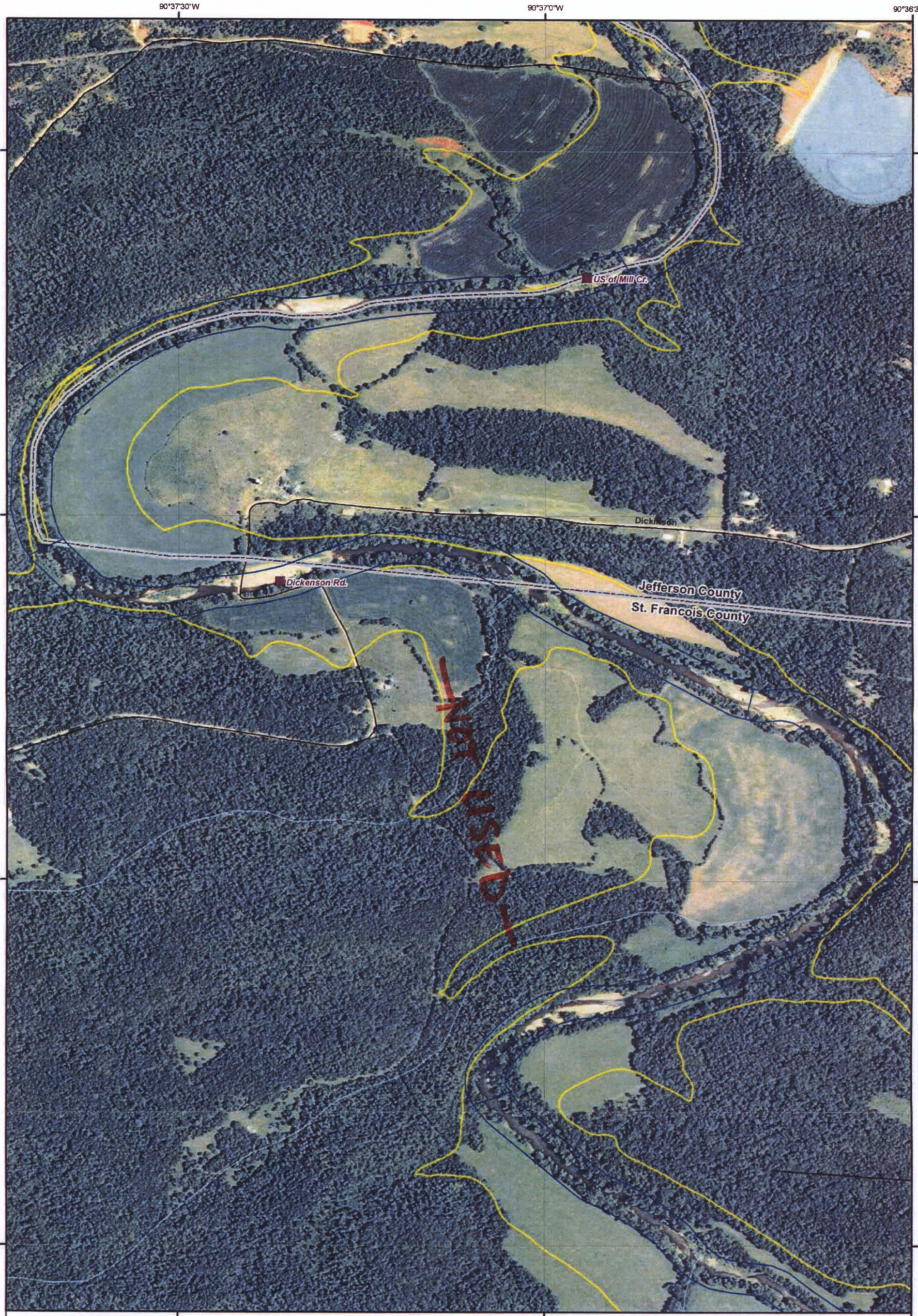

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Feet

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15

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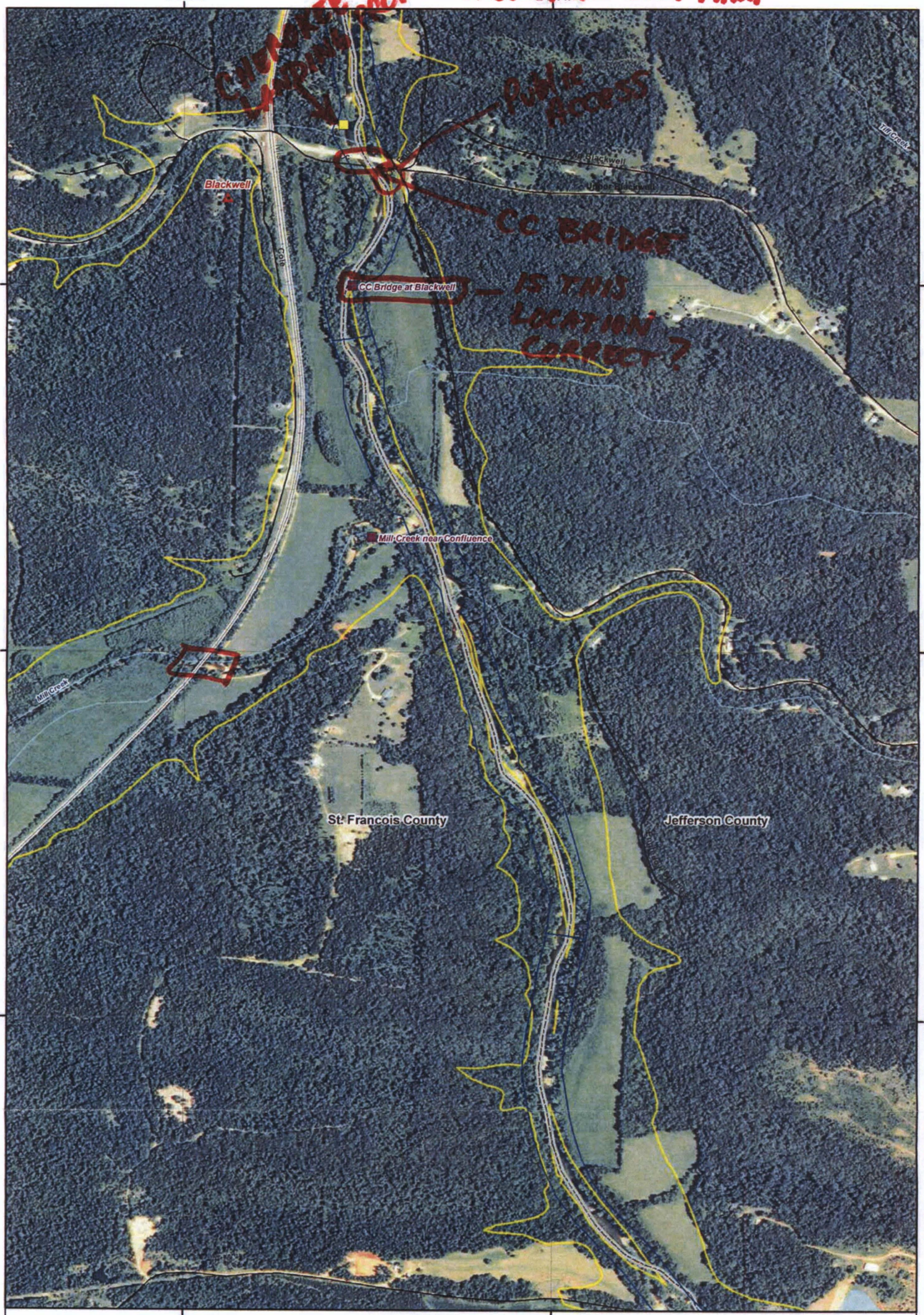
CHEROKEE PROPERTY - INCL. SMALL BOAT RAMP



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3/17/2012 BRVS

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Visual Survey Map Book

0 500 1,000 Feet

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Carter Locations
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Shaft Locations
Chat
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Project Study Locations (Martin et al. 2010)
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Visual Survey Map Book

0 500 1,000
Feet

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integral analysis

17

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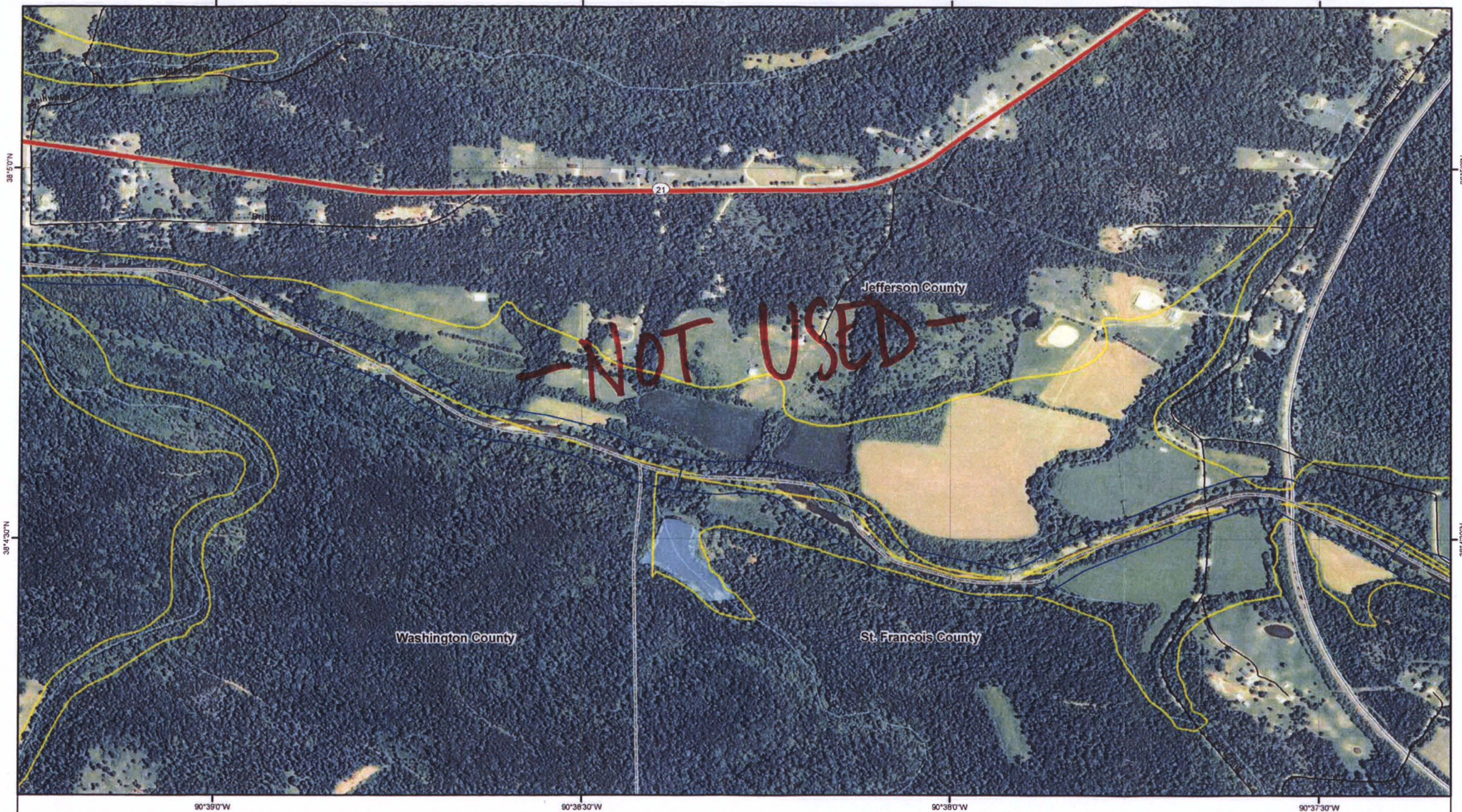

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0 500 1,000
Feet

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18

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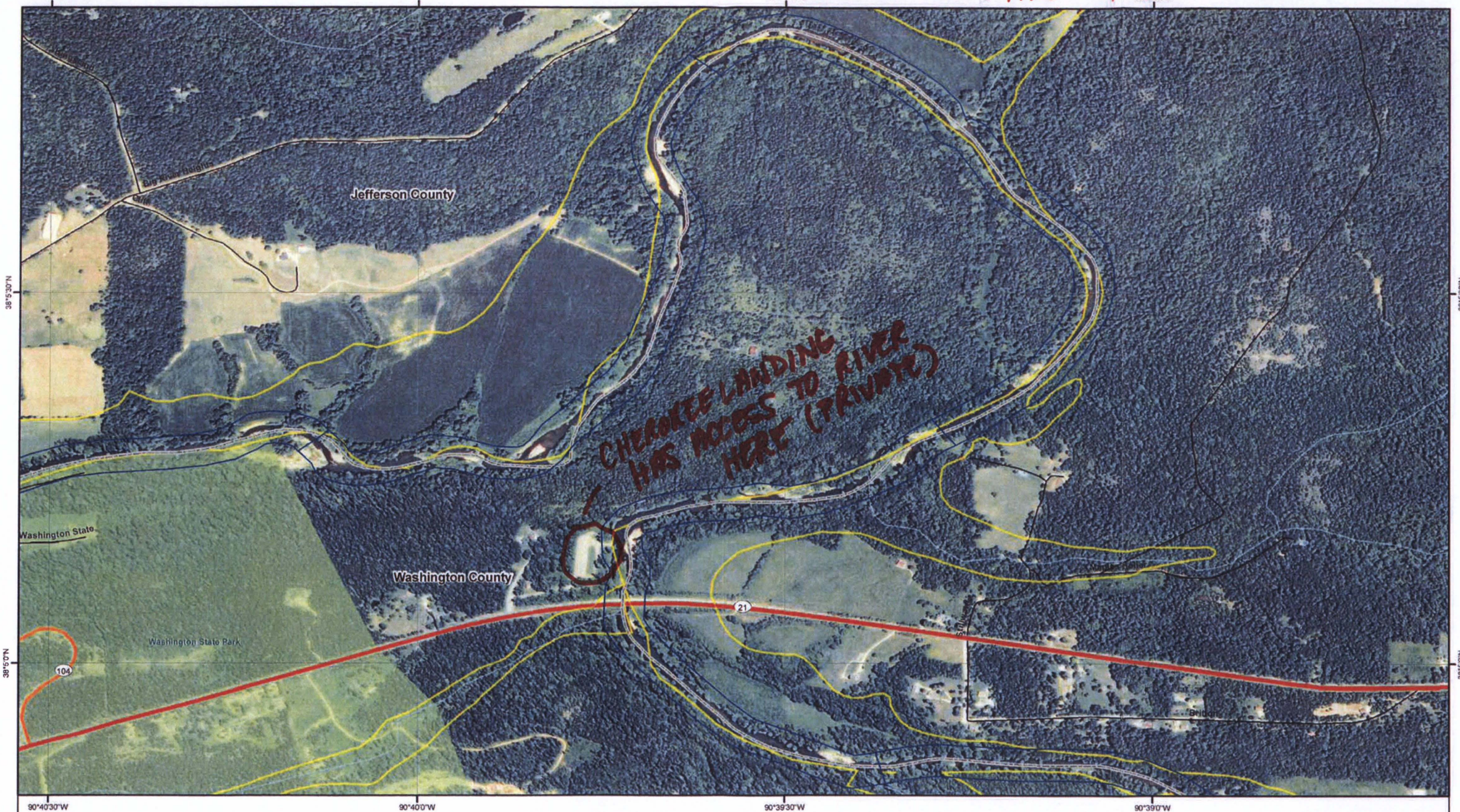

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Secondary State/County Highway
Freeway ramp
Ramp, other
Local or Rural Road

Visual Survey Map Book

0 500 1,000 Feet

N

integral consulting

19

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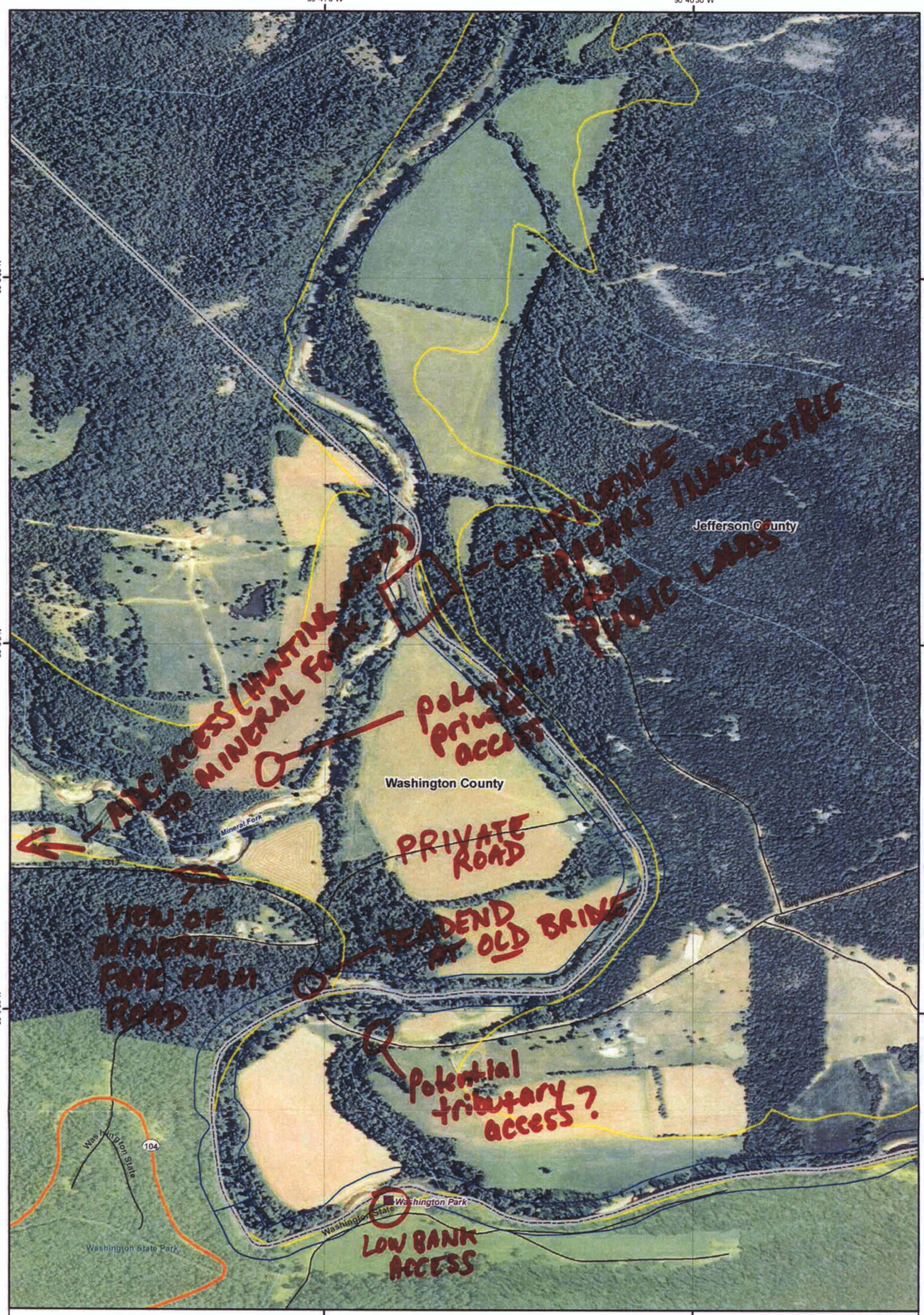


BEN STAHR, Integral CONSULTING 3/18/2012 BRVS

May 1

Day 1 of VRS part 2
Highway K to Cherokee Landing

Met @ Landing @ 7:30 - loaded up
Left landing @ 8:00
- Ian, Jarrod, Greg (EPA) Greg Bach

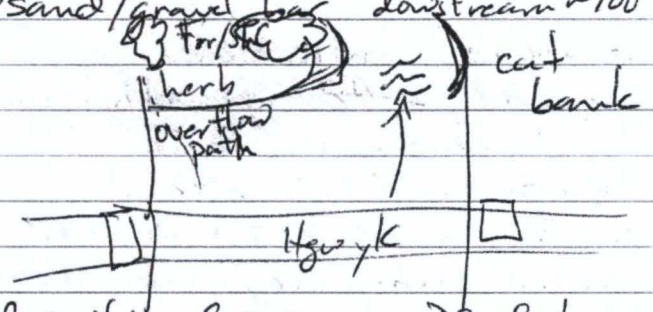
Arrive @ Hgway K ~ 8:10
Load & H+S mtg
On water @ 8:30

At Landing (put in)
- left bank disturbed - traffic on gravel bar
- opposite bank is outcrop
- several large boulders in stream
  - gravel riffle area where stream narrows to ~ 20'
- upstream of Hgway K crossing
- minnows observed / darters ? small fry
- depth @ riffle 3-8"
- absence of algae & silt
- good clarity

- herbaceous growth on sand/gravel bar - one small shrub/tree
- heavily vegetated banks except where disturbed

Problem w/ GPS & camera (Yuma)
- taking photos w/ notes (no GPS coord)

Hgway K - pillars span water
- sandy / eroding banks
- sandy gravel substrate
- width 60' across
- sand/gravel bar downstream ~100'



- depositional areas on DS of bar & along right side bank
- points & photos

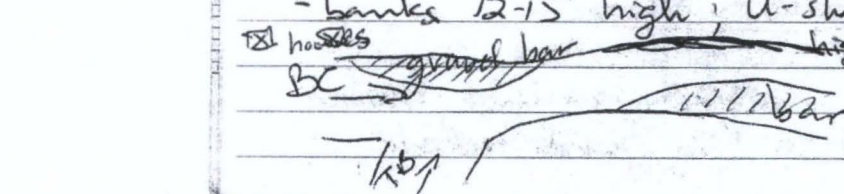
frogs
Turkey vulture, cardinal, rt hawk, snake
beaver chew, sunfish, perch, tadpole

MP 93-92

- U-shaped valley
- vegetated banks w/ evidence of erosion/slumping
- gravel/sand substrate w/ small gravel side bars
- relatively straight: few/no bends
- depth 6-18"; width water ~60-70'
- lots of fish; carp, sunnies, others
- sycamore, cottonwood, box elder
- good clarity/visibility
- banks ~12' high; forested

Terre Bleue confluence

- probed 12-48" gravelly sand
- photos facing US of TBC
- 40-50' across; 6-12" deep
- sand/gravel substrate; silt @ depth
- earthen banks, vegetated,
- evidence of tree/bank collapse
- silty clay @ depth
- banks 12-15' high; U-shaped valley



MP 91-90

- outcrop on right side for portion
- some bedrock along left
- forested floodplain on right ~~left~~ left w/ an array of houses along left
- sandy substrate w/ interspersed gravel/sand side bars
- ~~sma~~ lots of fish observed; small fry
-

Deposition area (near MP 90)

- coarse sandy, gravel, ~~clay~~, > 4' deep probed across channel
- powerline crossing
- shells observed (small + few)

St. Francis Park

- boat ramp access
- public use: wading + sunbathing
- evidence of fishing
- sand/gravel bars (no veg)
- MDNR GPR of several bars (K. Listor report)

deer, turtles, green snake
swallowtail butterfly, pileated woodpecker

Coonville Creek
- confluence blocked by recently fallen tree
-

MP 88-87
- numerous mid-channel & side bars w/ riffle/pool areas
- forested banks & floodplains (R)
- gravel/sand side bars lack vegetation

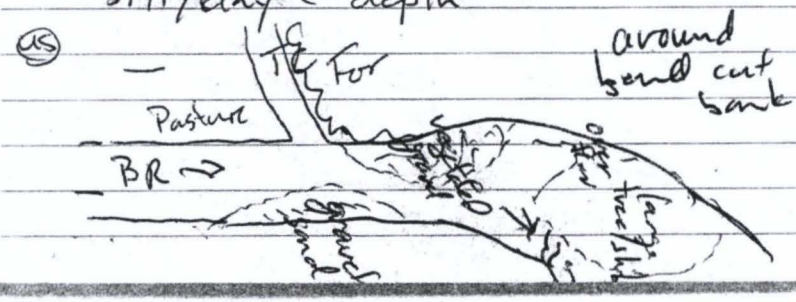
Arrive Cherokee Landing @ 3:45

May 2 - Day 2

- Cherokee Landing to Blackwell Hgway
- Dan, Jarrod, Greg
- Meet @ Landing 6:30
  - load + pack. H+S mtg
- In the water @ 7 am
  - water marker @ Landing < 3'

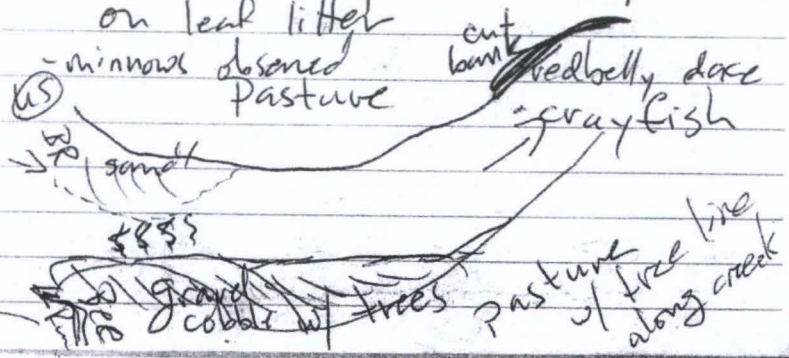
Turkey Creek app MP 86
- coarse gravel substrate
- cattle crossing: worn banks, eroded
- 6-12" deep; 80-100' water width
- sand/gravel bars
- pasture on both sides; right bank has more trees

Creek: 12' wide, 5' earthen banks on right & forested on left
- confluence: 2-4' prolong depth w/ silt/clay @ depth



After Turkey Ck
- water width 150-175'
- depth 6-12"
- gravel/sand substrate
- canopy cover over water
- few sand/gravel bars (side) not vegetated
- large sycamore & silver maple trees
- lots of cattle access/use

Bee Run (MP 85)
- parrallel: abandoned rail line
- large gravel/cobble delta
- observed flow: water width ~8'; depth 4-18"
- high (20') earthen banks w/ vegetation
- water clear fine silt deposition on leaf litter
- minnows observed
- redbelly dace
- crayfish



FW mussel found (1½" long)
- photos & coords taken

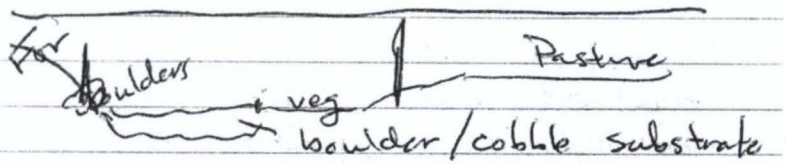
MP 85-86
- ustream narrows; more meanders w/ large vegetated side bars
- canopy cover
- vegetated banks w/ high earthen eroded areas - photos/GPS

Bald eagle perched in Sycamore near Hgwy E

MP 85-84
- high (~15-20') earthen banks w/ evidence of erosion
- adjacent pasture on left; forested right
- sandy/gravelly substrate
- area of Asian clam concentration - photo/GPS
- side bars: gravel/sand w/ vegetation some trees/saplings

deer, gbh, turtles, coot, dipper, bank swallow, rwblackbird, kingbird, BE

Hgwy E Crossing (MP 84)
- concrete pillars
- spans floodplain
- water width 50'; depth 4+'



Trib just DS of Hgwy E
- Channel Course - under as to outlet around large, well established, vegetated side bar
- opposite high cut bank

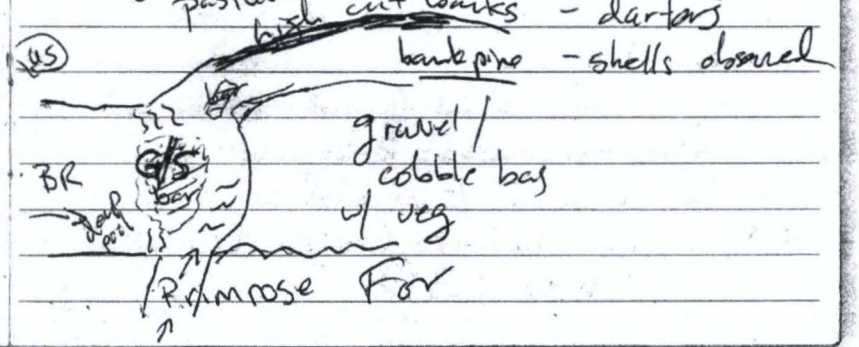
- primary outlet/outflow @ MP 83.5 (refer to map/aerial)

- slight flow
- gravel, coarse sand delta
- channel width 30', water width 4' depth 2-4"
- vegetated banks

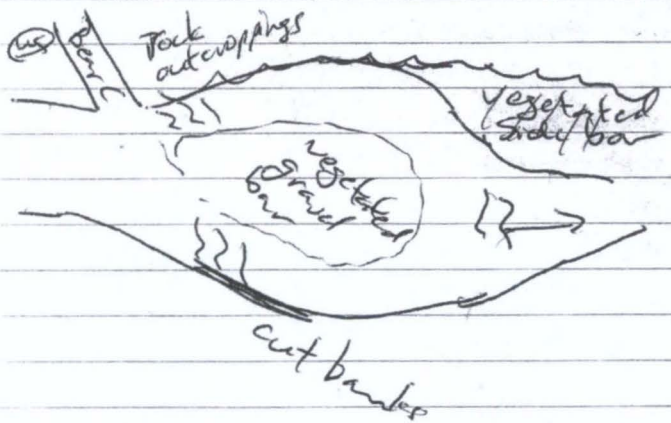
water clarity not as good as yesterday
- pollen & sediment

less fish observations (in general)

Primrose Ck (~ MP 81)
- flow observed
- bank to bank 25-30' wide; water width 4-10' across; depth 4-8"
- gravel cobble @ mouth; sand/gravel substrate
- vegetated banks
- minnows
- darters
- shells observed

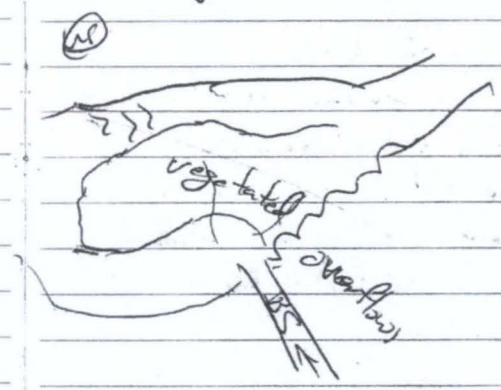


Bear Crk
- bank to bank 30-40' across
  - water width ~25-30'
- gravel/cobble substrate w/ silt + sand
- water depth 4-18"
- banks 10' high: For on right, pasture on left
- evidence of erosion on right bank a confluence



Three Hill Ck
- dry: large sand/gravel delta w/ cobble vegetated bar
- bank to bank 10-15' wide
- two confluences (refer to map)
  - photo / GPS

Blue Springs
- minor flow
- V shaped valley: bank to bank @ confluence 4' wide, water width 1", depth 2"
- vegetated banks
- large vegetated ~~dead~~ channel bar @ confluence; cobble/gravel
- algae on rocks



Unnamed Trib between 76-77
- flow observed
- vegetated banks: 10' high
- bank-bank ~20'; water width 4-6" depth 2-6"
- minnows observed

killdeer

Cole's Landing / Dickenson Rd.
- 5' high road span
- concrete footers w/ slabs
- does not span water or floodplain
  - large gravel/cobble deposition/bar on us side (R)
  - smaller, bars vegetated DS
- gravel/cobble substrate

MP 76-75
- very few bars: bank to bank water, ~100-150' across
- water depth 3-6'
- sandy/gravel substrate
- vegetated banks
- outcrop & pasture

Road Crossing (~ MP 74.6)
- no longer complete
- old culvert + concrete base on right, left has gravel road to water's edge
- banks are separated by vegetated mid channel bar

Trib (on right) @ ~ MP 73.4
- small flow; depth 2-6"; width 12-18"; bank to bank 3-5' wide
- V shaped, vegetated
- adjacent to footpath

Mill Creek confluence
- human use/disturbance (gazebo)
- high cut bank, eroded

Blackwell Landing @ 5:25

Arrive @ Landing @ 4:30

May 3

Blackwell to Mammoth
Ian, Jarrod & Greg
Arrive @ Cherokee Landing @ 6:30
Arrive @ Blackwell @ 7:15
On the water @ 7:30

Blackwell to 71.5
- water width ~ 150-200'; depth > 4'
- poor visibility
- open foreground (?) on left; forested floodplain on right
- no bars - a few herbaceous areas along edge of water @ base of slope

Tiff Creek (near MP 72)
- large trib: 40-50 across, water width same w/ small gravel mid channel bar
- U-shaped, vegetated banks
- footpath near confluence w/ BR
- gravel/cobble substrate @ mouth
- no bars/deposition @ mouth

- further US: channel divides into 4-6' channels around vegetated mid channel bar
- probing - sandy, 1-4' in thin band along left bank; remainder of channel <1'
- river otter observed in Tiff Ck

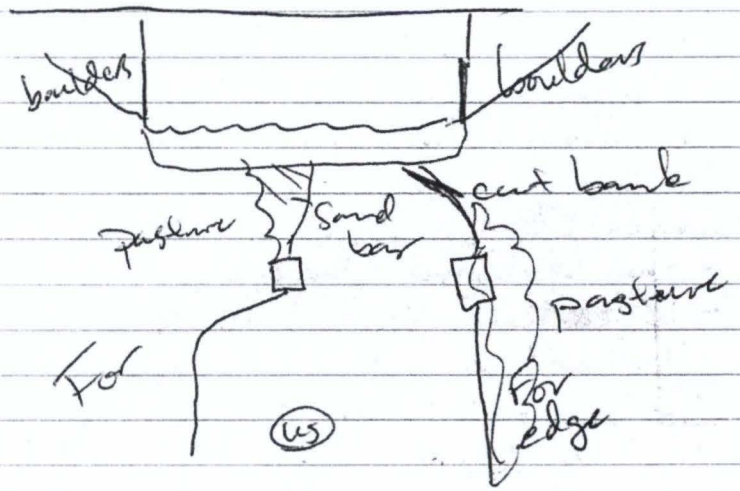
Immediately DS on BR from Tiff: riffle area around herbaceous wetland/bars

Carson Ck
- deep U-shaped channel
- 12' earthern bank large trees
- channel/water width 15', depth ~3'
- bedrock portion, gravelly
- no visibility of bottom
- no bars/deposition @ mouth
- mallard w/ chicks

Observed 2 fishermen in kayaks

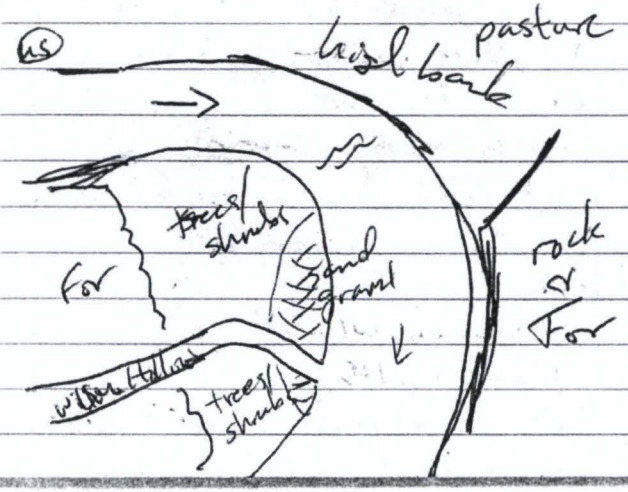
MP 71.5 to 70
- water width narrows 75-100'
- more riffle areas w/ cobble
- sand/gravel side bars w/ veg (heavy trees/shrubs)
- depth 3-4'
- vegetated banks, steep,

Mo-Pacific Rail crossing
- concrete pillars; crossing >100'
- channel narrows from 100 - 80'
-



Riffle area below RR crossing
- 3rd set DS
- live & dead FW mussels located
  - photo & GPS
- darters, minnows, crayfish
- cobble, bedrock
- filamentous algae
- Asian clams present

Wilson Hollow
- flowing
- large gravel/cobble bar (delta) @ confluence w/ BR; vegetated w/ trees & grasses
- creek has formed small, shallow channel across bar
- coon tracks, deer, minnow heron, snake w/ catfish
- U-shaped channel; 20' across
- 12-15' banks, earthen w/ trees
- water width 20'; depth 6-18"
- silty sand bottom
- Asian clams & shells; FW mussel shell on sand gravel bar



HP 69 to

- river relatively straight
- scattered gravel/sand side bars w/ vegetation
- high cut banks : forested but evidence of collapse
- trees in channel creating riffle areas
- some wetland (PEM) areas along banks - create narrows

~~Maddin Crk~~ (RD) Overflow Channel

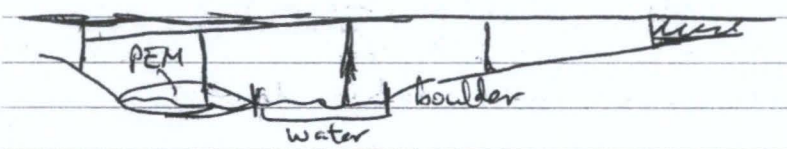
- no flow observed
- sand build-up @ mouth
- confluence @ angle w/ BR
- forested channel no well defined
  - bank to bank ~ 15' ; pockets of standing water
  - trees in channel
- tadpoles, coon tracks, deer
- FW mussel shell found on BR bank

Maddin Creek

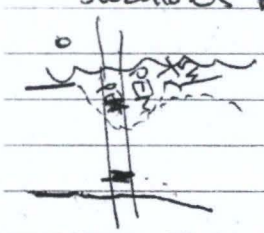
- angled confluence w/ BR
- bank to bank width
- ~~tra~~ channel is ~ 8' wide, meanders thru valley ; some terracing / floodplain ~~with~~ between higher banks
- outer banks ~ 15' high ; inner terrace 4' high
- sandy / silt w/ organic (leaves) muck
- terrace area is herb. other is Fox
- minnows, coon + deer tracks, fish @ mouth
- no delta/bar @ confluence
- opposite bank on bend in ~~BR~~ BR there is a gravel/sand bar

Hgwy 21

- concrete pillars + road
- ~~does~~ pillars not span channel ; does span floodplain



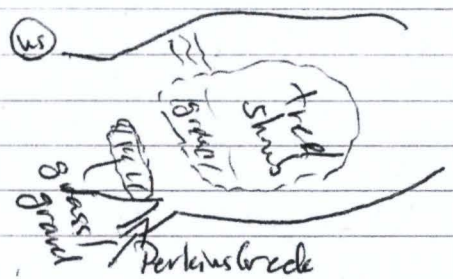
- swallows nesting on bridge + pillars



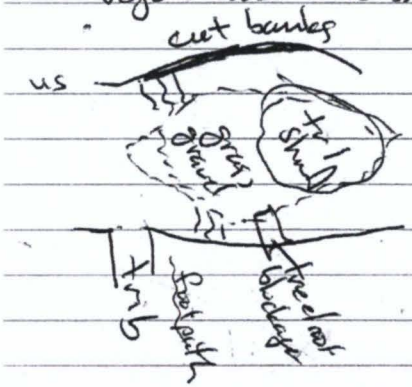
Small drainage us of Hgwy 21
- flowing, no name on USGS
- U-shaped channel ~20' across
  water width 3-5', depth 6", clear
- well vegetated banks
- small deposition of sand/gravel a mouth

Riffles downstream of Hgwy 21 & beyond bend/landing
- several FW mussel shells

Perkins Creek
- no observed flow, but not dry
- bank to bank 12-15'; well vegetated ~12' high
- water: edge to edge, 4-8" deep
- tree collapse @ confluence
- sandy gravel substrate



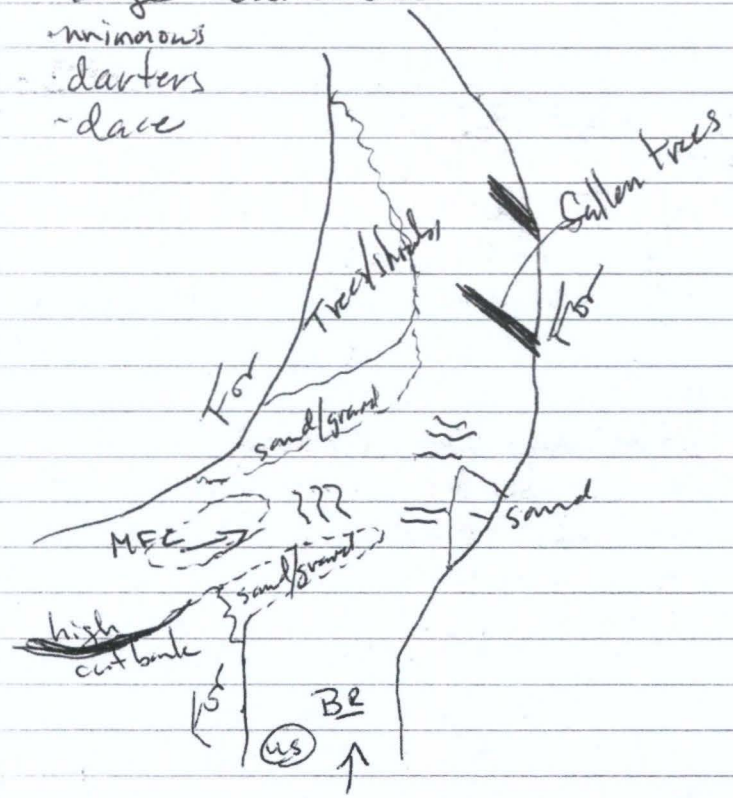
Trib from Camp Ne-o-Tez (MP 66.5)
- footpath adjacent to creek
- no flow observed but water present
- banks 25' across, water 15' across
- sandy gravel substrate
- depth 24"
- vegetation (trees) across mouth



MP 65 to 64.5
- stream narrows & meanders
- high cut banks
- side bars: sand gravel / a vegetated
- numerous trees fallen in channel creating riffles

Washington State Park
- high cut banks
- swimmers & sunbathers
- grass / park area & ag field
- riffles around sharp meander

Mineral Fork Ck 3:30
- large confluence
- minnows
- darters
- dace



- bank to bank ~ 150' right bank ~ 15-20' high; left bank 10-12' high
- numerous sand/gravel bars throughout channel
- water width 20-30', depth variable
  - deep pools + shallow riffles
- beaver dams

Left MFC @ 4:30
Arrived @ Mammoth Landing @ 5:30
Picked up @ 6:10
Arrive @ Cherokee Landing @ 7:15

3/18/12 B Stang, I. Stupakoff
1620 At Mineral Fork Creek and route 47.

BIS NOTES - Bank/bar soils are sandy gravel ~60/40 gravels/sand gravels generally less than 1cm (0.5-2cm on average?) Sands well graded fine to coarse organish brown color in water near right bank there is a veneer of depositional silts. A lot of silt suspended when step near water line. Water is turbid, unable to see bottom
- END BIS 3/18/12

1643 At Kingston Ranch Gate #9 near Mineral Fork Creek 314 8625955 - Kingston Ranch phone # on placard at gate.
1717 Back at hotel

I. Stupakoff B.S.

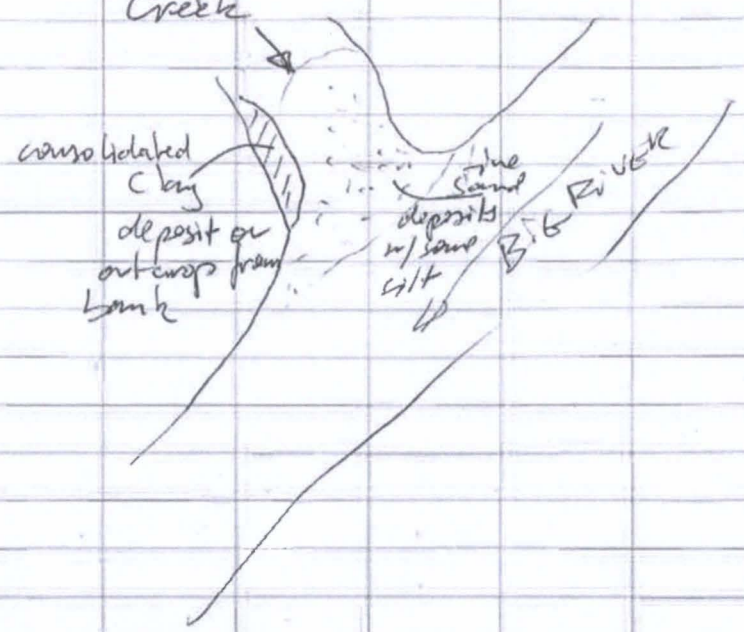
5/1/12 I. Stupakoff
0735 At Cherokee Landing loading van and canoes.
Crew: Ian Stupakoff, Jarrod Sasper (Integral), Robin Dingle (ELM), Greg Beck (EPA). Chrissy Berner from Cherokee Landing transported to Highway K boat ramp.
0808 At Highway K boat ramp.
0830 Health and safety meeting.
0927 GPS camera not working
0955 Figured that TerraSync cannot run at the same time as G-camera on this unit. Bluetooth driver for pro XH antenna is missing. OK to use G-camera if TerraSync is off. Fixed driver issue.
1015 depositional area with fine sand ~~bar~~ at 1.2 downstream of sand bank w/ 6 to 8 inches penetration. Little silt.
1026 Downstream of power line depositional area with fine

5/1/12 I. Stupakoff

sand and silt. Penetration to 3ft. Reddish brown silty clay.

1055 Depositional area - fine sand and silt with some coarse gravel. Penetration 6 to 8 inches. Possible sediment on proper sampling area downstream of sand bank.

1150 Confluence with Terra Blue Creek



1206 Depositional area - coarse sand with silt. Large quantities

5/1/12 I. Stupakoff

of gas entrapped in 6 to 8 inches depth. Max. depth to 3ft.

1310 Large depositional area beneath small powerline (~15KV) - Area Coarse sand and gravel filled with fine sand and traces of silt. Some of the gravel contains black glass-like subround 1/4 in pebbles. They are brittle when pressed between fingers (~5% of total) and very light. Sediment depth >4ft in 90% of area. Plotted polygon on TerraSync.

1415 Depositional area downstream from park beach. Area has thick layers of leaf debris at depth. When walking over it, a large amount of gas was expelled. Sed. depth >4ft

1438 Depositional area downstream of beach area.

5/1/12 I. Stupakoff

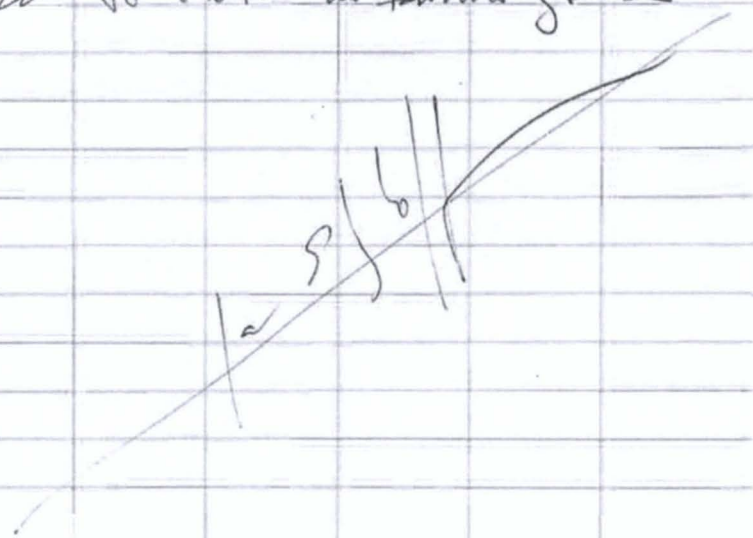
Coarse sand towards mid channel. Finer sand near bank on left hand side. Sed. Depth between 3-4 ft. Possible peeper area.
~~Some~~ Corbicula live (13) in sediment

1504 Depositional area > 4 ft deep
Fine gravel to coarse sand angular 1/4" - 3/4".

1540 At Cherokee Landing unloading

1600 Finished Loading van.
Heading to Farmington Lam.

1620 At Hotel in Farmington Lam



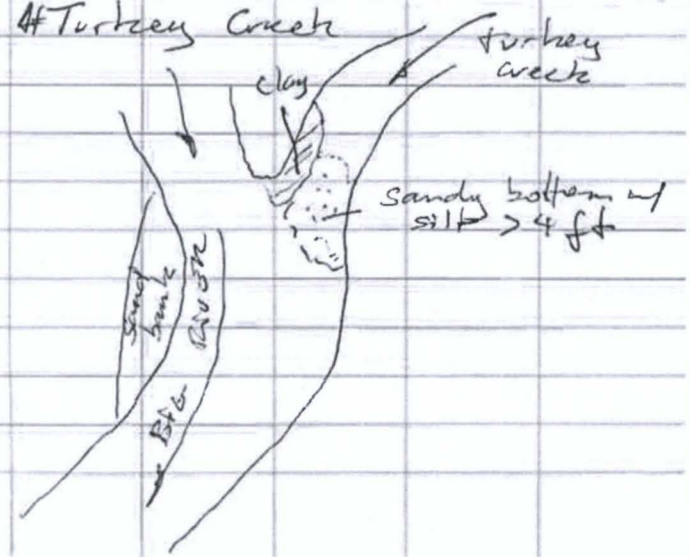
5/2/12 I. Stupakoff

0625 At Cherokee Landing
Crew: Ian Stupakoff (Integral)
Jarrod Gasper
Greg Bech (EPA)
Robin Dingle (EPA)

0650 Health and safety meeting
water level < 3 ft at cherokee landing

0700 On water towards Blackwell boat access.
goal: visual survey of eroded banks, depositional areas, human activities, access points, outcrop areas

0723 At Turkey Creek



5/2/12 I. Stupakoff

0750 At depositional area on left bank. Material is coarse gravel and coarse sand with silt veneer (1/8") Depth >4 ft in most places, good for peepers.

0810 At Bee Run creek. Mapped small meandering into river. Large number of small fish in creek and in river just downstream of creek. Small rock pools had high concentration of possible "sothern redbelly dace". Took several underwater pictures. One orange crayfish (yellowish) <2 in.

0840 Found eroded bank. A rock outcrop protruded at bottom of bank into river and continued downstream.

0845 Found live fresh water mussel at end of rock bottom area.

0858 Eroded bank and creeck on right bank of river.

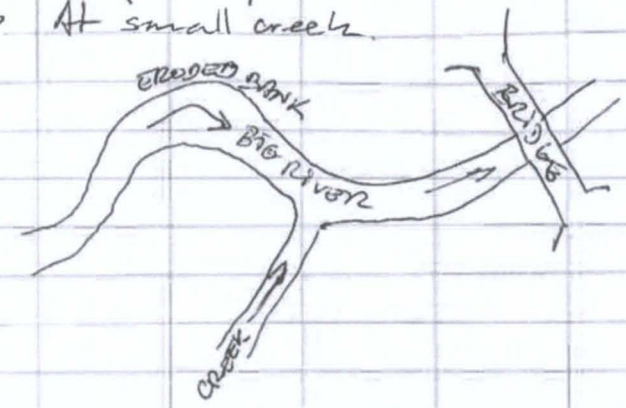
0907 Small depositional area <1 ft depth w/ coarse sand & some silt.

0918 Eroded bank on right side is mostly clay.

5/2/12 I. Stupakoff

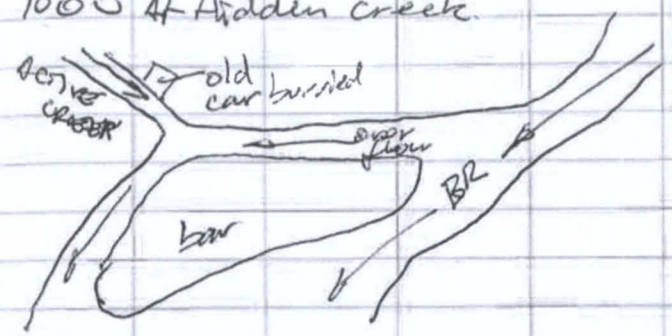
0925 At small depositional area on right bank finelly sorted sand <1 ft depth.

0938 At small creek.



0949 At eroded bank. Hard clay deposit.

1000 At Hidden creek.



1005 Eroded bank. Hard clay

1010 At Cabain coarse creek

1015 Took picture of algae or epiphite on

5/2/12 L. Stupalsoff

rock in front of creek

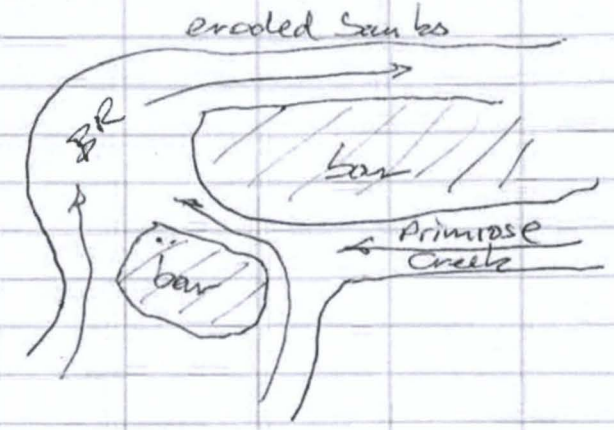
1025 Depositional area w/ coarse silty sand < 1 ft depth.

1047 Depositional area w/ small cobbles and coarse sand and silty clay >4 ft.

1053 Drain ditch on left bank

1105 Depositional area right bank. with coarse and medium sand & silt 3-4 ft deep. Corbicula clams are ubiquitous.

1140 At Primrose creek is active.



1200 At depositional area medium sand and fine silt < 2 ft depth.

1220 Creek on right bank

5/2/12 L. Stupalsoff

1239 At depositional area. High concentration of leaves at depth w/ gas production. Not ideal for sed. sampling.

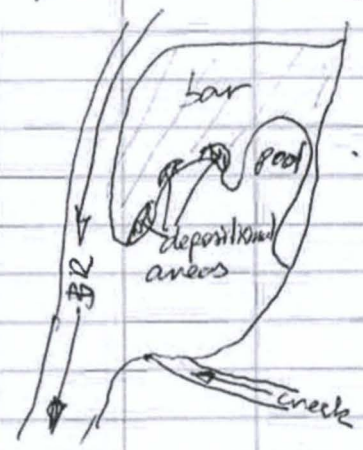
1302 At Bear Creek

1315 At Three Hill creek

1333 Eroded bank left bank

1354 At Blue Springs Creek

1415 At active creek on left bank Deposit of medium to fine sand w/ some silt < 1 ft depth



1457 At Dickinson Rd bridge.

1500 Replaced batteries on Yuma tablet.

1504 Depositional area right bank

5/2/12 1. Stupakoff

with fine sands < 3ft depth

1518 Flat head cat fish found alive under tree stump in middle of river. Fish length ~20 inches.

1542 At drainage ditch from barite retention pond (Active).

1723 At Blackwell Landing.

1900 Steve Anderson arrives to pick up canoes and crew.

1920 At Cherokee landing unloading van.

1935 Done for the day.

5/3/12 I. Stupakoff

0635 At Cherokee Landing loading van.

Crew Ian Stupakoff } Integral
Jarrod Sooper
Robin Dingle (ELM)
Greg Bach (EPA)

0645 Left Cherokee Landing towards Blackwell boat access. Visual survey from Blackwell to confluence between Mineral Fork Creek and Big River. Canoe pick up at Mammoth boat access.

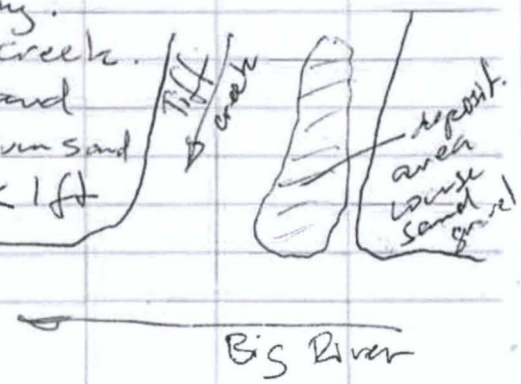
0715 At Blackwell boat access

0734 Health and Safety meeting

0738 On water

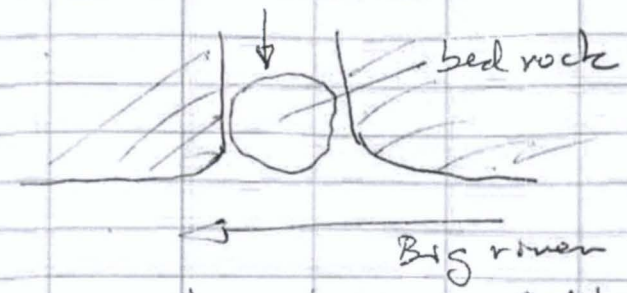
0747 Eroded bank w/ tree roots and clay.

0805 At Tiff Creek. Coarse sand and medium sand w/ silt < 1 ft

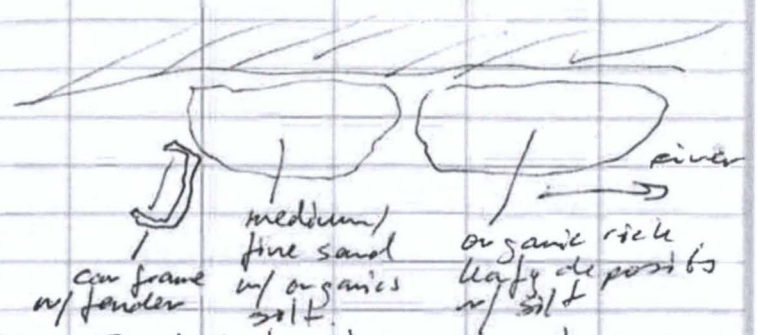


5/3/12 I. Stupakoff

0824 Carson Creek



0835 Depositional area left bank



0920 Eroded bank on high side. Fine sand and clay at top to clay at bottom.

0923 Depositional area left bank. Medium and coarse sand w/ silt. < 1 ft. Found live Corbicula.

0928 Depositional area a few yards downstream w/ medium sand & silt 2-3 ft

5/3/12 I. Stupakoff

0950 Found 5 in mussel by noticing open siphons at surface. Most of body was under gravel held lightly with large foot. Shell smooth with yellow tones and vertical green lines radiating from hinge towards lips. About 18" in water depth. Relocated mussel after taking photos and measurements. Found fresh water dead mussel of pearly matrix inside shell 3 1/4" long. Live corbicula was also observed.

1012 Active creek on left bank

1015 At Wilson Hollow creek. Observed 3-4 ft long snake pinkish/beige with reddish brown undulations on body with catfish in mouth. Took GPS pictures and video.

1027 Found dead fresh water mussel. Photographed and GPS.

1044 Depositional area with silty

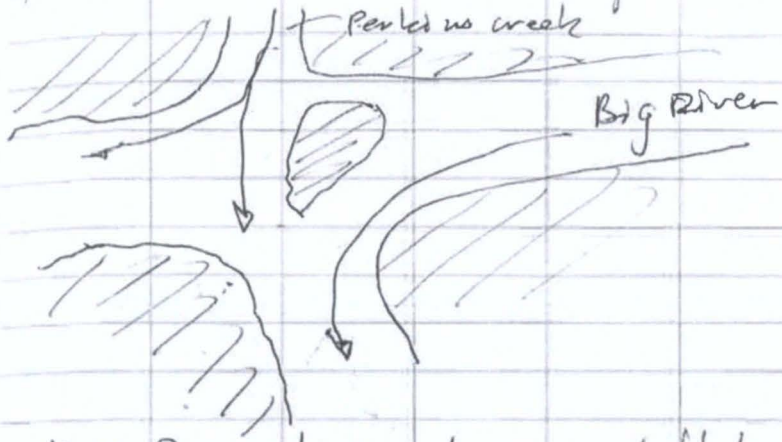
5/3/12 I. Stupakoff

sand leafy organic rich 1-2 ft deep.

1055 Creek on left bank.

1236 Maddox creek on left bank. Creek is active.

1257 Perkins creek on left bank

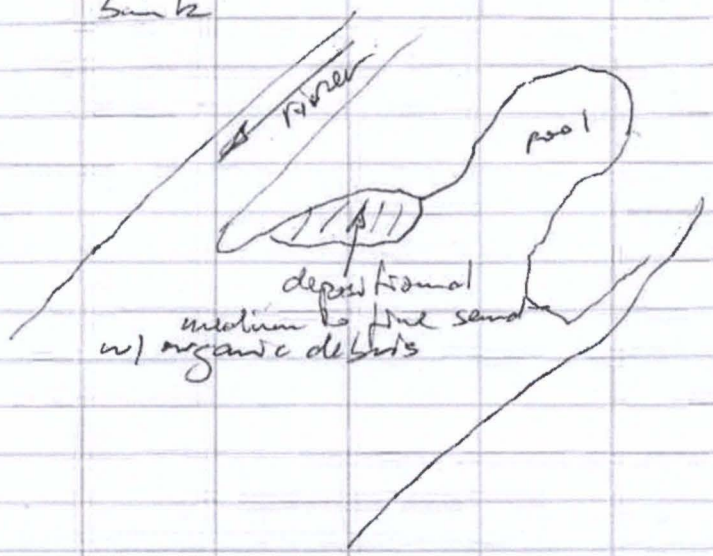


1258 Depositional area left bank. Coarse gravel overlaid with fine sand and silt < 2 ft.

1314 Creek on right bank

5/3/12 I. Stupak

1352 Depositional area left bank



1405 Eroded bank right side.

1420 Eroded bank right side in park area across large green lawn.

1455 At junction of Mineral Fork and Big River

1502 Eroded bank on right side of Mineral Fork Fine sandy soil and hard clay at bottom of eroded bank.

1515 Found 3-4in dead sucker

5/3/12 I. Stupak

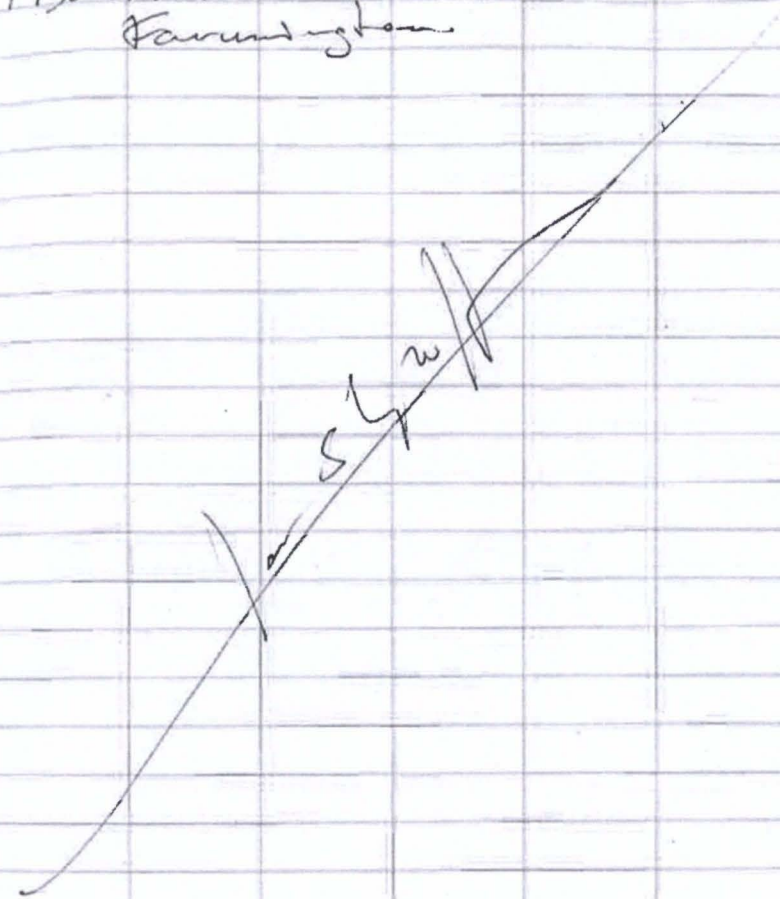
1630. Finished observing Mineral Fork

1655 At Mammoth boat ramp.

1815 Steve Andersen arrived to pickup crew and canoes.

1915 Arrived at Cherokee landing.

1930 Arrived at hotel in Farmington.



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Phone (303)

Project Big River Visual Survey
~~4/1/2012~~ →
5/1/2012 → 5/3/2012

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CONTENTS

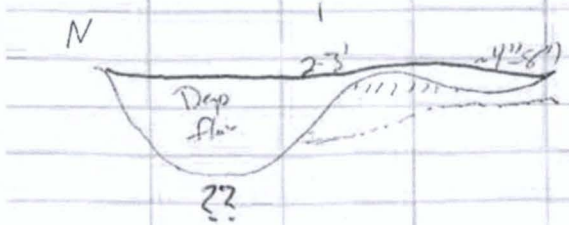
PAGE	REFERENCE	DATE
1-21	Big River Visual Survey May 1,2,3 2012	

Ian S (I-1), Robin (EM), Greg Beck (EM), J Gasper (Integral)

7:45 meet at Cherokee landing

8:22 – Hit Bridge at put-in

8:30 – get paddle move on. Put in just upstream of HWY X.
Look for Depositional Area/site
N side of river, bluff @ or near waterledge
~80 ft, wide floodplain to the S.
Probing 4-10" to refusal at S bank.
mix small gravel, to sand
very angular
Mid-stream, ~15' of depth.
Deeper sand 2+ ft at the beg.



Trouble w/GPS/camera, Ian working to repair.

9:35 push off, downstream. Cross under hwy bridge. Gree-periphyton on sediment. Sand at surface smooth surface little gravel etc

Downstream of bridge, ~100m, river flow between banks. ~10-15 ft high, silty/clay texture

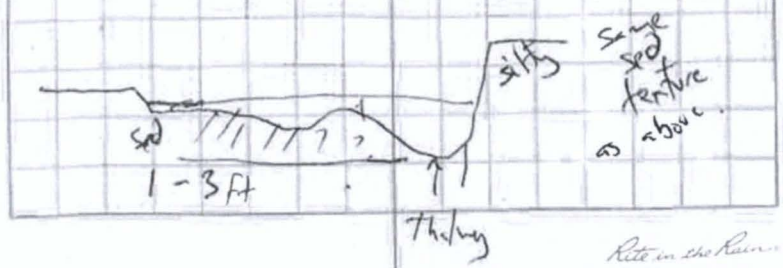
sediment in river is as upstream, except silt/clay near grassy bank.

10:06 stop at end of pipe to scope potential Pepe location. ~2ft deep coarse sand deposit.

Continue downstream, isolated of crops on (L) bank. Same sediment texture.
Continued silty banks, sand/gravel streambed.

10:55 stop at bridge Ian/photo
previous stretch of river silt/clay banks
incised channel, not very sinuous.

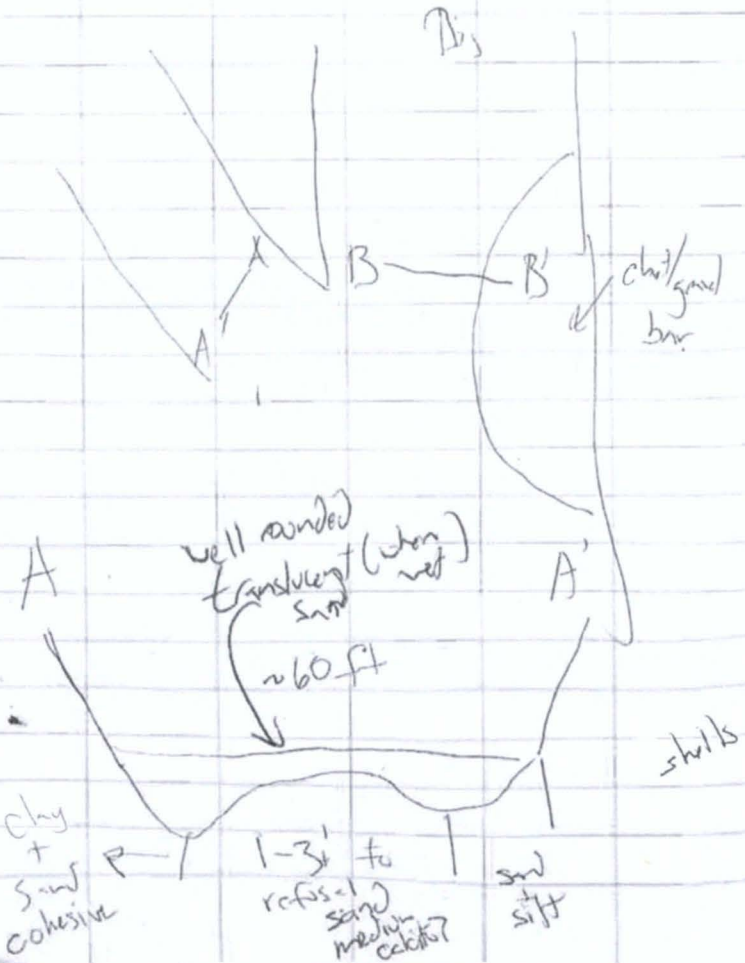
bubbles when probing edge, not in channel

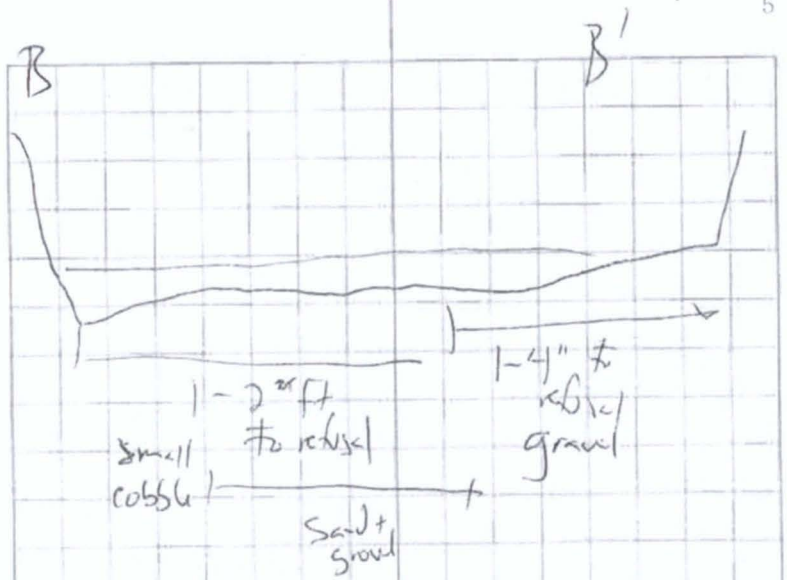


Rite in the Rain

11:24 picture of bank observation
- chat size/bar of sediment
- slag(?) in river, black vitreous solid w/ vesicles

11:35 confluence w/ Tenasbleu river





12:30 lunch

1:10 stop at ~~powerlines to probe bar~~ (JG4/1)
powerlines to probe bar for sed depth

deep (full probe) 3/4 of way across the river. Discontinued due to water depth. Some sediment - thin org film at surface, angular coarse sand/fine gravel mix with some sed. No refusal at most locations

estimate 1 yd deep x 20 yd wide by 50 yd long

Rite in the Rain

- Significant (~5%) fraction of black, friable, glassy substance.

2:00 stop to look at grey lenticular deposit in bank

Dark grey, very fine, tight clay, no odor. In bank of otherwise solid silty bank sediment.

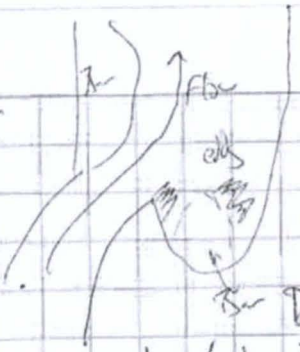
2:05 bluffs ~~to~~ R/L to left. Grey said these bears (to R) were sampled by geoprobe. No recovery, seds were not cohesive at all. Lot of sampling in this area because of State Park. Anecdotal Reports that there has been lots of sedimentation in this area (kids used to jump off cliffs into pools).

At edge of stream pockets of methane, with touch of sulfide. Almost makes water boil.

Joe Blum - Park Super

2:40 Stop at bar where river approaches St. Park Road. At downstream end, seds consistent with those upstream → coarse sands and fine gravel. Little to no clay or silt. Sed depth from 3- no refusal. Less black clinker/slag like material than previous sites.

3:05

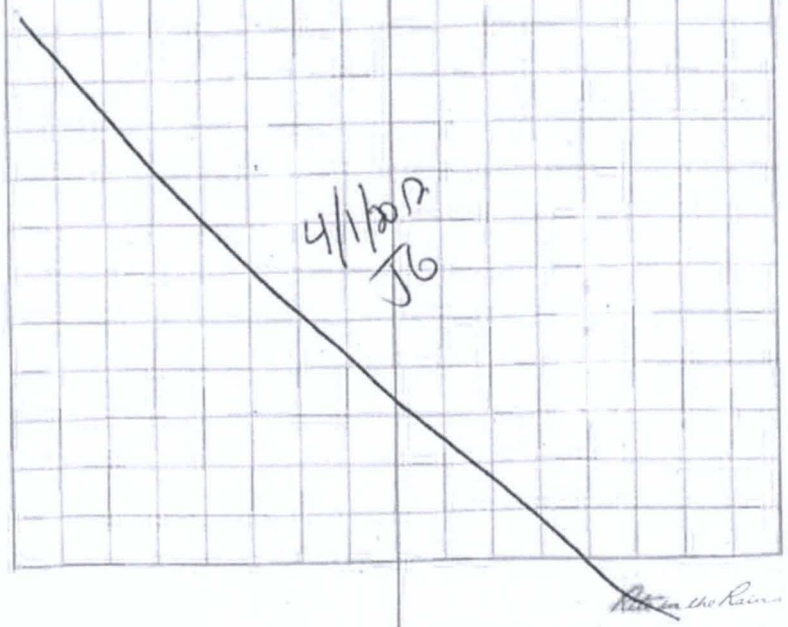


shading = deep pool 5+ft

Deep, Seds, ~4+ft. Typical (as above/upstream) sediment

3:45p – Arrive at Cherokee Landing. Unload and pack up truck for return to hotel

4:20p – Arrive at Hotel. End of Day



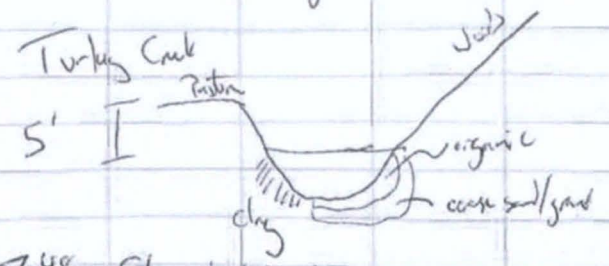
Rain the Rain

Day 2 - BRUS
Cherokee Landing to Blackwell, MO (~12 miles)
Robin Dingle (ECM), Greg Beck (EM)
Ian Shipinskoff (Integral), Jared Gasper (Integral)

6:30 Arrive at Cherokee Landing, pack canoes down, load up.
6:50 Safety Briefing
7:05 Goals: record outcrops, tributaries, tall banks possible sampling/depositional areas, also human use locations, access points to river.

7:15 Depart Cherokee Landing.

7:20 Turkey Creek - passes through city of Bonneterre
Organic Sediment overlying the sand/gravel is highly sulfidic/methanogenic.



7:48 Stop at bar to probe.
~1/8" silt/clay surface layer, coarse sand below (typical as upstream) 2ft - no refusal in various spots depending on hitting small pebble.

8:08 at Bee Run, per Greg MoDNR has data on this trib. Mostly fish tissue data.
At opening, Bee Run has short distance to refusal 0-6" coarse sand at bed, higher silt/clay banks. Lots of geode-like calcite in Bee Run Sandy Delta at Bee Run is large gravel to small cobbles, fairly rounded (ie-paved to upstream) ~~bot~~ 96

8:48 stop at bar across from eroding bank, downstream of Bee Run (A) on map 12. Gravel mixe with sand, 0-4" to refusal.

9:10 stop at possible depositional area upstream of HWY E bridge. 1'-2' of sed by probe coarse sand, minimal gravel (relative to upstream) ~10%

9:14 stop @ eroding bank upstream of HWY E (in bends) for photo/GPS of banks.

9:27 stop at depositional area. medium-/fine well sorted sand, in 1 foot. refusal by hard/cohesive clay(?) layer

Rite in the Rain

935 at HWY Bridge Per Greg, new USGS Gage installed.

1001 stop at unknown tab near Hwy E Bridge evidence of old cut banks.

1010 Cabanne Creek; coarse sand/small gravel in main channel. Silt/clay near banks from erosion.

Beginning to see more periphyton on rocks/substrate in stream.

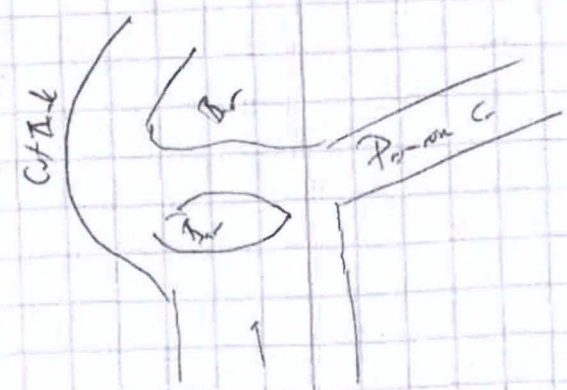
1025 Stop for depositional area coarse/medium sand to 1.5+ ft of sediment before refusal. some silt mixed in (suspended in water when disturbing sediment.)

1045 Gravel underlaying silt/clay on R bank stop at bar to probe (L) side of river steep bank sloping into R. In the top 6" there was 2" of coarse sand,

2" layer of sand/silt mixture, then additional sand.

1107 stop at bar for sediment probing 2-4 ft penetration coarse/medium sand more gravel cobble up the banks. Lots of clams, both living and dead

1143 Stop at Primrose Creek for GPS pole Bar at mouth is gravelly, exposed cut bank in silt/clay to (L) side of Big River. Primrose Cr is about 15-20 ft wide, silty banks ~10 ft tall. Gravelly/sandy substrate limited flow



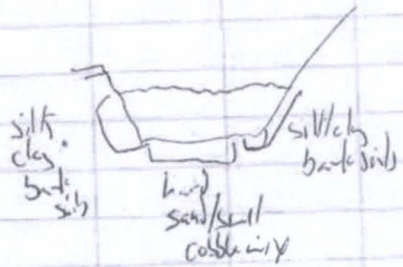
Rite in the Rain

12:03pm Stop at bar to poke
1.5-3' of poke penetration. Medium sand with a trace of silt.

12:15pm Unnamed tributary. Stop to look around.

12:30 stop for lunch at bar. Too organic rich for sampling.

1:00pm at Bear Creek



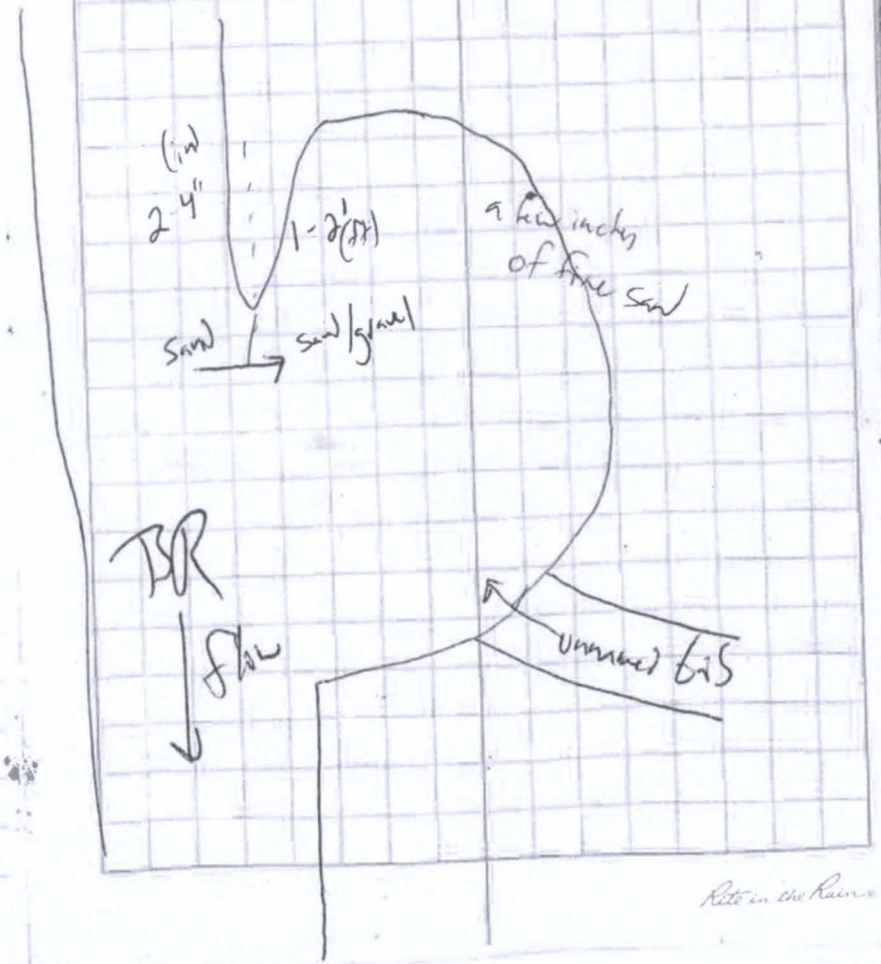
- poke in bear creek little/no penetration in center ½ ft into silt/clay.

1:15 a tributary (perhaps three hill creek) stop for GPS.

1:50 out of boat to look for Blue Spring
hidden behind delta/bar on R side of river
Bar has significant vegetation, armored by gravel/cobble.
River continues pattern of straight/wide/slow until hits bluff and turns, re-enters straight stretch.
Sediment appears to have less chert-like material —

most areas have sand/silt or gravel/cobble. Mid range is minimal in many places.

2:17 poke ~~near~~ JG ~~unnamed~~ JG unnamed tributary near potential sample location.



236 Dickerson Rd Bridge / Kohls landing
low bridge, in high water would
be safety hazard (any more than 1-2 ft
higher than today).

250 stop at potential sampling location. Bar
at R side, fine-medium sand
1-2 ft penetration with probe. Less
penetration to center of stream.
Ian has to change batting in GPS.

3:15 stop for catfish photos and viewing
spotted by Robin (flathead - 20 in)

3:42 stop at Drainage for ~~Drax~~ JG Droxer
Dam #10; just upstream of culvert at crossing
of unnamed road. Small creek, ~2-3 ft
wide. No apparent staining or red color.

350 stop at road crossing to rock pick.
Barite and calcite crystals abundant.
perhaps lead?

433 Stop at tub just ~~downstream~~ upstream JG 5/3 of Mill cr.
Limited delta deposits, steep channel sides,
narrows

4:40 Paddle up Mill Creek a short Distance.
Stop at Scr/deposition zone. ~1 ft of
probe recessible sediment - most place.
Reddish hue to sediment, some clays
mixed with gravel. Steep banks
about 10' feet.

5:20 arrive at take out just downstream of
CC Bridge. Wait for Steve to pick us up.

JG 5/3/2017

5/3/2012 Day 3 BRVS

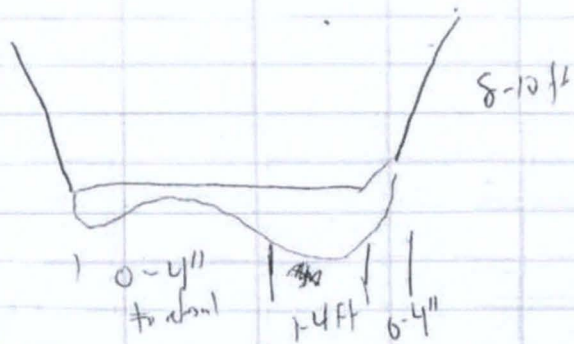
6:30 Meet At Cherokee Landing.

7:20 Arrive at Put-in, HIS Briefing, prep canoes

Rob-Dingle (ELM), Greg Beach (EPA)
Jim Stupinskoff (Integral), Jarrod Gasper (Integral)

7:43 Depart put in. Expose at bank on (R) just downstream of put in.
River continues as day before, broad low velocity channel, banks largely vegetated.

7:55 Tiff Creek
stop to Probe



In creek a mix of gravel, with silt and organic material. Towards river grades to coarse sand with mix of silt and organics. Greater penetration in sandy regions. Saw other ~50 yds up creek.

8:23 Stop in for look at Carson Creek area of bedrock, overlain by sandy gravel.

8:32 Stop at bar/depositional location 2-4' of probe.
Well sorted, fine sand mixed with some silt and organic material. Deposit appears consistent for at least 20 feet. Farther downstream grades to more mud and organics, upstream is more large sand/gravel.

9:14 Pass Railroad bridge

9:20 Stop to Probe Bar
0-4" nearest channel (gravel/sand)
2-3+ ft on downstream, (L) side of bar
sand/with some silt and gravel.

5/3 JG

all sediments are overlain by ~~[illegible] of~~ layer of organic/algal(?) growth.
Robin found large (~4") mussel in riffle near bar.

1012 Stop at Wilsons Hollow.
Creek valley [illegible] 20 feet wide
sand/gravel substrate, lots of filamentous algae. Little/no chat size/type of sediment, either in creek or on bar in river.

1045 Stop at backwater as potential depositional sampling location. Low density silt/organic mix over likely sands (~1 foot probe to refusal).

1124 ~~Stop at Maddin Cr.~~
~~Very small, no water, 10-15 ft wide/high~~
~~Flow deposits appear head high.~~ JG 5/3
Notes from wrong location (BR high water channel).

1135 Stop at Maddin Cr
40 ft wide, banks ~15 ft high
Small amount of flow
Silt/clay surface layer

JG
1-2 inches of silt/clay over ~~layer~~ lags gravels/

1157 Stop at unnamed trib ~50 yds upstream of Hwy 21 bridge. Sand/gravel bed mixture
Only small amount of water flowing
But no layer of silt/organic as in Maddin Cr.

JG
1230 Pass ~~thru~~ under Hwy 21 Bridge, pass MDC Hwy 21 river access.
Outcrops at (L)

1240 Stop at riffle to look for mussels after spotting empty shell.
No live mussels found, a number of broken and open shells were photographed.

103 Stop at bar/potential depositional area
med/coarse sand mixed organics on surface
gravels below.
Probe penetration 1-2'.

115 pm Stop at Unnamed ~~trip~~ JG tributary, near "Camp Ne-o-Tse" per Greg's GPS. Little to no flow, access path to River
Small gravel, large sands, with algae on rocks and film of silt.

157 Stop at Depositional Area & Probe
medium sand with gravel mixture.
2-4+ feet of probe. Some organic but not more than 5%.

231 cross under closed, old bridge.

255 Arrive at Confluence with Mineral Fk
~100 ft wide, strong flow, estimate 50-100 cfs
Gravel/sand bed, with some cobble.

404 Return from exploration up Mineral Fork.
Many log jams, bars and shallow riffles, would be most challenging canoeing. Lower stretch has number of eroding cut banks. Substrate is predominantly gravel, with sand and small cobbles. Floodplain ~~at for~~ JG would be easily connected to Big River once each exceeds

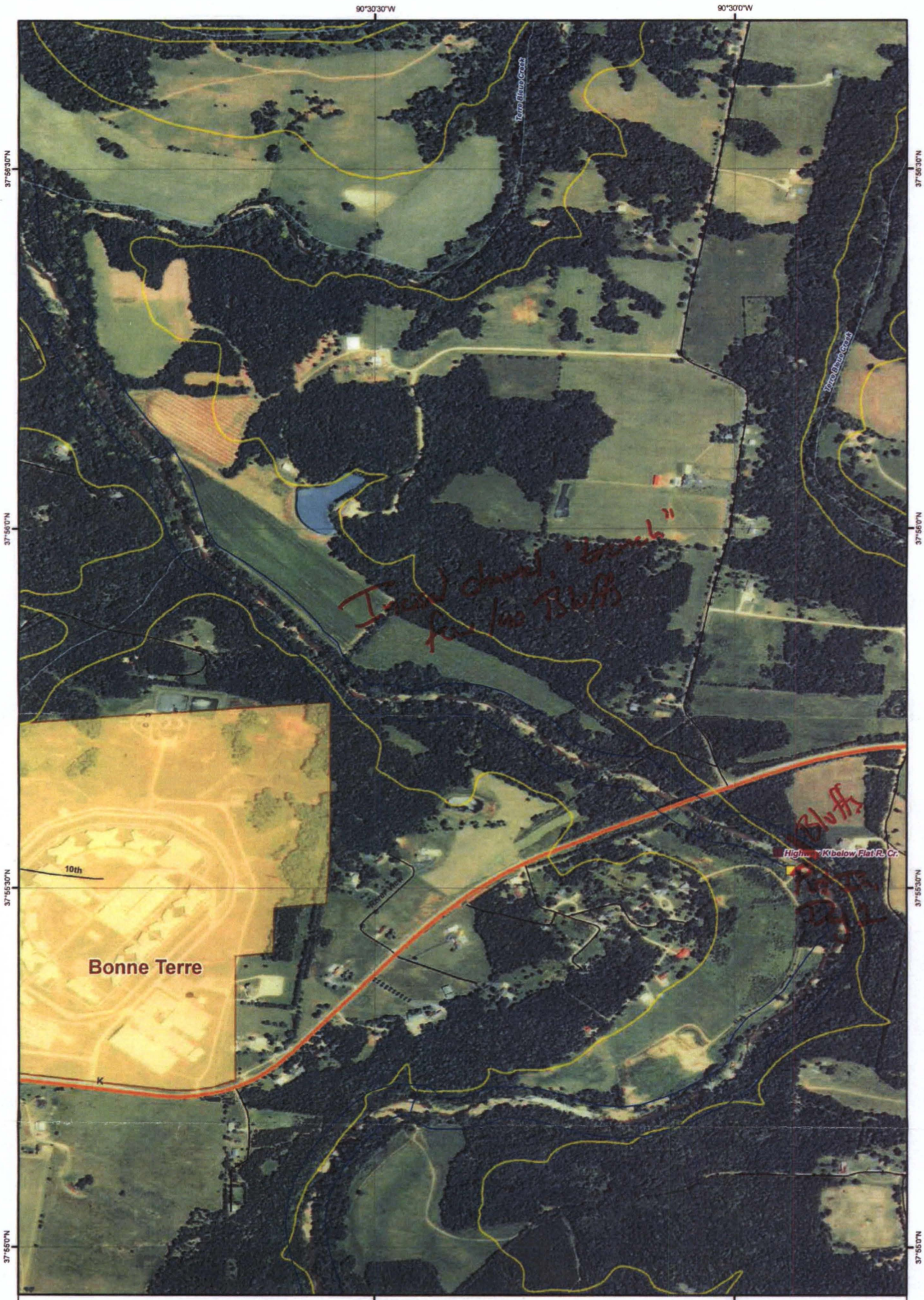
level of cut banks. Limited numbers of depositional ~~bar~~ JG areas.

430 Depart Mineral Fk.

500 Arrive Mammoth Landing. Unload canoes.
Wait for shuttle.

720 Arrive Cherokee Landing. End of Day

JG 5/3/2012


90°30'30"W
90°30'0"W
37°56'30"N
37°56'0"N
37°55'30"N
37°55'0"N
Turn Hump Creek
Two Mile Creek
Highway K below Flat R. Cr.
10th
Bonne Terre
K
Carter Locations
Pavlovsky Locations
Mine Locations
Shaft Locations
Chat
Tailings
Project Study Locations (Martin et al. 2010)
Gale-BR8 Sample Location
Roberts Sample Locations
Roberts Mussel Bed Quantity
0.2
0.3 - 0.4
0.5 - 1.9
2.0 - 9.1
FEMA Floodplain Extent
Rivers and Streams
County Boundaries
Primary Limited Access/Interstate
Primary US and State Highways
Secondary State/County Highway
Freeway ramp
Ramp, other
Local or Rural Road
Visual Survey Map Book
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90°31'30"W
90°31'0"W
37°57'30"N
37°57'0"N
37°56'30"N
37°56'0"N
Saint Francois State
St Francois State Park
Saint Francois State
Bluffs
Hooks
Maintance
Big River Hills
Bonne Terre
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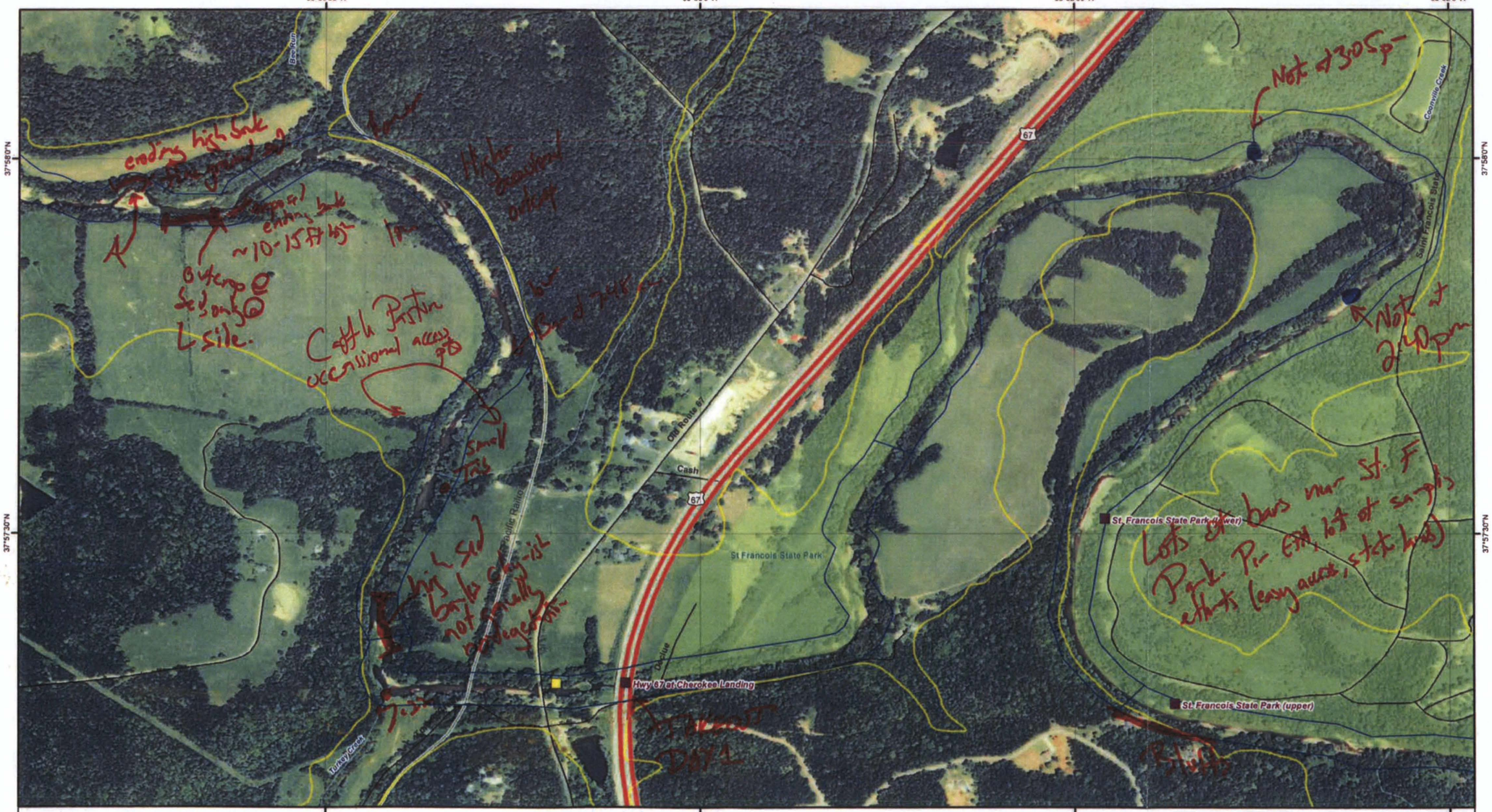
90°33'30"W
90°33'0"W
90°32'30"W
90°32'0"W
37°5'0"N
37°5'30"N
Bee Run
Coonville Creek
Saint Francois River
67
Cash
Old Route 67
St Francois State Park
St. Francois State Park (lower)
St. Francois State Park (upper)
Hwy 67 at Cherokee Landing
Turkey Creek
Not at 3:05 pm
Not at 2:40 pm
ending high bank
Higher seasonal outcrop
~10-15 ft high
Cattle Pasture
occasional access pt
small tailings
Lots of barns near St. F Park. Pr. ent, lot of samples attempts (easy access, state land)
Carter Locations
Pavlovsky Locations
Mine Locations
Shaft Locations
Chat
Tailings
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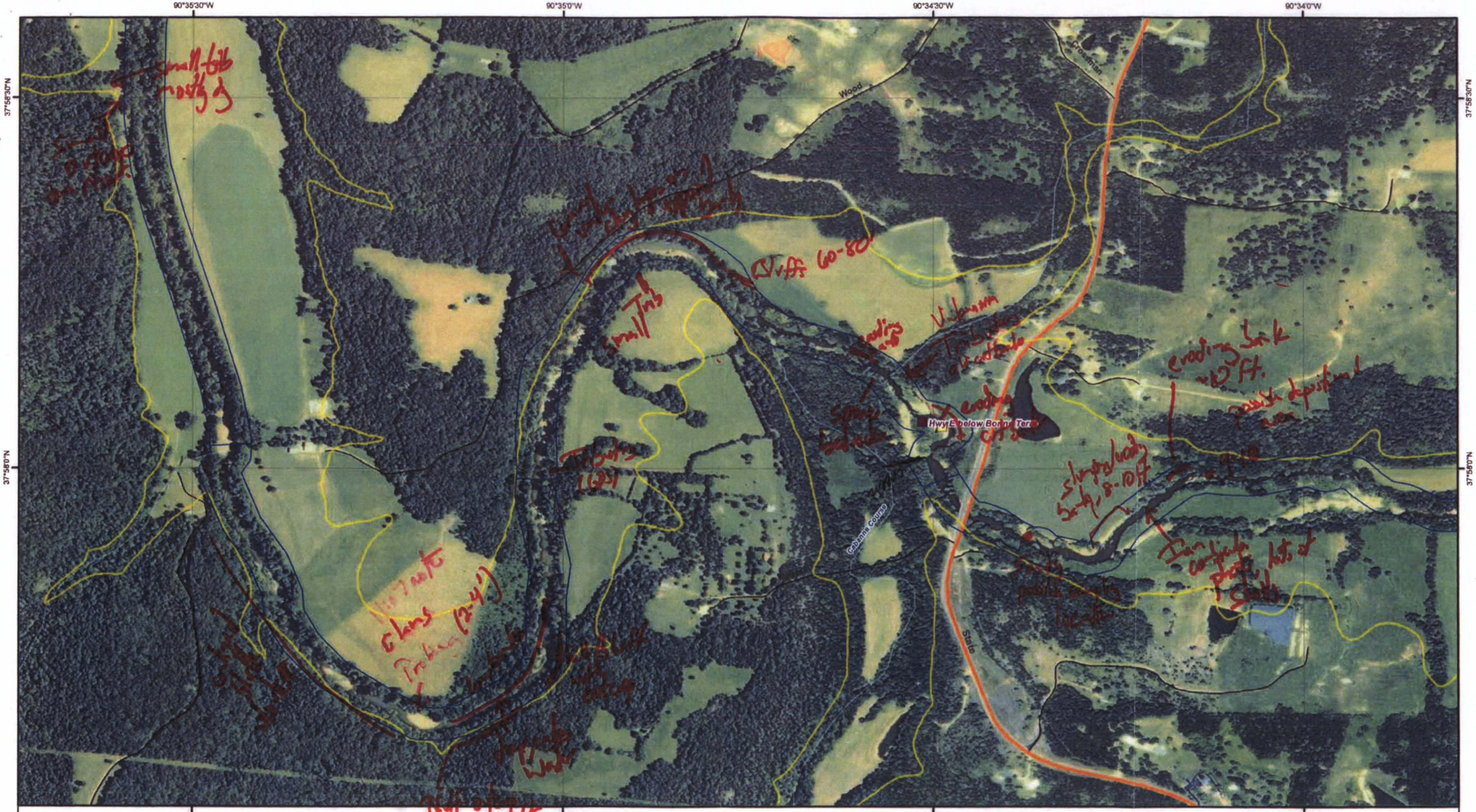

Carter Locations
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Mine Locations
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Chat
Tailings

Project Study Locations (Martin et al. 2010)
Gale-BR8 Sample Location
Roberts Sample Locations

Roberts Mussel Bed Quantity
0.2
0.3 - 0.4
0.5 - 1.9
2.0 - 9.1

FEMA Floodplain Extent
Rivers and Streams
County Boundaries

Primary Limited Access/Interstate
Primary US and State Highways
Secondary State/County Highway
Freeway ramp
Ramp, other
Local or Rural Road

Visual Survey Map Book

0 500 1,000
Feet

N

integral

13

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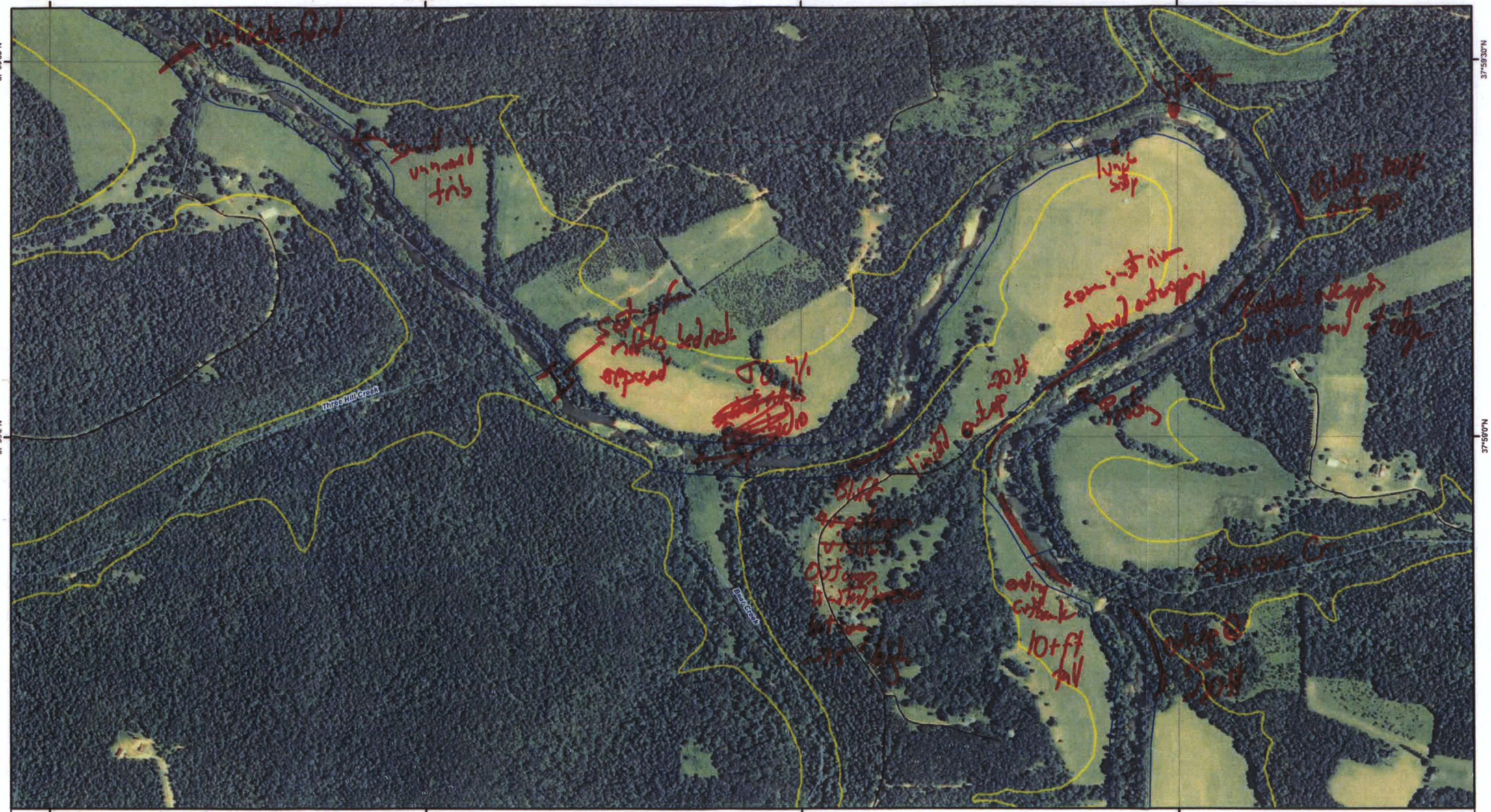

Carter Locations
Pavlovsky Locations
Mine Locations
Shaft Locations
Chat
Tailings

Project Study Locations (Martin et al. 2010)
Gale-BR8 Sample Location
Roberts Sample Locations

Roberts Mussel Bed Quantity
0.2
0.3 - 0.4
0.5 - 1.9
2.0 - 9.1

FEMA Floodplain Extent
Rivers and Streams
County Boundaries

Primary Limited Access/Interstate
Primary US and State Highways
Secondary State/County Highway
Freeway ramp
Ramp, other
Local or Rural Road

Visual Survey Map Book

0 500 1,000 Feet

N

integral urban

14

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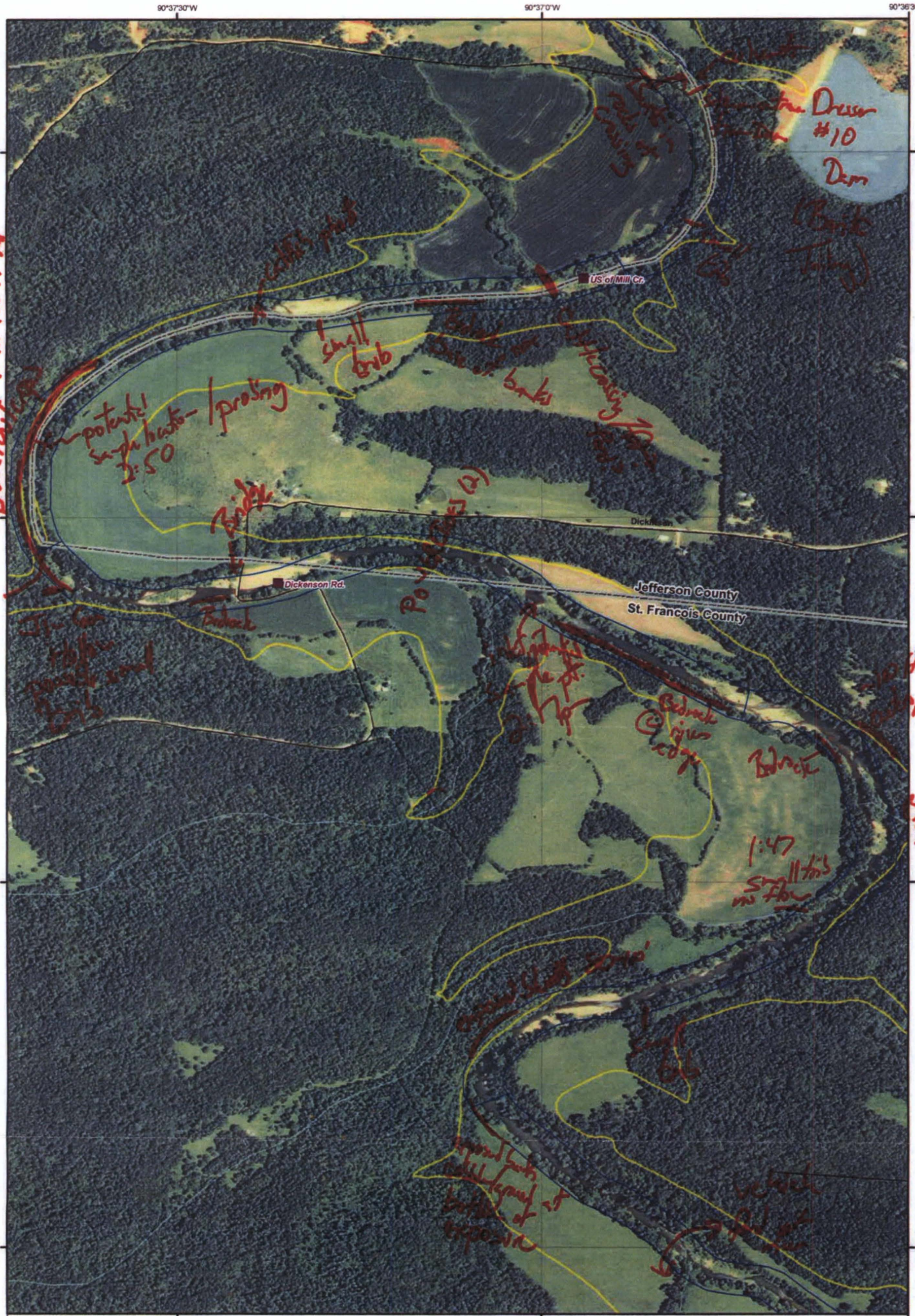

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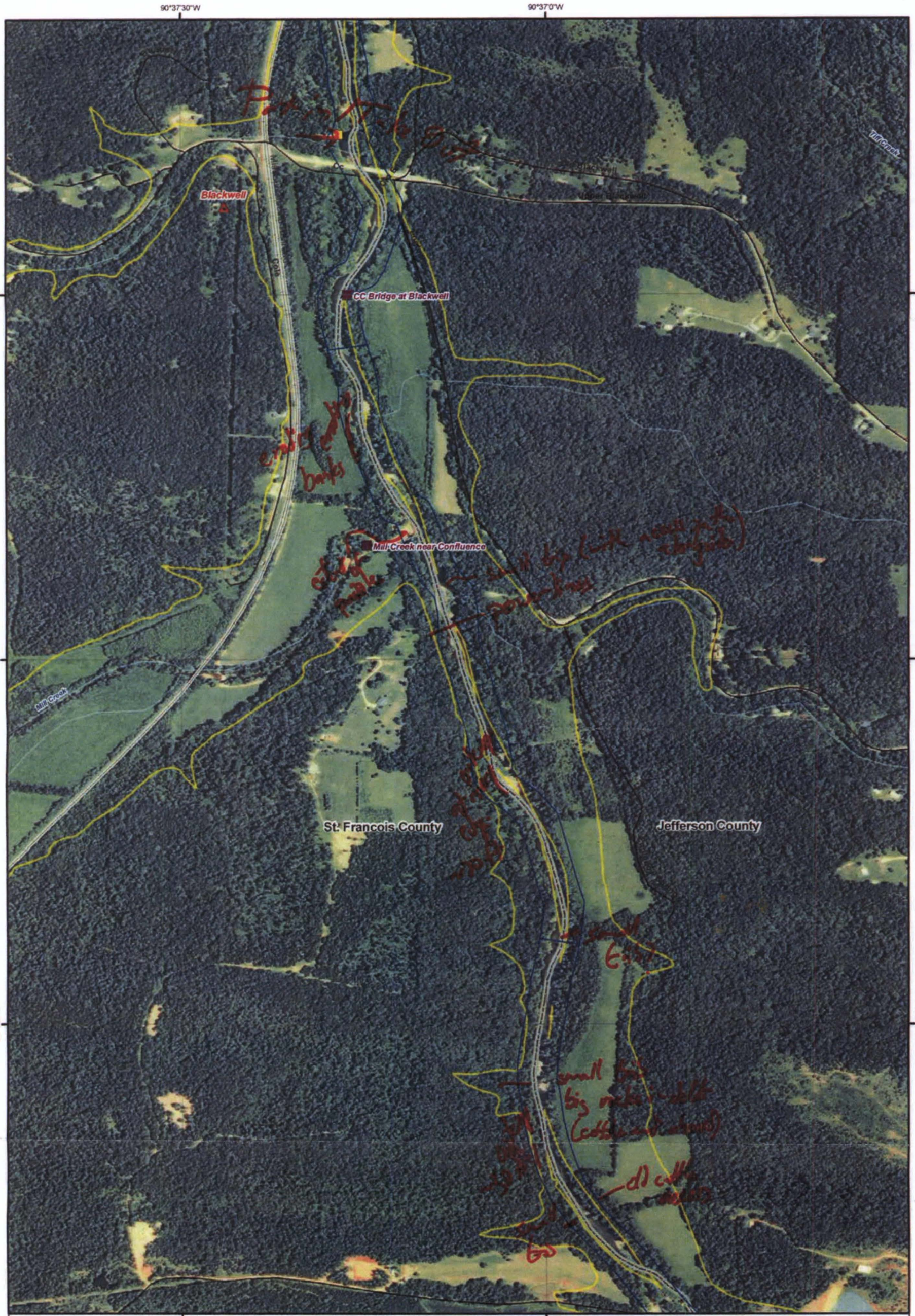

Carter Locations
Pavlovsky Locations
Mine Locations
Shaft Locations
Chat
Tailings

Project Study Locations (Martin et al. 2010)
Gale-BR8 Sample Location
Roberts Sample Locations

Roberts Mussel Bed Quantity
0.2
0.3 - 0.4
0.5 - 1.9
2.0 - 9.1

FEMA Floodplain Extent
Rivers and Streams
County Boundaries

Primary Limited Access/Interstate
Primary US and State Highways
Secondary State/County Highway
Freeway ramp
Ramp, other
Local or Rural Road

Visual Survey Map Book

0 500 1,000
Feet

N

integral

16

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Carter Locations
Pavlovsky Locations
Mine Locations
Shaft Locations
Chat
Tailings
Project Study Locations (Martin et al. 2010)
Gale-BR8 Sample Location
Roberts Sample Locations
Roberts Mussel Bed Quantity
0.2
0.3 - 0.4
0.5 - 1.9
2.0 - 9.1
FEMA Floodplain Extent
Rivers and Streams
County Boundaries
Primary Limited Access/Interstate
Primary US and State Highways
Secondary State/County Highway
Freeway ramp
Ramp, other
Local or Rural Road

Visual Survey Map Book

0 500 1,000 Feet

N

integral

17

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Carter Locations
Pavlovsky Locations
Mine Locations
Shaft Locations
Chat
Tailings
Project Study Locations (Martin et al. 2010)
Gale-BR8 Sample Location
Roberts Sample Locations
Roberts Mussel Bed Quantity
0.2
0.3 - 0.4
0.5 - 1.9
2.0 - 9.1
FEMA Floodplain Extent
Rivers and Streams
County Boundaries
Primary Limited Access/Interstate
Primary US and State Highways
Secondary State/County Highway
Freeway ramp
Ramp, other
Local or Rural Road

Visual Survey Map Book

0 500 1,000
Feet

N

integral consulting inc.

18

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Carter Locations
Pavlovsky Locations
Mine Locations
Shaft Locations
Chat
Tailings
Project Study Locations (Martin et al. 2010)
Gale-BR8 Sample Location
Roberts Sample Locations
Roberts Mussel Bed Quantity
0.2
0.3 - 0.4
0.5 - 1.9
2.0 - 9.1
FEMA Floodplain Extent
Rivers and Streams
County Boundaries
Primary Limited Access/Interstate
Primary US and State Highways
Secondary State/County Highway
Freeway ramp
Ramp, other
Local or Rural Road

Visual Survey Map Book

0 500 1,000 Feet

N

integral consulting inc.

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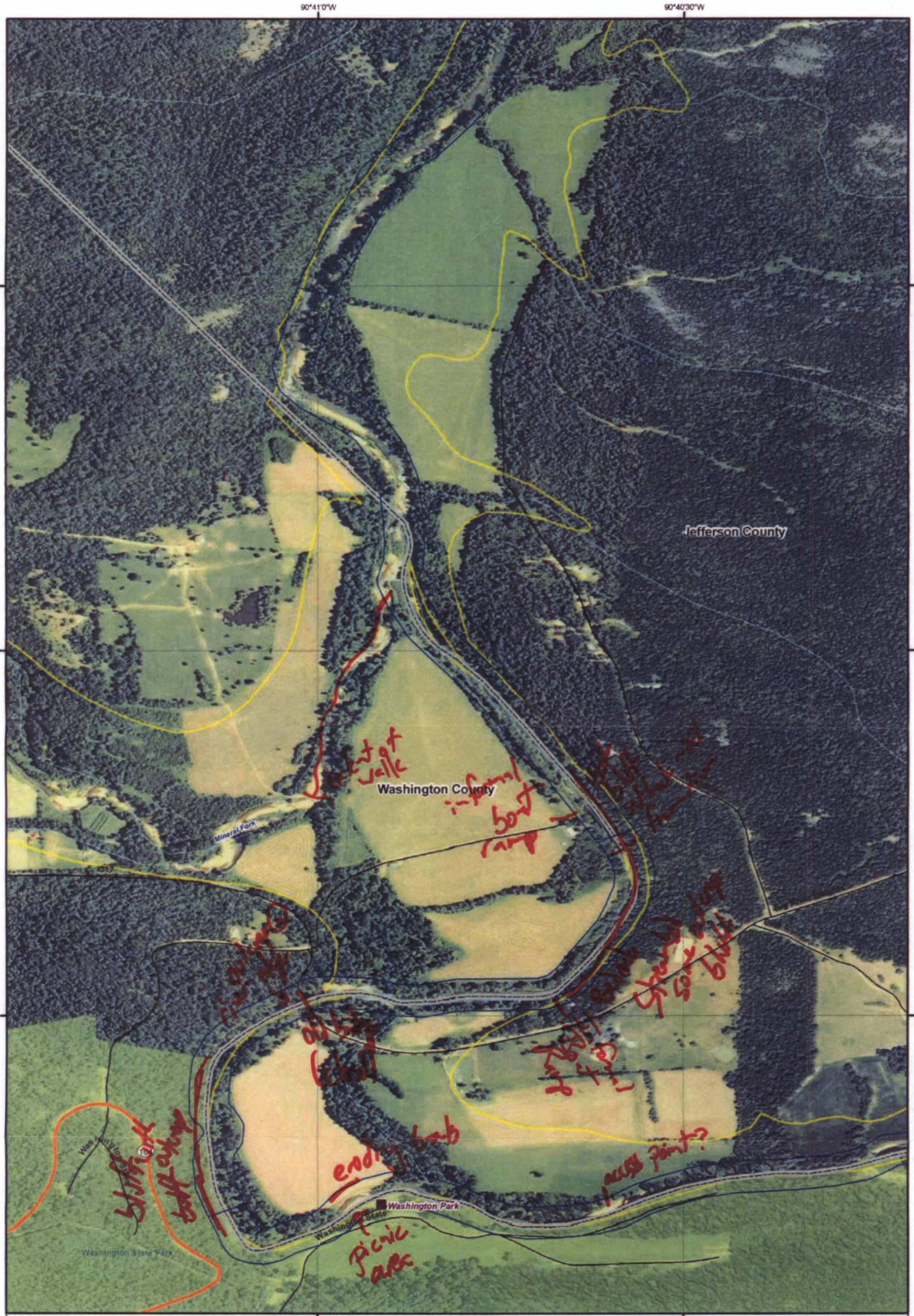
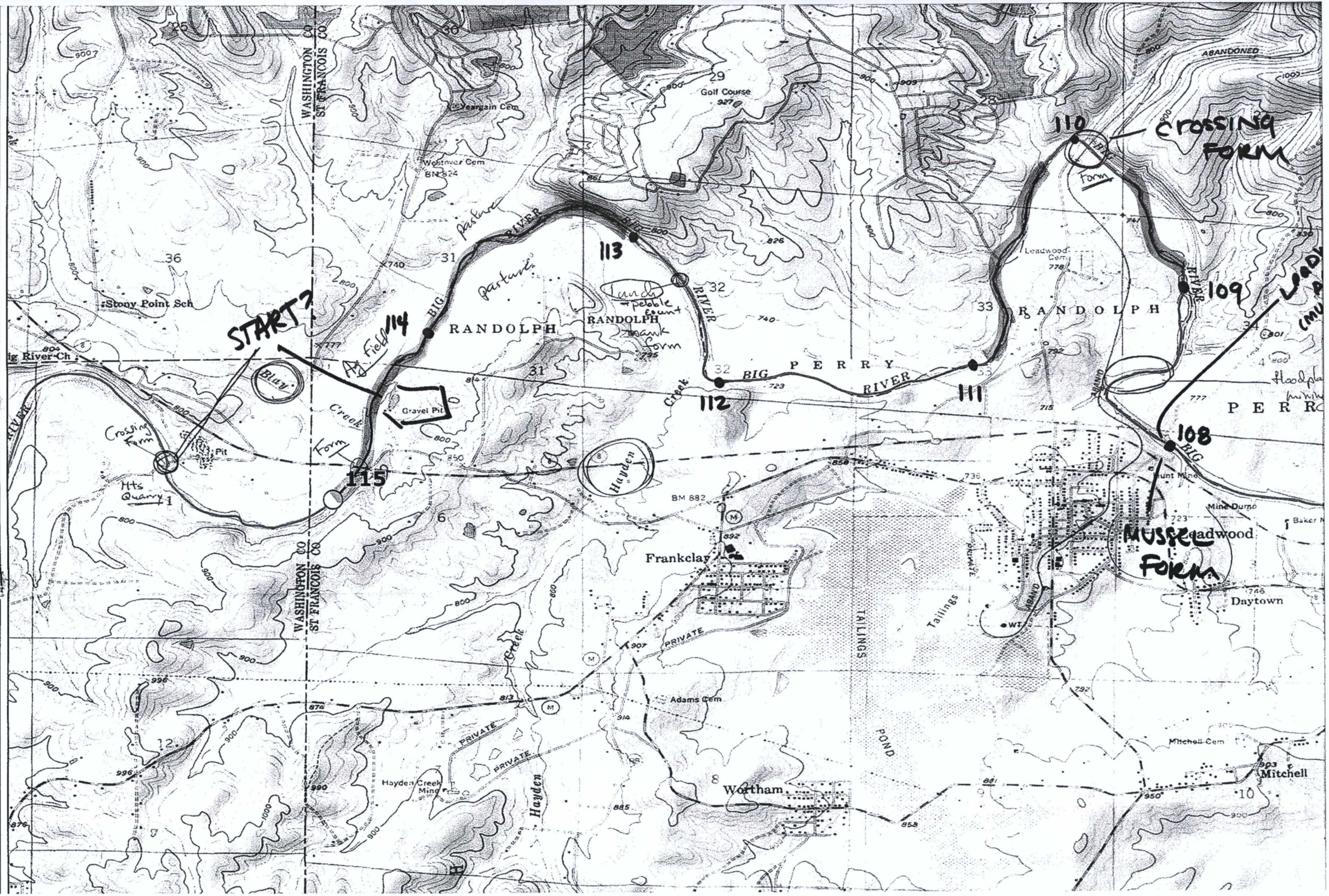
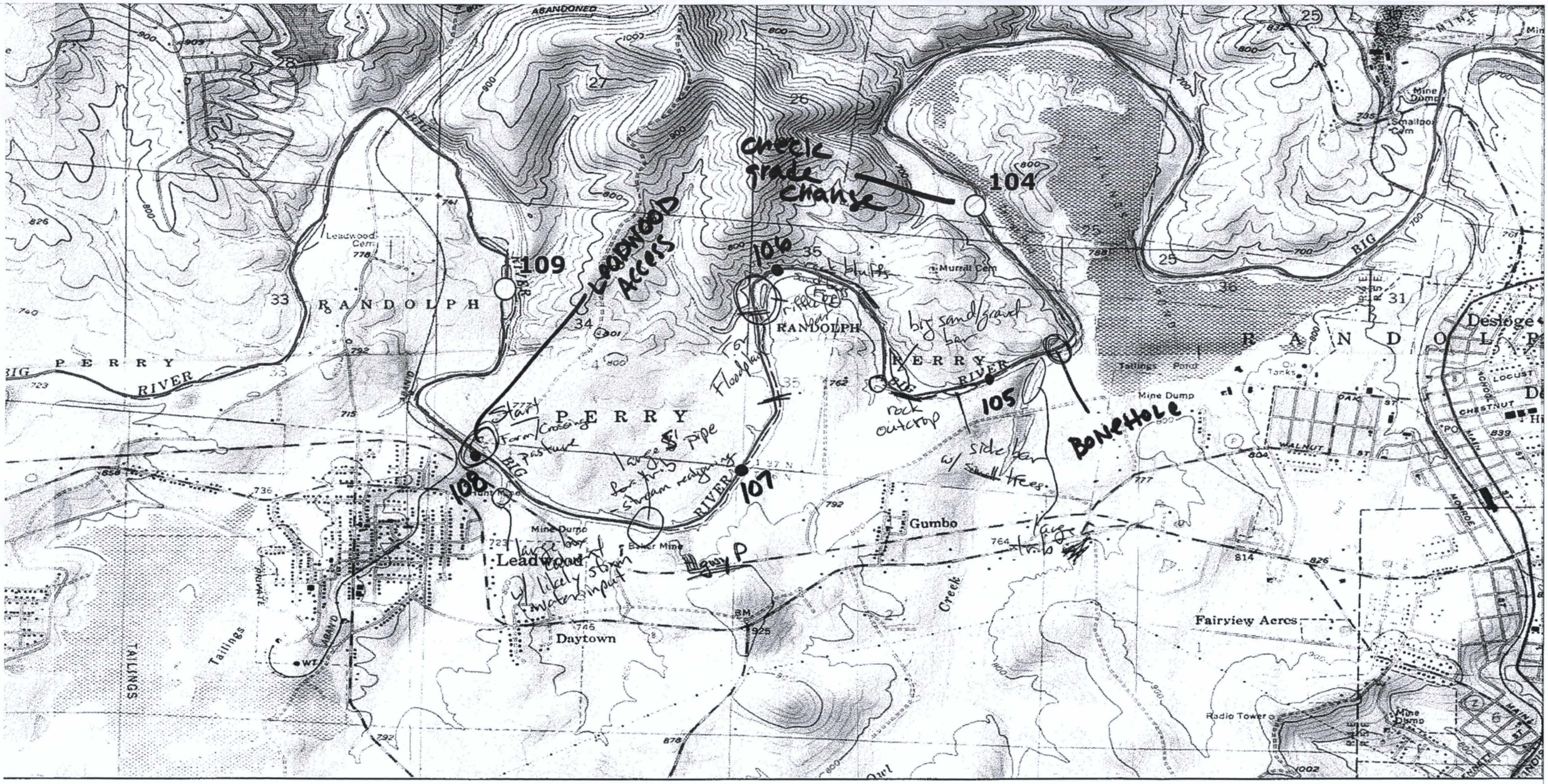

90°41'0"W
90°40'30"W
38°6'30"N
38°6'0"N
38°5'30"N
Jefferson County
Washington County
Mineral Fork
Washington State Park
Washington Park
Washington State
Carter Locations
Pavlovsky Locations
Mine Locations
Shaft Locations
Chat
Tailings
Project Study Locations (Martin et al. 2010)
Gale-BR8 Sample Location
Roberts Sample Locations
Roberts Mussel Bed Quantity
0.2
0.3 - 0.4
0.5 - 1.9
2.0 - 9.1
FEMA Floodplain Extent
Rivers and Streams
County Boundaries
Primary Limited Access/Interstate
Primary US and State Highways
Secondary State/County Highway
Freeway ramp
Ramp, other
Local or Rural Road
Visual Survey Map Book
0
500
1,000
Feet
N
integral
20
N:\GIS\Projects\C816_BigRiverFS_DoeRun\Working_MXDs\VRS_Mar2012\Maps\20_VRS_03072012.mxd - 3/7/2012 @ 7:54:23 PM


START 2
Ag. Field 114
113
112
111
110
109
108
115
Crossing Form
Form
Lunch + pebble count
Bank Form
Hayden
MUSSEL FORM
LOADING (MU
Floodpla
WASHINGTON CO
ST FRANCOIS CO
Golf Course
Vergain Cem
Westover Cem
BM 824
Stony Point Sch
Big River Ch
Pasture
BIG RIVER
RANDOLPH
PERRY
Leadwood Cem
ABANDONED
Gravel Pit
Pit
Mts Quarry
Blay
Creek
Frankclay
BM 882
TAILINGS POND
Tailings
PRIVATE
Adams Cem
Hayden Creek Mine
Hayden
Wortham
Leadwood
Mine Dump
Daytown
Mitchell Cem
Mitchell



ER LOCATION AND ID

LINE

- FORM 1
- FORM 2

NOTES:
1. DISTANCE BETWEEN MARKERS IS APPROXIMATELY 4.93 MILES.

C stream type
valley slope ~ 0.4%
channel slope ~ 0.2%

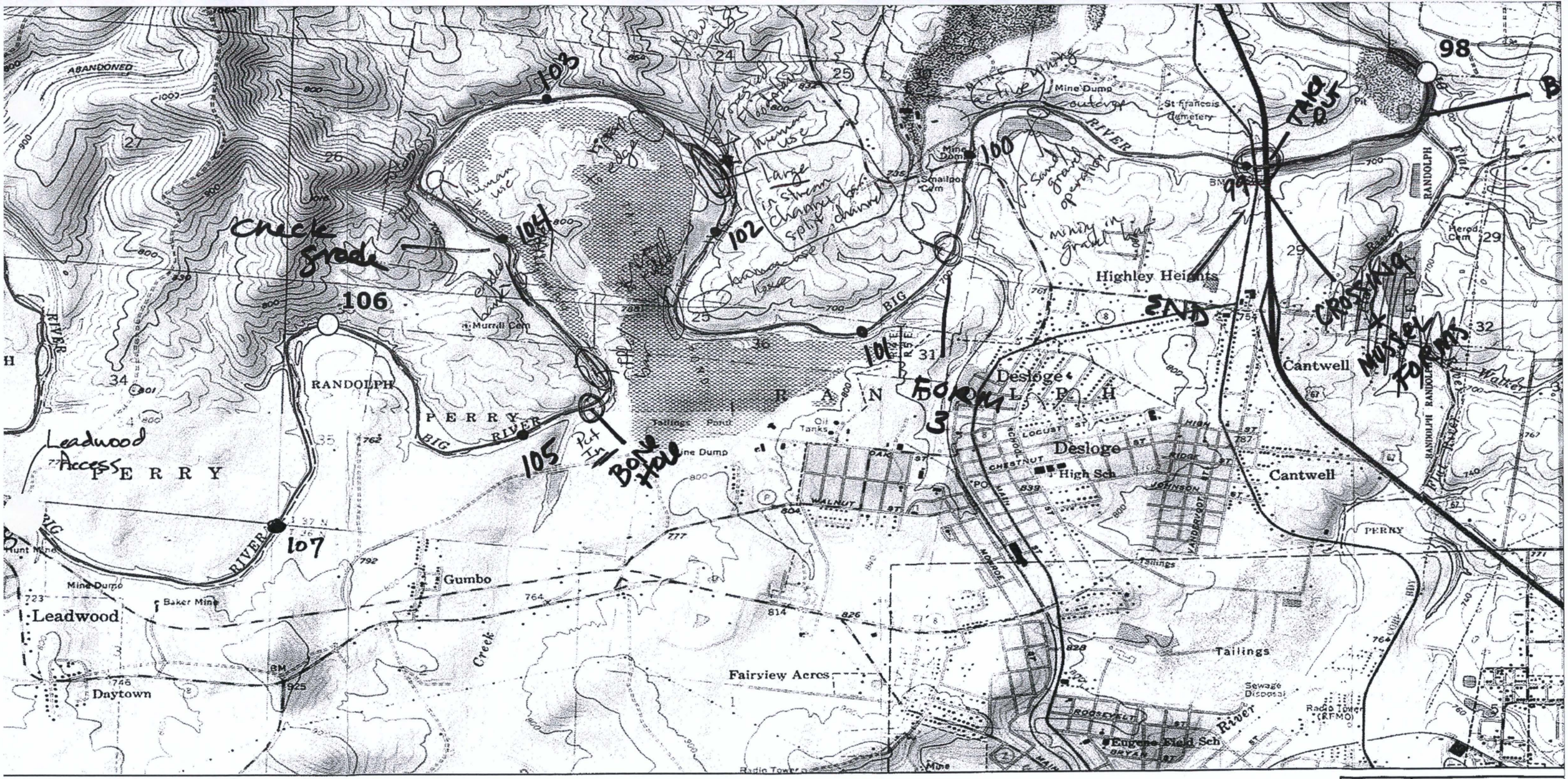
0 2,000 4,0

SCALE: 1 " = 2,000 '

TITLE: FIGURE 2
LEADWOOD ACCESS TO BONEHOLE ACC

LOCATION:
BIG RIVER
MISSOURI

THE



RIVER MILE MARKER LOCATION AND ID

BIG RVER CENTER LINE

NOTES:
1. DISTANCE BETWEEN MARKERS IS APPROXIMATELY 7.77 MILES.

- Form 1
- Form 2
- Form 3 - RR Xing + 67 S
- Form 4 - Along Tailings, At Bone Hole
- Form 5 - 67 S

C

to valley slope
2% channel slope

N	0 SC
TITLE:	BONEHOLE AC
LOCATION:	BIG RIVER MISSOURI
DATE:	07/08/2012

NOTES:
1. DISTANCE BETWEEN MARKERS IS APPROXIMATELY 7.85 MILES.

ast 2 } C - stream
nouth of
Flat River Creek
- at
ake out (Hwy K)

SOURCE:
1.

DRAFT

0 2,000 4,

SCALE: 1 " = 2,000 '

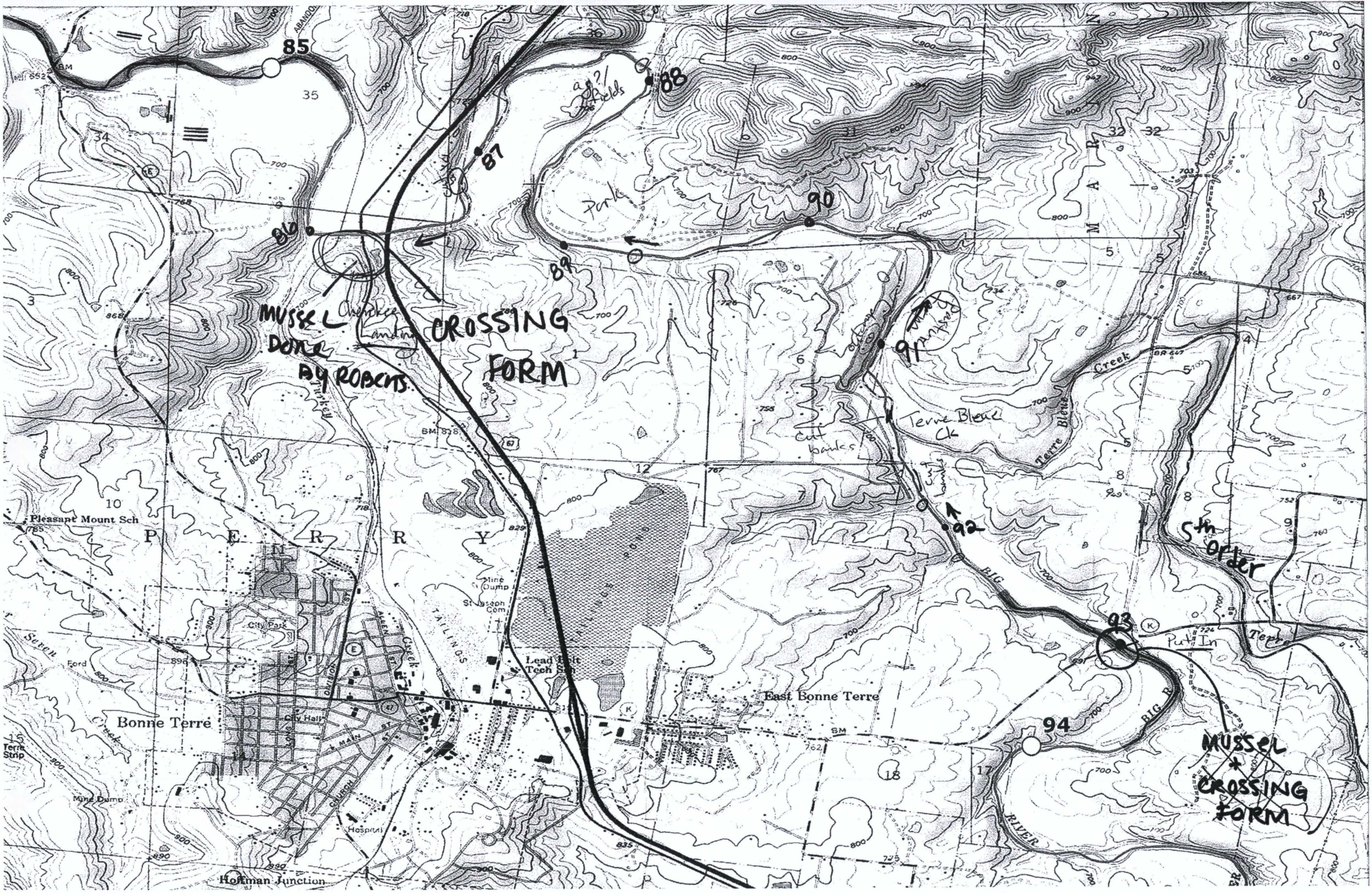
TITLE: FIGURE 4
SOUTH 67 BRIDGE TO HIGHWAY K BR

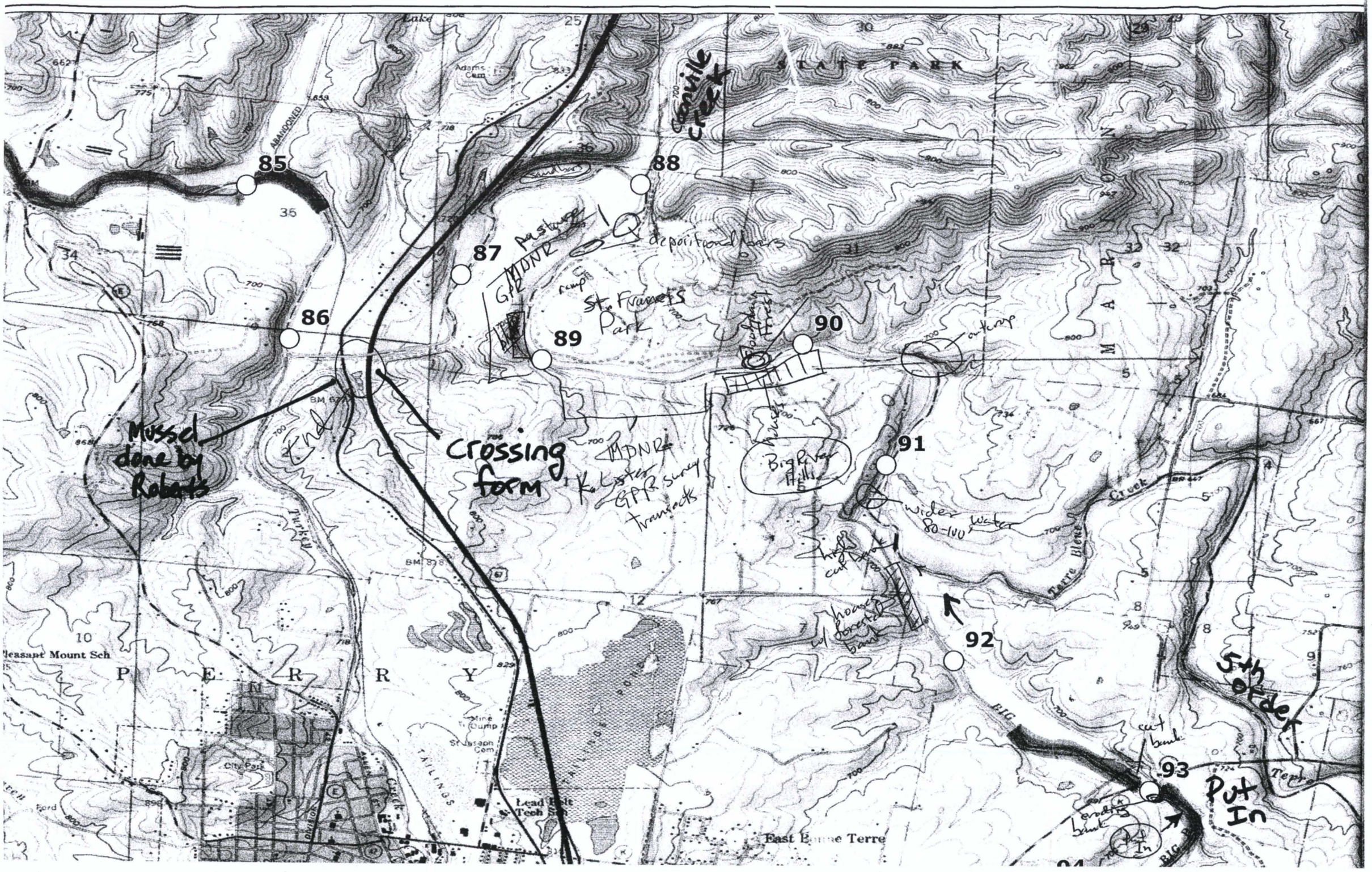
LOCATION: BIG RIVER MISSOURI

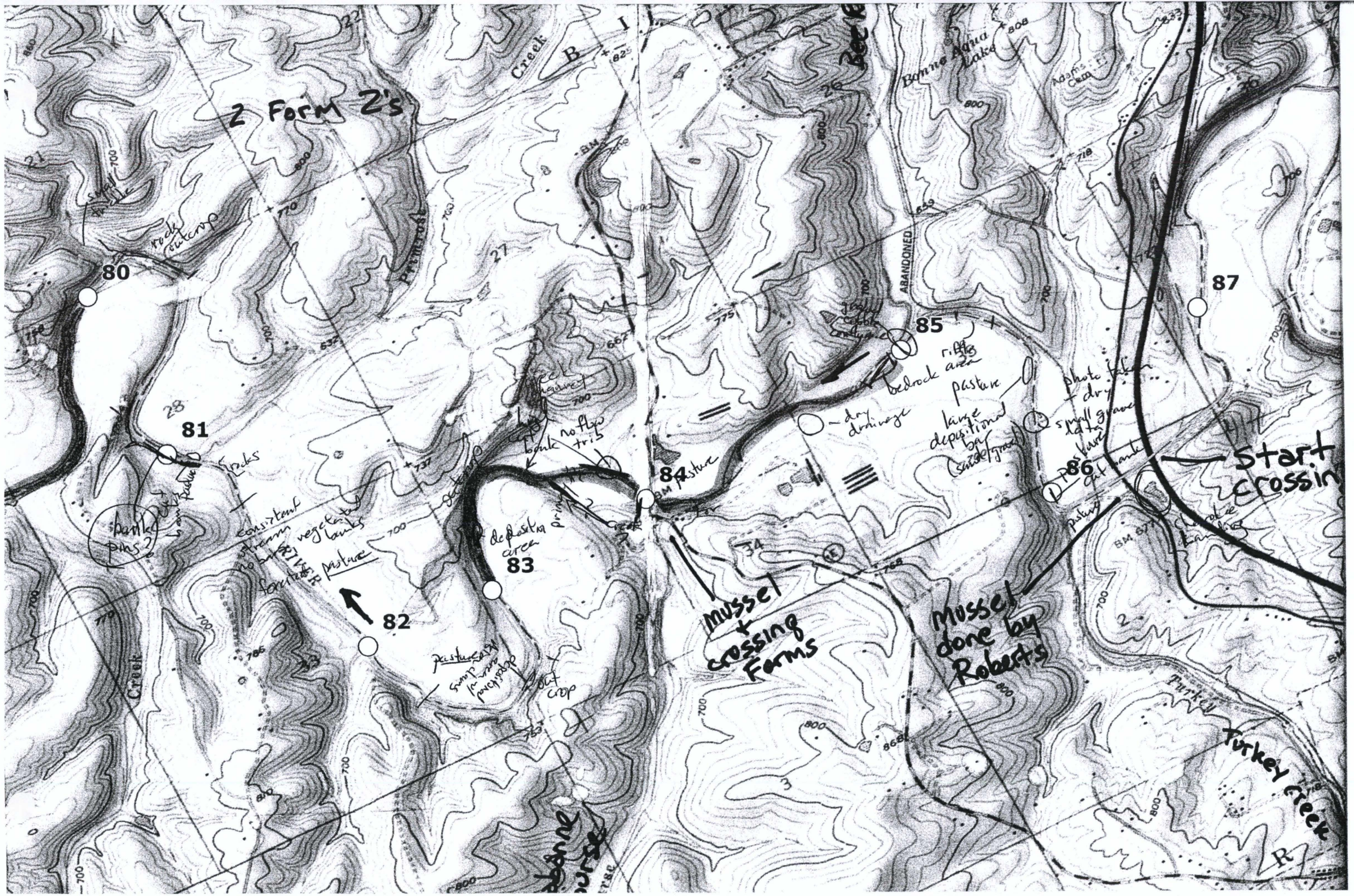
DATE: 03/08/2012

FILENAME: 211073_DAY4.mxd

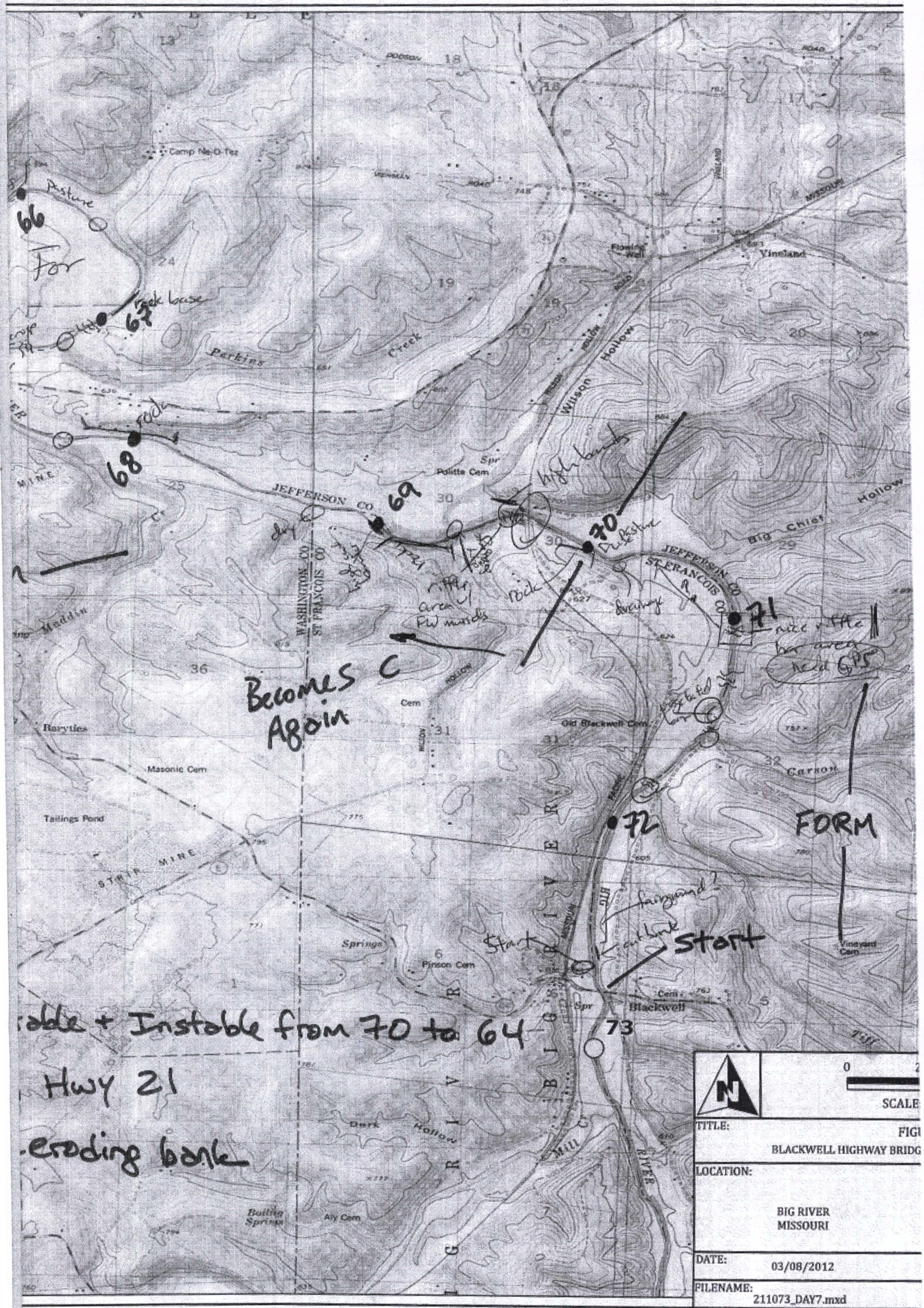
THE E
218 WALL S
4920 YORK ROAD,
612 MAIN S
267 BROADWAY,
2475 BAGLYOS C


85
86
87
88
89
90
91
92
93
94
MUSSEL DONE BY ROBCATS
CROSSING FORM
Ownbey Landing
Parks
Terre Bleue Ck
Terre Bleue Creek
5th order
Put In
MUSSEL
CROSSING FORM
P E R R Y
Pleasant Mount Sch
City Park
Bonne Terre
City Hall
Lead Belt Tech Sch
East Bonne Terre
Hoffman Junction
Mine Dump
TAILINGS
BIG RIVER
Turkey Creek
Seven Ford
Terre Strip

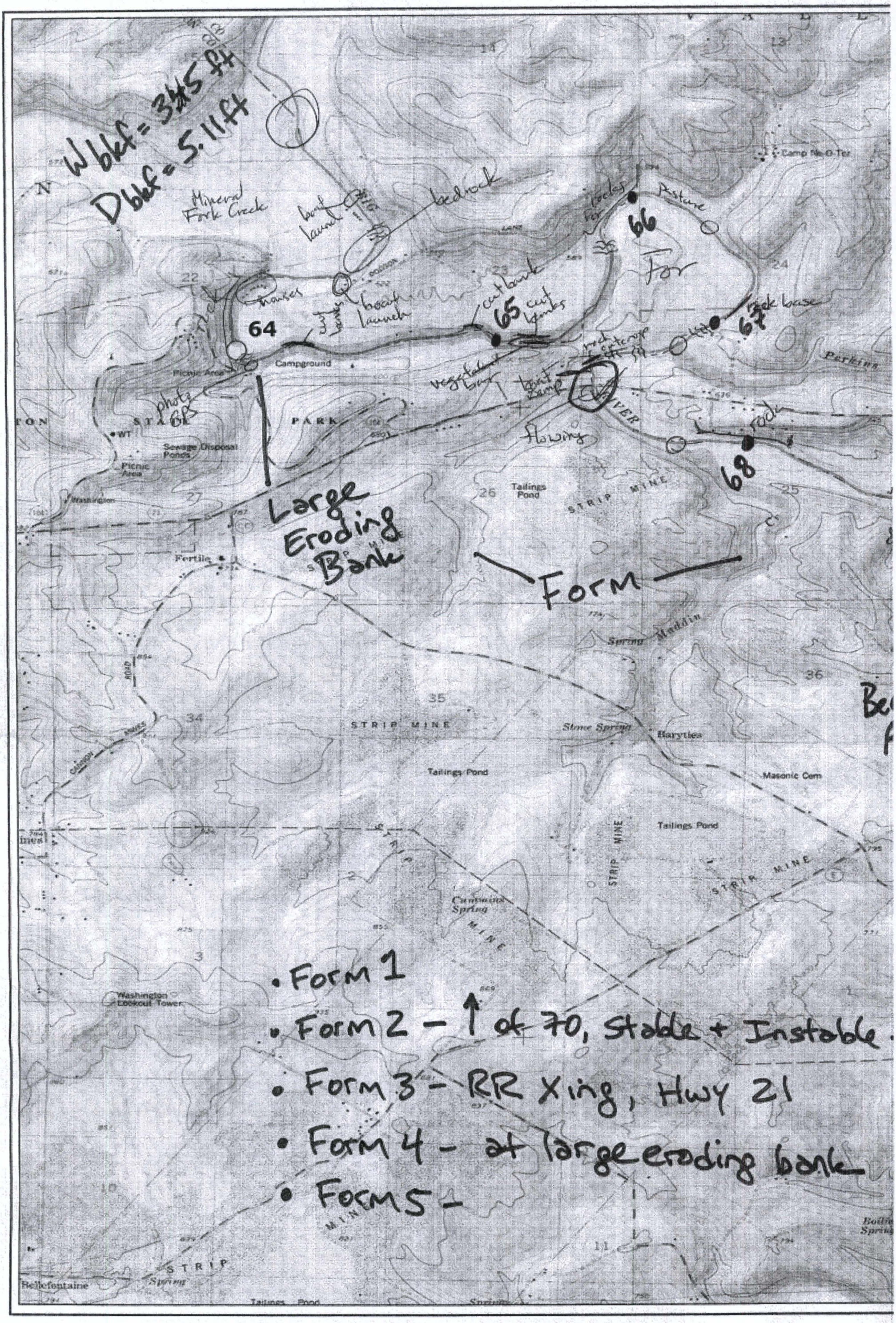

STATE PARK
Lake
Adams Cem
ABANDONED
Sevenile Creek
85
86
87
88
89
90
91
92
93
35
34
36
25
30
31
32
5
8
9
10
12
7
MONR
pasture
deposit and hours
ramp
St. Francis Park
outcrop
Mussel done by Roberts
Crossing form
MDNR
K. Lester
GPP survey transects
Big River Hills
wider 80-100 water
high cut bank
houses w/ forested bank
cut bank
landing bank
put in
5th order
Put In
Turkey
Pleasant Mount Sch
P E N R R Y
City Park
Mine Pump
Strassen Cem
TAILINGS
TAILINGS POND
Lead Belt Tech Sch
East Bonne Terre
Terre Bleue
Creek
BIG
Ford
BM 678
BM 838


2 Form 2's
80
81
82
83
84
85
86
87
Start Crossing
Mussel crossing Farms
Mussel done by Roberts
Turkey Creek
Bonne Agua Lake
ABANDONED
Creek
Adams Creek
pasture
bedrock area
dry drainage
large depositional bar
small gravel bar
no flow trib
deposition area
consistent stream vegetated banks
no bank erosion
forested pasture
rock outcrop
small riffle
banks pins 2
bank cut
sand pasture
sand/gravel
photo taken
dry
gate
pasture
BM 877
Turkey

END
Crossing Farm
Beaches
B
Dead Farm 2
Tiff
Spring
BLACKWELL
ENGLEDOW
ROAD
Small Hole
Footpath towards
RIVER
73
74
pasture
Small drainage
Road crossing
pasture
75
77
RIVER
DICKMANN
rock outcrop
Coles Cem
20
Here delta photo
no structure or bank
150-17
80
Bear Creek
79
no flow at GPS photo
stagnant stinky water
seep
78
high earthen bank
pasture
76
Hollow
Ally Cem
Flicker
Strip Mines
Ridge
Creek
JEFFERSON
ST FRANCOIS CO
16
21
19



TITLE:	FIGU BLACKWELL HIGHWAY BRIDG
LOCATION:	BIG RIVER MISSOURI
DATE:	03/08/2012
FILENAME:	211073_DAY7.mxd


Wbkf = 345 ft
Dbkf = 5.11 ft
Mineral Fork Creek
bedrock
boat launch
64
65
66
67
68
Campground
Picnic Area
Sewage Disposal Ponds
Tailings Pond
STRIP MINE
Large Eroding Bank
Form
Fertile
Spring
Stone Spring
Barytles
Masonic Cem
Washington Lookout Tower
Bellefontaine
Pasture
For
Perkins
RIVER
Flowing
Form 1
Form 2 - ↑ of 70, Stable + Instable
Form 3 - RR Xing, Hwy 21
Form 4 - at large eroding bank
Form 5 -

Day 1 A

BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

River: Big River
Date: 3-12-12
Investigators: RD, BS, IS, DK

GPS Point(s): _____ Photo No.: 367 - 372
Beginning / End Point: Start Day 1
Location/Description: Mounts Quarry

Type of Crossing
- [x] Ford
- [x] Culvert
- [ ] Bridge
- # Openings: 1
- [ ] Span
- [ ] Other
- [ ] Arch

Material
- [ ] Stone / Rock
- [x] Concrete w/ box culvert 10-12'
- [ ] Steel
- [ ] Other

Dimensions
Channel Width: 60 - 80 Height (Water Surface to Base): 3' @ culvert
Other (e.g. Width of Culvert Openings): 10 - 12'

Use
- [x] Road
- [ ] Rail
- # Lanes 1
- [ ] Other:

Condition
- [ ] Poor
- [ ] Good
- [x] Moderate
- [ ] New

Crossing Span:
- [ ] Adequate (spans channel and floodplain)
- [ ] Spans Both Banks
- [ ] Bank to Bank
- [ ] Constricts Channel
- [x] Severely Constricts Channel

Flow
Water depth consistent with US / DS Depth: Y / (N) (Deeper) / Shallower
Velocity consistent with US / DS: Y / (N) (Faster) / Slower
Slope consistent with US / DS: (Y) / N Steeper / Shallower
Inlet Drop: Y / (N) — " Outlet Drop: (Y) / N 6-8 "
Backwater: (Y) / N _____ '

Crossing Substrate
- [x] Concrete
- [ ] Bedrock
- [ ] Gravel / Cobble
- [ ] Sand
- [ ] Silt
- [ ] Other

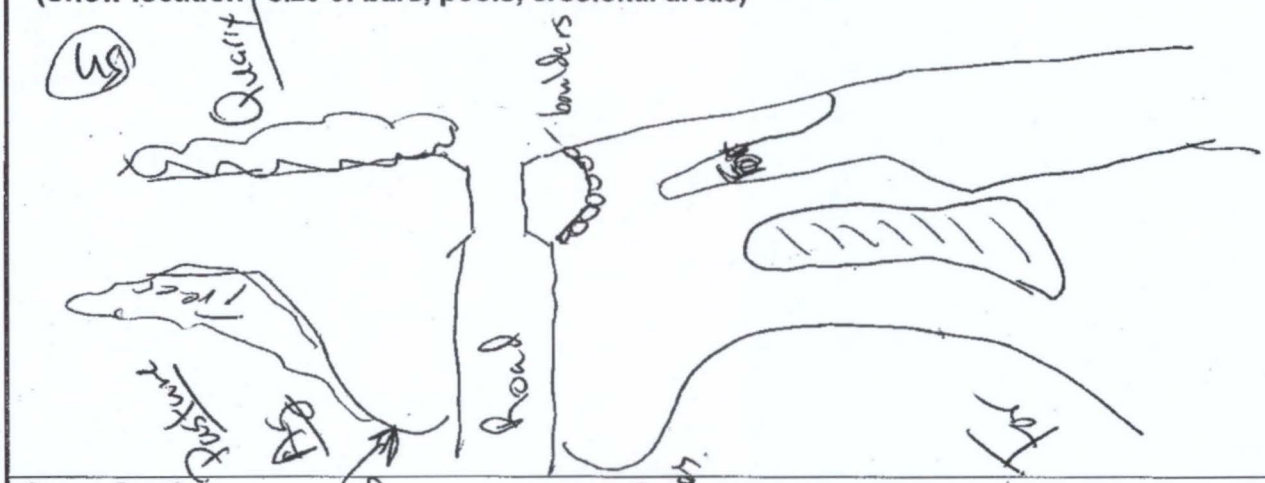
Wildlife
- [ ] Fish Observed: —
- [ ] Other Observations: —
- [ ] Potential Barrier to Wildlife: No

BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

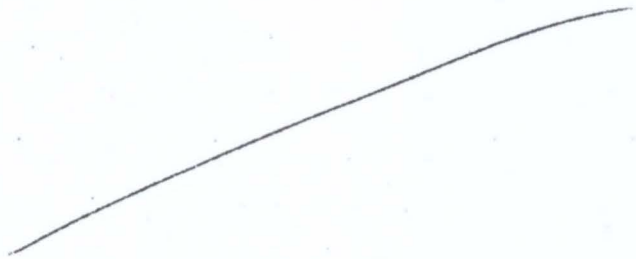
Day 1
A

Sketch (as necessary)

Plan view
(Show location / size of bars, pools, erosional areas)



Cross Section



Notes:

Pumping water for quarry operation from culvert

Day 1
B

BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

River: Big River
Date: 3-12-12
Investigators: RD, IS, BS, DK

GPS Point(s): _____ Photo No.: _____
Beginning / End Point: _____
Location/Description: Rte 8 overpass

Type of Crossing
- ☐ Ford
- ☒ Bridge
- ☒ Span
- ☐ Arch

☐ Culvert
Openings: _____
☐ Other
Rte 8

Material
- ☐ Stone / Rock
- ☒ Concrete
- ☐ Steel
- ☐ Other

Dimensions
Channel Width: 80-100'
Height (Water Surface to Base): > 25'
Other (e.g. Width of Culvert Openings): spans

Use
- ☐ Road ✓
- # Lanes _____
- ☐ Rail _____
- ☐ Other: _____

Condition
- ☐ Poor
- ☐ Moderate
- ☒ Good
- ☐ New

Crossing Span:
- ☒ Adequate (spans channel and floodplain)
- ☐ Spans Both Banks
- ☐ Bank to Bank
- ☐ Constricts Channel
- ☐ Severely Constricts Channel

Flow
Water depth consistent with US / DS Depth: (Y) / N Deeper / Shallower
Velocity consistent with US / DS: (Y) / N Faster / Slower
Slope consistent with US / DS: (Y) / N Steeper / Shallower
Inlet Drop: Y / (N) _____" Outlet Drop: Y / (N) _____"
Backwater: Y/(N) _____'

Crossing Substrate
- [ ] Concrete
- [ ] Bedrock
- [X] Gravel / Cobble
- [ ] Sand
- [X] Silt
- [ ] Other

Wildlife
[ ] Fish Observed: carp
[ ] Other Observations: beaver
[ ] Potential Barrier to Wildlife: no

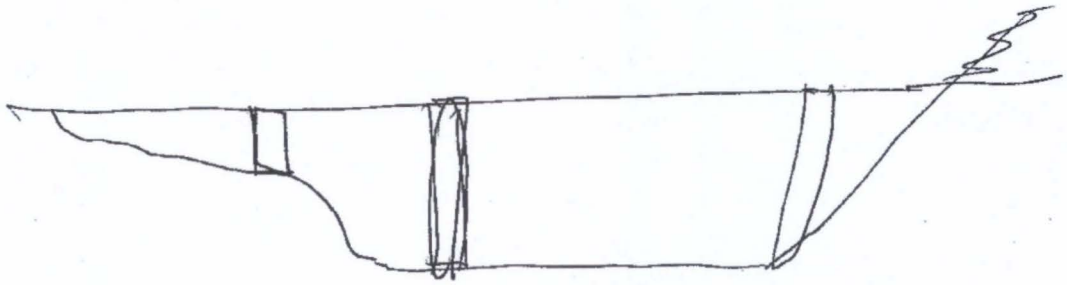
BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

Day 1
B

Sketch (as necessary)

Plan view
(Show location / size of bars, pools, erosional areas)

Cross Section



Notes:

Day 1
C

BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

River: Big River
GPS Point(s): _____ Photo No.: _____
Date: 3-12-12
Beginning / End Point: _____
Investigators: RD, BS, IS, DK
Location/Description: RR Crossing
37° 53.362590 N 90° 35.388774 W

Type of Crossing
- ☐ Ford
- ☐ Culvert
- ☐ Bridge
- # Openings: _____
- ☒ Span
- ☐ Other
- ☐ Arch

Material
- ☐ Stone / Rock
- ☒ Concrete pillars in channel
- ☐ Steel
- ☐ Other

Dimensions
Channel Width: 20'
Height (Water Surface to Base): >20' rails removed
Other (e.g. Width of Culvert Openings):

Use
- ☐ Road _____
- # Lanes _____
- ☒ Rail Abandoned
- ☐ Other: _____

Condition
- ☒ Poor
- ☐ Good
- ☐ Moderate
- ☐ New

Crossing Span:
- ☐ Adequate (spans channel and floodplain)
- ☐ Constricts Channel
- ☒ Spans Both Banks
- ☐ Severely Constricts Channel
- ☐ Bank to Bank

debris has accumulated over time & bars have formed

Flow
Water depth consistent with US / DS Depth: Y / (N) (Deeper) / Shallower
Velocity consistent with US / DS: Y / (N) (Faster) / Slower
Slope consistent with US / DS: Y / (N) (Steeper) / Shallower 4' drop
Inlet Drop: Y / (N) _____" Outlet Drop: (Y) / N _____"
Backwater: (Y) / N _____' Y pool 50' across >10' deep

trib enters just upstream of crossing

Crossing Substrate
- [ ] Concrete
- [ ] Sand
- [ ] Bedrock
- [ ] Silt
- [X] Gravel / Cobble riffle
- [ ] Other

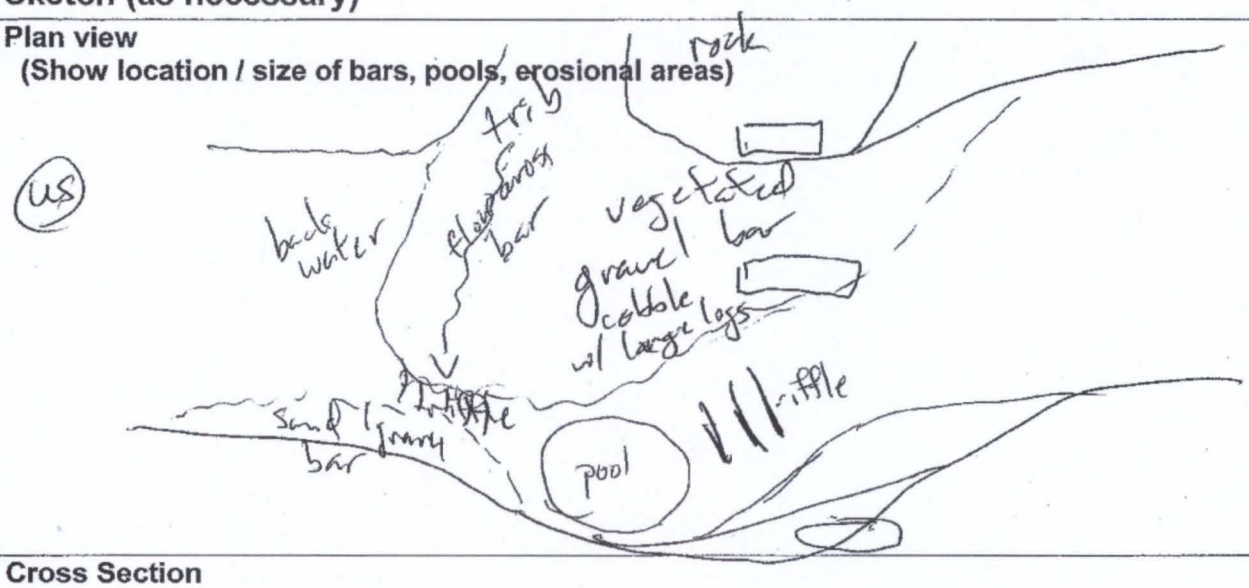
Wildlife
- [ ] Fish Observed: _____
- [ ] Other Observations: _____
- [ ] Potential Barrier to Wildlife: _____

Day 1
C

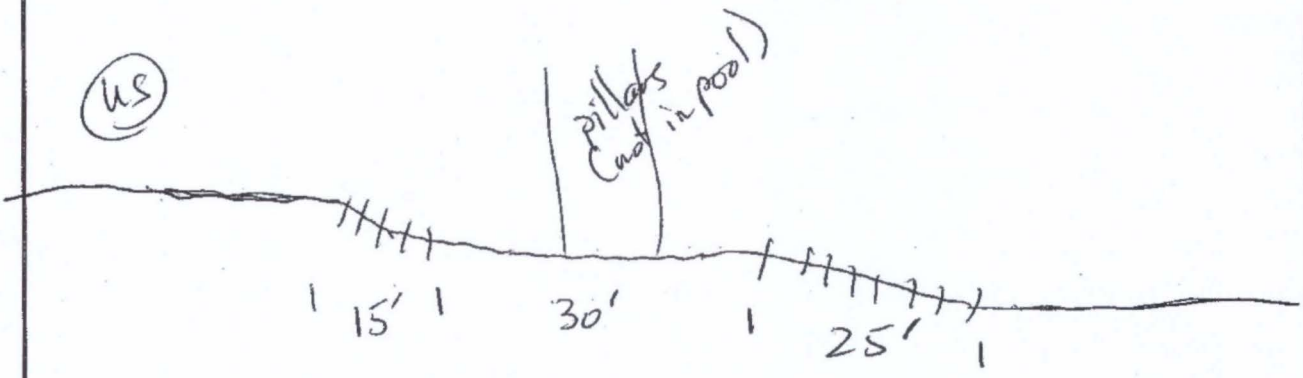
BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

Sketch (as necessary)

Plan view
(Show location / size of bars, pools, erosional areas)



Cross Section



Notes:

- very well established bars & channel

Pebble Count incomplete due to depth/time

Day 1

BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL BANK FORM

River: Big River	GPS Point(s): 90° 35.926669 W 37° 52.445506 N
Date: 3-12-12	Beginning / End Point:
Investigators: PD, BS, DK, IS	Location/Description: (lunch break location) road/ag crossing on side bar

GPS Point: 200 Ft. US to 200 Ft. DS

Left Bank*	Right Bank*
[X] Stable [ ] Instable	[ ] Stable [X] Instable
Height: 8'	Height: 10'
Erosion: (L) M H	Erosion: L (M) H
Collapsing/Slumping: Y (N)	Collapsing/Slumping: (Y) / N
Vegetated: L (M) H	Vegetated: L (M) H
Root Density: (L) M H	Root Density: L (M) H
Root Depth: L (M) H	Root Depth: L (M) H
Armoring: (L) M H	Armoring: (L) M H
Material (circle): loam	Material (circle): loam
Bedrock Boulder Chat	Bedrock Boulder Chat
Mixed Loose Stratified	(Mixed) Loose Stratified
Bank Angle Sketch	Bank Angle Sketch
Erosive Forces:	Erosive Forces:
[ ] Transverse Bars [ ] Mid-Channel Bars	[ ] Transverse Bars [X] Mid-Channel Bars
[ ] Flow Directed Towards Bank	[ ] Flow Directed Towards Bank
[ ] Steep Slope [X] Other side bar	[X] Steep Slope [X] Other side bar
Potential Bank Pin Location: Y (N)	Potential Bank Pin Location: Y / (N)
Description of Vegetation: (L) forested (R) Tree line w/ pasture behind →	Description of Vegetation:
Notes or Sketch: deer stand / blind in tree	Notes or Sketch: width bkfl = 124.8' depth to water / bkfl = 3' water depth = 6" to 3' thalweg 3'

* Facing downstream

Day 2 A

BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

River: Big River
Date: 3-13-12
Investigators: RD, IS, BS, DK
start of Day 2 37°52.130425N / 90°35.016646 8W

GPS Point(s): _____ Photo No.: _____
Beginning / End Point: _____
Location/Description: Leadwood Access

Type of Crossing
- ☐ Ford
- ☒ Culvert
- ☐ Bridge
- # Openings: 5
- ☐ Span
- ☐ Other
- ☐ Arch

Material
- ☒ Stone / Rock
- ☒ Concrete
- ☐ Steel
- ☐ Other

Dimensions
Channel Width: 125'
Height (Water Surface to Base): even
Other (e.g. Width of Culvert Openings): 5, 3' culverts; some severly clogged

Use
- ☒ Road
- ☐ Rail
- # Lanes 1
- ☐ Other:

Condition
- ☐ Poor
- ☐ Good
- ☒ Moderate repaired
- ☐ New

Crossing Span:
- ☐ Adequate (spans channel and floodplain)
- ☐ Spans Both Banks
- ☐ Bank to Bank
- ☐ Constricts Channel
- ☒ Severely Constricts Channel

undersized, inadequate culverts

Flow
Water depth consistent with US / DS Depth: Y / N Deeper / Shallower downstream
Velocity consistent with US / DS: Y / N Faster / Slower
Slope consistent with US / DS: Y / N Steeper / Shallower
Inlet Drop: Y / N ____" Outlet Drop: Y / N 4'
Backwater: Y / N ____' Pool 3' deep,

Crossing Substrate
- [ ] Concrete
- [ ] Bedrock
- [X] Gravel / Cobble DS
- [X] Sand
- [X] Silt
- [ ] Other

US

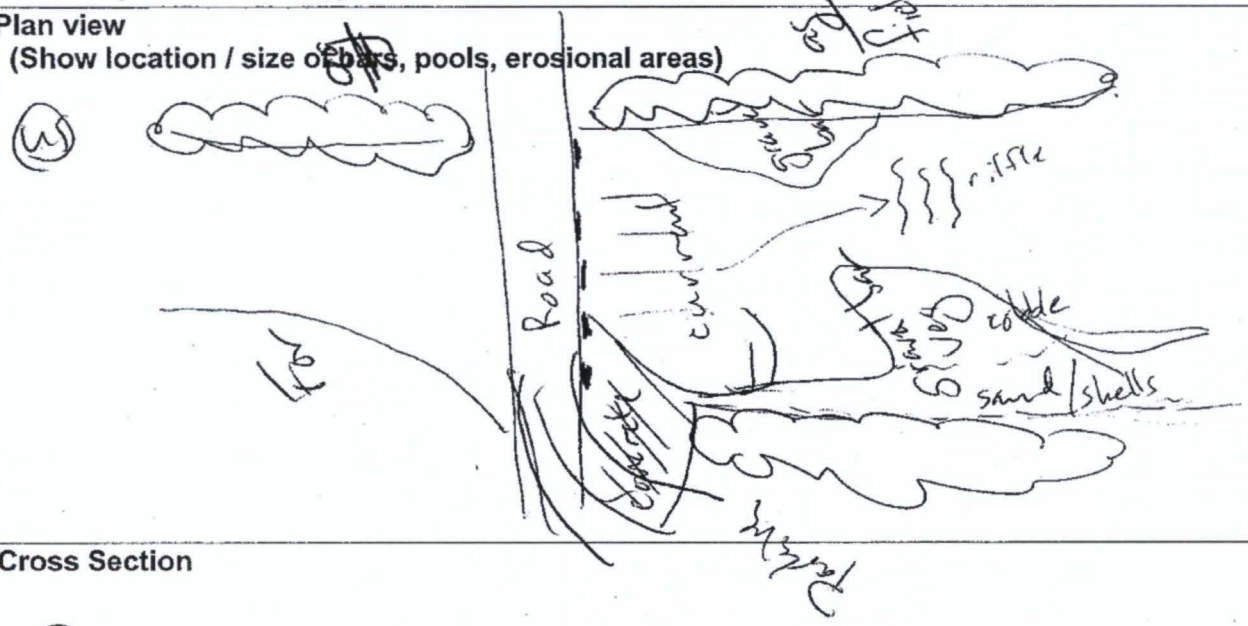
Wildlife
- [ ] Fish Observed: minnows
- [ ] Other Observations: _____
- [X] Potential Barrier to Wildlife: Yes

Day 2
A

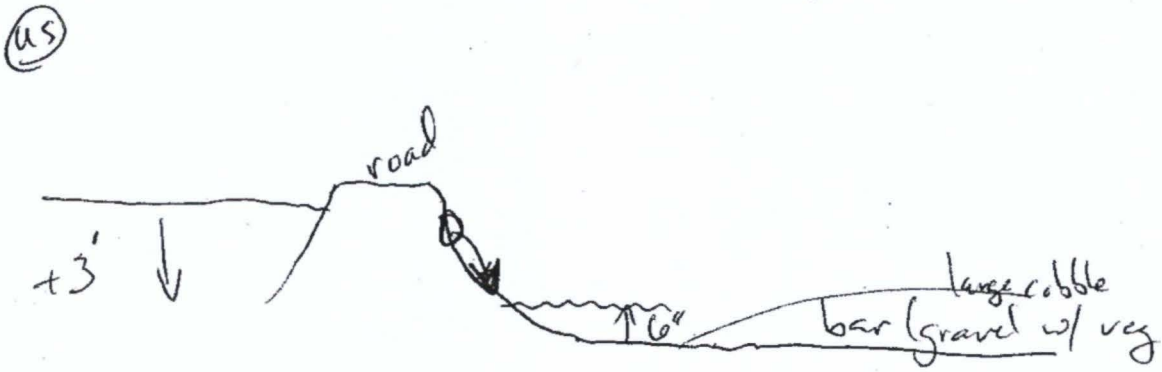
BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

Sketch (as necessary)

Plan view
(Show location / size of bars, pools, erosional areas)



Cross Section



Notes:

- recent repairs = poured concrete
- observed by fisherman 3/12 (pm) & 3/13 (am)
- shells observed on banks

Day 2

B

BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

River: Big River
Date: 3-13-12
Investigators: RD, IS, BS, DK

GPS Point(s): _____ Photo No.: _____
Beginning / End Point: _____
Location/Description: Bone Hole

Type of Crossing
- [x] Ford
- [ ] Bridge
- [ ] Span
- [ ] Arch
- [ ] Culvert
- # Openings: ____
- [ ] Other

flows over/around

Material
- [x] Stone / Rock
- [x] Concrete
- [ ] Steel
- [ ] Other

Dimensions
Channel Width: 150'
Height (Water Surface to Base): NA
Other (e.g. Width of Culvert Openings): water goes over

Use
- [x] Road
- # Lanes 1
- [ ] Rail
- [ ] Other:

Condition
- [ ] Poor
- [x] Moderate
- [ ] Good
- [ ] New

Crossing Span:
- [ ] Adequate (spans channel and floodplain)
- [ ] Spans Both Banks
- [ ] Bank to Bank
- [ ] Constricts Channel
- [x] Severely Constricts Channel

NA no outlets; overflow design

Flow
Water depth consistent with US / DS Depth: Y / (N) (Deeper) / Shallower US
Velocity consistent with US / DS: Y / (N). (Faster) / Slower DS
Slope consistent with US / DS: (Y) / N Steeper / Shallower
Inlet Drop: Y / (N) ____" Outlet Drop: (Y) / N 5'
Backwater: (Y) / N ____' pool 150' across & ~5-10' deep

Crossing Substrate
- [ ] Concrete
- [ ] Bedrock
- [x] Gravel / Cobble
- [x] Sand
- [x] Silt
- [ ] Other

Wildlife
- [x] Fish Observed: minnows
- [x] Other Observations: human use - fishing, wading
- [x] Potential Barrier to Wildlife: Yes

Day 2
B

BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

Sketch (as necessary)

Plan view
(Show location / size of bars, pools, erosional areas)

Cross Section

Notes:
people fishing (1:30 pm)

Day 3
A

BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

River: Big River
Date: 3-14-12
Investigators: RD, IS, BS, DK

GPS Point(s): _____ Photo No.: _____
Beginning / End Point: _____
Location/Description: Old RR bridge crossing (between 101 & 100)

Type of Crossing
- ☐ Ford
- ☒ Bridge
- ☐ Span
- ☐ Arch
- ☐ Culvert
- # Openings: _____
- ☐ Other

Material
- ☐ Stone / Rock
- ☒ Concrete
- ☒ Steel
- ☐ Other

some timber supports

Dimensions
Channel Width: 100'
Height (Water Surface to Base): ~100'
Other (e.g. Width of Culvert Openings): NA

Use
- ☐ Road _____
- # Lanes _____
- ☒ Rail abandoned
- ☐ Other: _____

Condition
- ☒ Poor
- ☒ Moderate
- ☐ Good
- ☐ New

Crossing Span:
- ☒ Adequate (spans channel and floodplain)
- ☐ Spans Both Banks
- ☐ Bank to Bank
- ☐ Constricts Channel
- ☐ Severely Constricts Channel

Some fill in floodplain

Flow
Water depth consistent with US / DS Depth: (Y) / N Deeper / Shallower
Velocity consistent with US / DS: (Y) N Faster / Slower
Slope consistent with US / DS: (Y) N Steeper / Shallower
Inlet Drop: Y / (N) _____" Outlet Drop: Y / (N) _____"
Backwater: Y (N) _____'

Crossing Substrate
- [ ] Concrete
- [ ] Bedrock
- [X] (Gravel) / Cobble little
- [X] Sand
- [ ] Silt
- [ ] Other

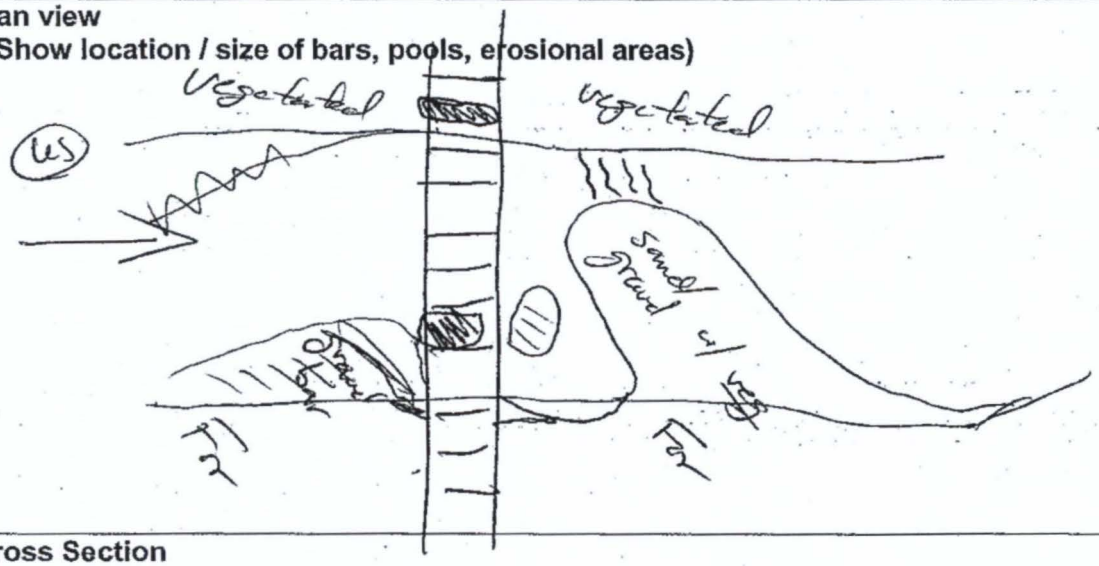
Wildlife
- [X] Fish Observed: minnows, darters
- [ ] Other Observations: _____
- [ ] Potential Barrier to Wildlife: No

Day 3
A

BIG RIVER: VISUAL RIVER SURVEY
SEDIMENT DYNAMICS ASSESSMENT
SUPPLEMENTAL STREAM CROSSING INFORMATION FORM

Sketch (as necessary)

Plan view
(Show location / size of bars, pools, erosional areas)



Cross Section

Notes: