




Stream Restoration in West Tennessee

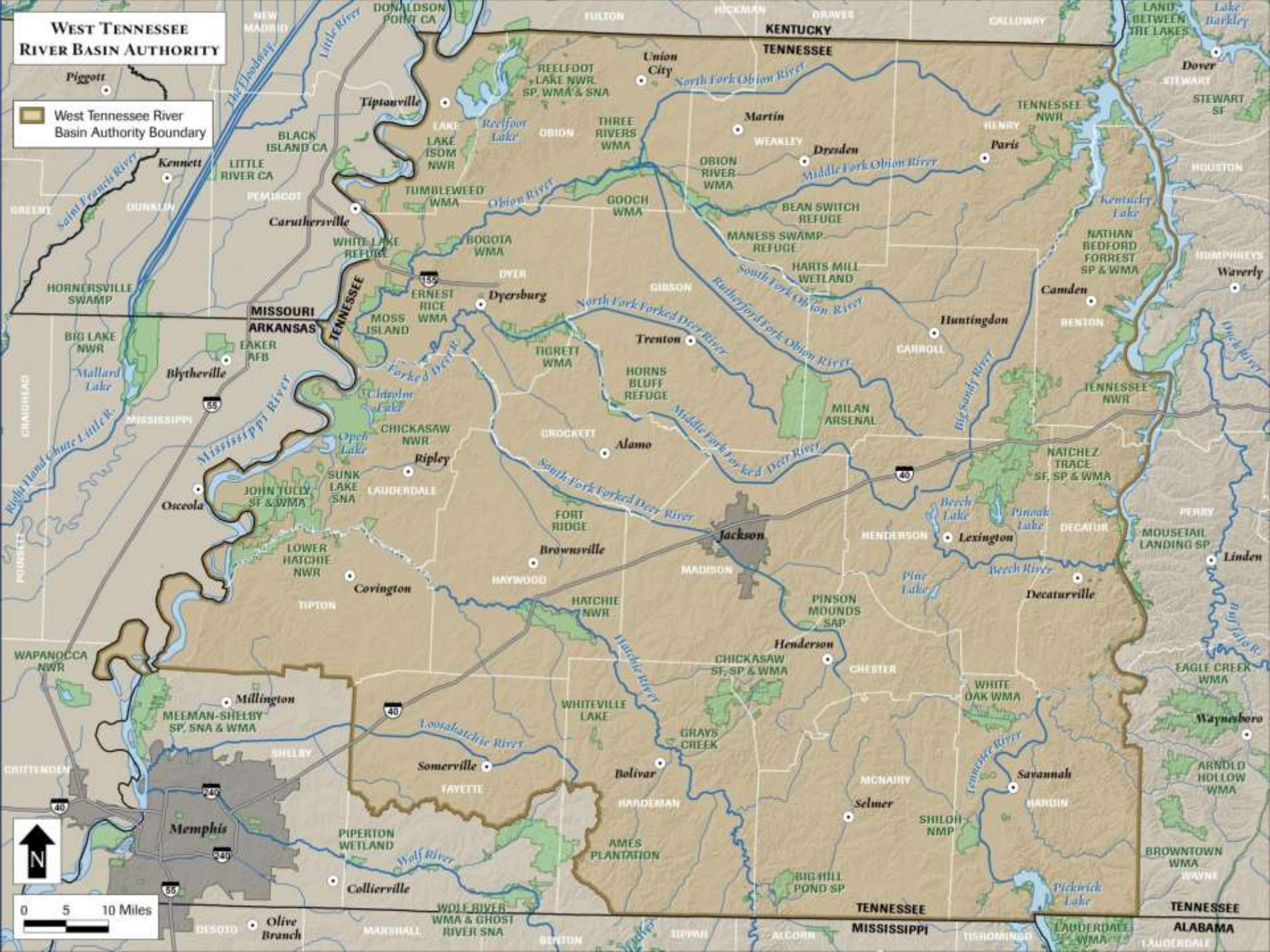
West TN River Basin Authority— 2022

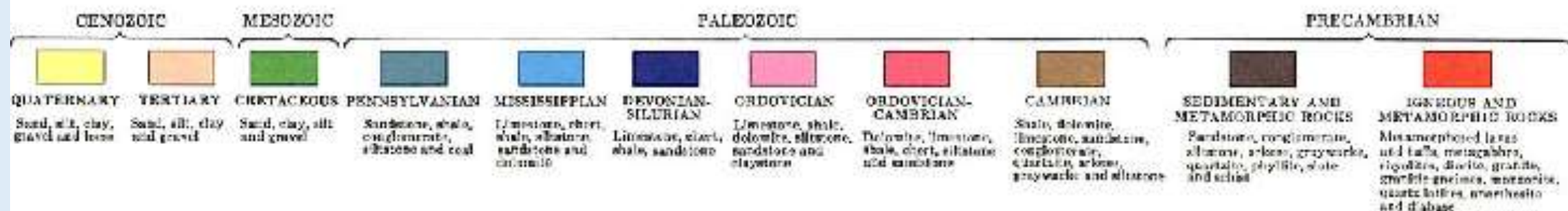
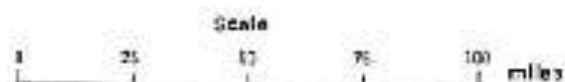
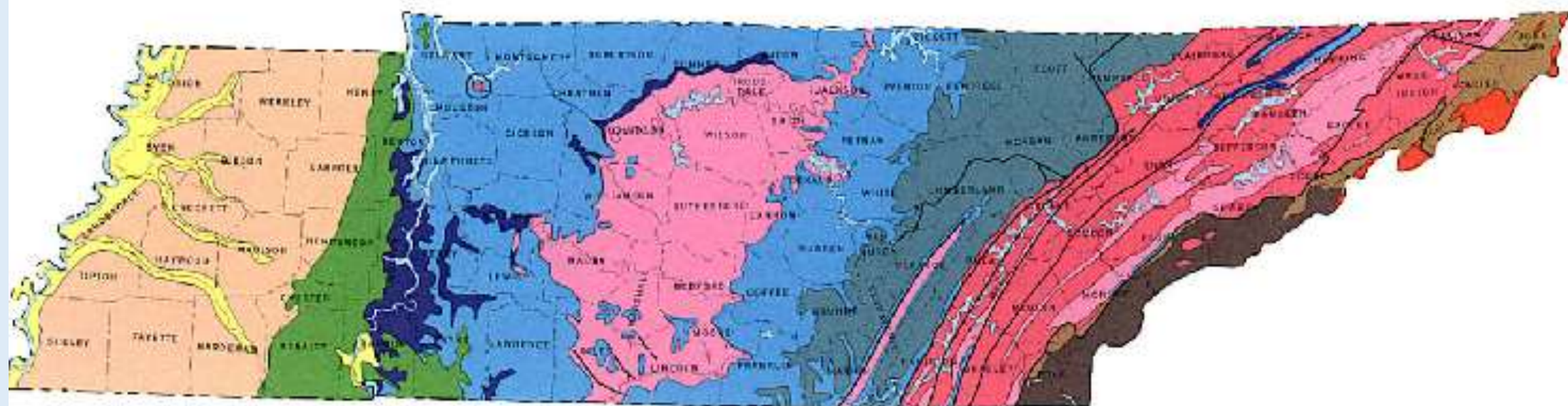
A topographic map of West Tennessee showing stream restoration areas. The map uses a color gradient from green (low elevation) to red and brown (high elevation) to represent terrain. A network of streams is visible, with several larger streams highlighted in a light green/yellow color, indicating restoration areas. The map is overlaid with a grid.



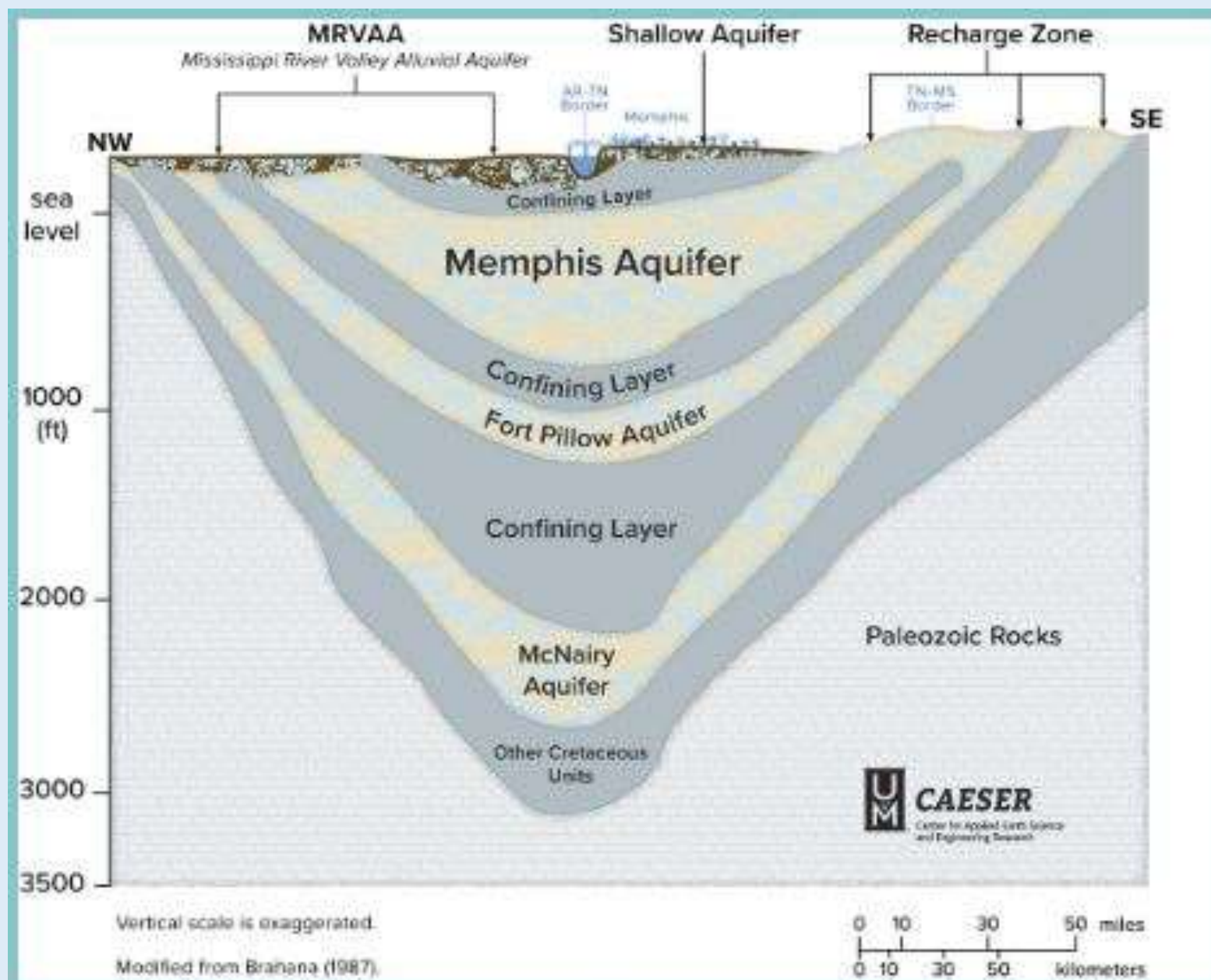
WEST TENNESSEE RIVER BASIN AUTHORITY

 West Tennessee River Basin Authority Boundary





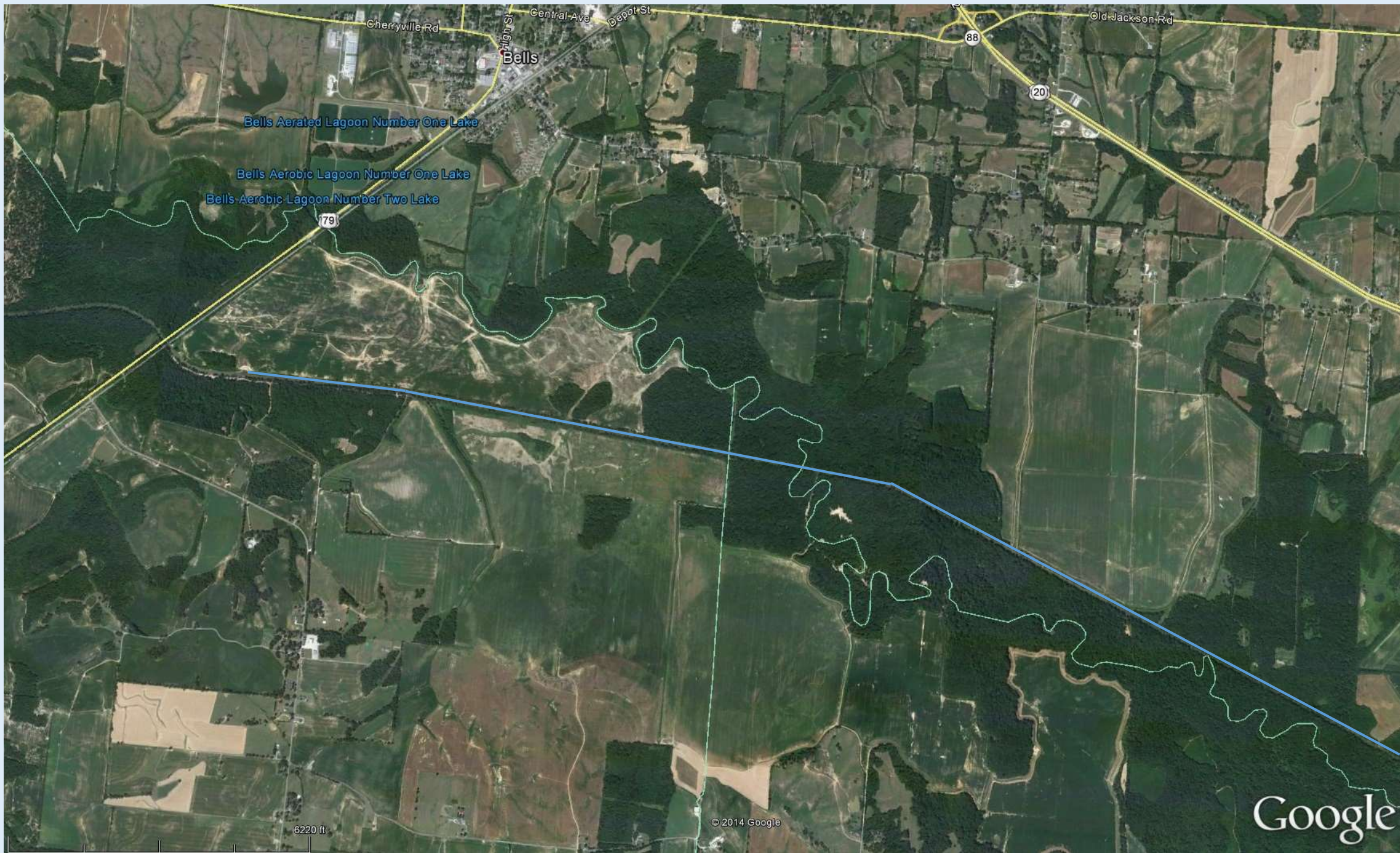
GENERALIZED GEOLOGIC MAP OF TENNESSEE



Cross Section of the Mississippi Embayment







Bells Aerated Lagoon Number One Lake

Bells Aerobic Lagoon Number One Lake

Bells Aerobic Lagoon Number Two Lake

179

88

20

6220 ft

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Google



























RESTORATION

- How Far Do We Go? Pre-Columbian, Regional Reference, Functional Parameter Improvement





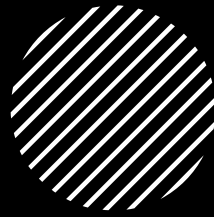









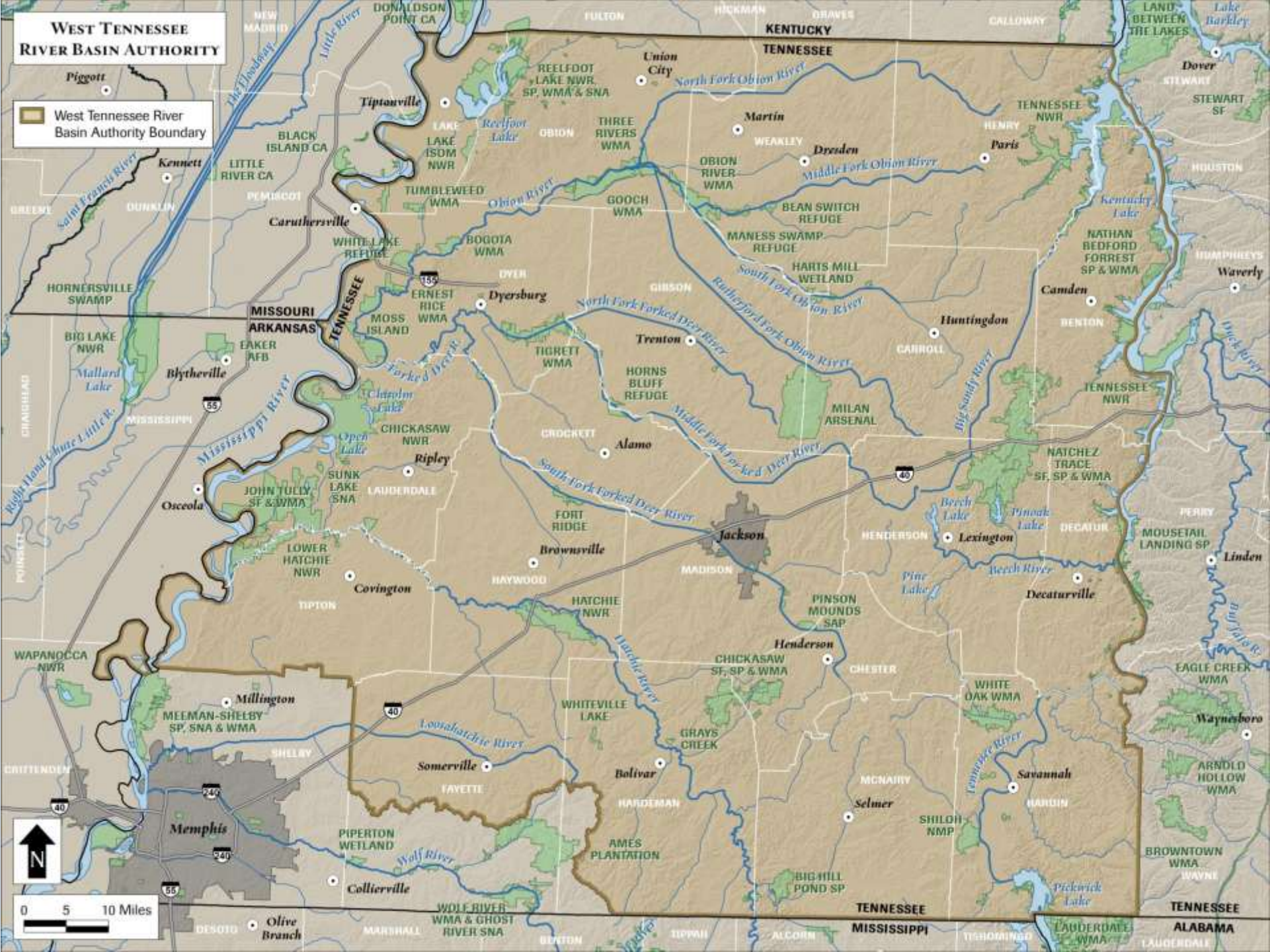
WTRBA GOAL:
Under the
existing
watershed
conditions and
existing
constraints
seek to...



- MINIMIZE – INSTABILITY, INVASIVES, UPSTREAM/DOWNSTREAM IMPACTS, AND MAINTENANCE
- OPTIMIZE – SEDIMENT TRANSPORT, PHYSICAL DIMENSIONS, FLOODPLAIN USE AND CONNECTION
- MAXIMIZE – FLOOD STORAGE, STREAM HABITAT, BENEFICIAL LAND USE

WEST TENNESSEE RIVER BASIN AUTHORITY

 West Tennessee River Basin Authority Boundary



PROJECT SELECTION

Altered Hydrology
(Urban or
Channelized)

Lack of Critical
Habitats

Dysfunction of
Sediment, Debris,
and/or Flood
patterns.

Vertical
Stabilization

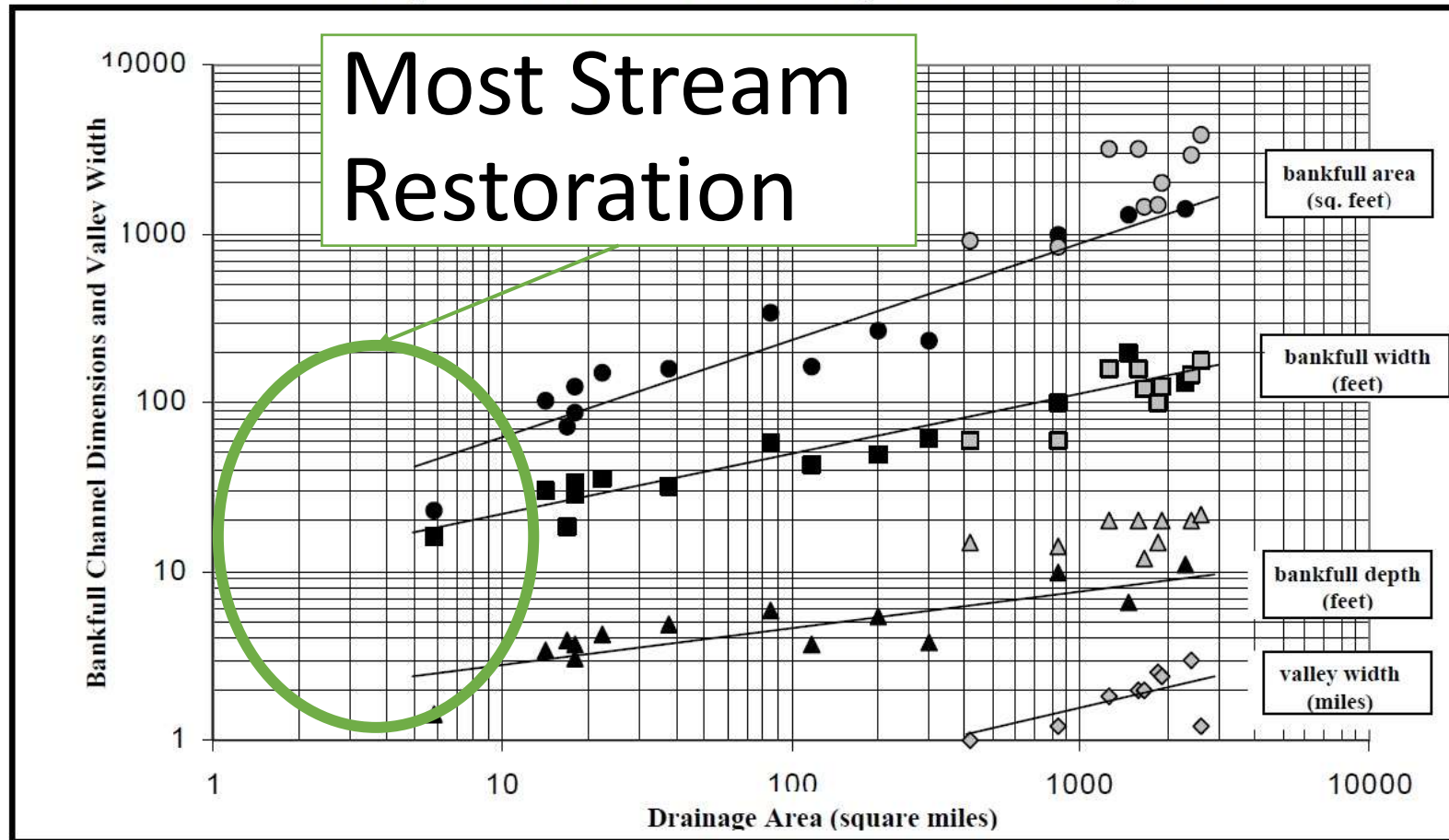
Flood Risk
Reduction



Restoration Design

FIGURE 2

Fluvial Geomorphic Regional Curves for Western Tennessee
Showing Bankfull Dimensions and Valley Width vs Drainage Area



Black symbols are 1997 - 1998 data (this study). Gray symbols are 1911 - 1912 data (Hidinger and Morgan, 1912).
Bankfull channel dimension regression formulae and regression lines are calculated using only 1997 - 1998 data.

$$\begin{aligned} \text{Bankfull area} &= 16.4 \times \text{DA}^{0.57} \quad R^2 = 0.89 \\ \text{Bankfull depth} &= 1.7 \times \text{DA}^{0.22} \quad R^2 = 0.68 \end{aligned}$$

$$\begin{aligned} \text{Bankfull width} &= 9.6 \times \text{DA}^{0.36} \quad R^2 = 0.90 \\ \text{Valley width} &= 0.07 \times \text{DA}^{0.44} \quad R^2 = 0.44 \end{aligned}$$

Engineering Based Design

Design Flow

Bottom Width

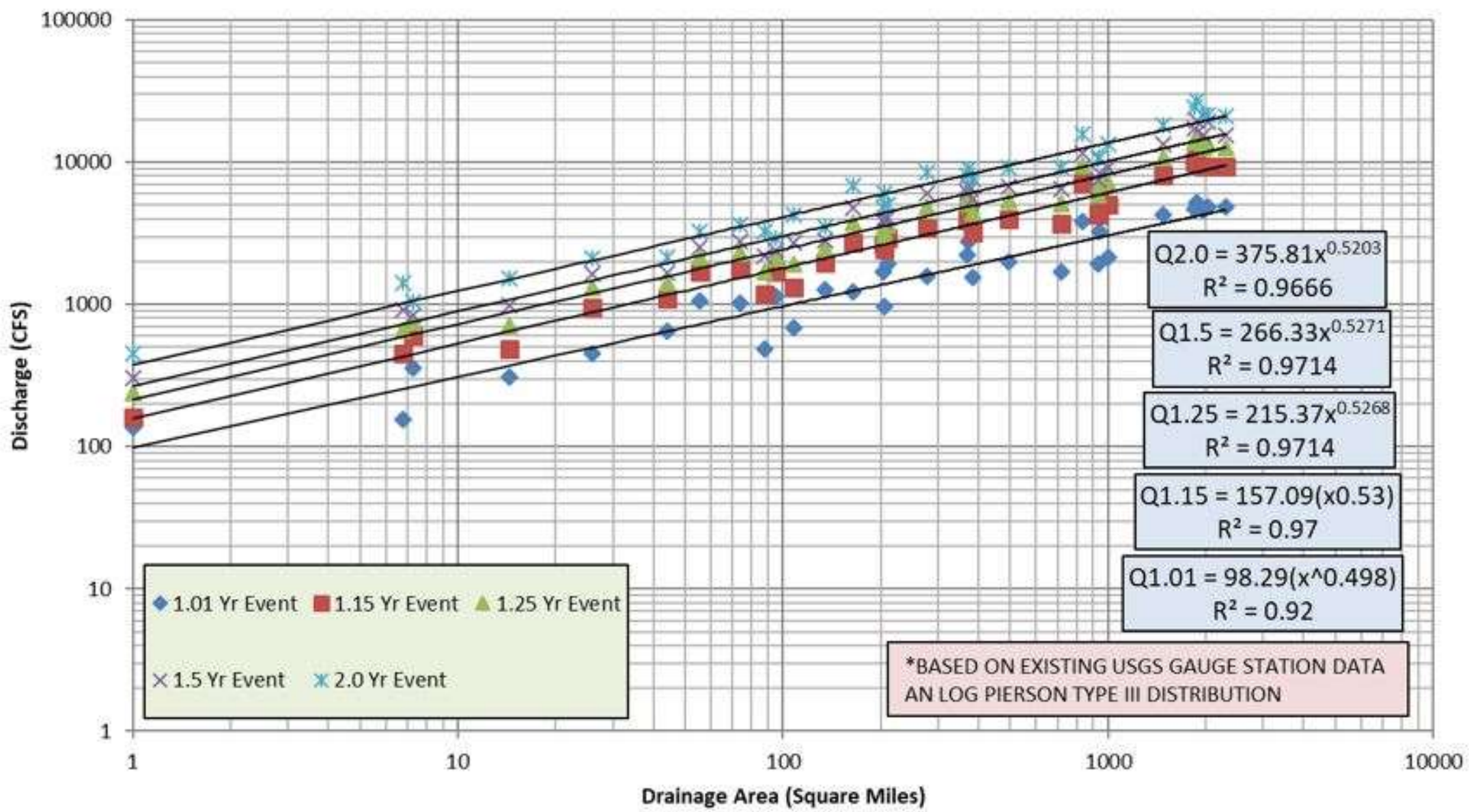
Side Slope

Bed Slope

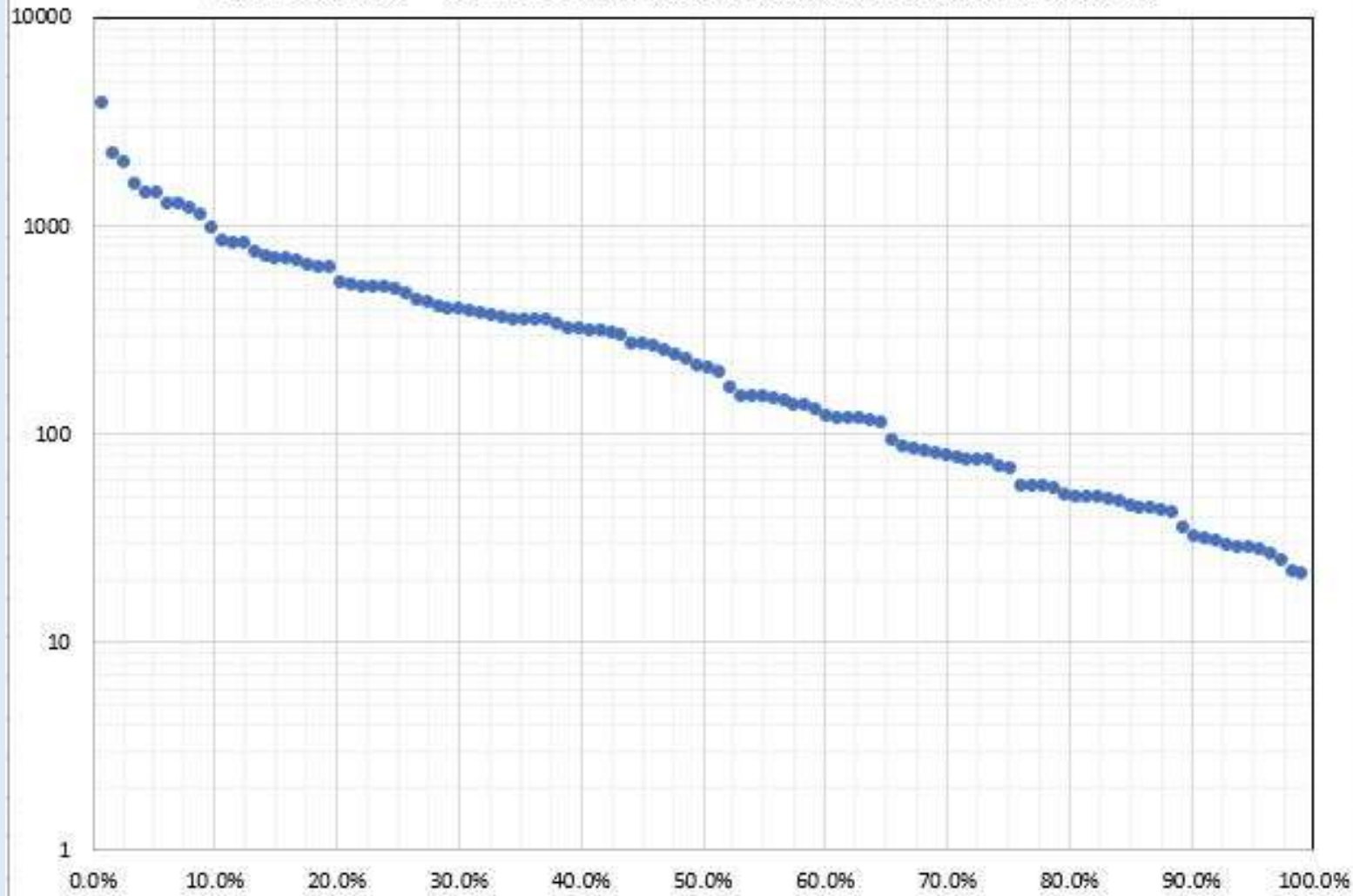
Target Valley
Width

Sinuosity
(Iterative, Slope
Floodplain/Slope
Channel)

West TN Historic Gage Data for High Freq. Events- 1.01-2Yr Discharge



Event Record - Ranked Flow Versus Percent Chance Exceedance



Calculating Likelihood of Event Exceedance Using On-Site Gauge Record & Cross Section Survey Data				
Total Records	112			
Partial Duration Record				
Event Rank High to Low	Depth Feet	Area Feet	Flow Q(CFS)	Percentage Exceedance
1	13.95	285	3868	0.0%
2	10.47	101	2229	1.8%
3	9.94	87	2012	2.7%
4	8.79	65	1591	3.5%
5	8.39	60	1456	4.4%
6	8.51	58	1429	5.3%
7	7.87	55	1289	6.2%
8	7.80	54	1267	7.1%
9	7.68	53	1231	8.0%
10	7.40	51	1147	8.8%
11	6.81	48	981	9.7%
12	6.34	47	858	10.6%
13	6.25	47	835	11.5%
14	6.24	47	833	12.4%
15	5.88	46	745	13.3%
16	5.79	46	724	14.2%
17	5.67	46	696	15.0%
18	5.66	46	694	15.9%
19	5.64	46	690	16.8%
20	5.47	46	651	17.7%
21	5.39	46	634	18.6%
22	5.37	46	630	19.5%
23	4.90	45	532	20.4%
24	4.85	45	522	21.2%
25	4.81	45	514	22.1%
26	4.81	45	514	23.0%
27	4.78	45	508	23.9%
28	4.74	45	500	24.8%
29	4.63	45	479	25.7%
30	4.42	44	440	26.5%
31	4.39	44	435	27.4%
32	4.26	44	412	28.3%
33	4.19	44	399	29.2%
34	4.18	44	398	30.1%
35	4.14	44	391	31.0%
36	4.10	44	384	31.9%
37	4.04	44	374	32.7%
38	3.99	44	366	33.6%
39	3.93	44	356	34.5%
40	3.95	44	358	35.4%
41	3.91	43	353	36.3%
42	3.90	43	351	37.2%
43	3.82	43	338	38.1%
44	3.74	43	325	38.9%
45	3.73	43	324	39.8%
46	3.66	43	313	40.7%
47	3.65	43	312	41.6%
48	3.60	43	304	42.5%
49	3.55	42	296	43.4%
50	3.58	42	272	44.2%

West_TN_Cumulative





Sinuosity 2.2



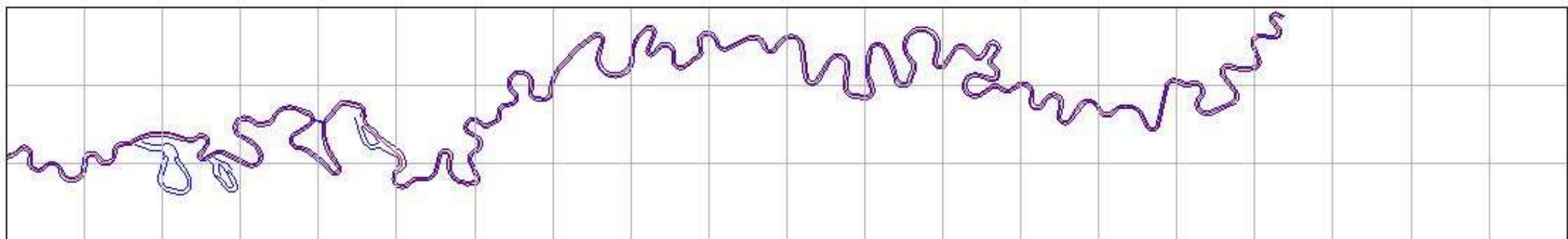
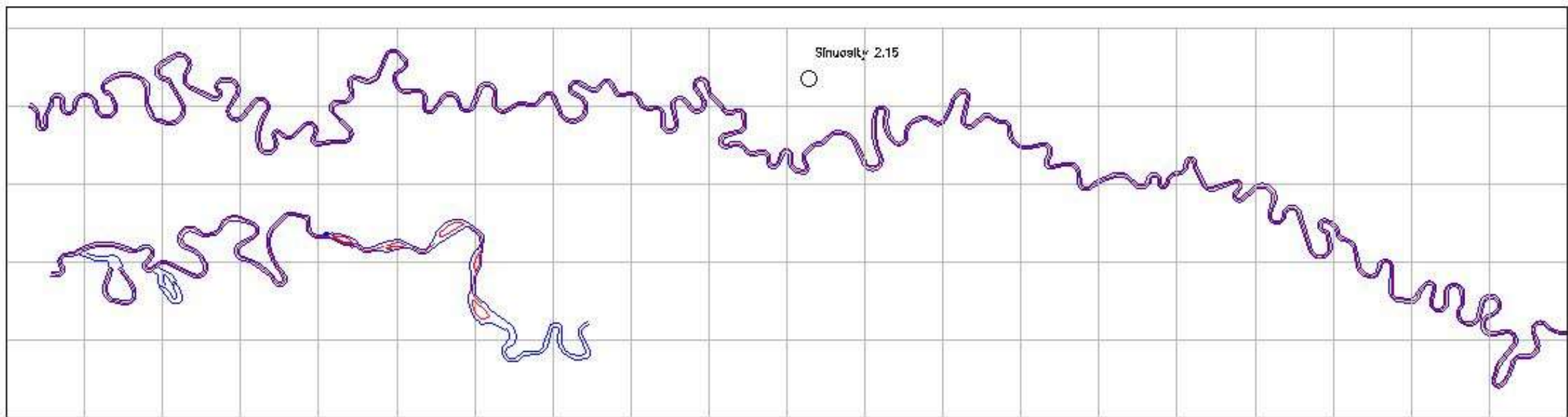
AVERAGE CENTERLINE
RADIUS



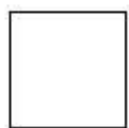


Lake Wood

AVERAGE CENTERLINE
RADIUS



DIMENSIONLESS MEANDER PATTERN COMPILATION



SQUARE = 100 UNITS X 100 UNITS
AVERAGE CENTERLINE RADIUS = 10 UNITS
WIDTH = 4.6 UNITS

The image features a central white circle with a thick light green border. Inside this circle, the word "CONSTRUCTION" is written in white, uppercase, sans-serif font. To the left of the circle, there are two white zigzag lines. To the right, there is a light orange circle with a white outline, a set of four parallel white diagonal lines, and a large solid light orange circle in the bottom right corner. A small light orange circle is also located at the bottom left of the main circle.

CONSTRUCTION









Google Earth

lat 35.379223° lon -88.322341° elev 0 ft eye alt 26037 ft



The image features a central white circle with a thick light green border. Inside this circle, the word "CHALLENGES" is written in white, uppercase, sans-serif font. Surrounding the central circle are various abstract elements: a white zigzag line on the left, a small orange circle at the bottom left, a larger orange circle at the top right, a set of four white diagonal lines on the right, and a large orange circle at the bottom right.

CHALLENGES









RESEARCH



STREAM FLOW



GROUNDWATER



FISH RESPONSE



AQUATIC PASSAGE



MUSSEL SURVEYS

Questions

