

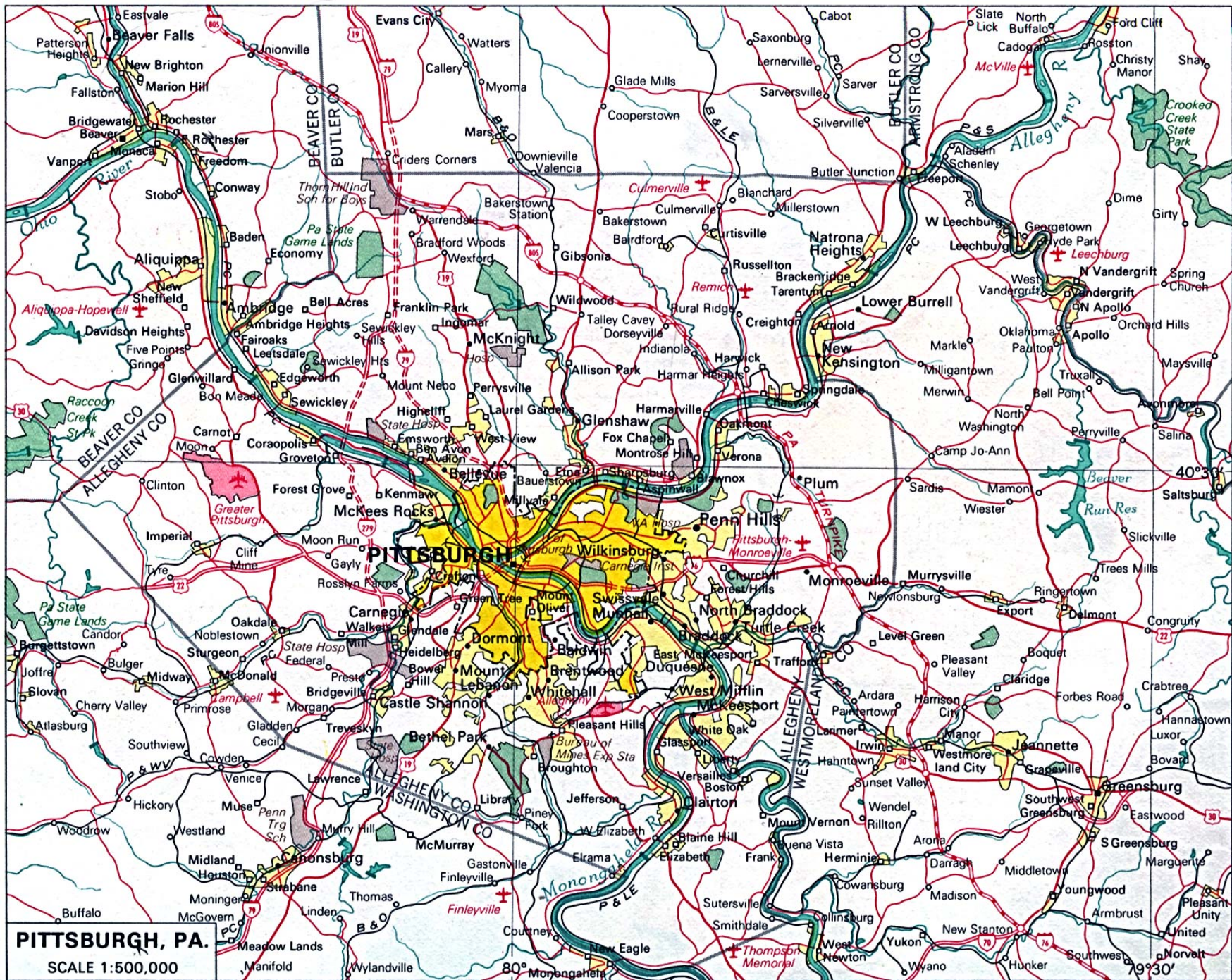
Integrated Sampling on the Monongahela and Allegheny Rivers



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION



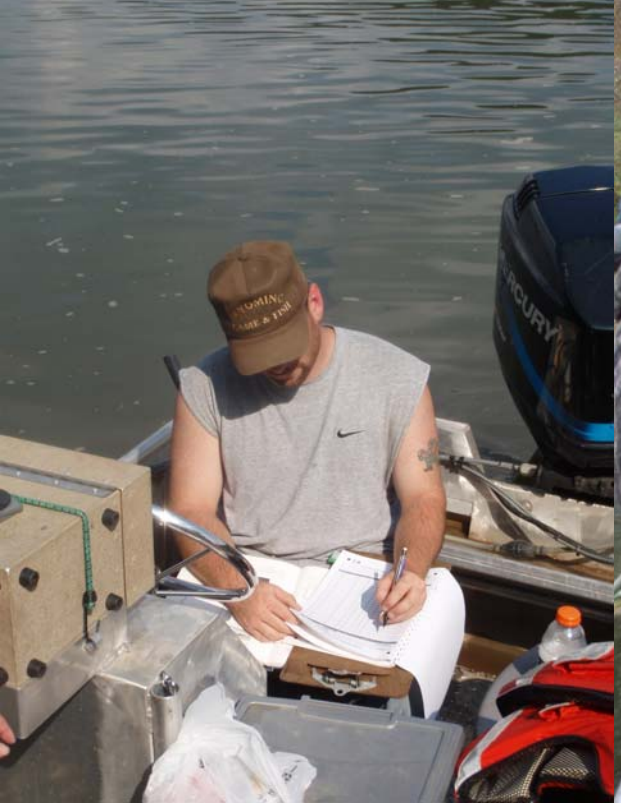
0 500 Miles
0 500 KM



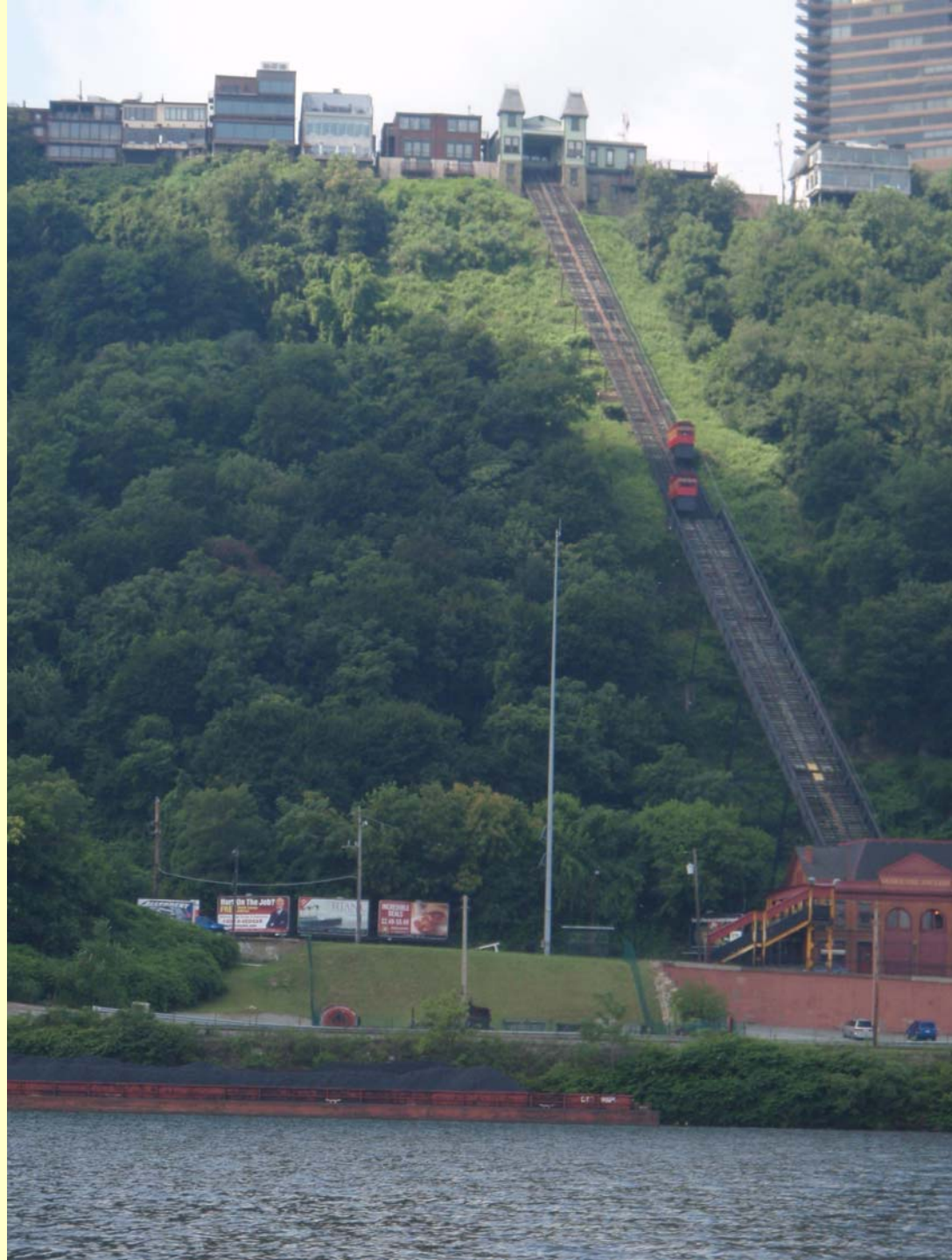
The Assessment will come from people...



...doing great things...



...to restore the
chemical,
physical, and
biological
integrity of
America's
rivers.





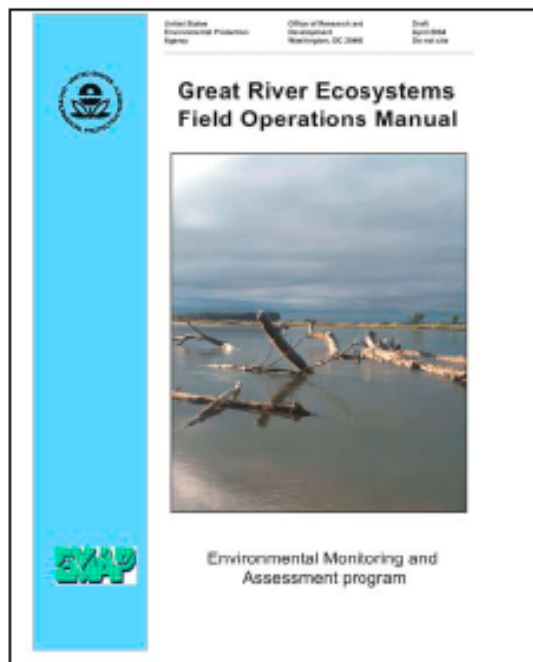
But don't we already know a lot about the rivers?

The Answer is no. The ad hoc, targeted and selected pool approaches have produced spatially, temporally, and methodologically scattered water quality monitoring data that are inadequate for assessing river systems.

EMAP-GRE Program Components

Field Operations

Crew Training

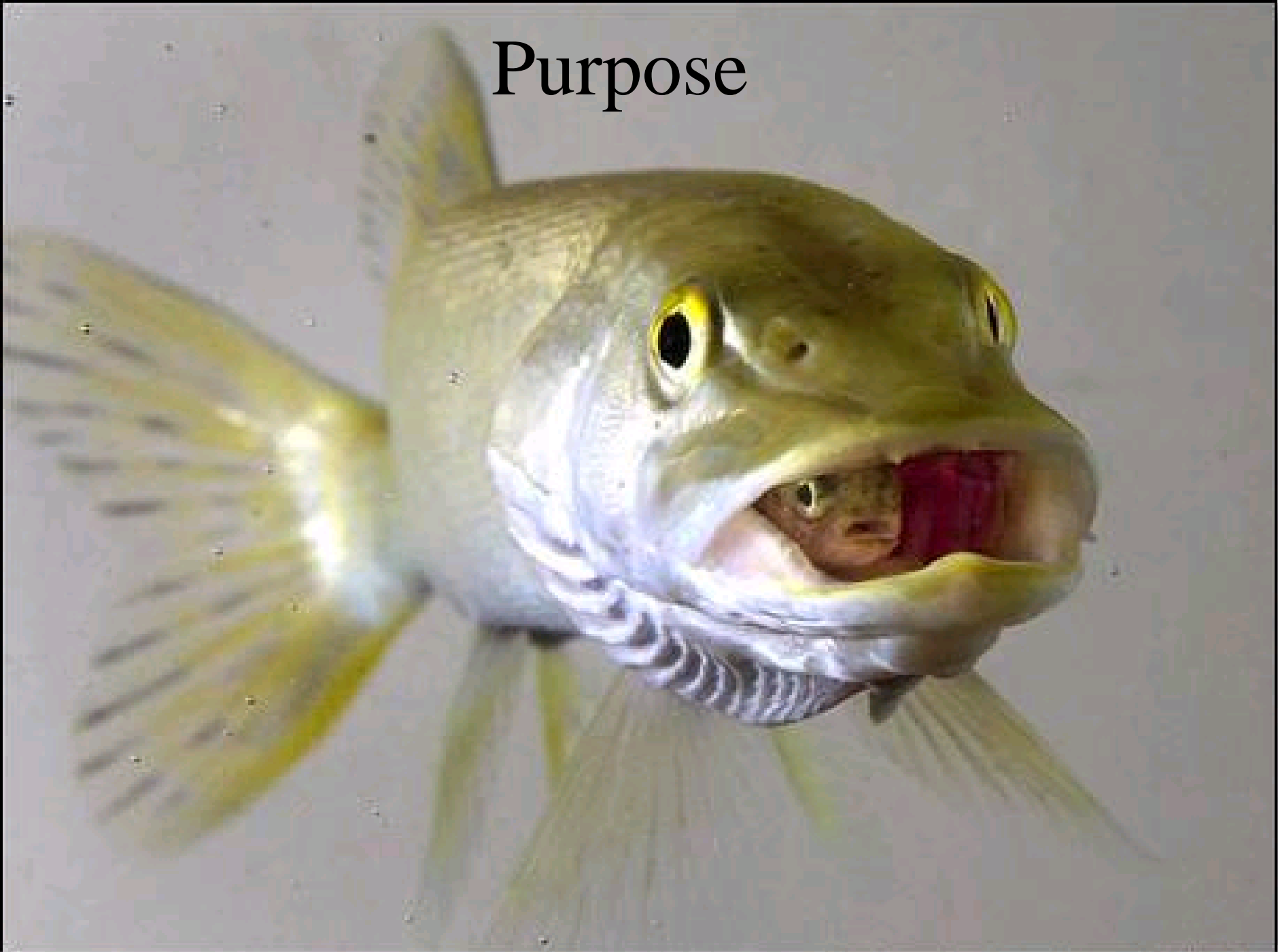


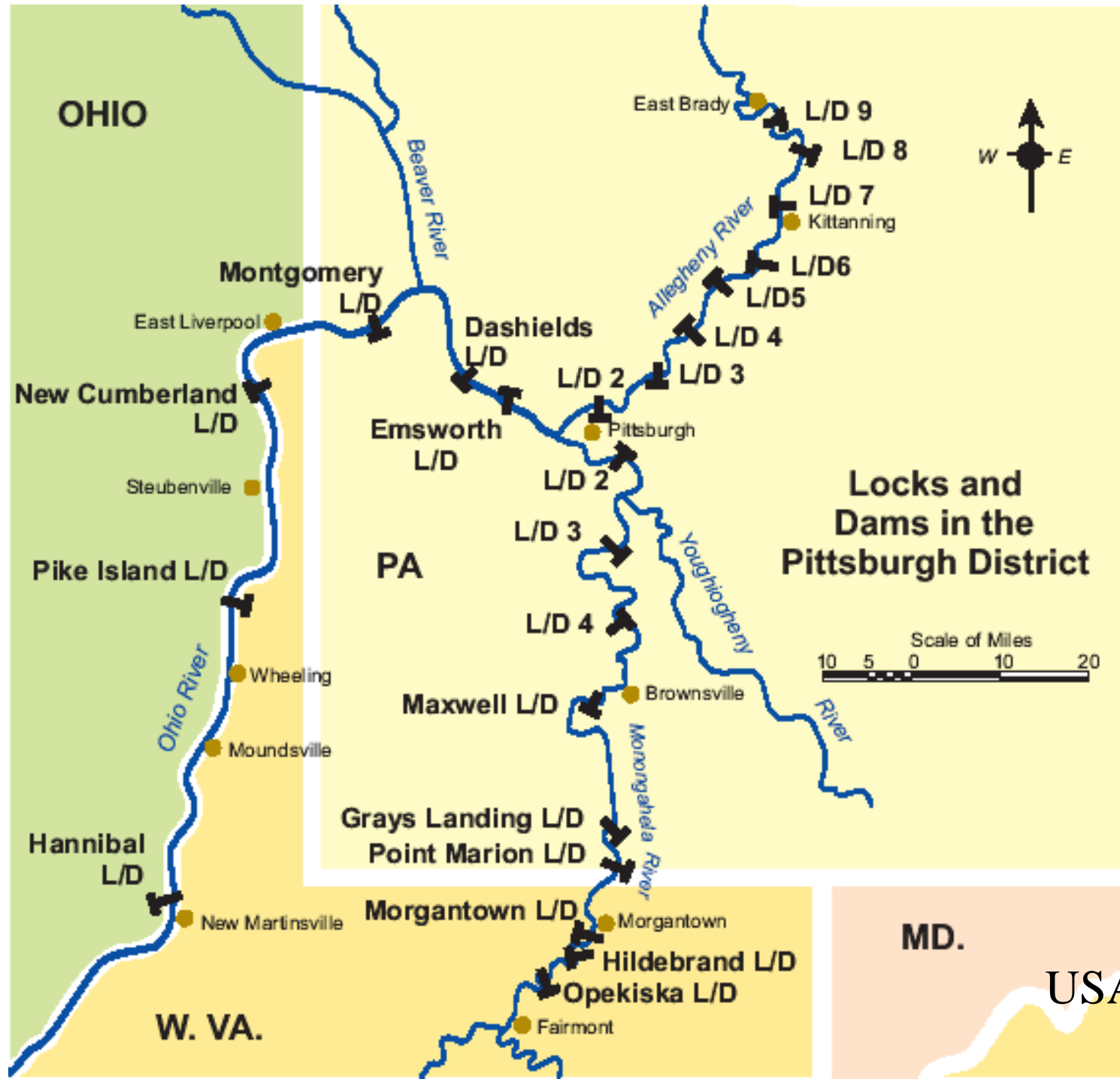
Sample Analysis
Data Analysis
Design Support
Information Management



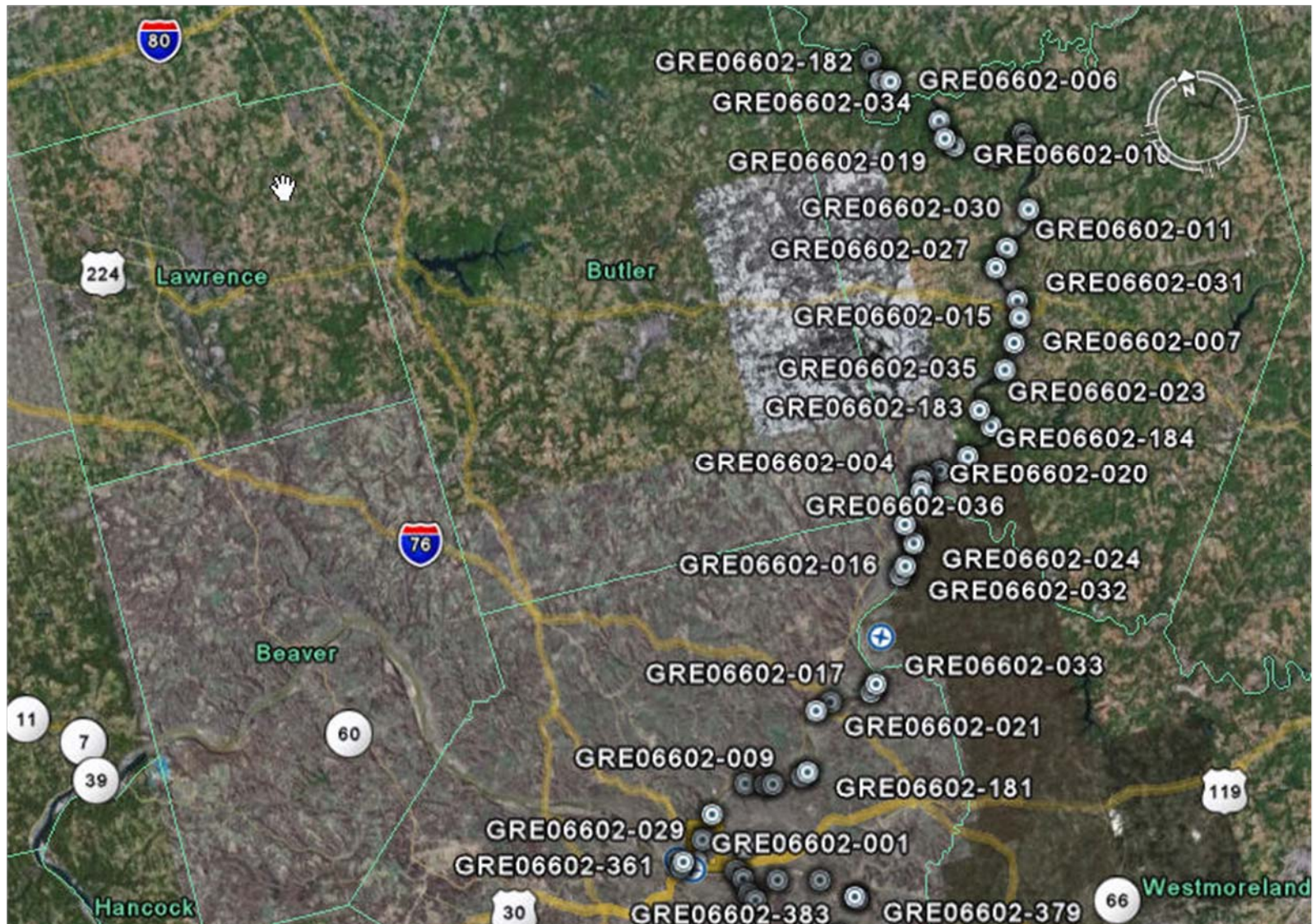


Purpose

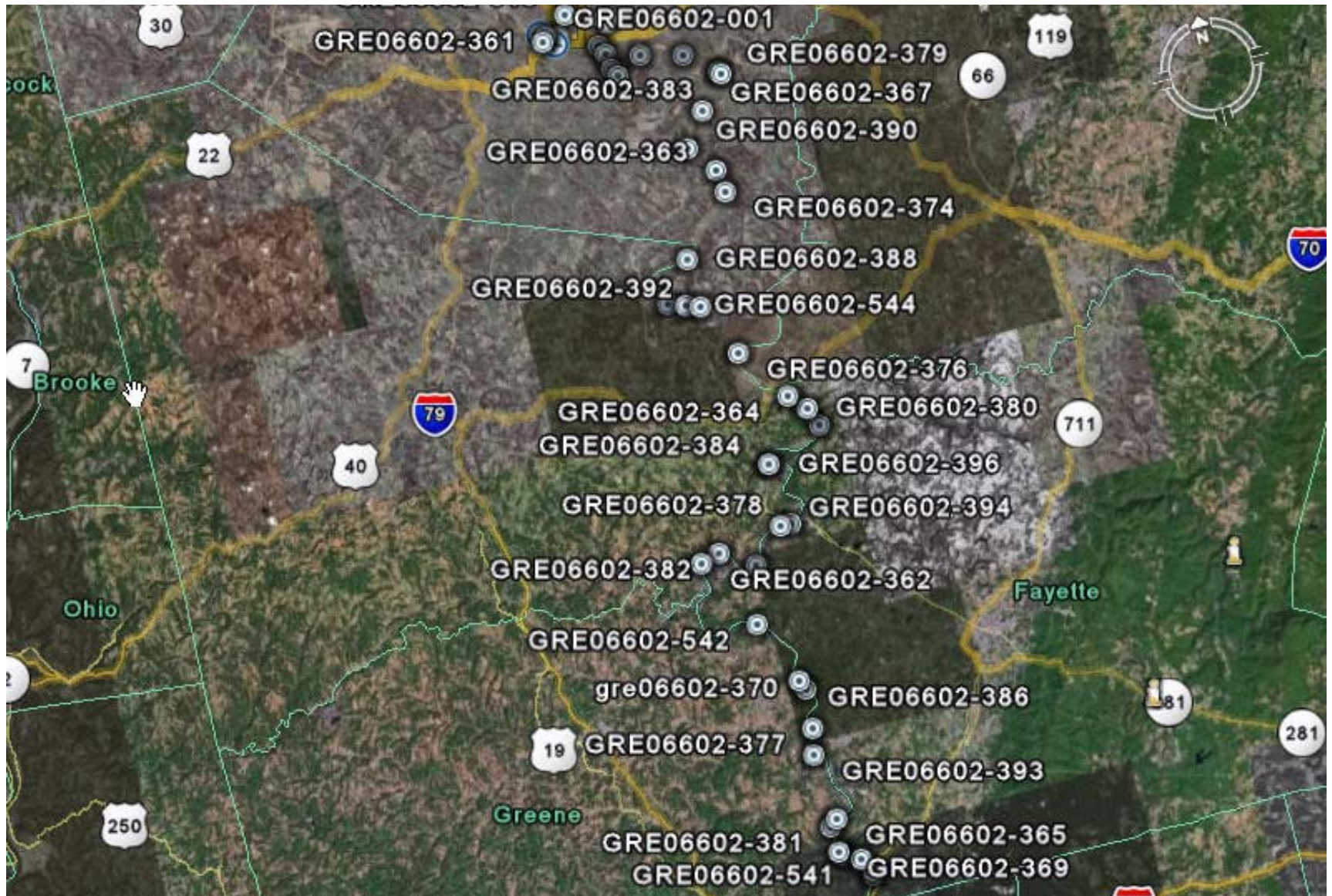




Allegheny River Sites (34)



Monongahela River Sites (31)



EMAP-GRE Site Dossier

GRE06602-001

NAME	SECTION	SAMPLE BANK	CLOSEST RIVER MILE	# PLANNED VISITS	POOL/DOMAIN	NED ELEVATION
Allegheny	PA PA	Left	0	1	First Pool	215.85

DETAIL	LABEL	LON_DD	LAT_DD	OR_AZ	SB_DIST	NSB_DIST	CH_WIDTH
X-Site	X-Site	-80.009460	40.444028	--	--	--	--
River Left	RL	-80.009283	40.443534	--	--	--	--
River Right	RR	-80.009652	40.444566	--	--	--	--
Cross Channel Transect/Target MCS	1A/2K	-80.009106	40.443039	--	--	--	--
Cross Channel Transect/Non-Target MCS	NTS	-80.009845	40.445103	--	--	--	--
Upstream End of Primary Transect	1K	-80.003547	40.444623	--	--	--	--
Downstream End of Secondary Transect	2A	-80.014702	40.441965	--	--	--	--
Cross Channel Transect	--	--	--	335.32	114.69	124.71	239.40

DATA DICTIONARY

DETAIL = Description

LABEL = Point label from dossier page 2

LON_DD = Longitude in decimal degrees

LAT_DD = Latitude in decimal degrees

OR_AZ = Orthogonal azimuth (degrees clockwise from north)

SB_DIST = Distance to sample bank [meters]

NSB_DIST = Distance to non-sample bank [meters]

CH_WIDTH = Total width of channel [meters]

**NED Elevation value is in meters.

**All distance values are in meters.

**All azimuth values are in degrees.

**All coordinate values were derived using:

Projection: Geographic

Datum: NAD83

Spheroid: GRS1980

Units: Degrees

Semimajor Axis: 6378137.000000000000000000

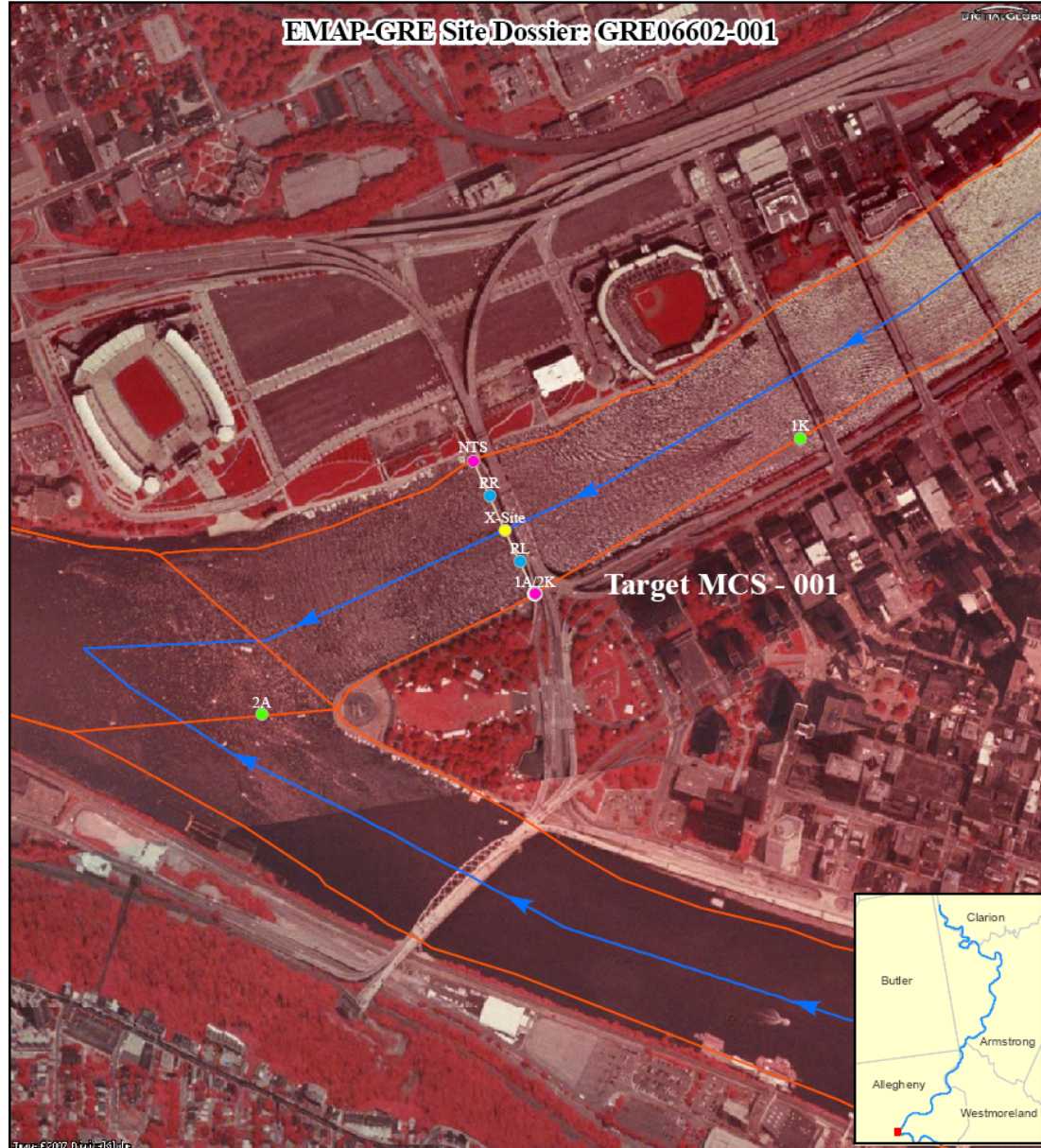
Semiminor Axis: 6356752.314140356100000000

Inverse Flattening: 298.257222101000020000



U.S. EPA, Mid-Continent Ecology Division
6201 Congdon Blvd
Duluth, MN 55804

Map layout produced under the FAIR II Contract
68-W-01-032 Task Order 2024

**SITE LAYOUT LEGEND**

- River Centerline
- Main Channel Shoreline
- Cross-Channel/Bathymetry Transect
- X-Site
- RL/RR
- 1A/2K
- 1K/2A

IMAGERY METADATA

Scale: 1:12,000
 Resolution: 1 meter
 Data Type: USDA NAIP
 Acquisition Year: 2004
 Source: GlobeExplorer

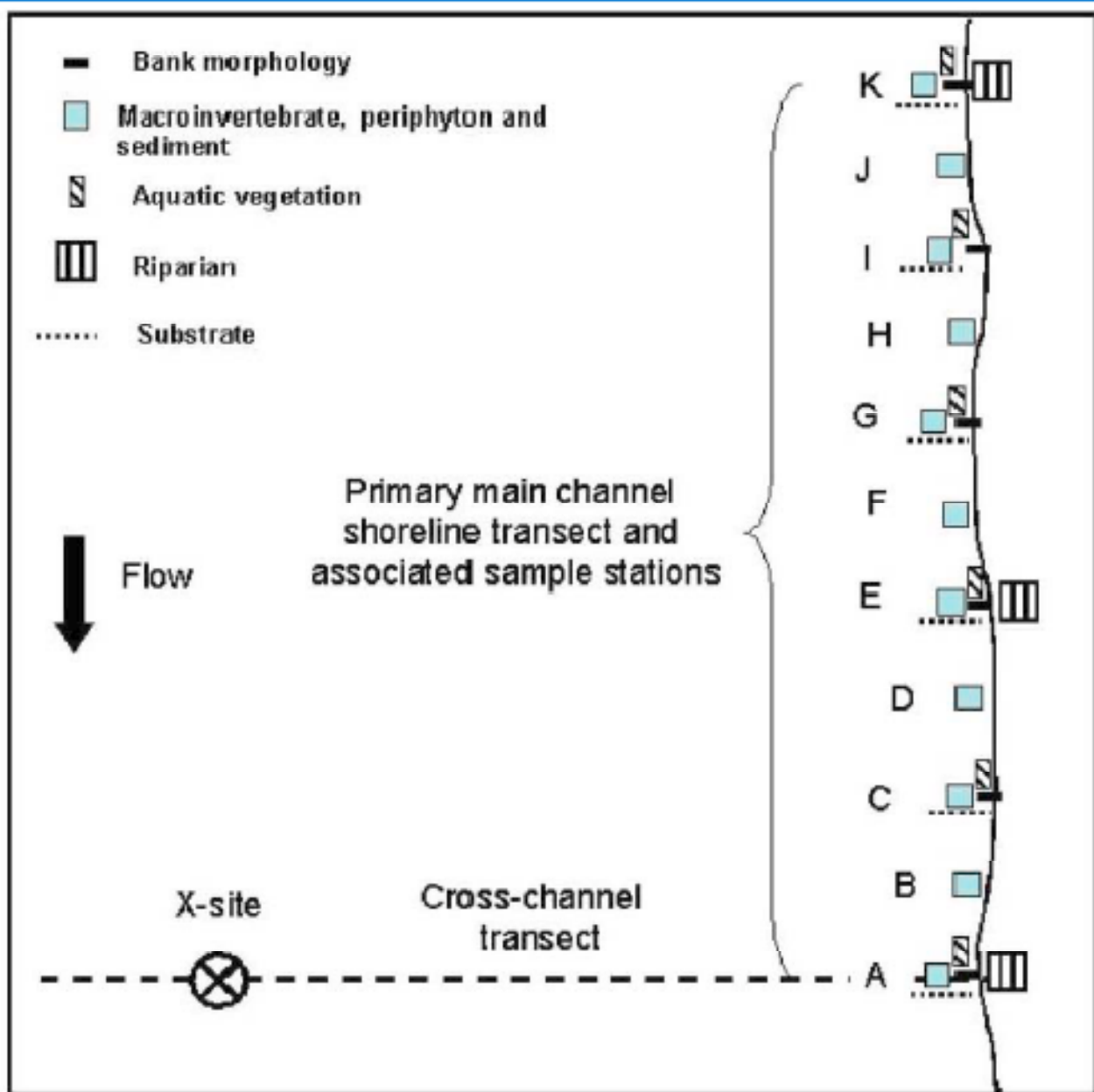
For point label details, please reference the second table on dossier page 1 for channel and shoreline transect attribute information

Map Scale - 1:8,000



U.S. EPA, Mid-Continent Ecology Division
 601 Congress Blvd
 Duluth, MN 55804
 Map layer produced under the FAIR II Contract
 May 25, 2007

Site Anatomy (Primary transect)

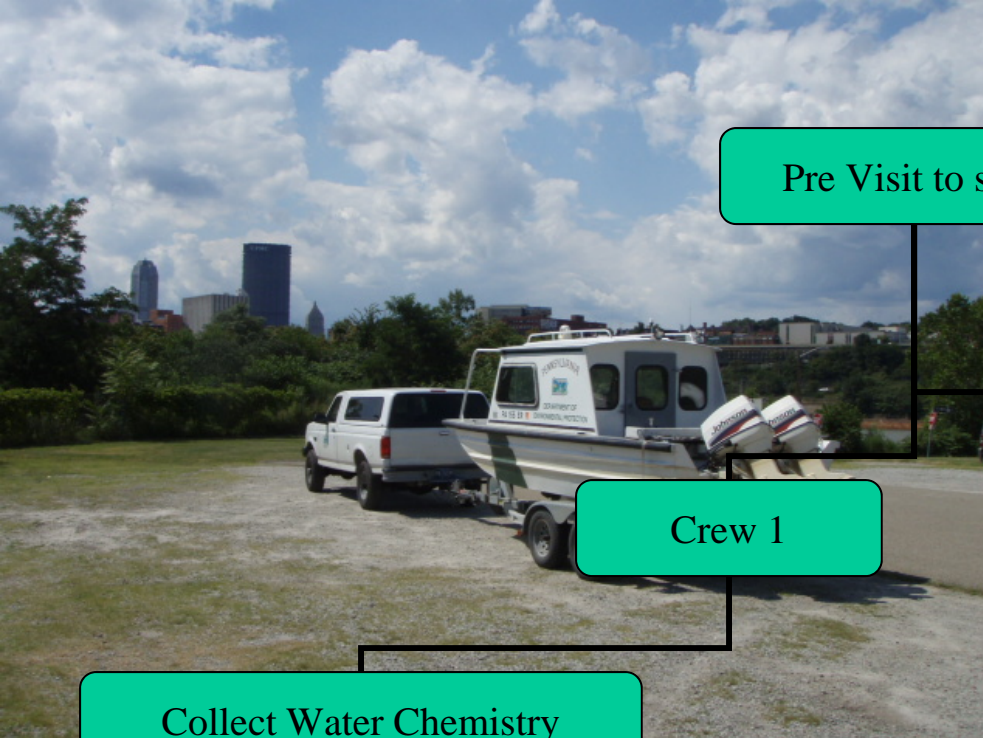


Primary shore transect has 11 stations (A-K) at 50 m intervals. Different things happen at different stations.

Secondary transect has 6 fish habitat stations at 100 m intervals. Upstream end is 500 m and downstream end is 0 m.

What is being collected:

- Water Chemistry
- Chlorophyll A
- Plankton
- Sediment
- Habitat
- Macroinvertebrates
- Fish
- Mussels



Pre Visit to sites

Crew 1

Collect Water Chemistry



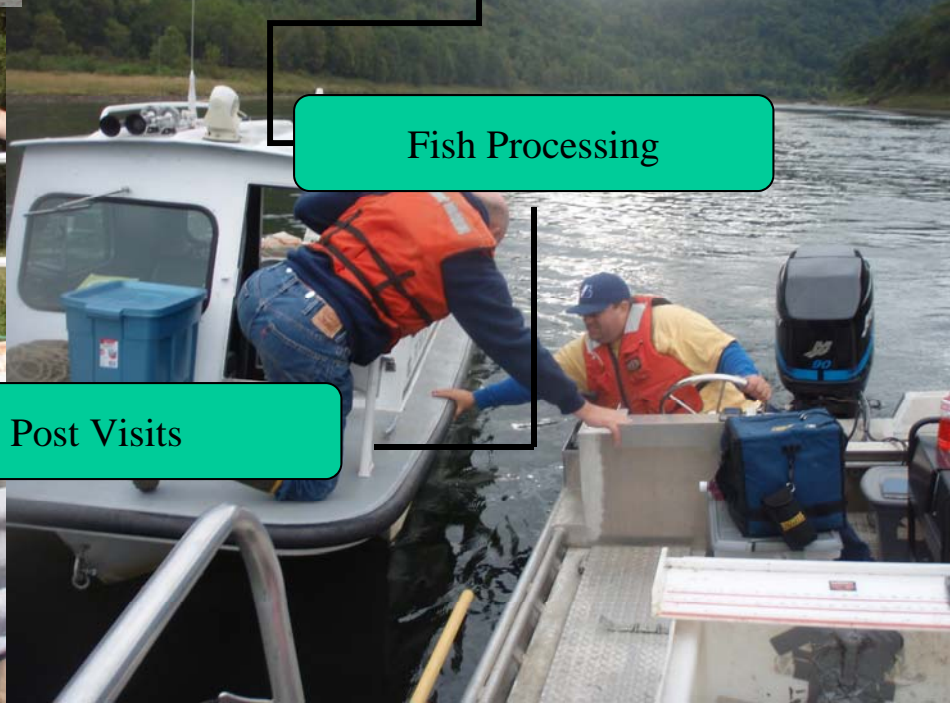
Crew 2

Collect Fish



Collect Macroinvertebrates

Collect Sediment



Fish Processing

Post Visits

Water Chemistry Sampling

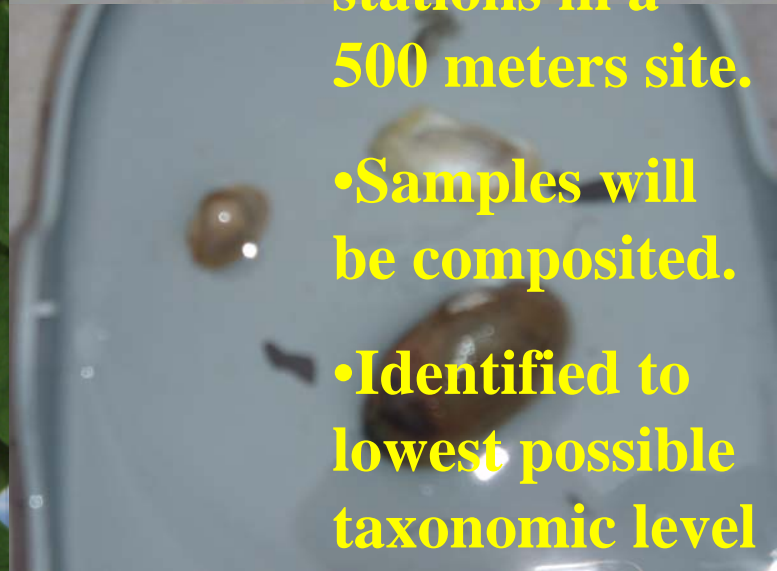
- One grab sample from the middle of the channel at each X-site
- Send to DEP Lab for analysis



Water Chemistry Laboratory Parameters

- TKN
- Ammonia Nitrogen
- Total Phosphorus
- Chloride
- Nitrate-Nitrite
- Sulfate
- TSS
- Alkalinity
- Turbidity
- TDS
- Aluminum
- Barium
- Iron
- Lead
- Magnesium
- Arsenic
- Mercury
- Calcium
- Potassium
- Hardness

Macroinvertebrates



- 2 kicks at 11 stations in a 500 meters site.
- Samples will be composited.
- Identified to lowest possible taxonomic level



Sediment Sampling

- Composite samples of fine sediments
- Samples collected from the 11 Macroinvertebrate stations.
- Target sample volume of 4 liters
- Shipped to EPA ORD Lab in Cincinnati, Ohio for testing.

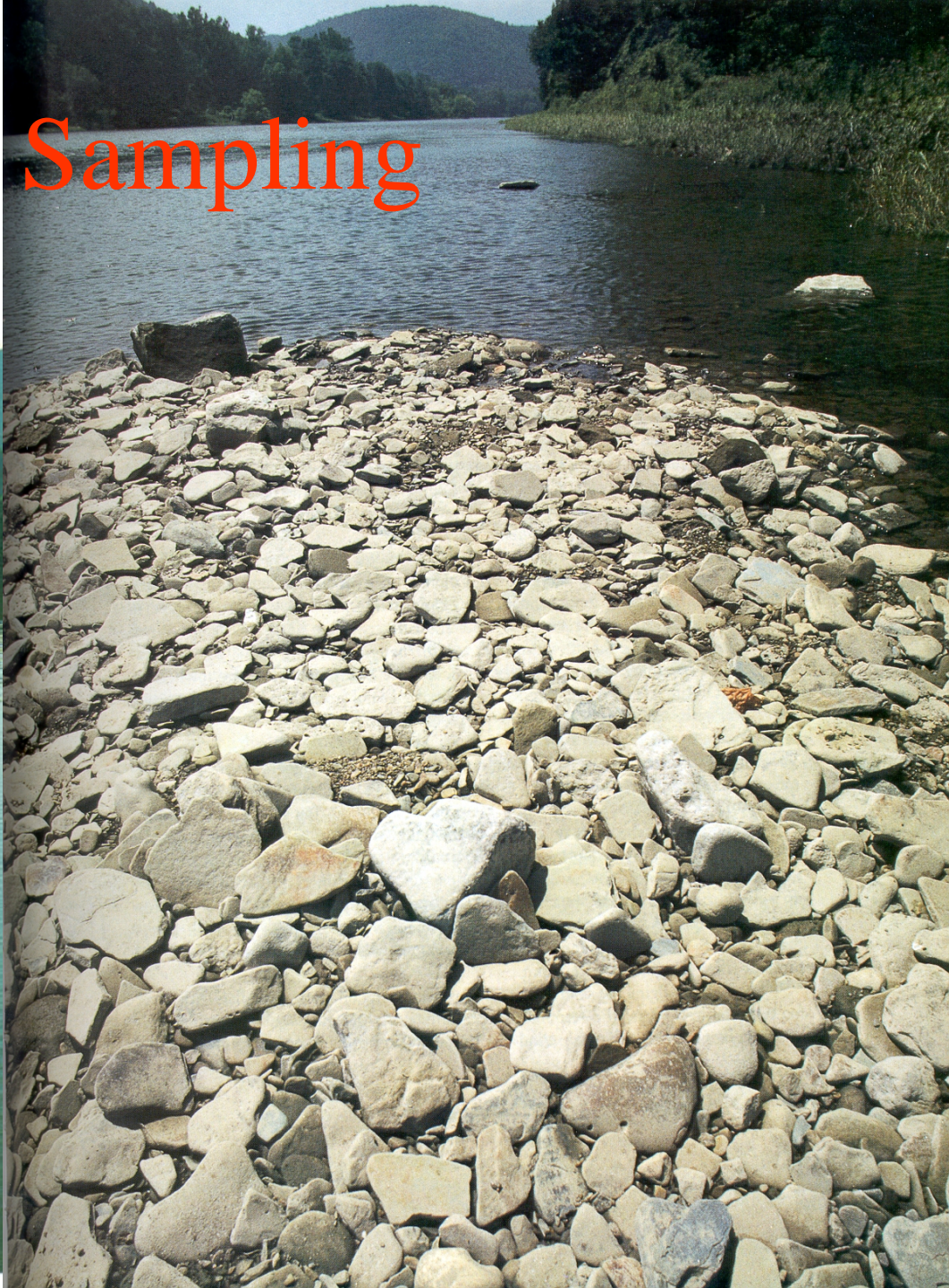


Habitat Sampling



•EMAP-GRE Habitat Forms

•ORSANCO's Fish Habitat Survey Methodologies





Environmental Monitoring and Assessment of Great River Ecosystems (EMAP-GRE)

Improving the science and practice of assessing Great River Ecosystems

US EPA Office of Research & Development
National Health & Environmental Effects Laboratory
Mid-Continent Ecology Division Duluth, MN

- David Bolgrien: Sample design, program administration, GIS
- Ted Angradi: Ops manual, benthos, reference
- Mark Pearson: fish, training
- Terri Jicha: IM, water chemistry
- Debra Taylor: Physical habitat and vegetation
- Brian Hill: Branch chief and algae
- Allan Batterman: QA officer

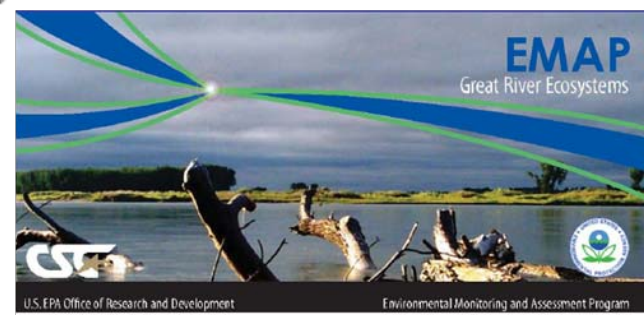
EPA Region 3 Wheeling
Field Office Staff:

Frank Borsuk

Maggie Passmore

Lou Reynolds

Greg Pond



ORD Staff in Cincinnati, OH

- Jim Lazorchak
- Karen Blocksom
- Joe Flotemersch
- Mark Smith

Mussel Sampling

- Experimental sampling technique to cover the 500 meters sampling site.
- Determine if there is any correlation to bugs, fish, water chemistry and sediment.



MARSHALL
UNIVERSITY



Monongahela River Mussel Results 2008

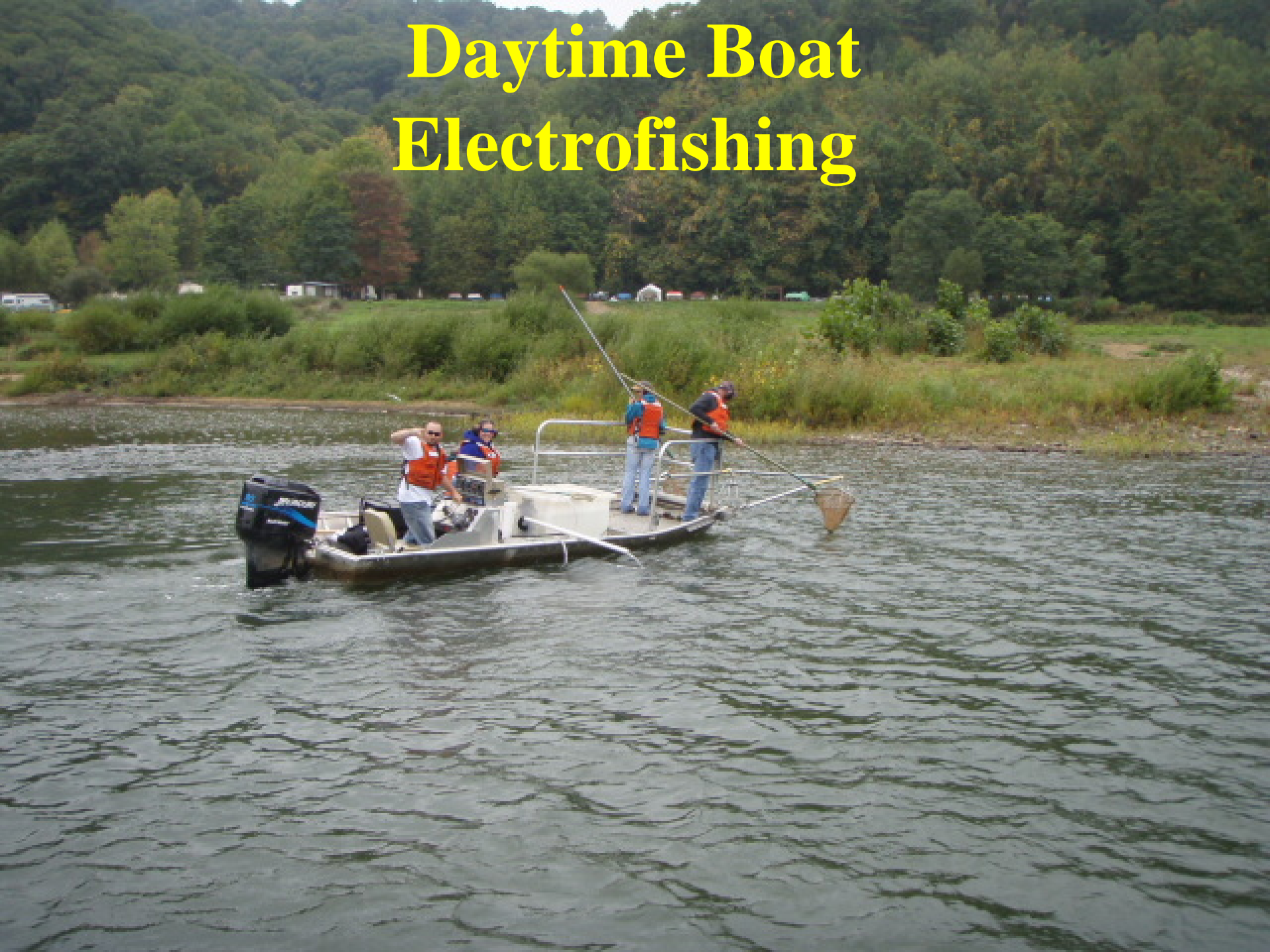
Live Species	Pool 1	Pool 2	Pool 3	Pool 4	Max Pool	G L Pool	Total
Leptodea fragilis	1	0	0	0	0	0	1
Potamalis alatus	14	71	13	16	20	1	135
Lasmigona costata	1	0	0	0	0	0	1
Pyganodon grandis	1	0	0	0	0	0	1
Quadrula quadrula	1	1	0	0	0	0	2
Lampsilis siliquoidia	1	0	1	4	0	1	7
Amblema plicata	0	0	0	1	0	0	1
Total # of individuals	19	72	14	21	20	2	148
Total # of species	6	2	2	3	1	2	7

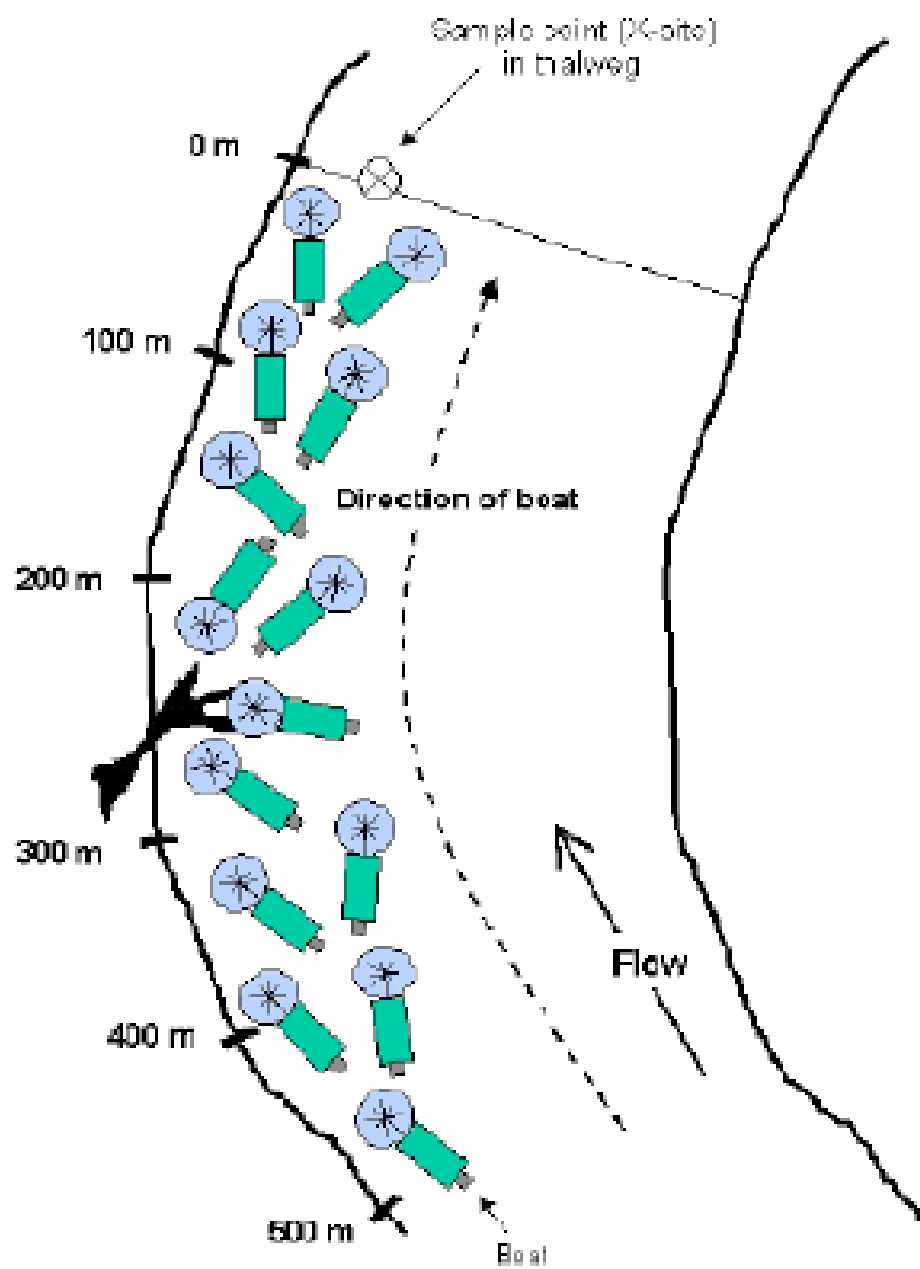
Allegheny River Mussel Results

2009

GENUS	SPECIES	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Pool 6	Pool 7	Pool 8	Pool 9	Total
Actinonaias	ligamentina	3	2	3	1	8	30	8			55
Anodontoides	ferussacianus	0	0	0	0	0	1	0			1
Ellipto	dilatata	2	3	2	2	19	104	40			172
Fusconaia	flava	0	1	5	0	41	17	4			68
Lampsilis	siliquoidea	10	6	9	4	11	9	12			61
Lampsilis	cardium	2	1	2	0	0	1	0			6
Lasmigona	costata	8	1	2	0	10	11	12			44
Leptodea	fragilis	7	3	1	0	1	1	2			15
Ligumia	recta	2	2	3	0	1	1	0			9
Pleurobema	sintoxia	0	0	0	0	1	1	0			2
Potamilus	alatus	76	31	23	15	61	8	14			228
Potamilus	ohioensis	1	0	0	0	0	0	0			1
Pyganodon	grandis	0	1	0	0	0	0	2			3
Quadrula	quadrula	12	1	0	0	0	0	0			13
Simpsonaias	ambigua	0	0	0	0	7	0	0			7
Strophitus	undulatus	0	0	0	0	0	1	0			1
Truncilla	donaciformis	0	0	0	0	1	0	0			1
Utterbackia	imbecillis	2	0	2	0	1	0	0			5
Total #'s		125	52	52	22	162	185	94			692
Total Species		11	11	10	4	12	12	8			18
# of sites		6	2	5	2	4	3	4	4	4	34

Daytime Boat Electrofishing





Benthic Trawling





Fish Processing



Photo Voucher

FISH VOUCHER

10% Formalin Preserved

GRE06602- 390

07 29 /2008

TRANSECT: 1 2

Jar _____ of _____

COMMON NAME: LONGNOSE GAR

412013



2008 and 2009 Fish Results

Allegheny 2008	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Pool 6	Pool 7	Pool 8	Pool 9	Total
# of individuals	266	309	141	482	638	1658	372	1127	354	5347
# of species	24	28	15	32	29	38	29	38	24	56
Allegheny 2009										
# of individuals	441	200	867	70	785	688	772	920	1010	5753
# of species	34	27	35	21	34	30	37	34	36	55
Monongahela 2008	Pool 1	Pool 2	Pool 3	Pool 4	Maxwell	G L Pool	Total			
# of individuals	340	153	555	557	345	301	2251			
# of species	28	24	31	31	29	25	48			
Monongahela 2009										
# of individuals	1615	1527	5036	691	502	1560	10931			
# of species	28	33	37	27	30	22	45			


2008 Species comparisons

Species Common Mon	Species Found Allegheny
Bluegill	Bigeye Chub
Channel Catfish	Bluebreast Darter
Golden Redhorse	Gilt Darter
Logperch	Golden Shiner
Freshwater Drum	Greenside Darter
Common Carp	Highfin Carpsucker
Mimic Shiner	Longhead Darter
Smallmouth Bass	River Carpsucker
Largemouth Bass	Streamline Chub
Quillback	Striped Bass
Silver Redhorse	Tippecanoe Darter
11	Trout Perch
	White Bass
Species Common Allegheny	13
Bluegill	
Channel Darter	Species Found Mon
Johnny Darter	Black Crappie
Logperch	Chain Pickeral
Smallmouth Bass	Green Sunfish
5	Hybrid Striped Bass
	Saugeye
Species Common Both Rivers	5
Bluegill	
Logperch	
Smallmouth Bass	
3	

2009 Species comparisons

Species Common to all Mon Pools	Species Common to all Allegheny Pools 2009
black redhorse	Common Carp
bluegill	Golden Redhorse
bluntnose minnow	Rock Bass
channel shiner	Silver Redhorse
Common Carp	smallmouth bass
emerald shiner	spotfin shiner
freshwater drum	6
golden redhorse	
Johnny darter	Species common to Both Rivers
logperch	Common Carp
mimic shiner	golden redhorse
rock bass	rock bass
Smallmouth Bass	Smallmouth Bass
spotfin shiner	spotfin shiner
spotted bass	
15	5

EPA provides specialized field forms


EMAP-GRE WATER CHEMISTRY AND PLANKTON FORM (front)

SITE ID: GRW04448-

DATE: ____ / ____ / 2 0 0 ____

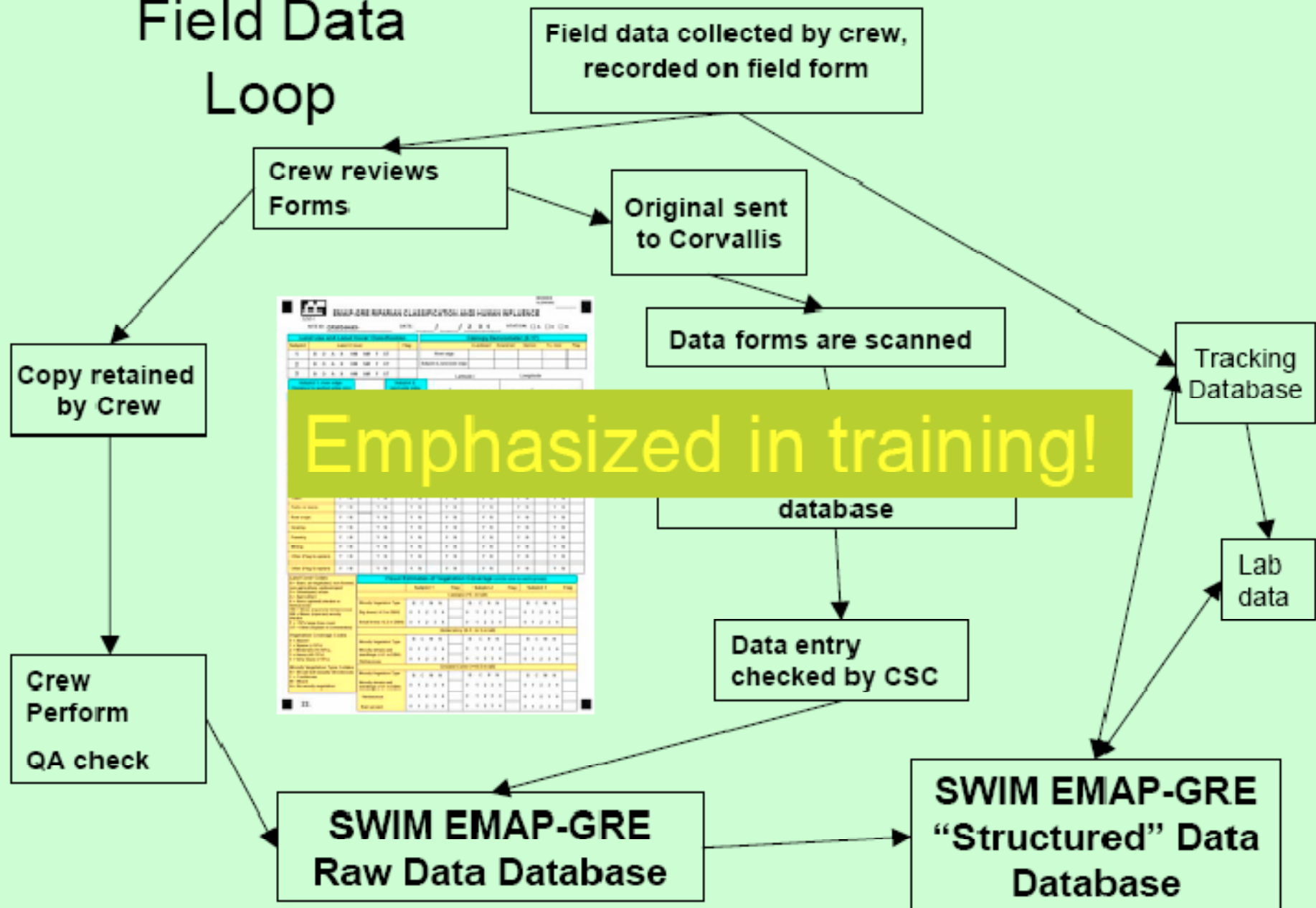
MANUAL VISIT NUMBER: ☐ 1 ☐ 2

REVISION: (to 1/2004)

Water Chemistry										
Water Sample				FLAG	DO/PH Calibration			FLAG		
Sample ID 2 L composite					Altitude at Calibration (m)					
Sample	Collected?	Composite of 3 stations?		FLAG	Was DO meter calibrated on day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No					
2 L composite 1	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes <input type="checkbox"/> No			Was pH meter calibrated on day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No					
660 mL grab	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes <input type="checkbox"/> No								
2 L Composite Field Duplicate Sample ID					Alkalinity	Sample ID				
DI Blank Sample ID					Alkalinity Duplicate	Sample ID				
Water Quality Measurements										
* See below for rules on which depths to take readings; flag depths not used.	River Left			Thalweg			River Right			
	0.5 m from surface	Mid depth	0.5 m from bottom	0.5 m from surface	Mid depth	0.5 m from bottom	0.5 m from surface	Mid depth	0.5 m from bottom	
	Total depth	Sample depth	Sample depth	Total depth	Sample depth	Sample depth	Total depth	Sample depth	Sample depth	
Depth xx.x m										
DO (mg/L)										
Conductivity (uS/cm)										
Temperature (C)										
pH										
Flag										
Phytoplankton Composite Desired Sample (1035-ml composite excluding preservative)										
Sample ID		Composite vol. (mL)								FLAG
				Number of Locations Sampled (0-3):						
60-um Macrozooplankton Composite Sample (160-L composite filtration desired)										
Sample ID		Volume filtered (L)								FLAG
				Number of Locations Sampled (0-3):						
20-um Microzooplankton Composite Sample (16-L composite filtration desired)										
Sample ID		Volume filtered (L)								FLAG
				Number of Locations Sampled (0-3):						
<small>* If depth at the station >2m, collect meter readings and a subsample 0.5 m above the bottom, mid-depth, and 0.5m from the surface; subsample volumes: 445mL for water, 21.5mL for phytoplankton, 30L for macrozooplankton, 2L for microzooplankton.</small>										
<small>* If depth at the station <2m and >1m, collect meter readings and a subsample 0.5 m above the bottom, mid-depth, and 0.5m from the surface; subsample volumes: 605mL for water, 325mL for phytoplankton, 30L for macrozooplankton, 3L for microzooplankton.</small>										
<small>* If depth at the station <1m, collect meter readings and a sample at mid-depth: 1.3L for water; subsample volumes: 650mL for phytoplankton, 60L for macrozooplankton, 6L for microzooplankton.</small>										

Flag codes: K=no measurement made, U=suspect measurement; #1, #2, etc=misc flags assigned by field crew.
 Explain in comments.

Field Data Loop



Interesting Finds





Field Season is Some Bad &..





..Mostly Good





Special Thanks to the Field Crew



Captain
Gary

Dr.
Dakin

Dan

Rick

Stephanie

Laura