Portland Harbor Superfund Site

RI/FS Summary

Eric Blischke

EPA Region 10

2001

AOC MOU

2002/2003

Begin Round 1 Work Plan

ROUND 1 SAMPLING:
- Fish Tissue
- Sediment
- Bathymetry

Summer 2004

Approved Work Plan and Field Sampling Plan

ROUND 2A SAMPLING:
- Surface
- Subsurface
- Bioassays

Fall 2004

Round 1 Site Characterization Report

ROUND 2A SAMPLING:
- Surface Water
- Groundwater pilot

Winter 2005

Step 1 Hydro Model Report

ROUND 2A SAMPLING:
- High Flow Surface Water

Summer 2005

Round 2A Data Report

ROUND 2B SAMPLING:
- Sediment Cores
- Subyearling Chinook

Fall 2005

Food Web Model Report

ROUND 2B SAMPLING:
- Benthic (clams)
- Groundwater

Fall 2006

Framework Issues

ROUND 3A SAMPLING:
- lamprey
- Up & downstream
- Surface Water

Spring 2007

Round 2 Report

ROUND 3A SAMPLING:
- Sturgeon
- Storm Water

Summer/Fall 2007

F&T Model Report

ROUND 3B SAMPLING:
- Biota Tissue
- FS (N&E)
- Risk (bioassay)

2008

Draft RI and Baseline Risk Assessments

2009

Draft FS Report

2010

Proposed Plan and Record of Decision

Site Characterization Summary

- 2001 – 2002: Round 1 Sampling
  - Physical System and Fish Tissue
- 2004 – 2005: Round 2 Sampling
  - Major sampling effort focused on sediment chemistry and bioassays, surface water, groundwater and benthic tissue
- 2006: Round 3A Sampling
  - Surface water, lamprey and sturgeon

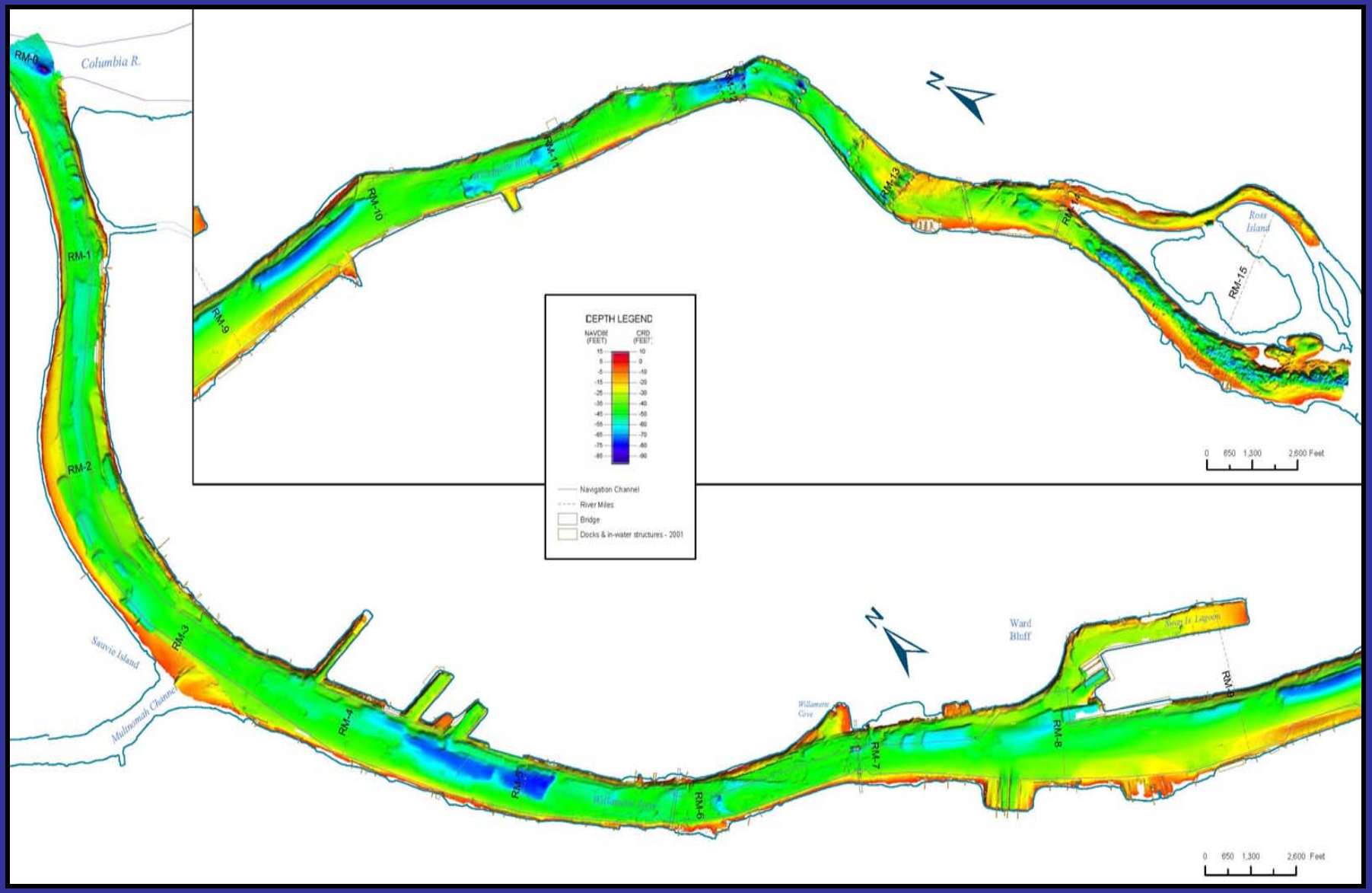
Site Characterization Summary

- 2007: Round 2 Report
  - Comprehensive summary of all data through Round 2
  - Preliminary risk evaluation
  - Initial PRGs and AOPCs
  - Identification of “final” data gaps
- 2007: Round 3B Sampling
  - Follow-up sediment chemistry, sediment toxicity and tissue chemistry
- 2008: FS Data Collection
  - Mobility and debris identification

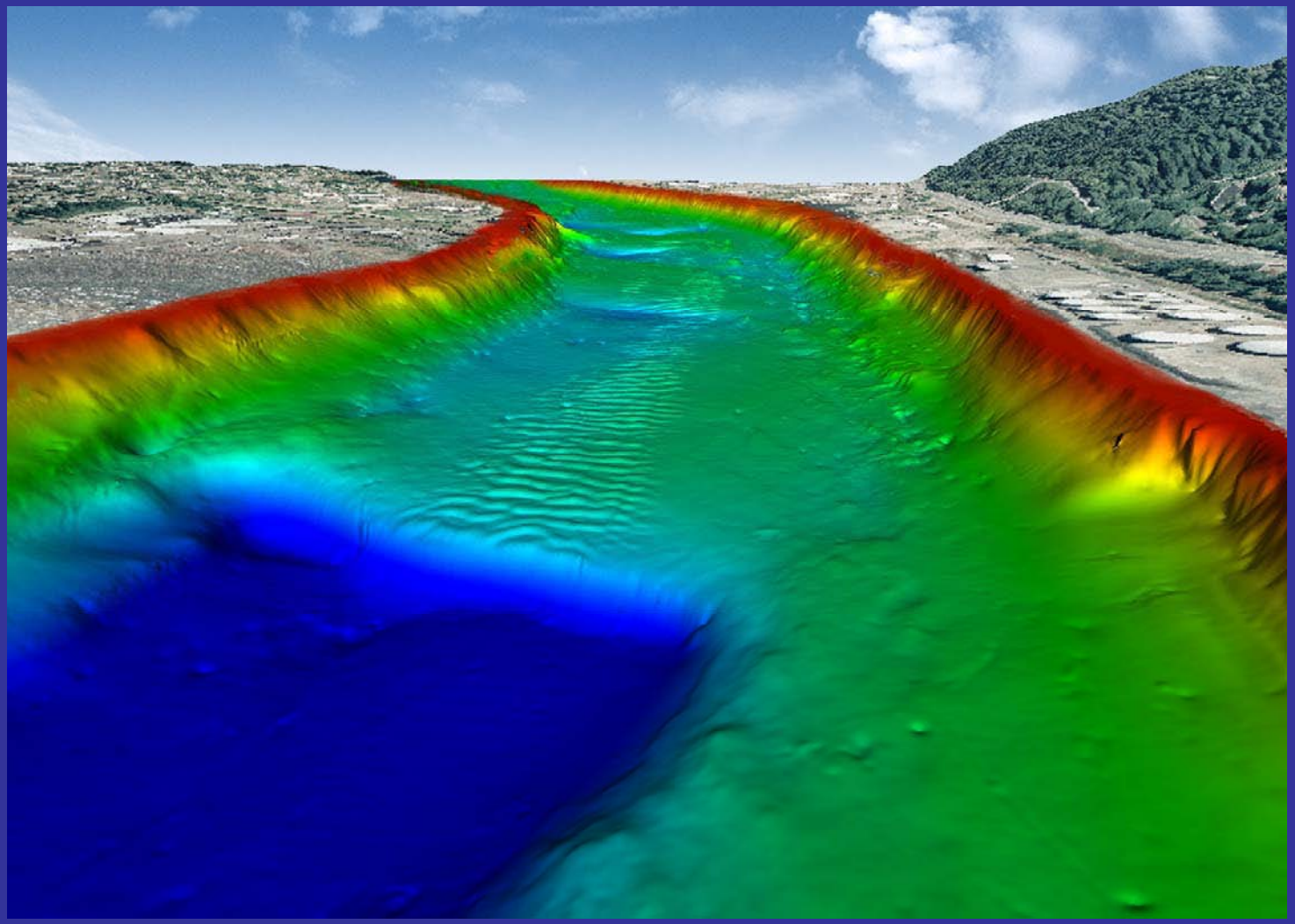
Physical System

- Data Collection Elements
  - STA Survey (2000)
  - SPI Survey (2001)
  - 4 Bathymetric Surveys (2002 – 2004)
  - Sediment traps, SedFlume cores (2007)
- Evaluation Phase
  - Hybrid Model links hydrodynamics, fate and transport and food web model
  - Chemical loading analysis from upstream, stormwater and groundwater

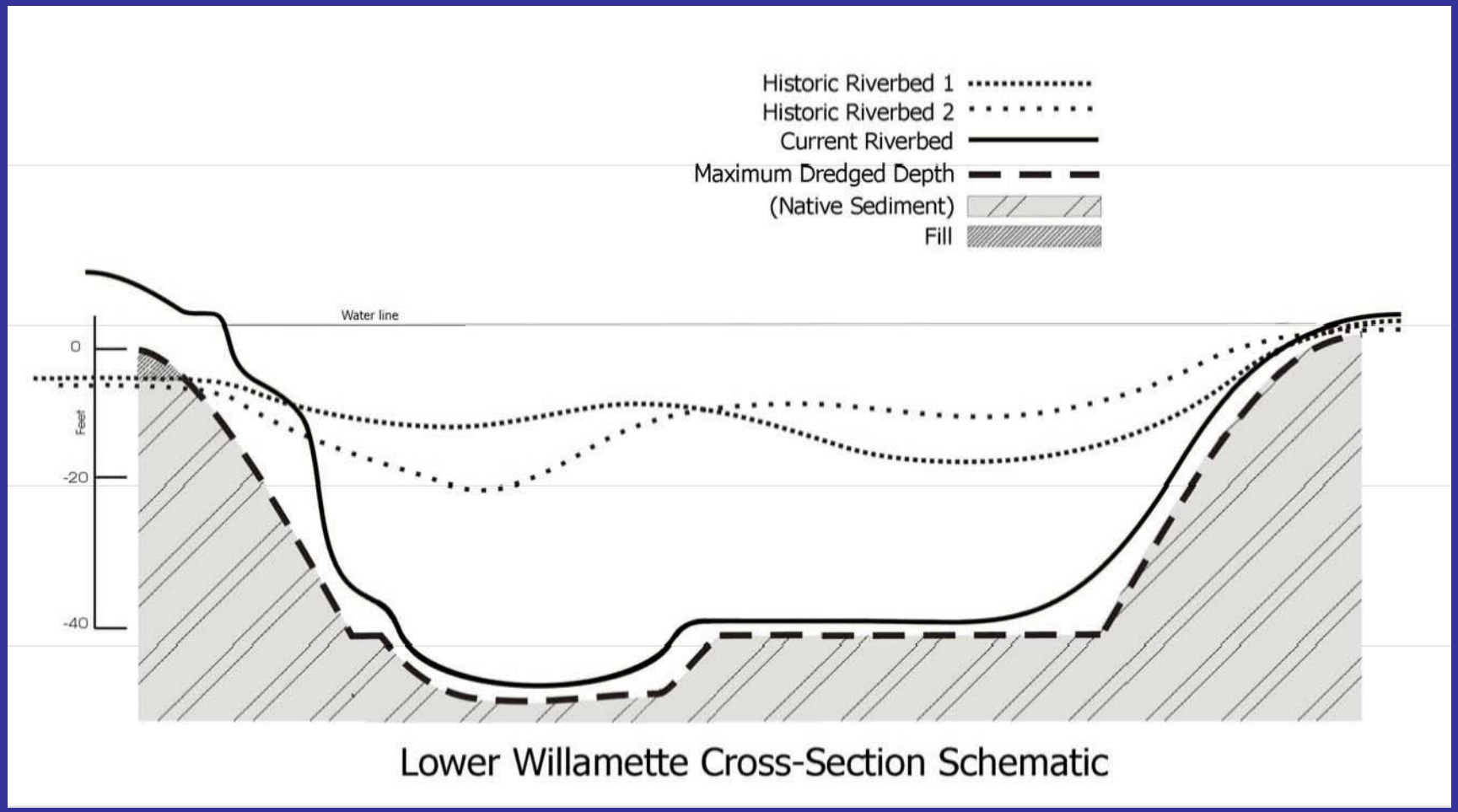
River Bathymetry



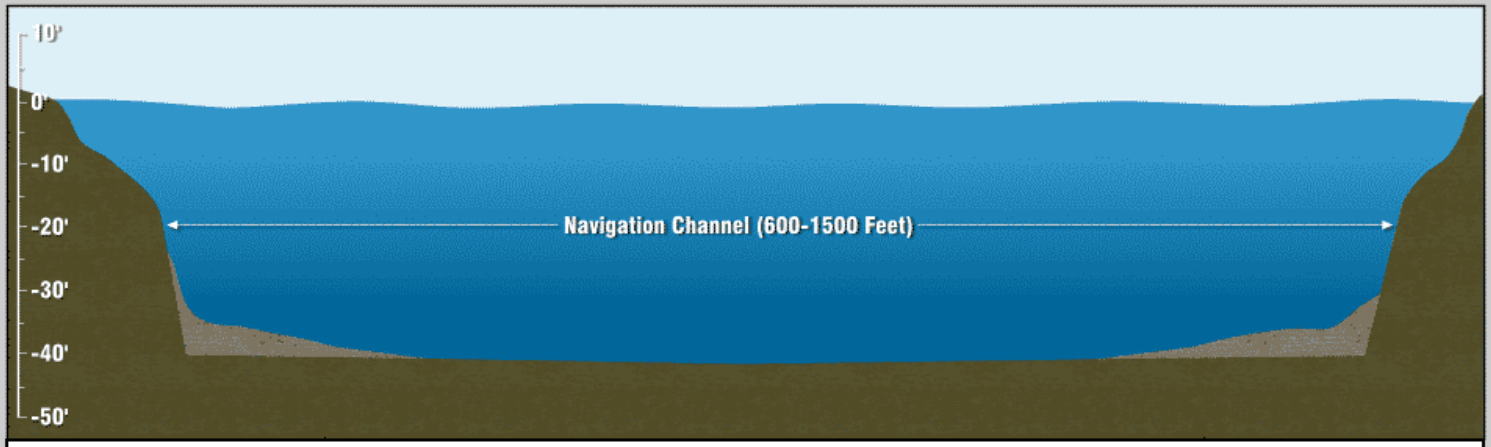
Portland Harbor Riverbed



Portland Harbor Riverbed



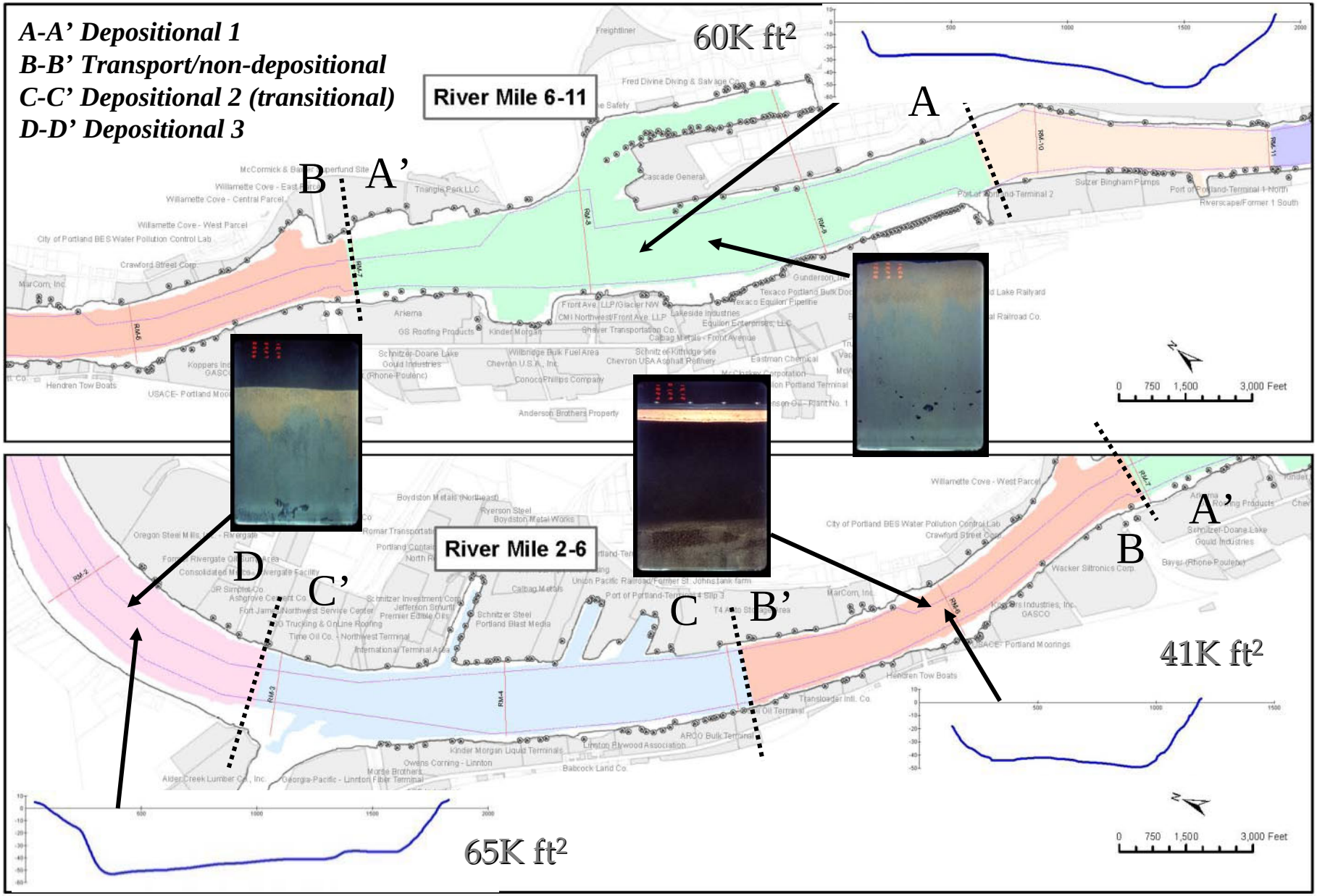
Portland Harbor Riverbed



A Hypothetical Willamette River Cross Section

B Willamette River Cross Section at River Mile 9

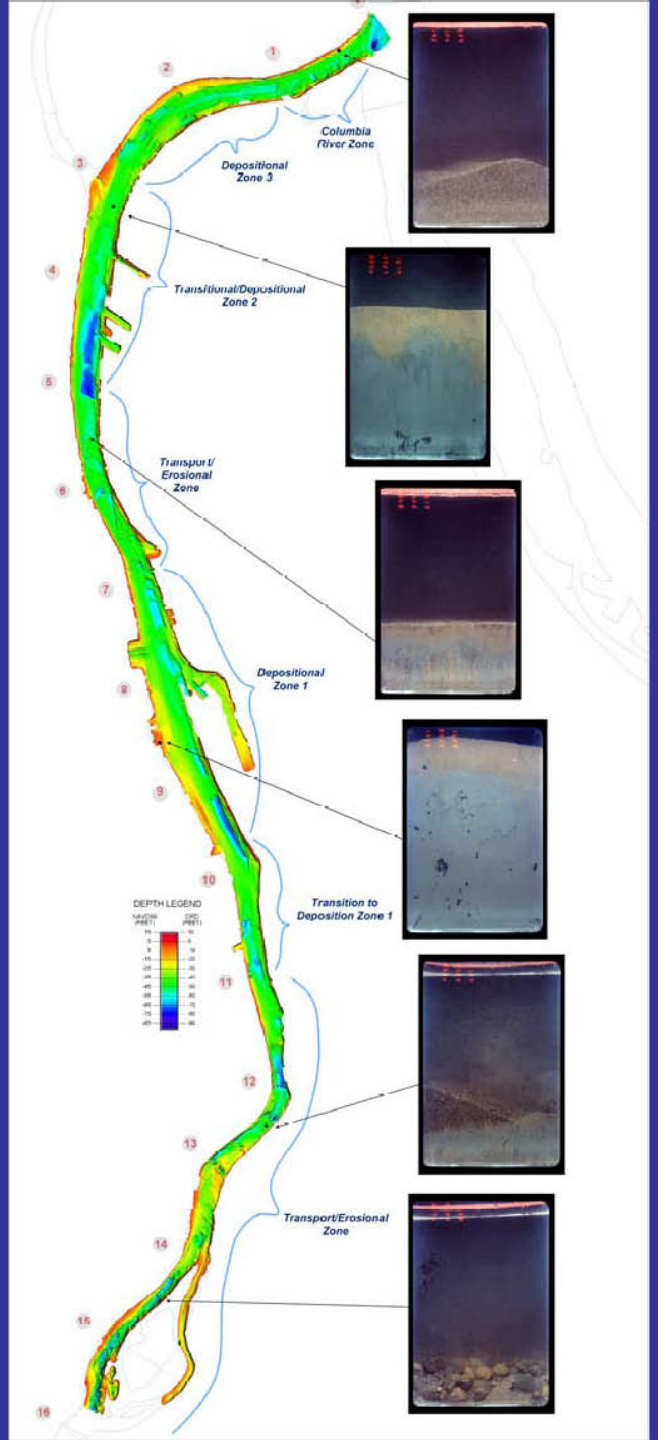
Sediment Profile Imaging



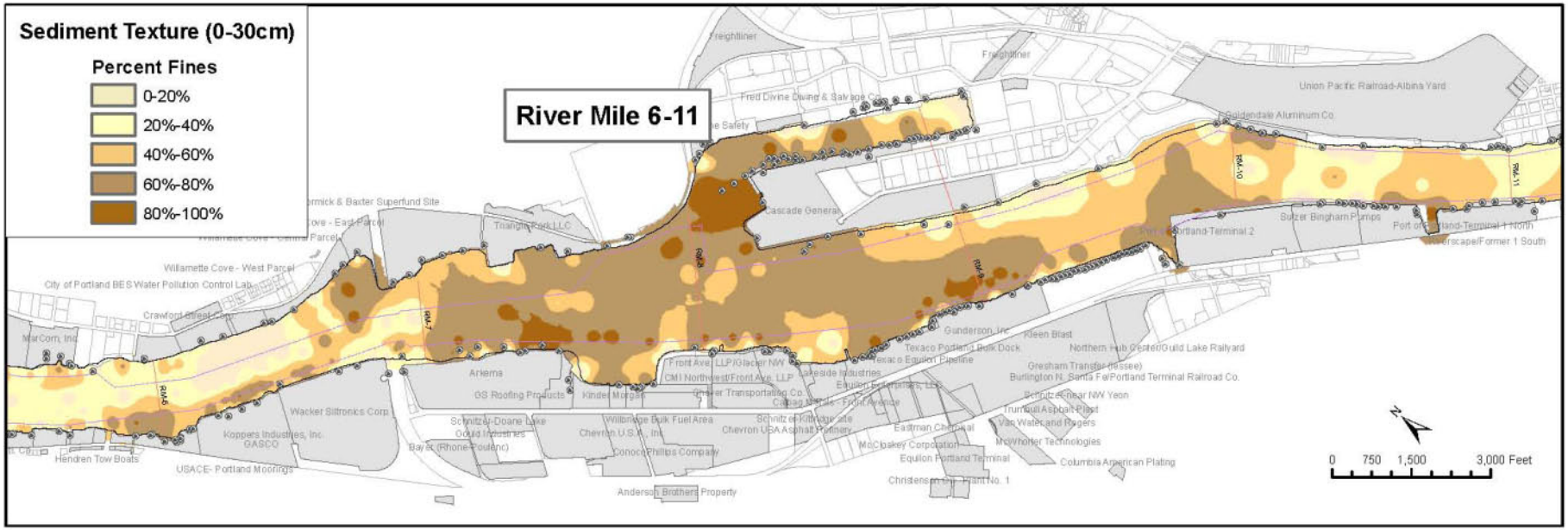
Sediment-profile images reveal bottom textures by reach

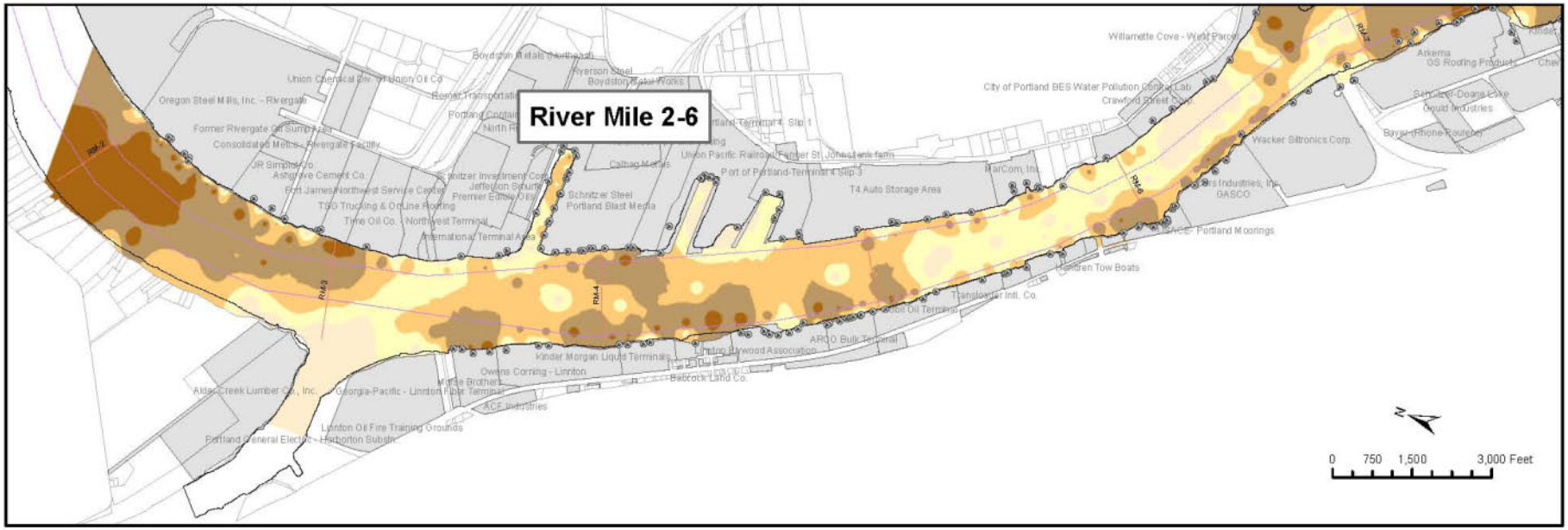
RM 10

RM 12.5

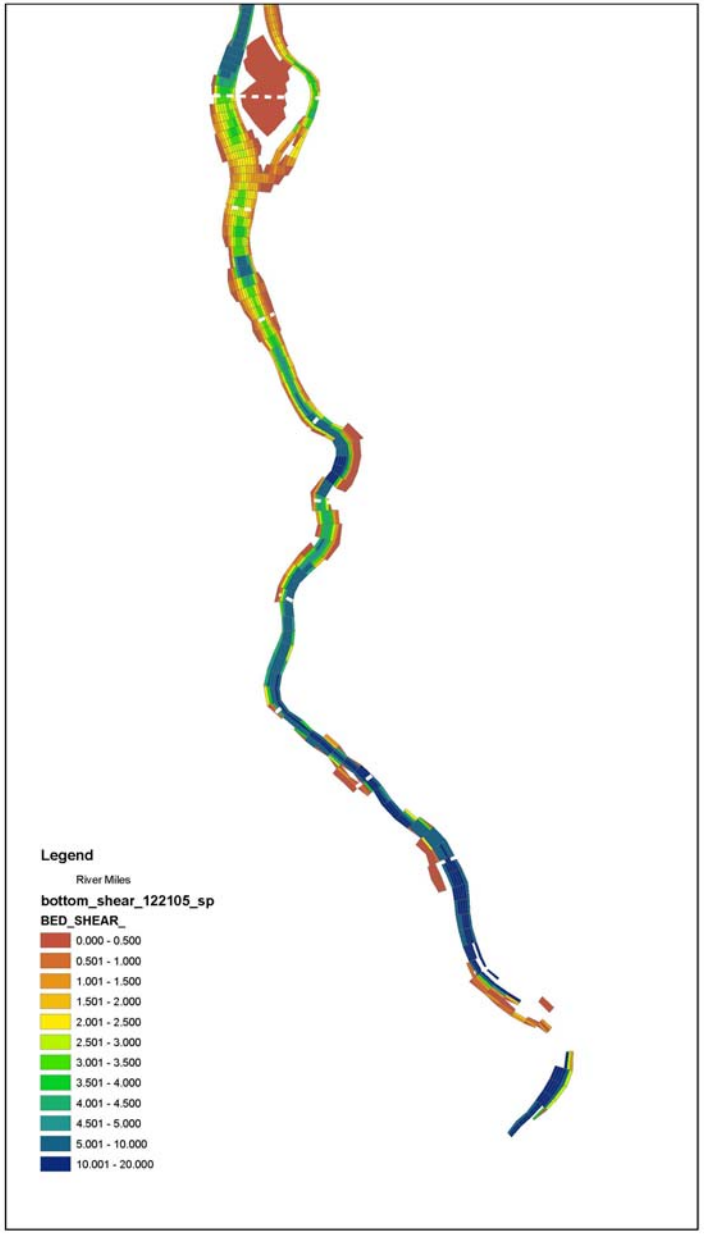


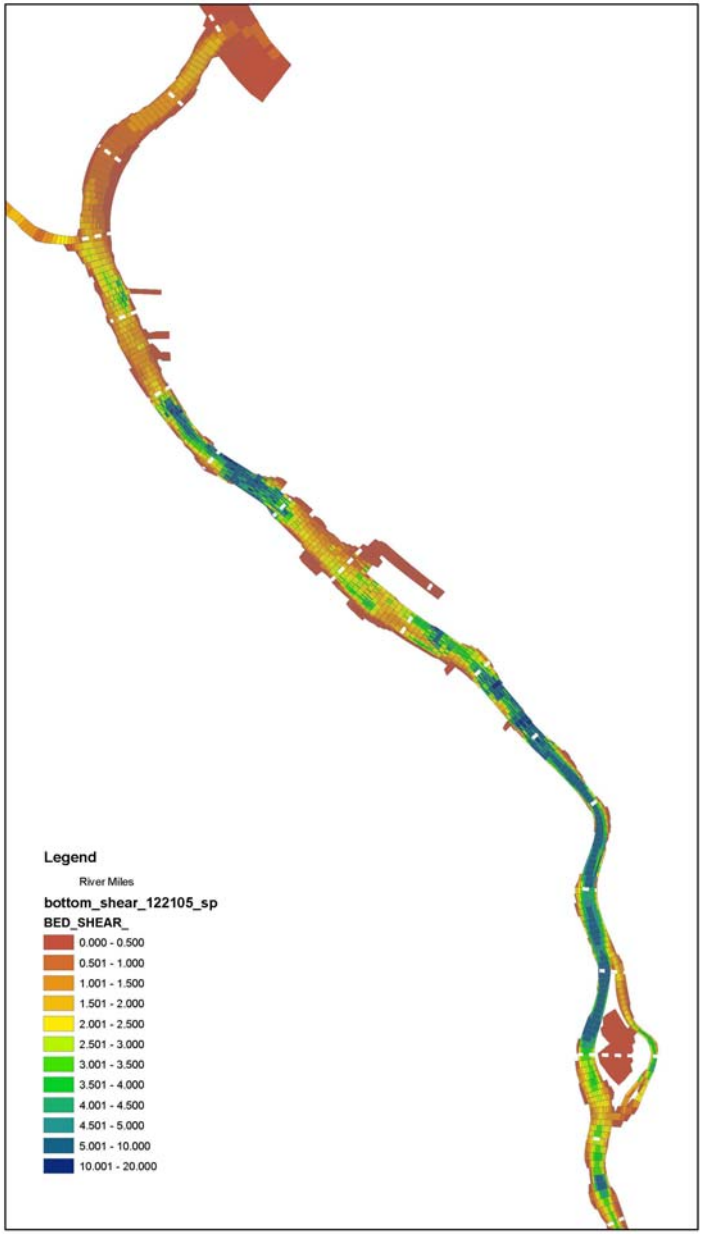
Grain Size Analysis





Modeled Bottom Shear





Sediment Sampling

- Beach sediments
- Surface sediments for nature and extent
- Collocated sediments to understand sediment/biota relationship
- Sediment bioassays to assess benthic risk
- Subsurface sediments to assess vertical extent of contamination and evaluate depositional history
- Upriver sediments to develop background estimates
- Upstream and downstream sediments to develop site boundary

Sediment Sample Numbers and Types

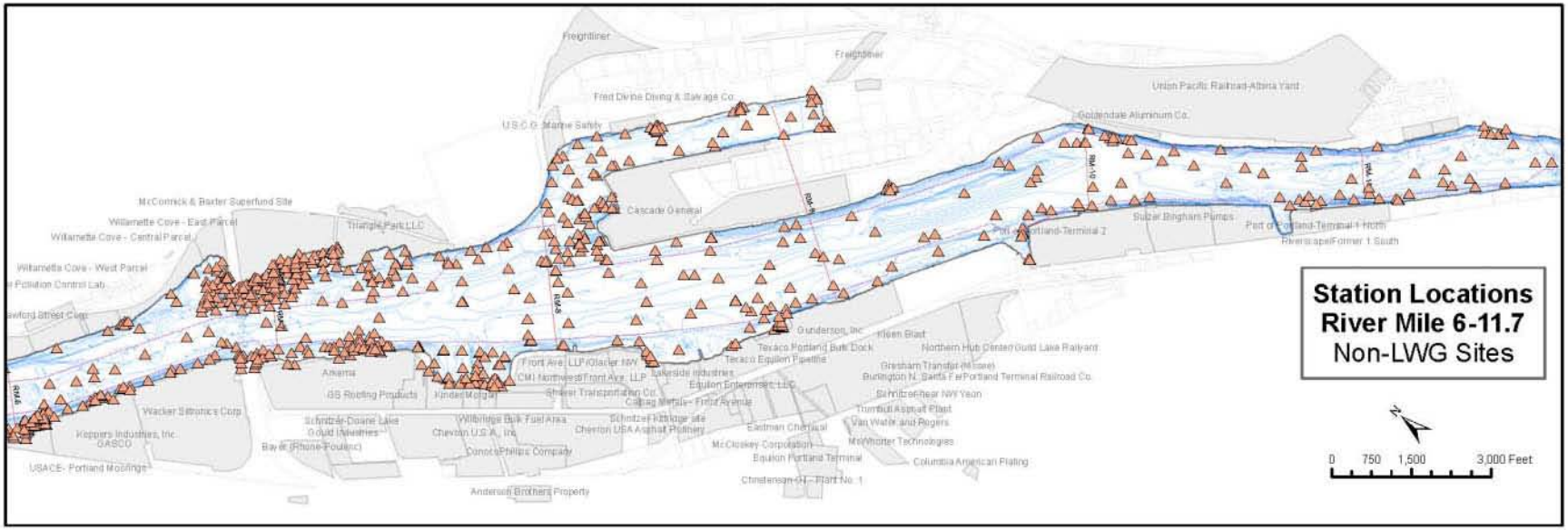
Sample Type	River Mile	Time Frame	Surface Chemistry Samples	Surface Bioassay Samples	Subsurface Samples
Non-LWG	RM 1- 12	1990 - 2004	849		729
USACE DMMP	RM 2 - 12	2005	86		72
LWG Data					
Round 1	RM 2 - 10	2002	74		0
Round 2A	RM 2 - 11	2004	555	233	609
Round 2A	RM 16 - 26	2004	18		
Round 2B	RM 2 - 11	2005	34		147
Round 3A	RM 2 - 11	2006	35		0
Round 3B	RM 1 - 12	2007	210		228
Round 3B	RM 16 - 26	2007	24	60	0
Totals			**1885**	**293**	**1785**

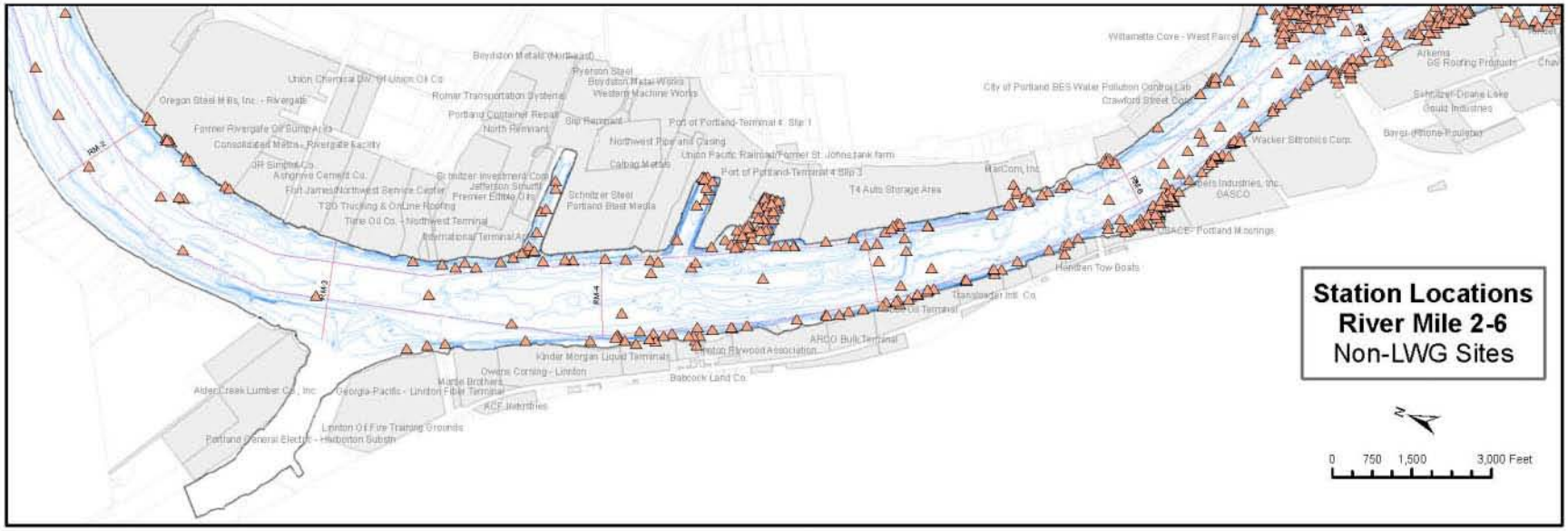
Note: Round 3B also included 52 sediment trap samples and 16 erosion cores

Sediment Chemistry Data Sources

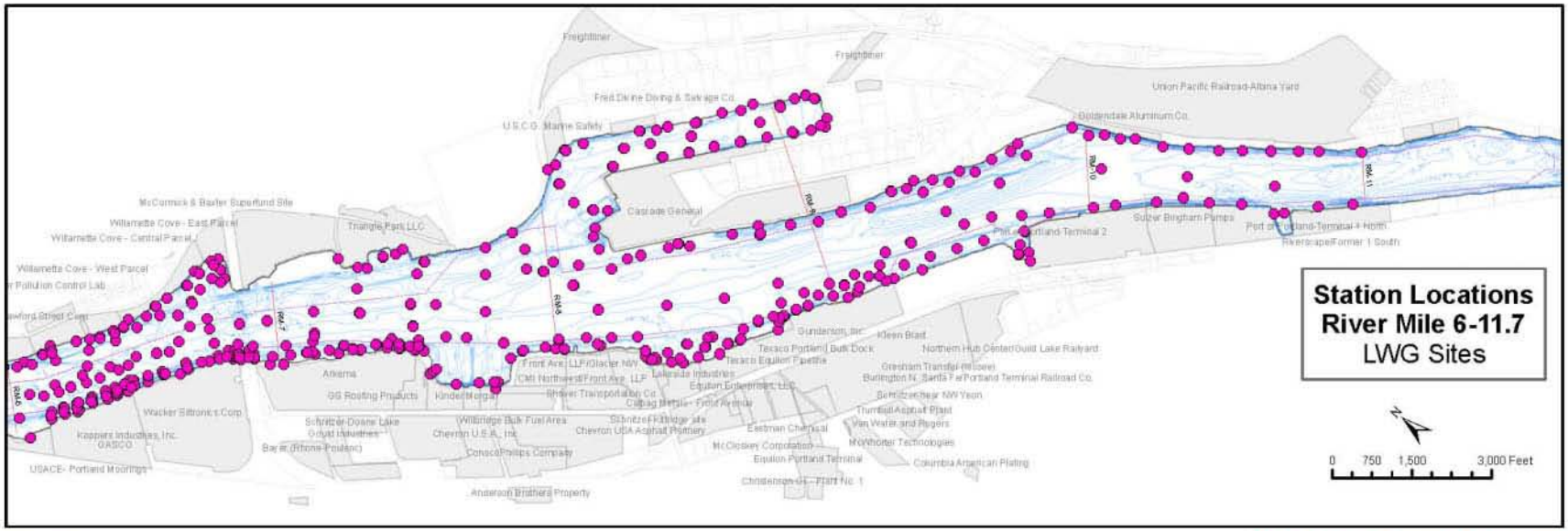
- “Historical” or Non LWG-Generated Data
  - 71 Sediment Surveys from 1990 through 2004 throughout Portland Harbor; historical Data mapped in Work Plan
  - USACE DMMP Sampling (2005)
- LWG-Generated Data
  - Round 1 – Shoreline and Surface Sediments
  - Round 2 – Shoreline, surface and subsurface sediments
  - Round 3 – Surface and subsurface sediments

Station Locations – Non-LWG

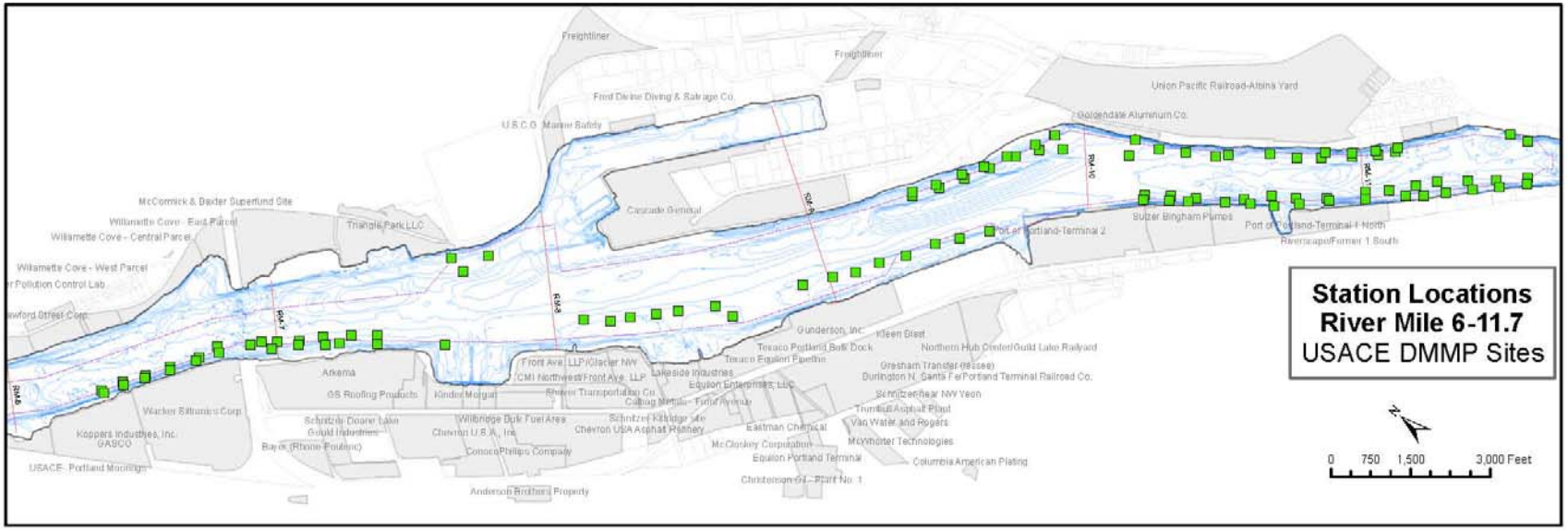


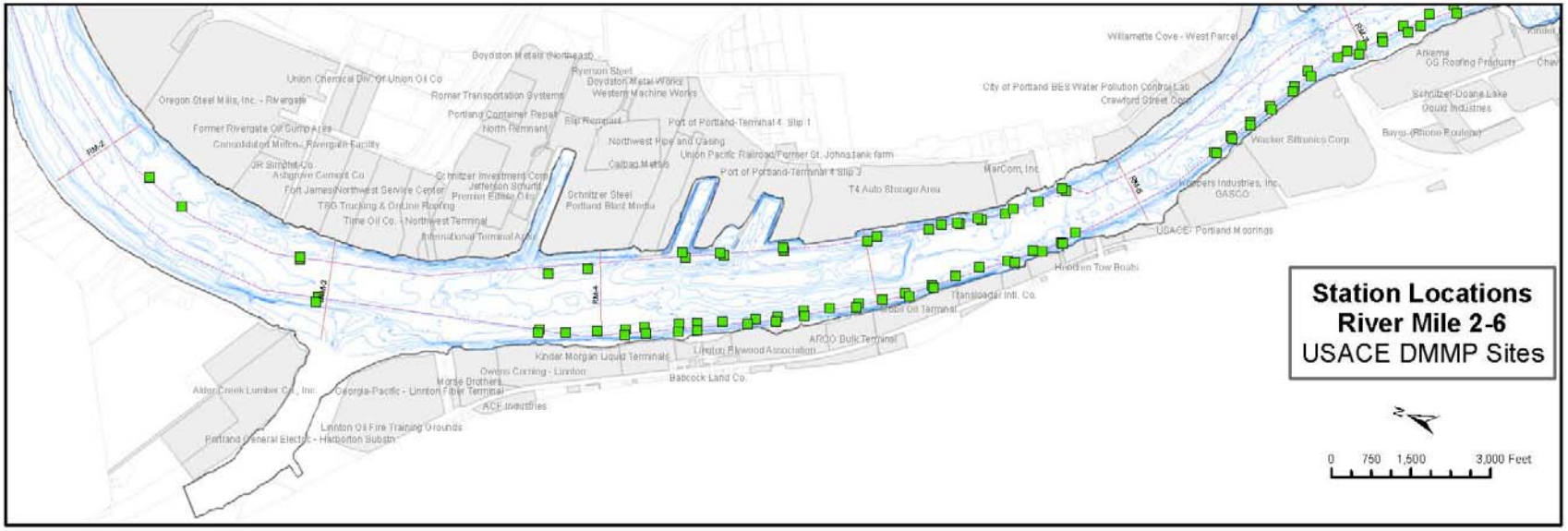


Station Locations –LWG



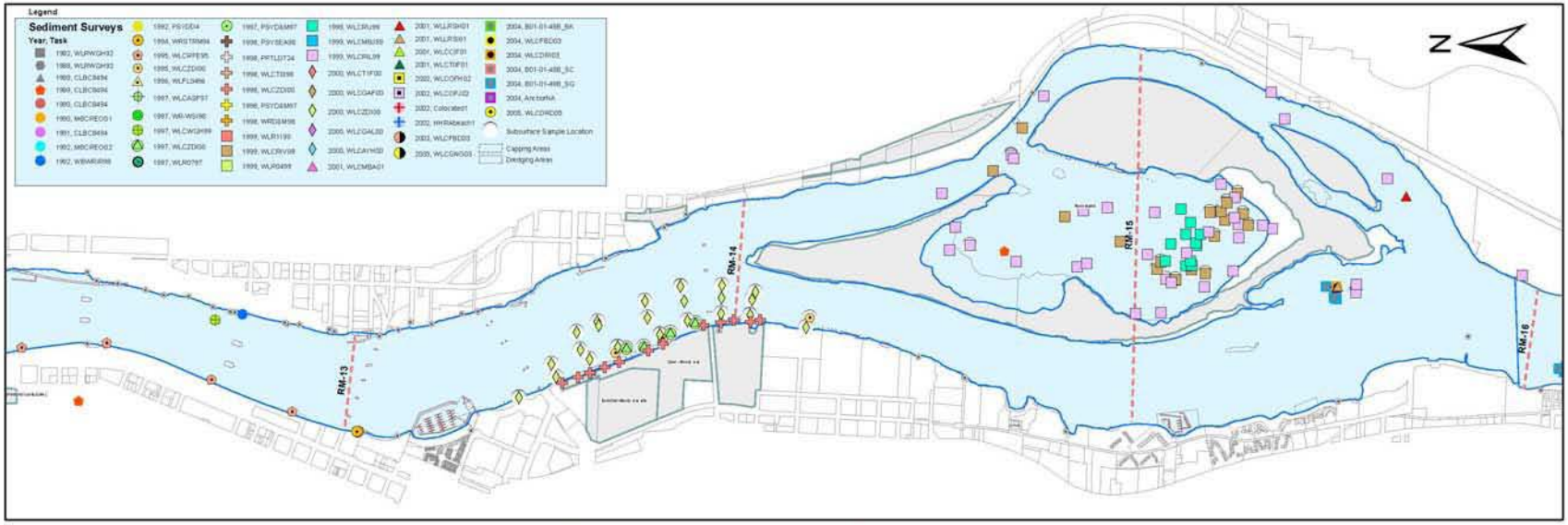
Station Locations - DMMP

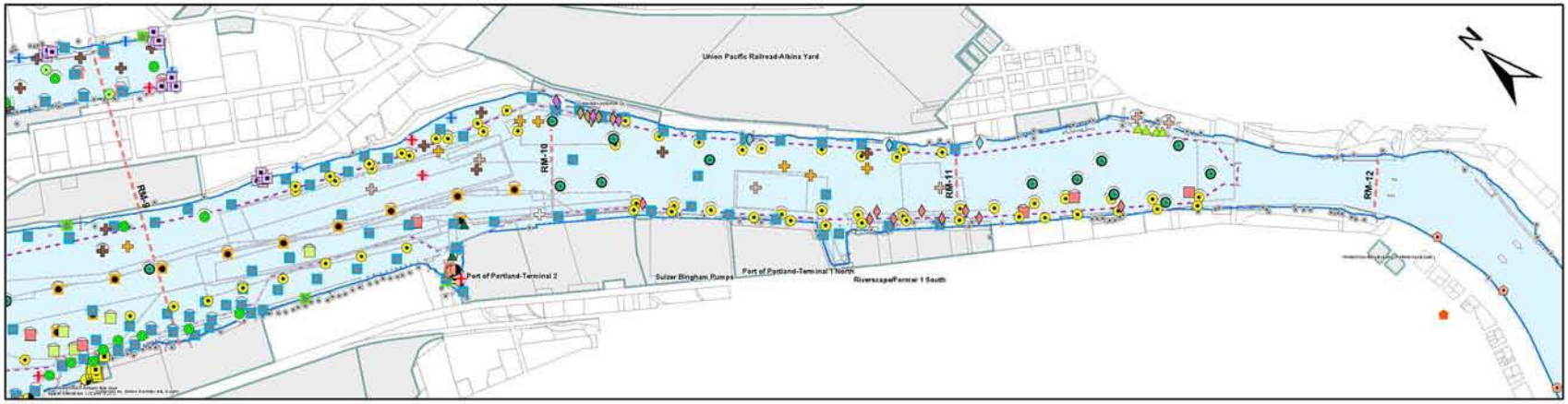




Total Station Locations

Upstream Samples – RM 9 - 16





integral

LWG
Lower Willamette Group

0 500 1,000 1,500 2,000
Feet

Map Features:
Outfalls
River Miles
Docks & Structures
Navigation Channel
River Edge

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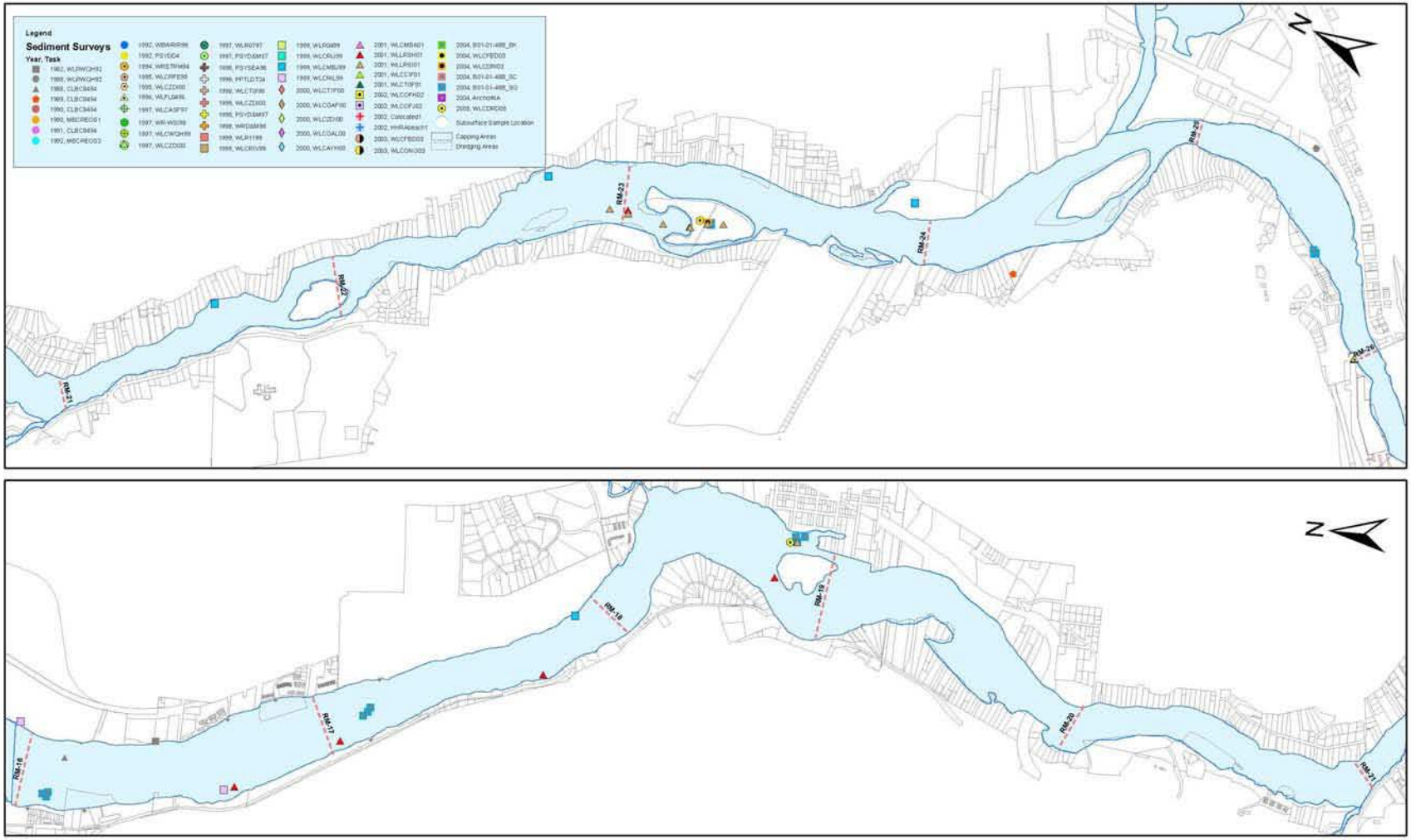
Page 1 of 2
Portland Harbor RI/FS
Existing Sediment Survey Locations
RM 9 to RM 26

Upriver Samples – RM 16 - 26



integral

LWG
Lower Willamette Group

0 500 1,000 1,500 2,000
Feet

Map Features:
- Outfalls
- River Miles
- Docks & Structures
- Navigation Channel
- River Edge

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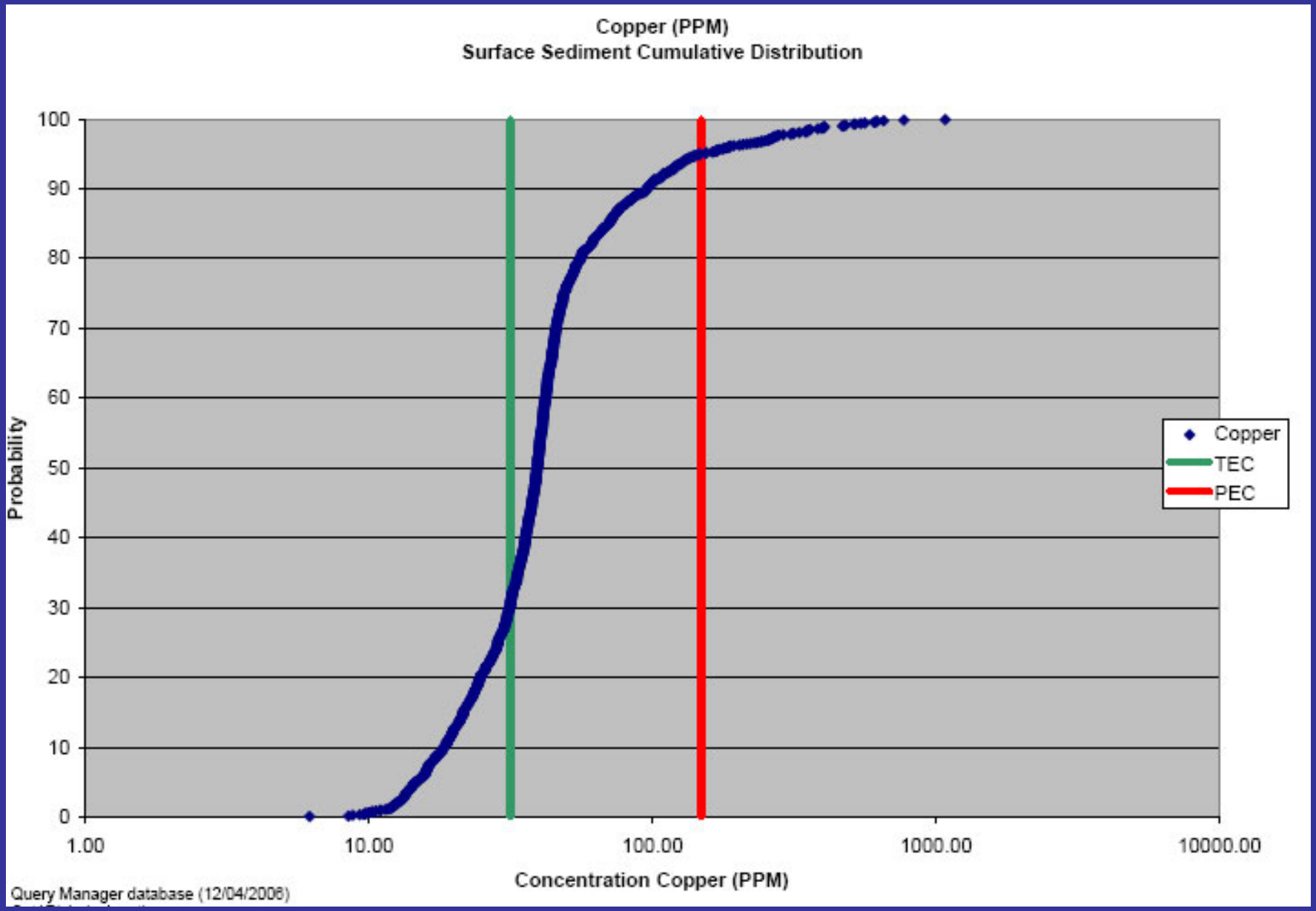
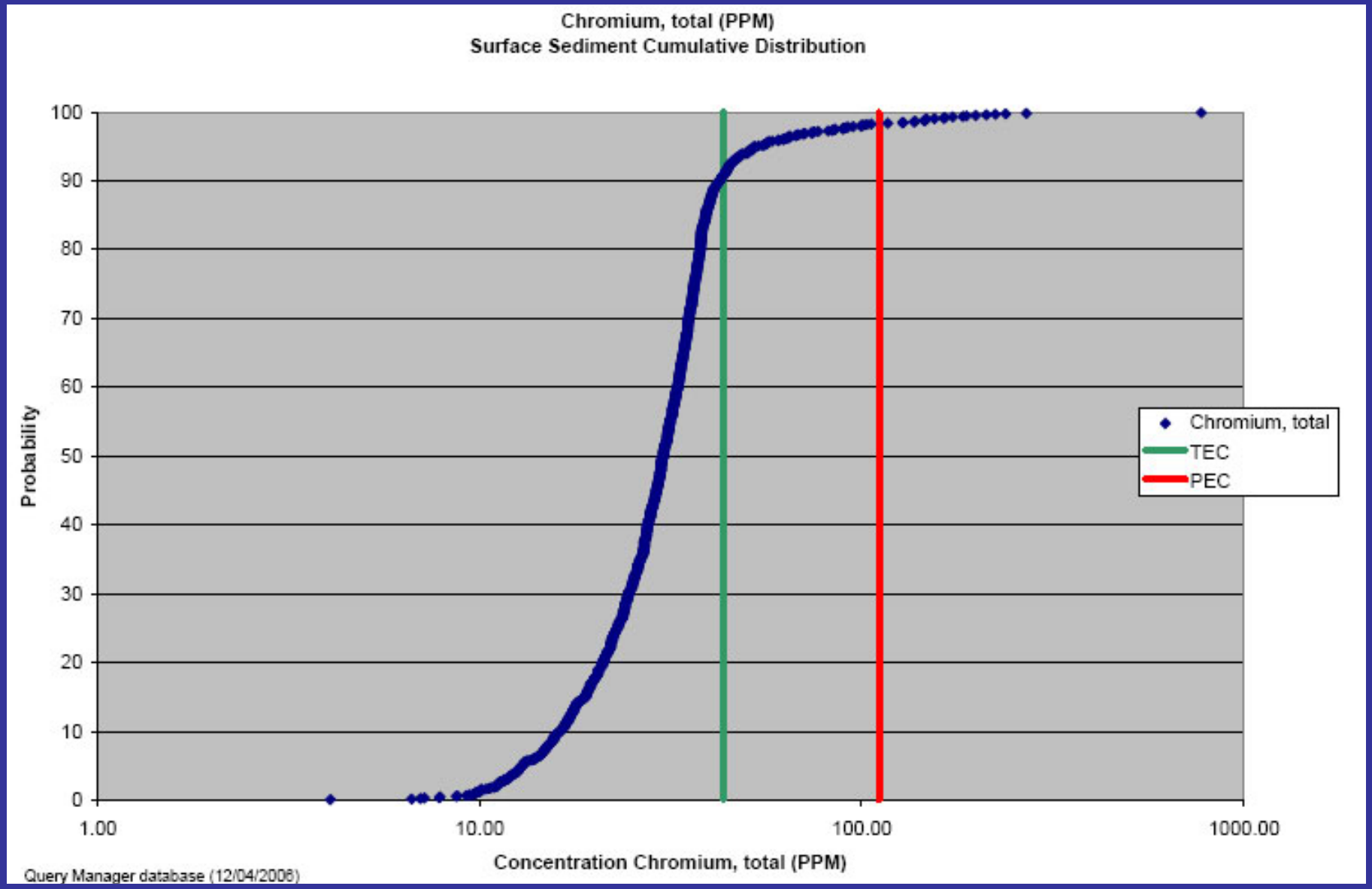
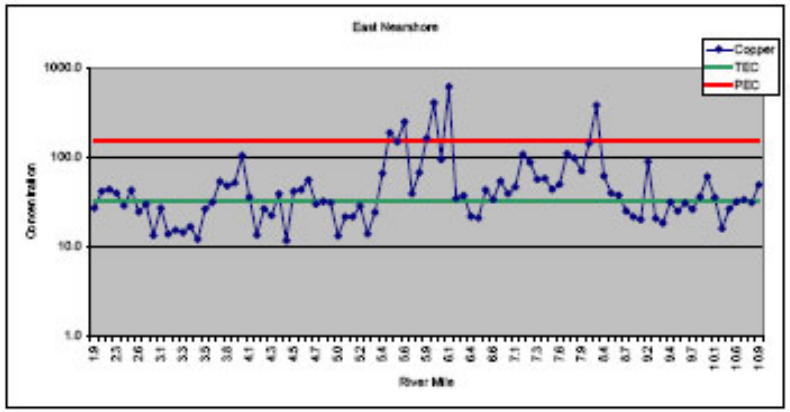
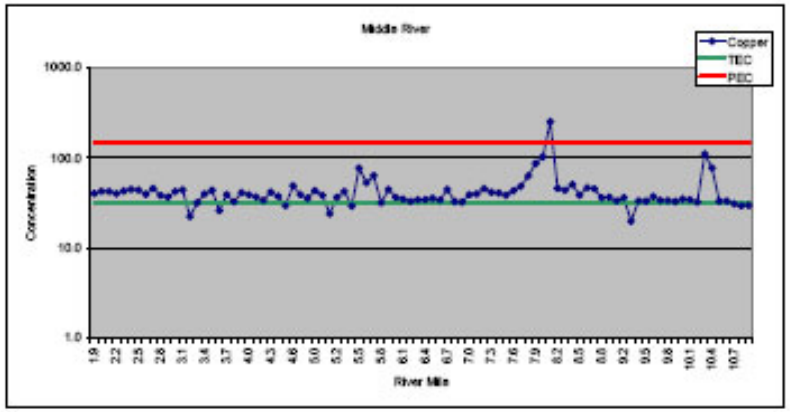
Page 2 of 2
Portland Harbor RI/FS
Existing Sediment Survey Locations
RM 9 to RM 26

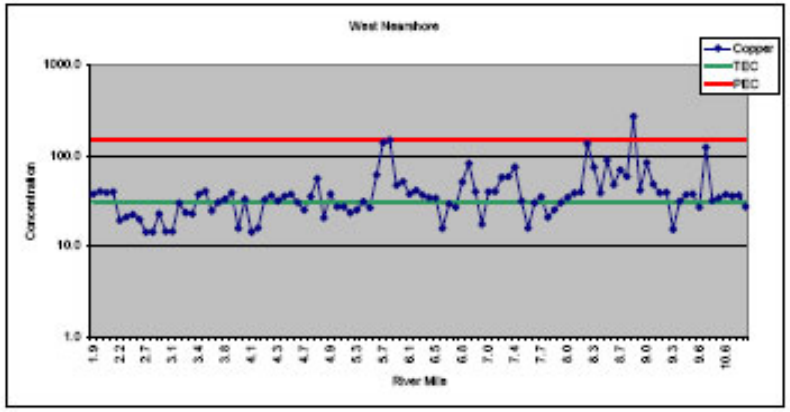

Copper (PPM)
Surface Sediment Cumulative Distribution
Probability
100
90
80
70
60
50
40
30
20
10
0
1.00
10.00
100.00
1000.00
10000.00
Concentration Copper (PPM)
Copper
TEC
PEC
Query Manager database (12/04/2006)


Chromium, total (PPM)
Surface Sediment Cumulative Distribution
Probability
100
90
80
70
60
50
40
30
20
10
0
1.00
10.00
100.00
1000.00
Concentration Chromium, total (PPM)
Chromium, total
TEC
PEC
Query Manager database (12/04/2006)

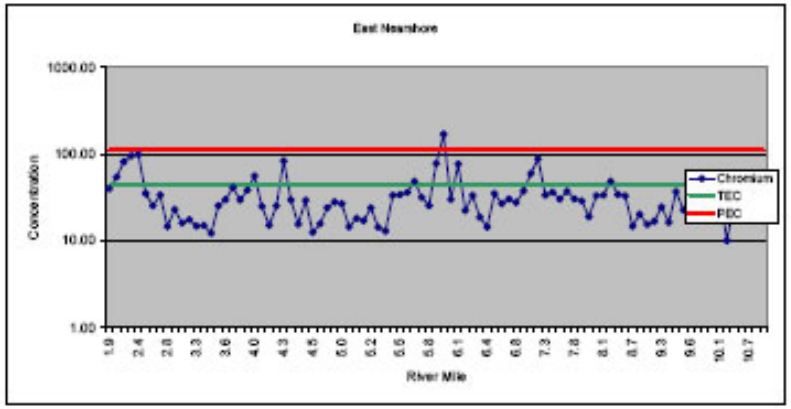
Copper (PPM) Surface Sediment
summarized by 1/10th river mile segments

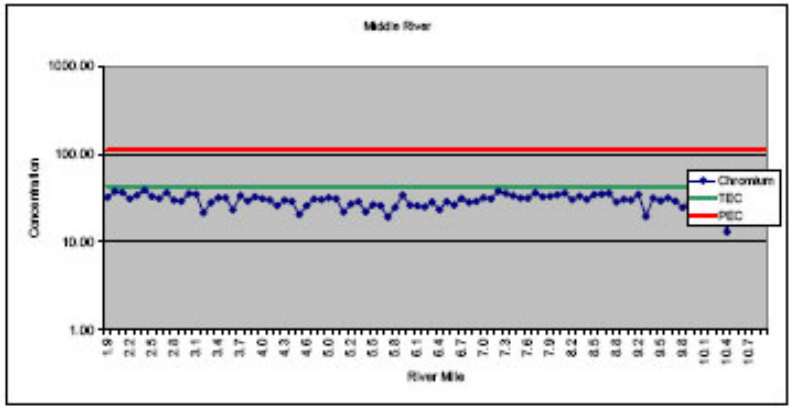


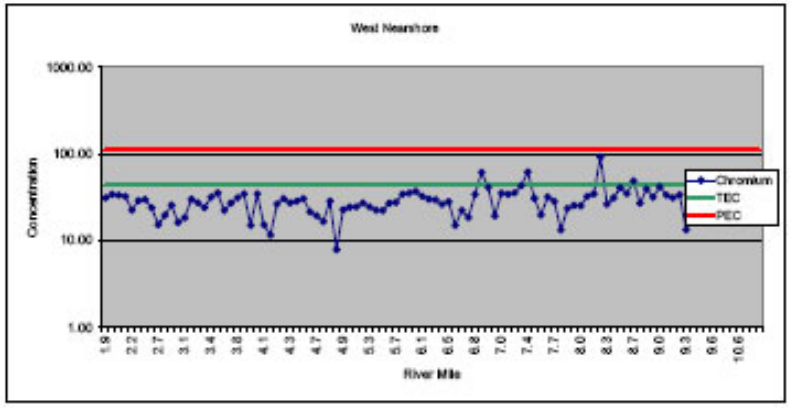


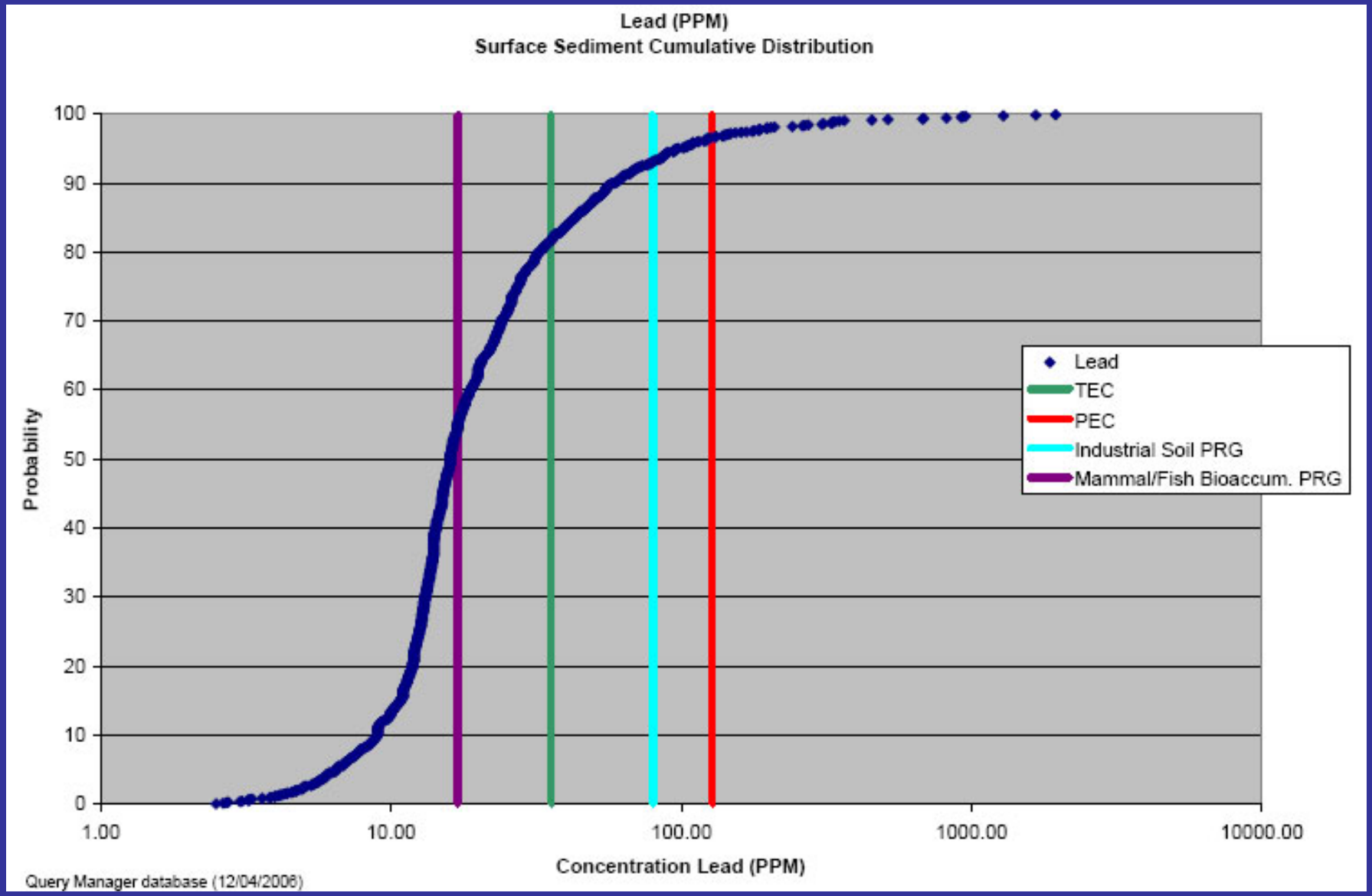


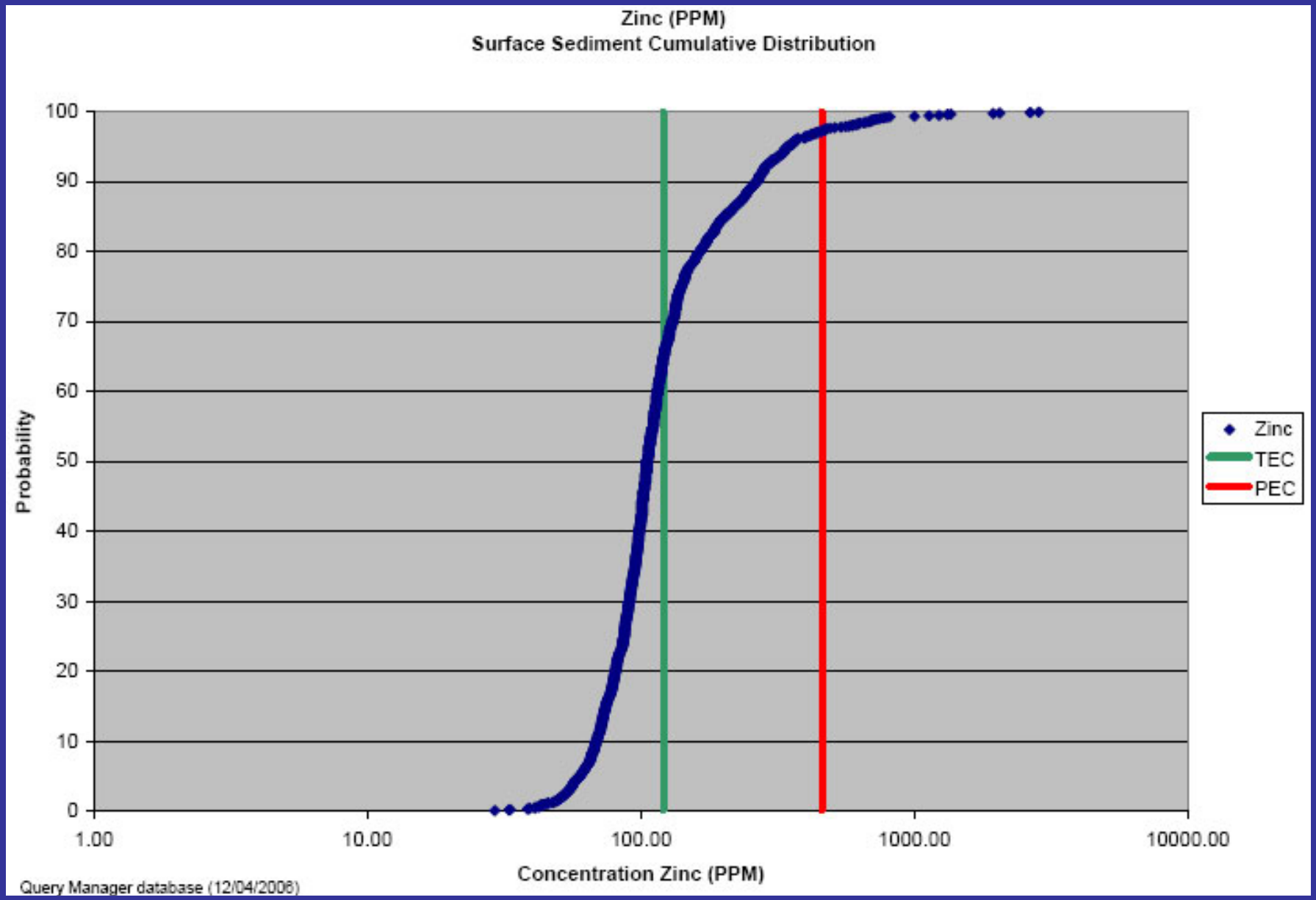
Total Chromium Surface Sediment
Summarized by 1/10th River Mile Segments



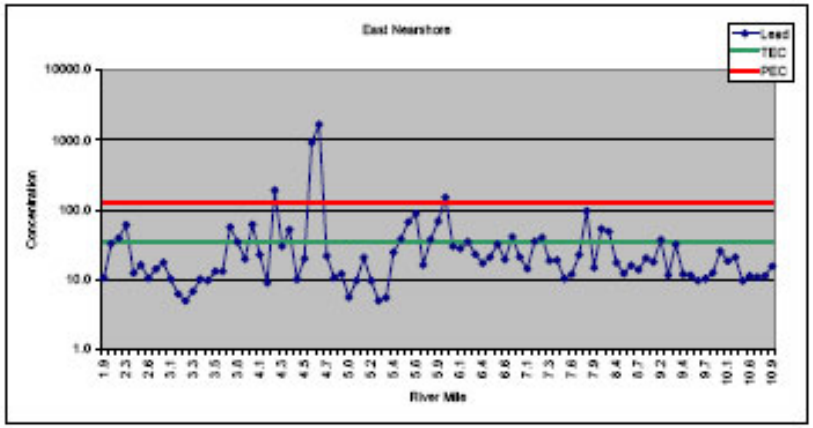


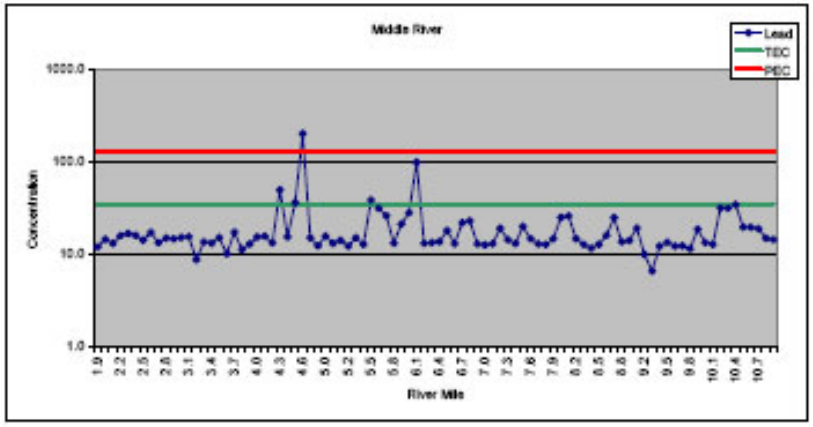


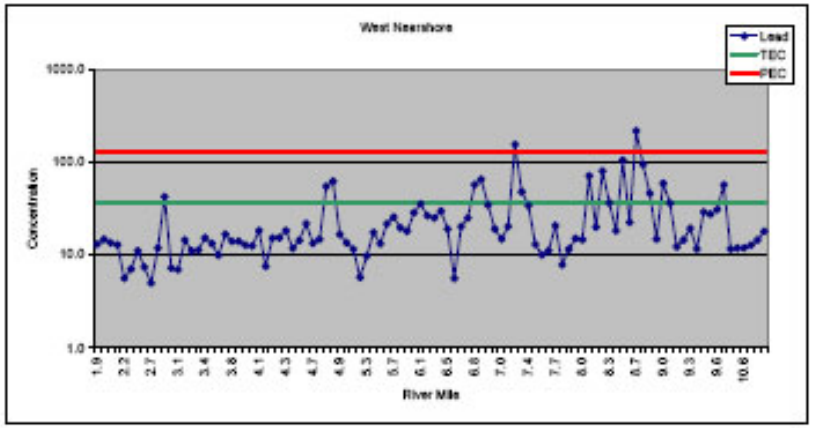

Lead (PPM)
Surface Sediment Cumulative Distribution
Probability
100
90
80
70
60
50
40
30
20
10
0
1.00
10.00
100.00
1000.00
10000.00
Concentration Lead (PPM)
Lead
TEC
PEC
Industrial Soil PRG
Mammal/Fish Bioaccum. PRG
Query Manager database (12/04/2006)


Zinc (PPM)
Surface Sediment Cumulative Distribution
Probability
100
90
80
70
60
50
40
30
20
10
0
1.00
10.00
100.00
1000.00
10000.00
Concentration Zinc (PPM)
Zinc
TEC
PEC
Query Manager database (12/04/2006)

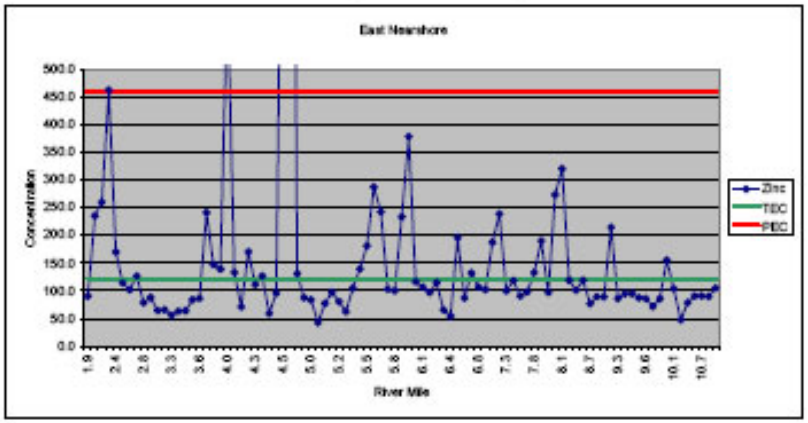
Lead (PPM) Surface Sediment
summarized by 1/10th river mile segments

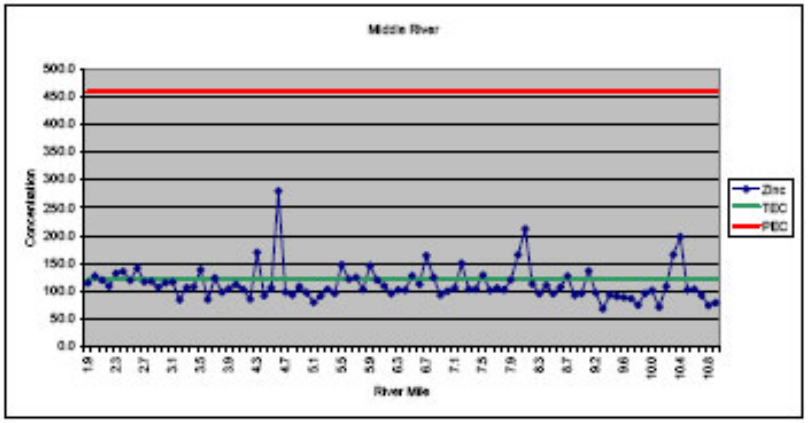


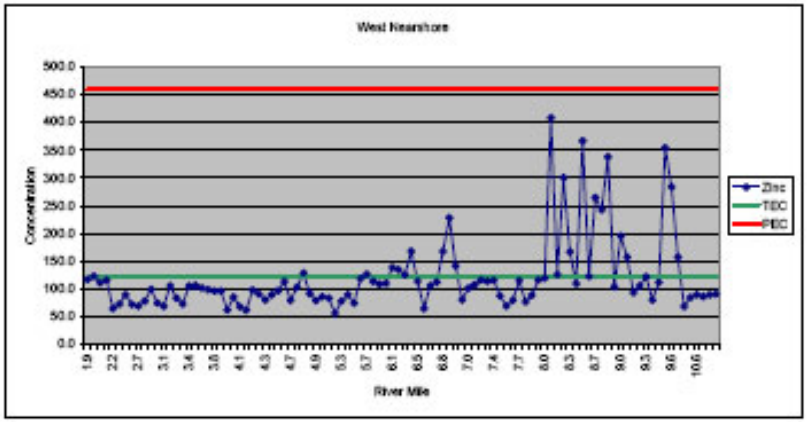


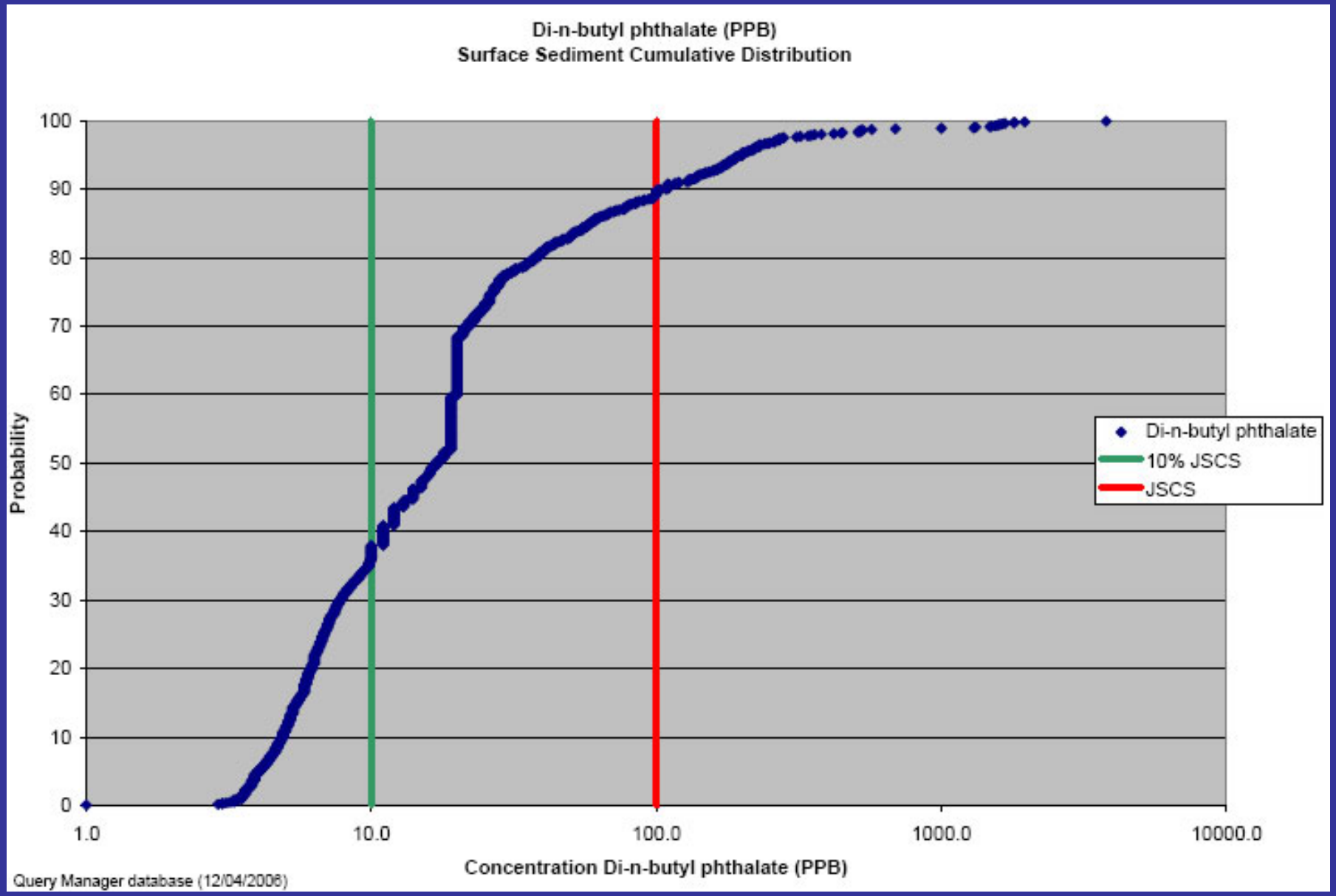


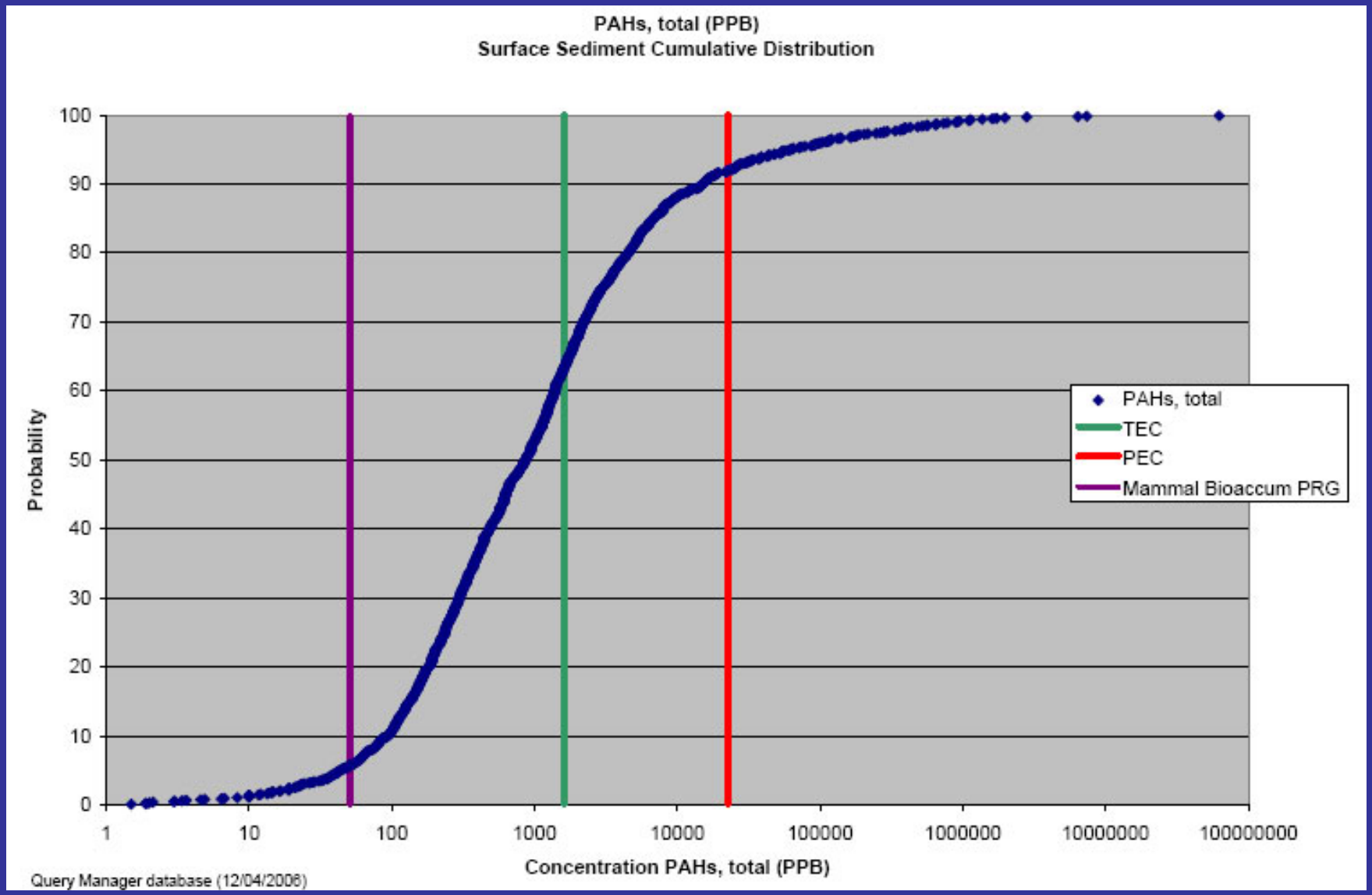
Zinc (PPM) Surface Sediment
summarized by 1/10th river mile segments



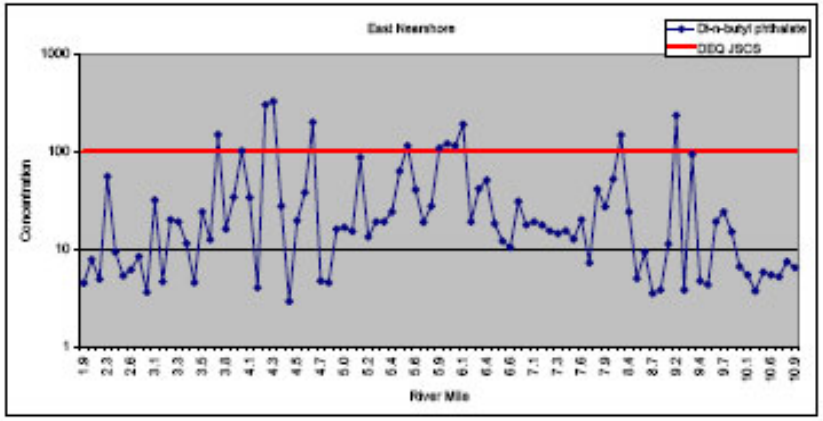


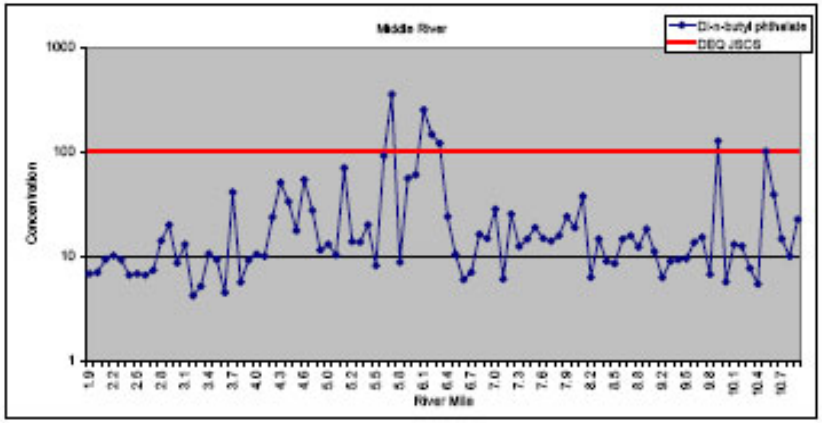


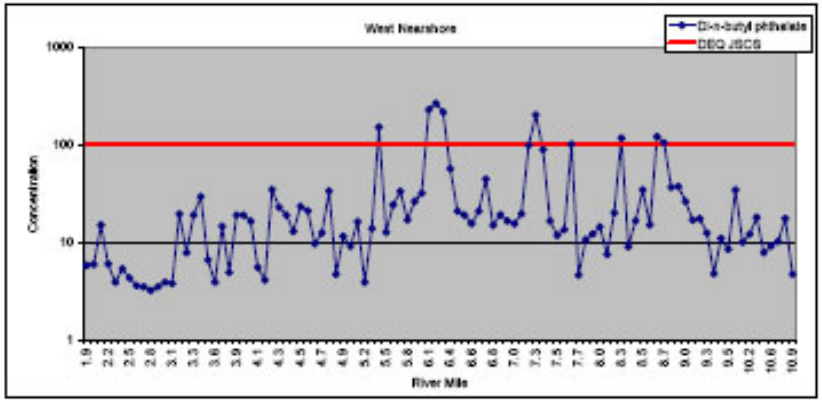

Di-n-butyl phthalate (PPB)
Surface Sediment Cumulative Distribution
Probability
100
90
80
70
60
50
40
30
20
10
0
1.0
10.0
100.0
1000.0
10000.0
Concentration Di-n-butyl phthalate (PPB)
Di-n-butyl phthalate
10% JSCS
JSCS
Query Manager database (12/04/2006)


PAHs, total (PPB)
Surface Sediment Cumulative Distribution
Probability
100
90
80
70
60
50
40
30
20
10
0
1
10
100
1000
10000
100000
1000000
10000000
100000000
Concentration PAHs, total (PPB)
PAHs, total
TEC
PEC
Mammal Bioaccum PRG
Query Manager database (12/04/2006)

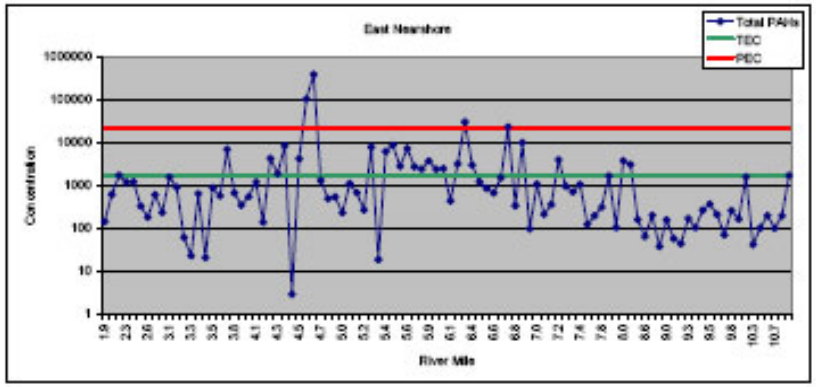
Di-n-butyl phthalate (PPB) in Surface Sediment
Summarized by River Mile Segments

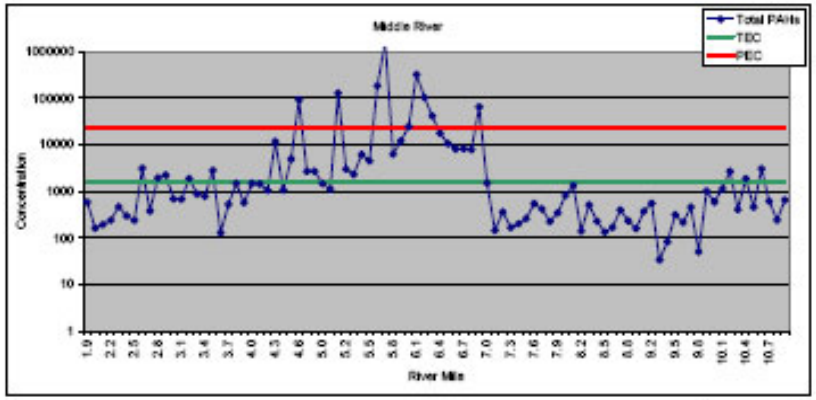


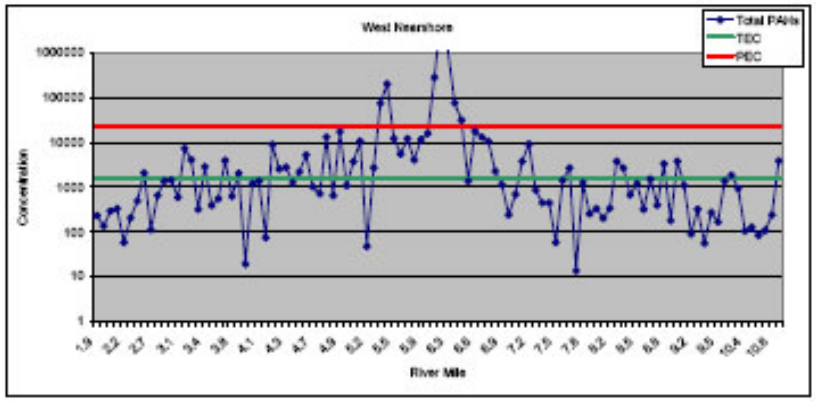


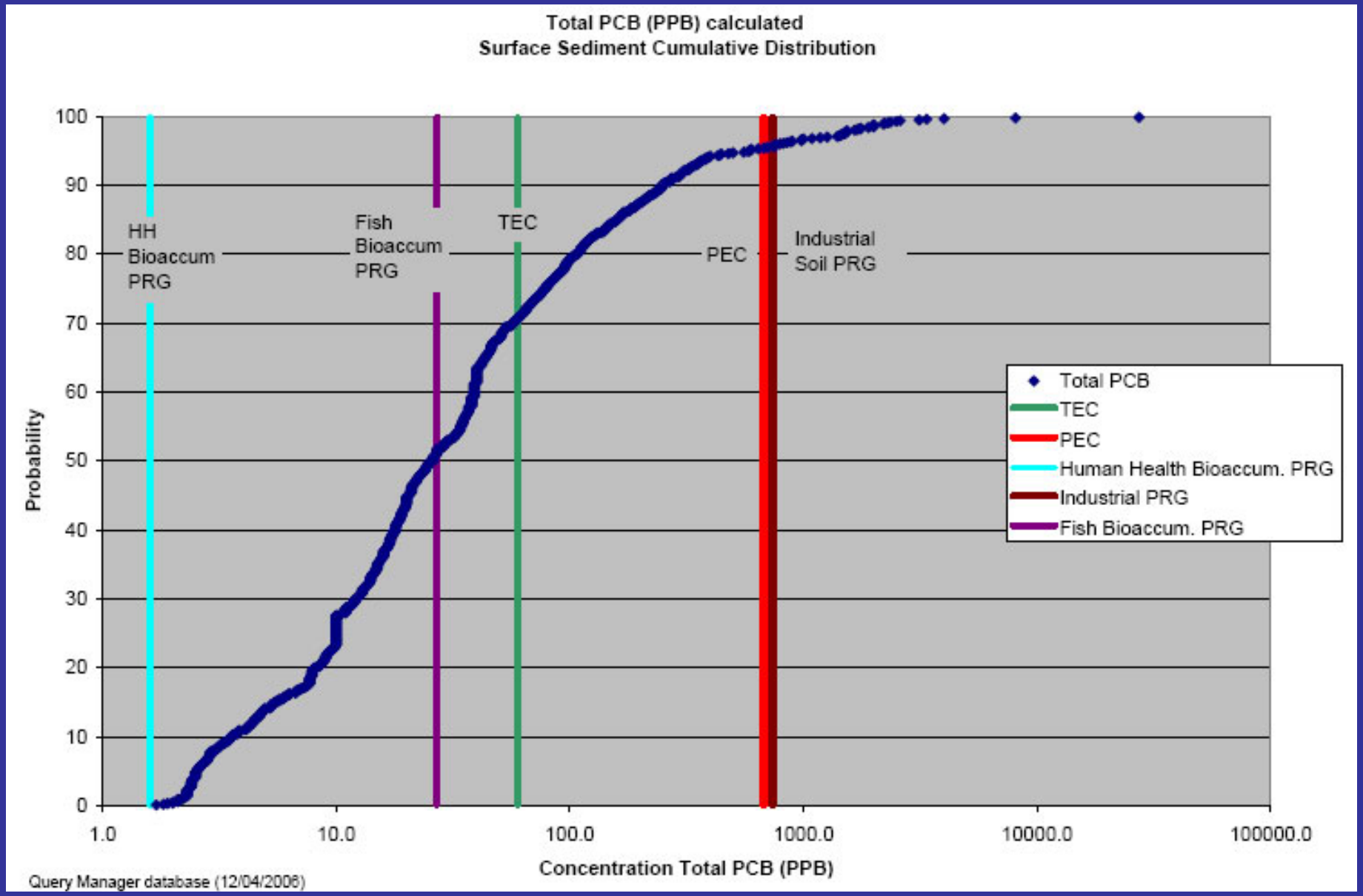


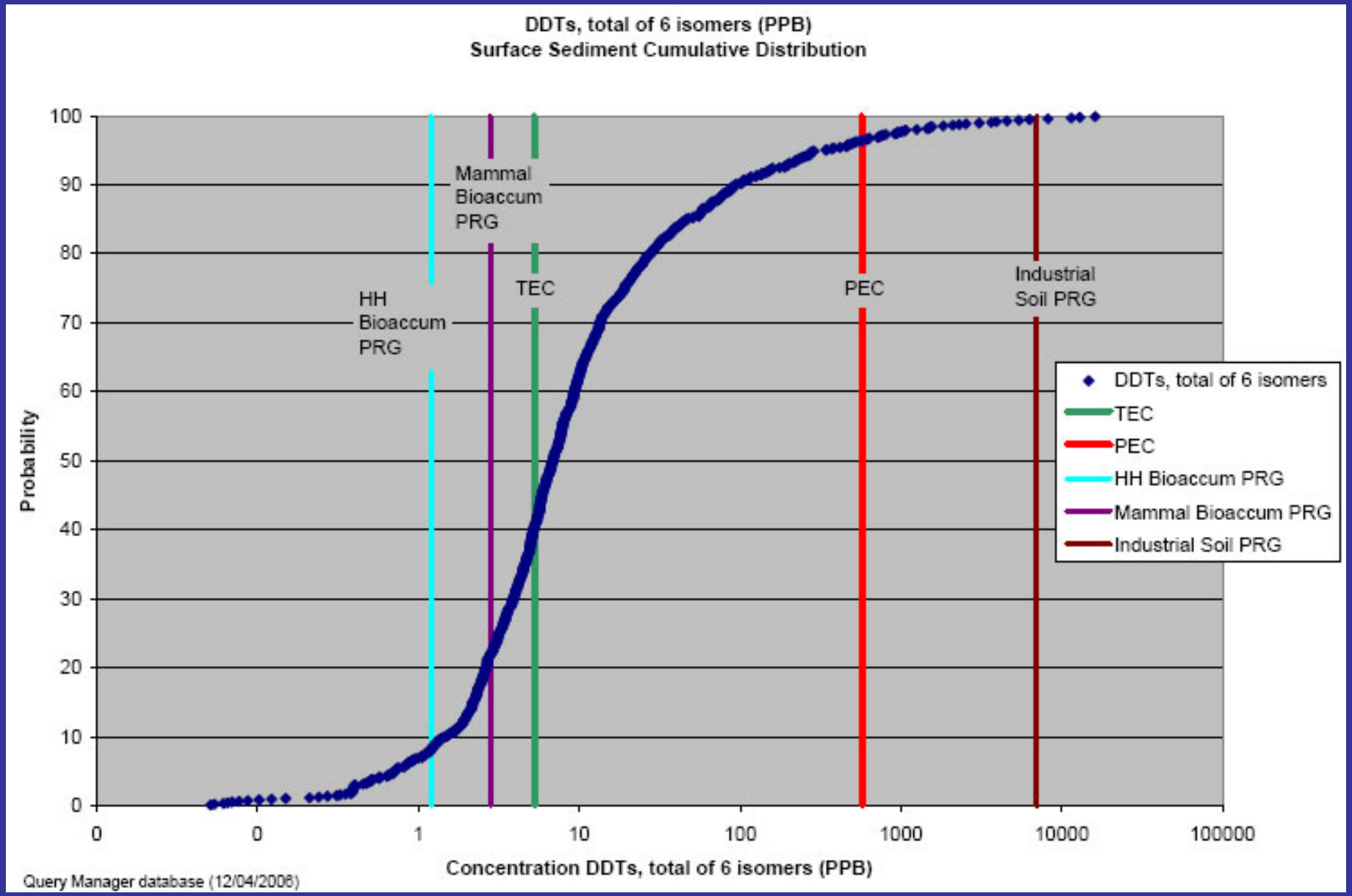
Total PAHs Surface Sediment
Summarized by River Mile Segments



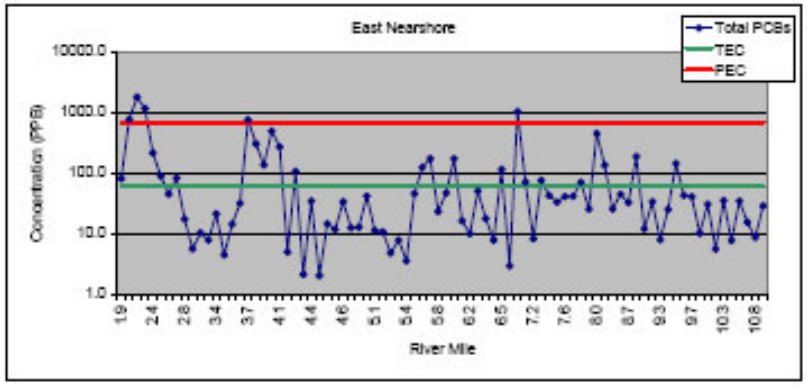


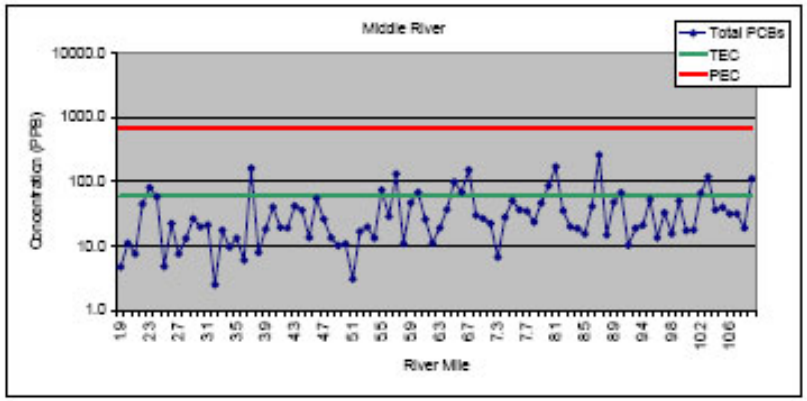


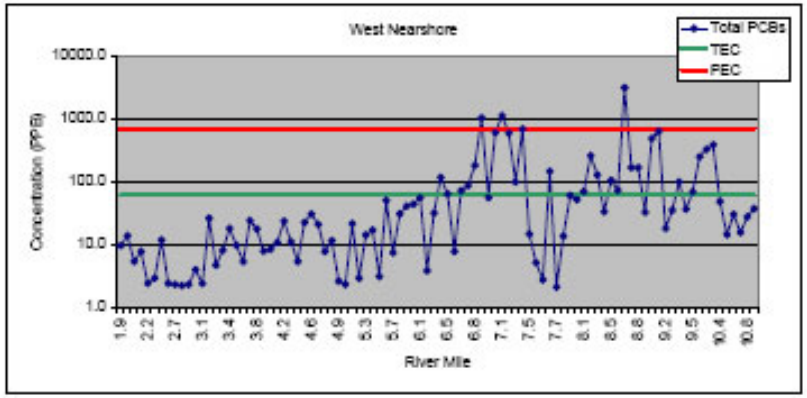

Total PCB (PPB) calculated
Surface Sediment Cumulative Distribution
Probability
100
90
80
70
60
50
40
30
20
10
0
1.0
10.0
100.0
1000.0
10000.0
100000.0
Concentration Total PCB (PPB)
HH Bioaccum PRG
Fish Bioaccum PRG
TEC
PEC
Industrial Soil PRG
Total PCB
TEC
PEC
Human Health Bioaccum. PRG
Industrial PRG
Fish Bioaccum. PRG
Query Manager database (12/04/2006)


DDTs, total of 6 isomers (PPB)
Surface Sediment Cumulative Distribution
Probability
100
90
80
70
60
50
40
30
20
10
0
0
0
1
10
100
1000
10000
100000
Concentration DDTs, total of 6 isomers (PPB)
Mammal Bioaccum PRG
HH Bioaccum PRG
TEC
PEC
Industrial Soil PRG
DDTs, total of 6 isomers
TEC
PEC
HH Bioaccum PRG
Mammal Bioaccum PRG
Industrial Soil PRG
Query Manager database (12/04/2006)

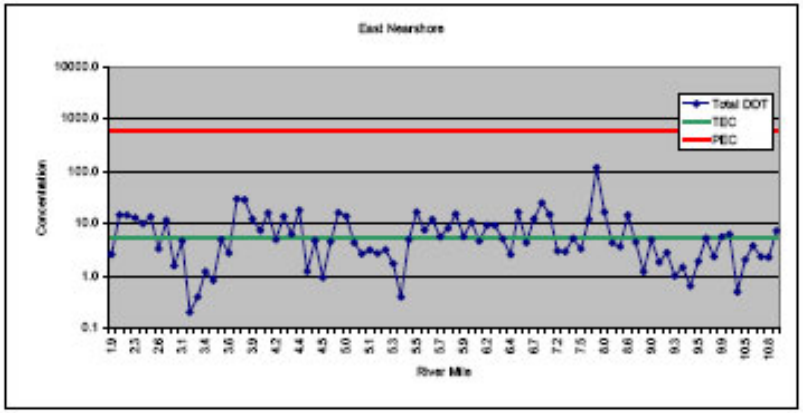
Total PCBs Surface Sediment
Summarized by River Mile Segments

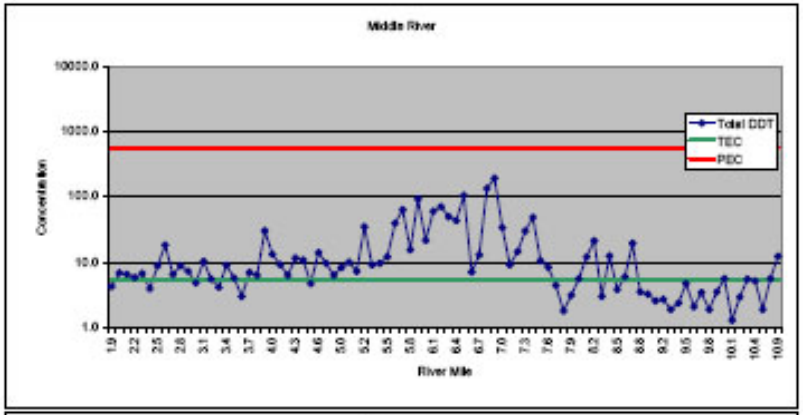


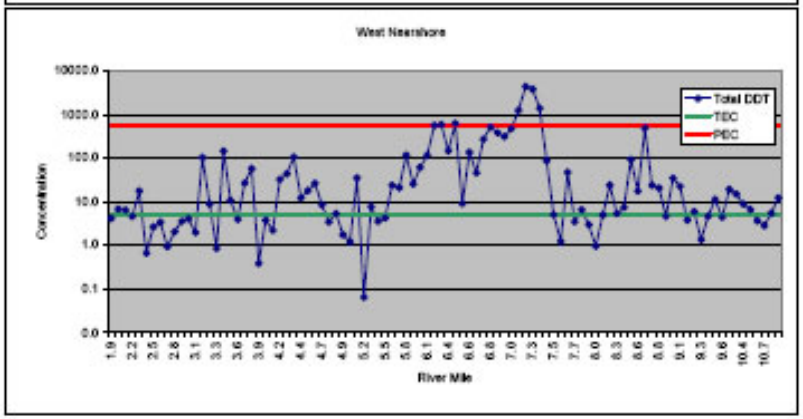


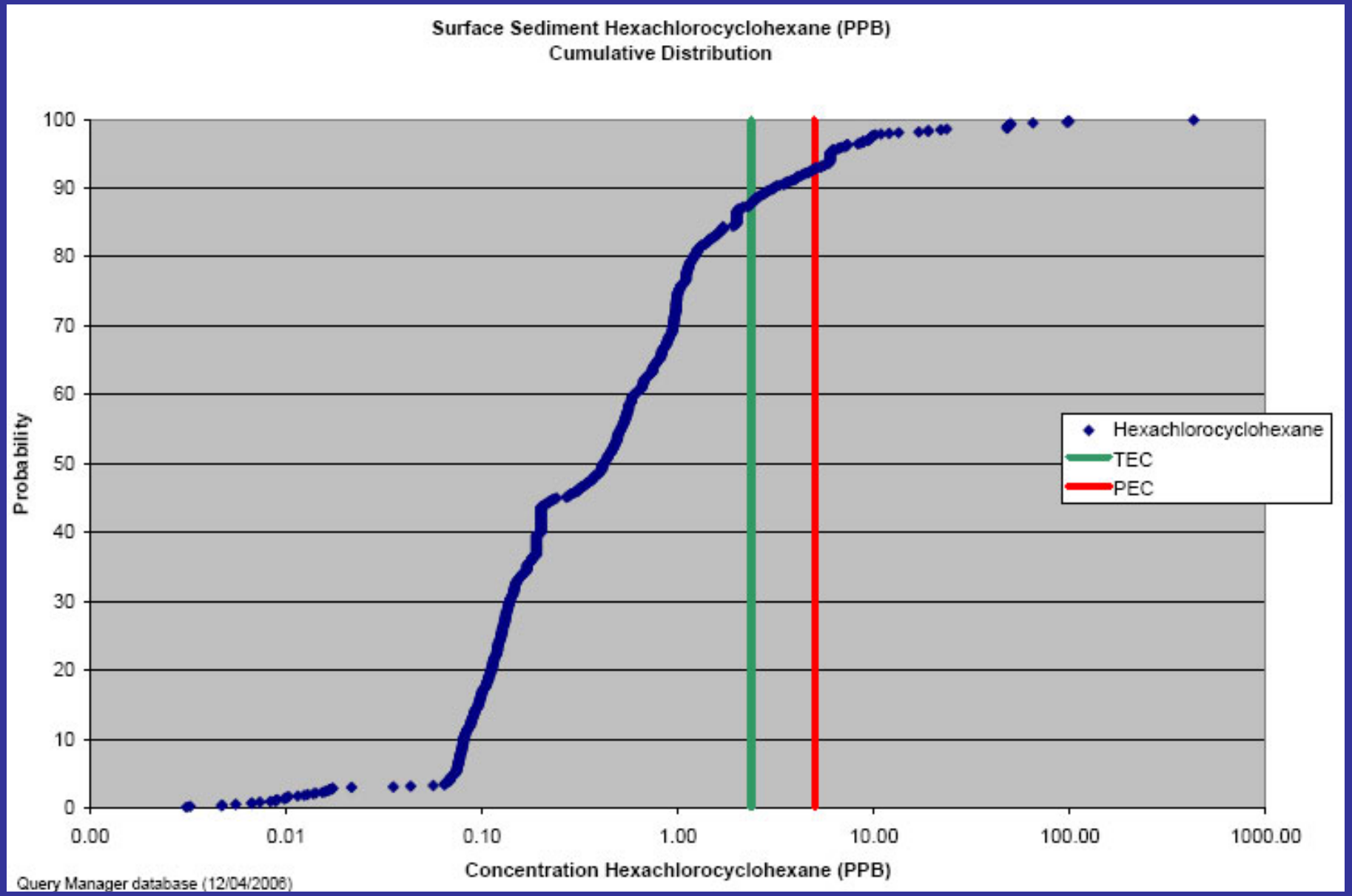


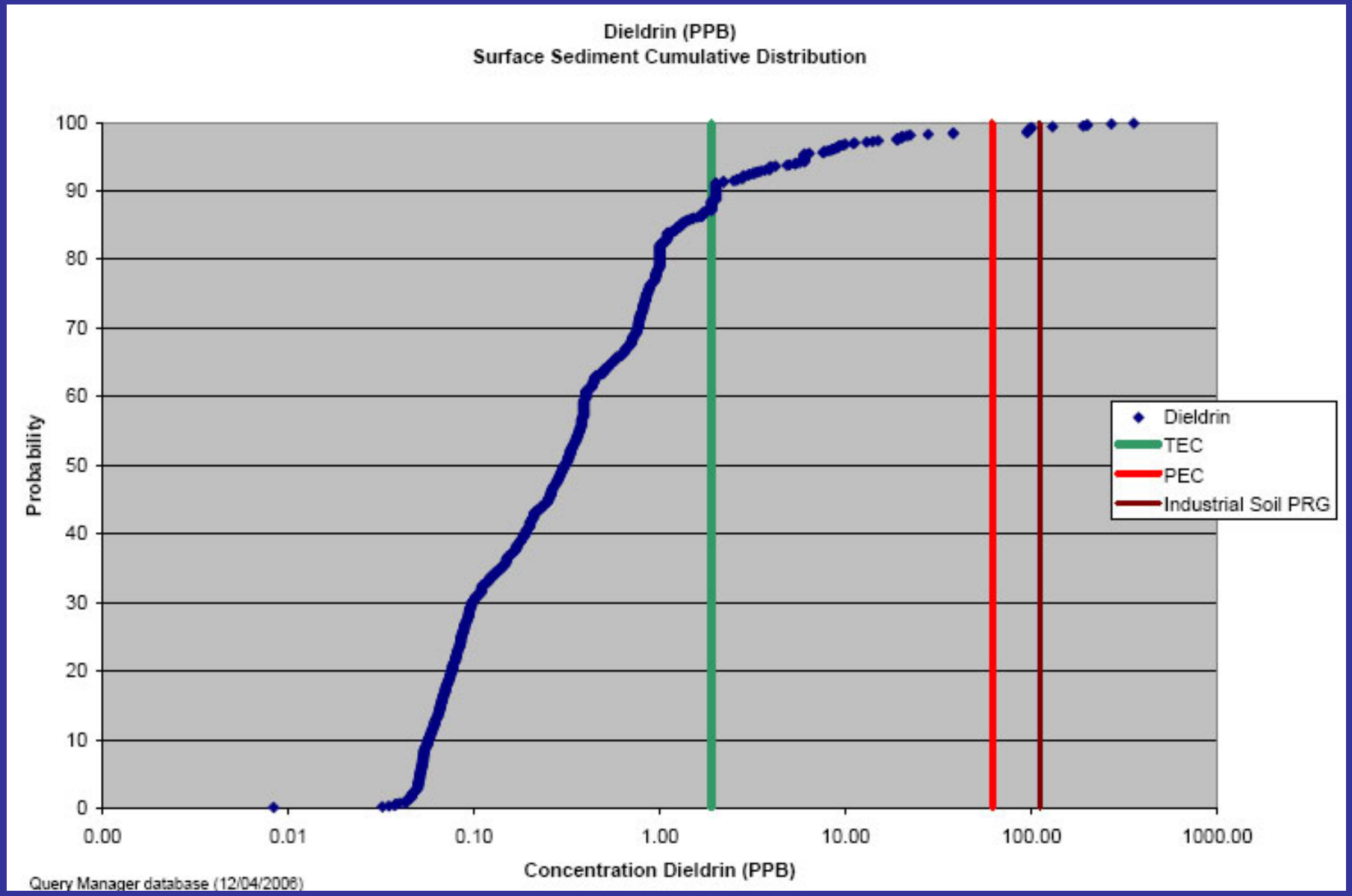
Total DDT Surface Sediment
Summarized by 1/10th River Mile Segments



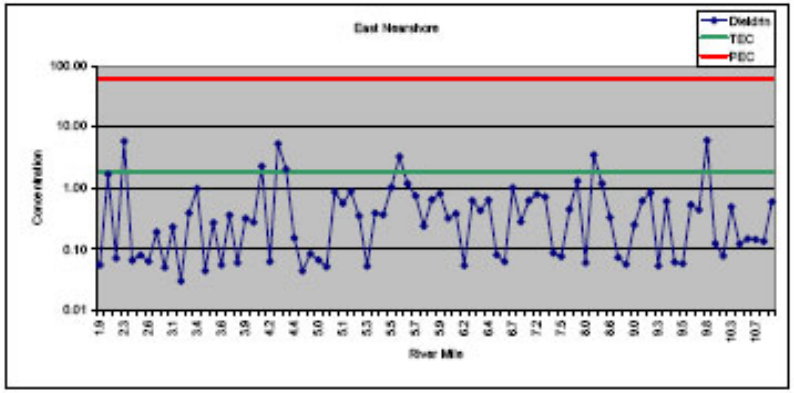


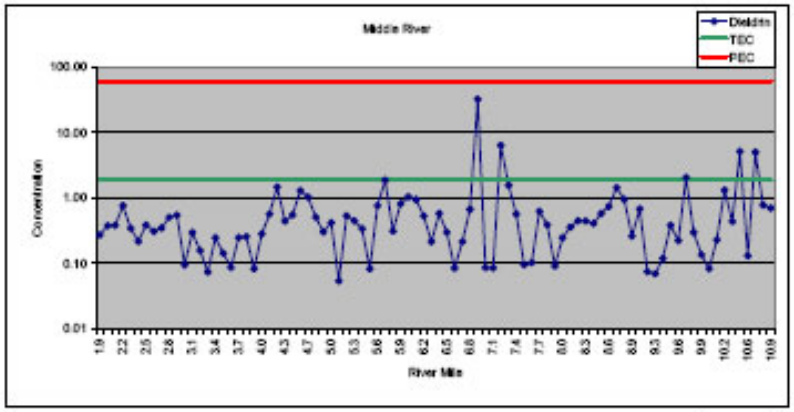


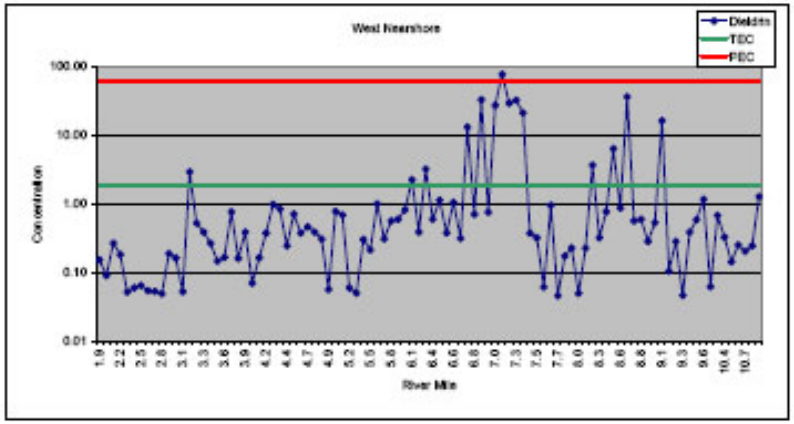

Surface Sediment Hexachlorocyclohexane (PPB)
Cumulative Distribution
Probability
100
90
80
70
60
50
40
30
20
10
0
0.00
0.01
0.10
1.00
10.00
100.00
1000.00
Concentration Hexachlorocyclohexane (PPB)
Hexachlorocyclohexane
TEC
PEC
Query Manager database (12/04/2006)


Dieldrin (PPB)
Surface Sediment Cumulative Distribution
Probability
100
90
80
70
60
50
40
30
20
10
0
0.00
0.01
0.10
1.00
10.00
100.00
1000.00
Concentration Dieldrin (PPB)
Dieldrin
TEC
PEC
Industrial Soil PRG
Query Manager database (12/04/2006)

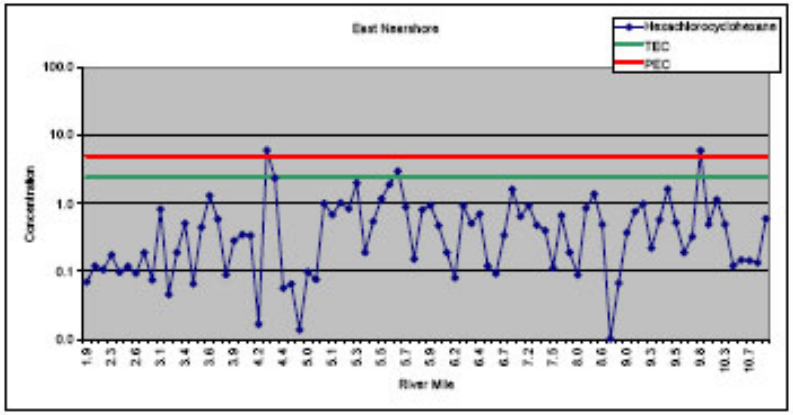
Dieldrin in Surface Sediment
Summarized by River Mile Segments

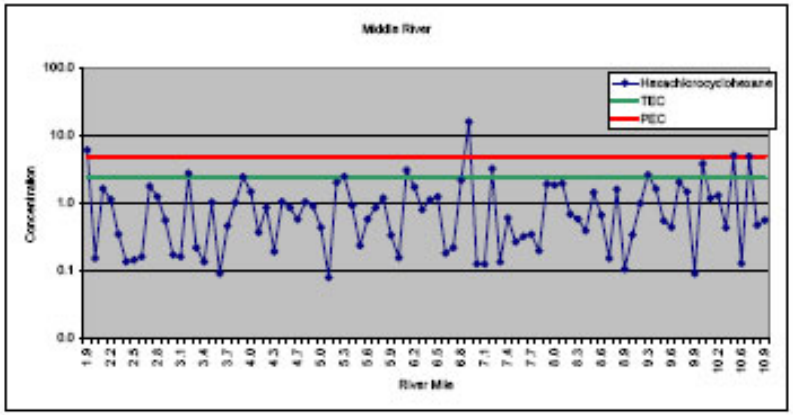


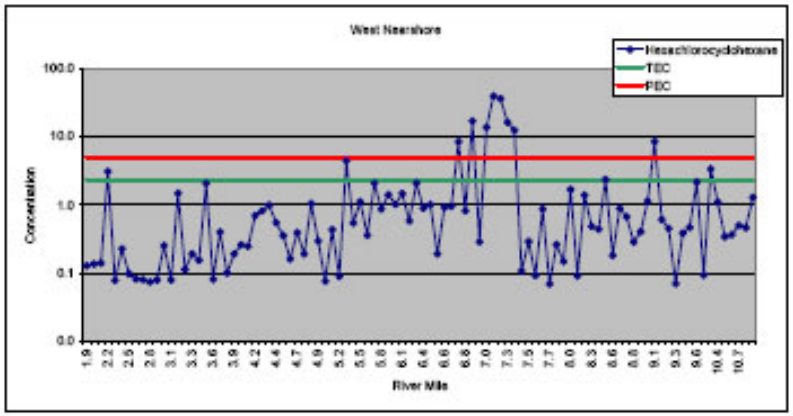




Hexachlorocyclohexane (PPB) Surface Sediment
summarized by 1/10th river mile segments



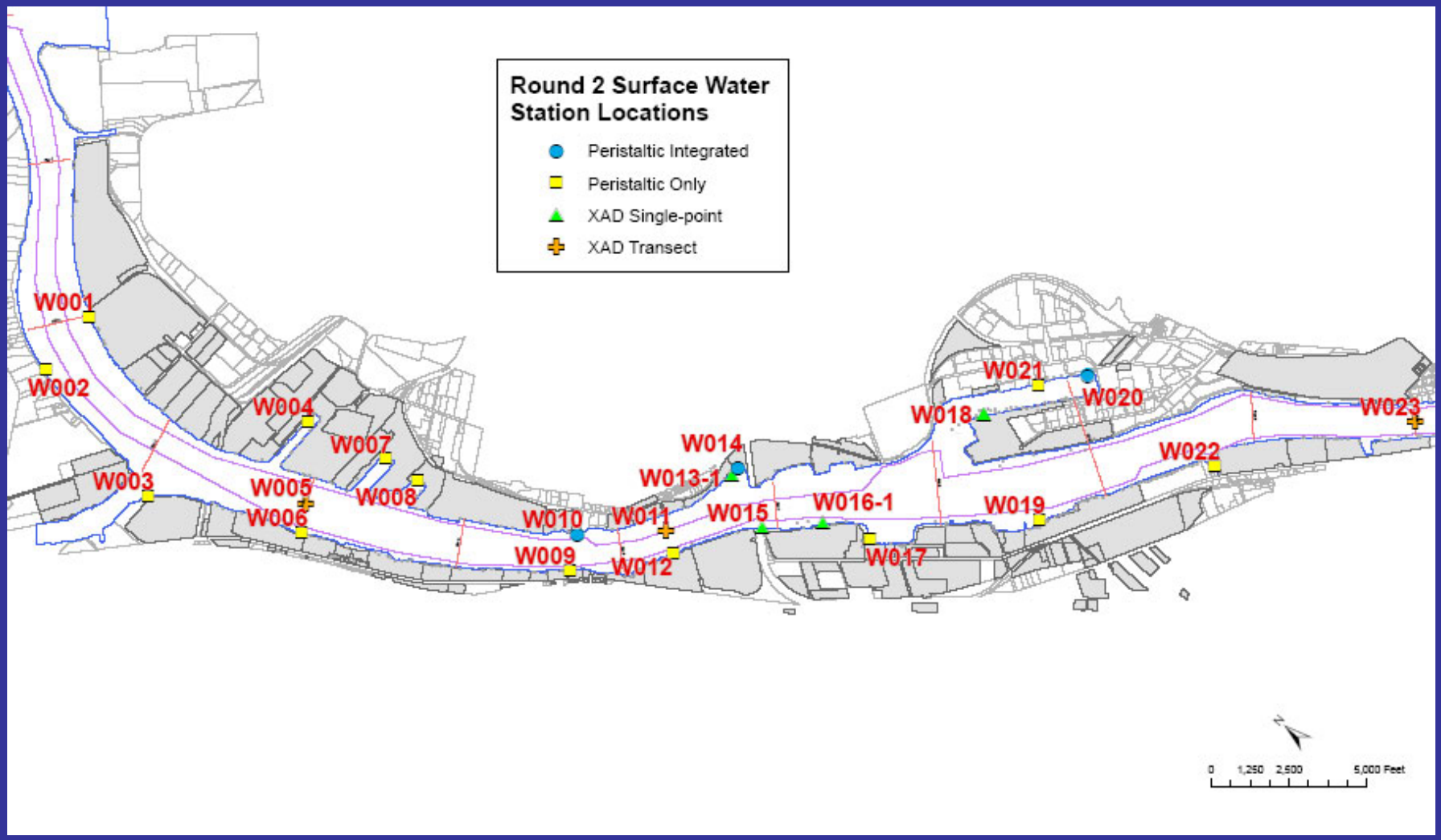




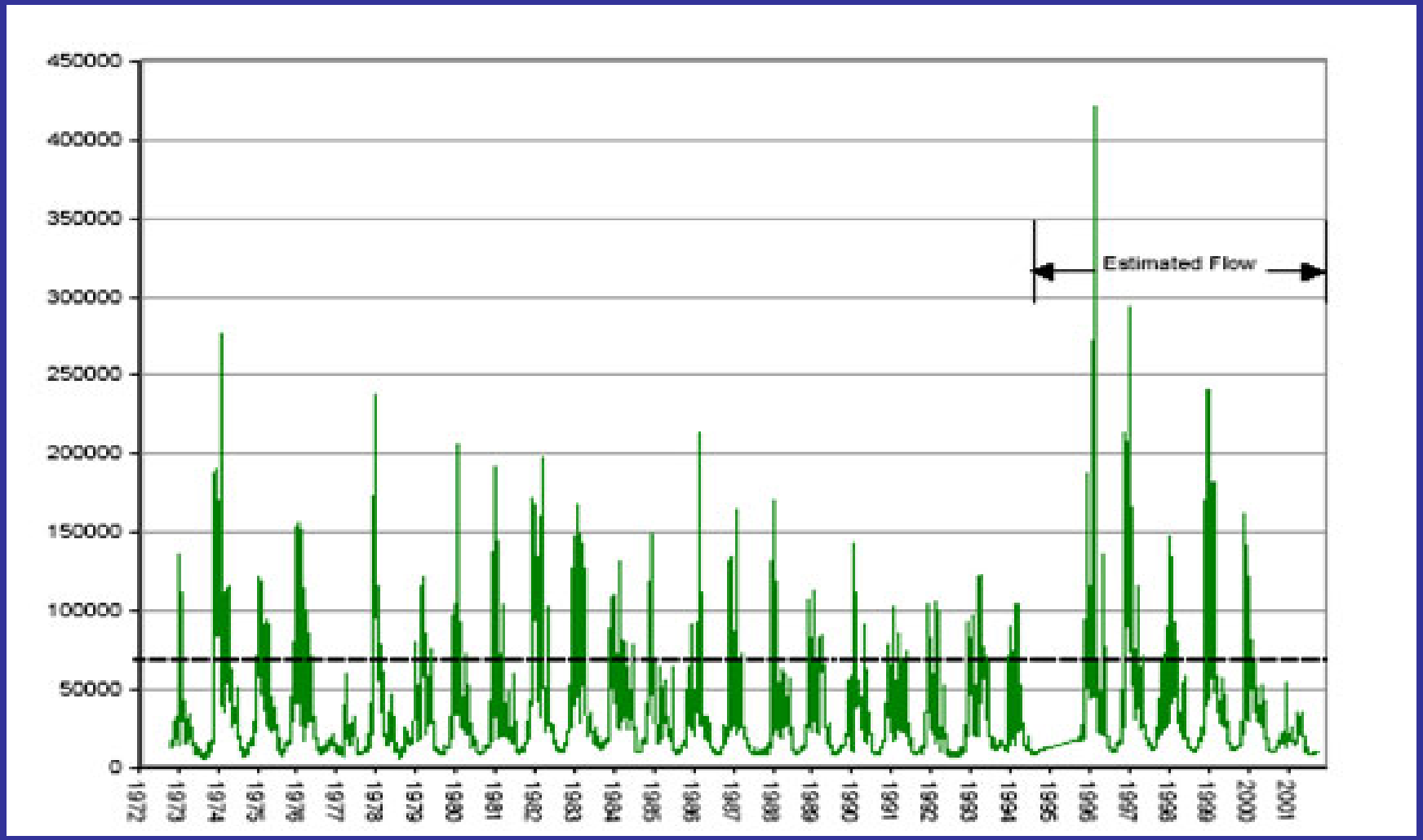
Surface Water Sampling

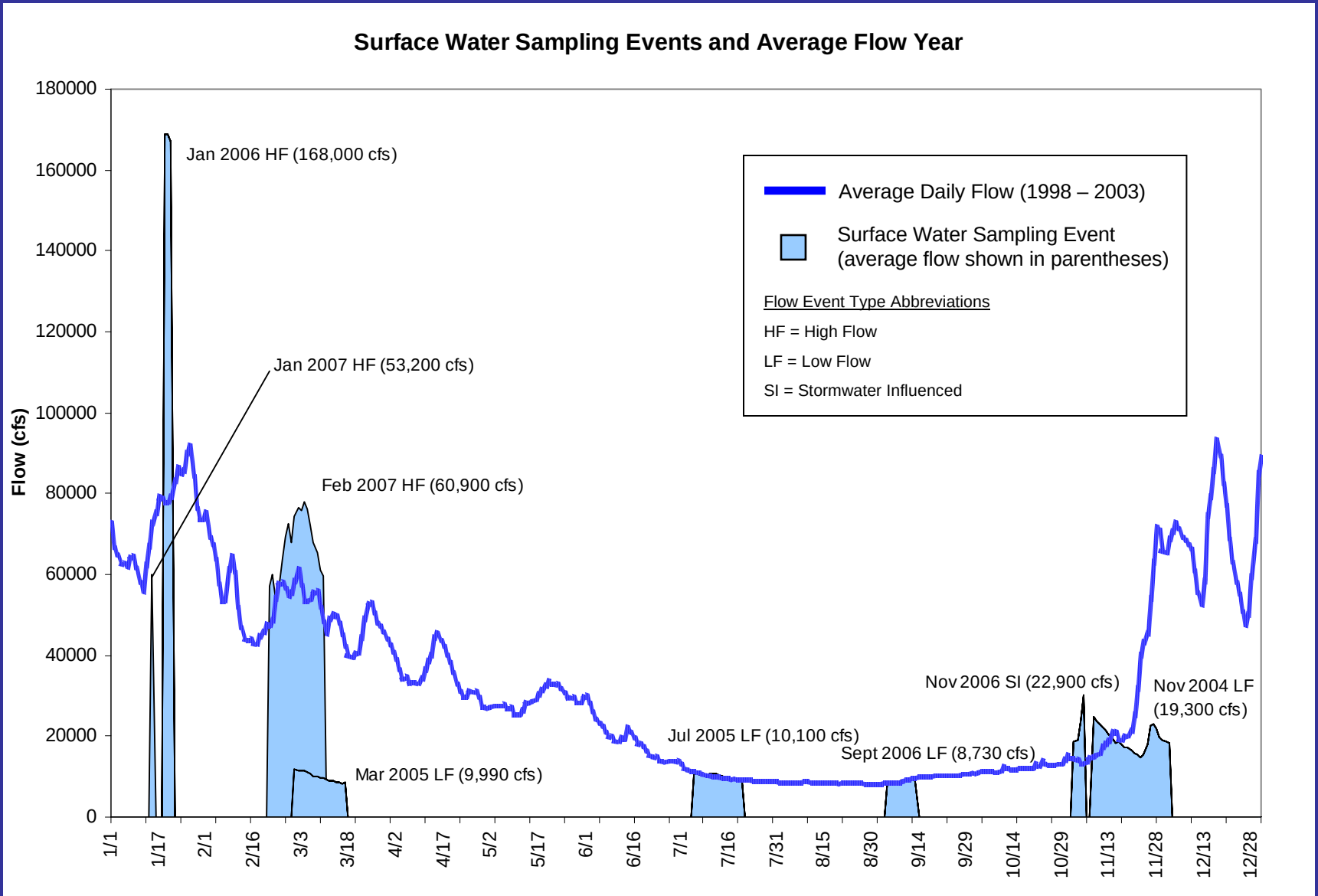
- Data Collection Efforts
  - HHRA, ERA, Source and Transects (High flow, low flow and early rainy season)
  - Winter 2006 high flow sampling event (170,000 cfs)
  - Round 3A Surface Water Sampling
    - Additional transects (RM 16, Multnomah Channel and downstream boundary)
    - Source specific samples to evaluate contaminant loading (Stormwater Pulse)

Round 2 Surface Water Stations

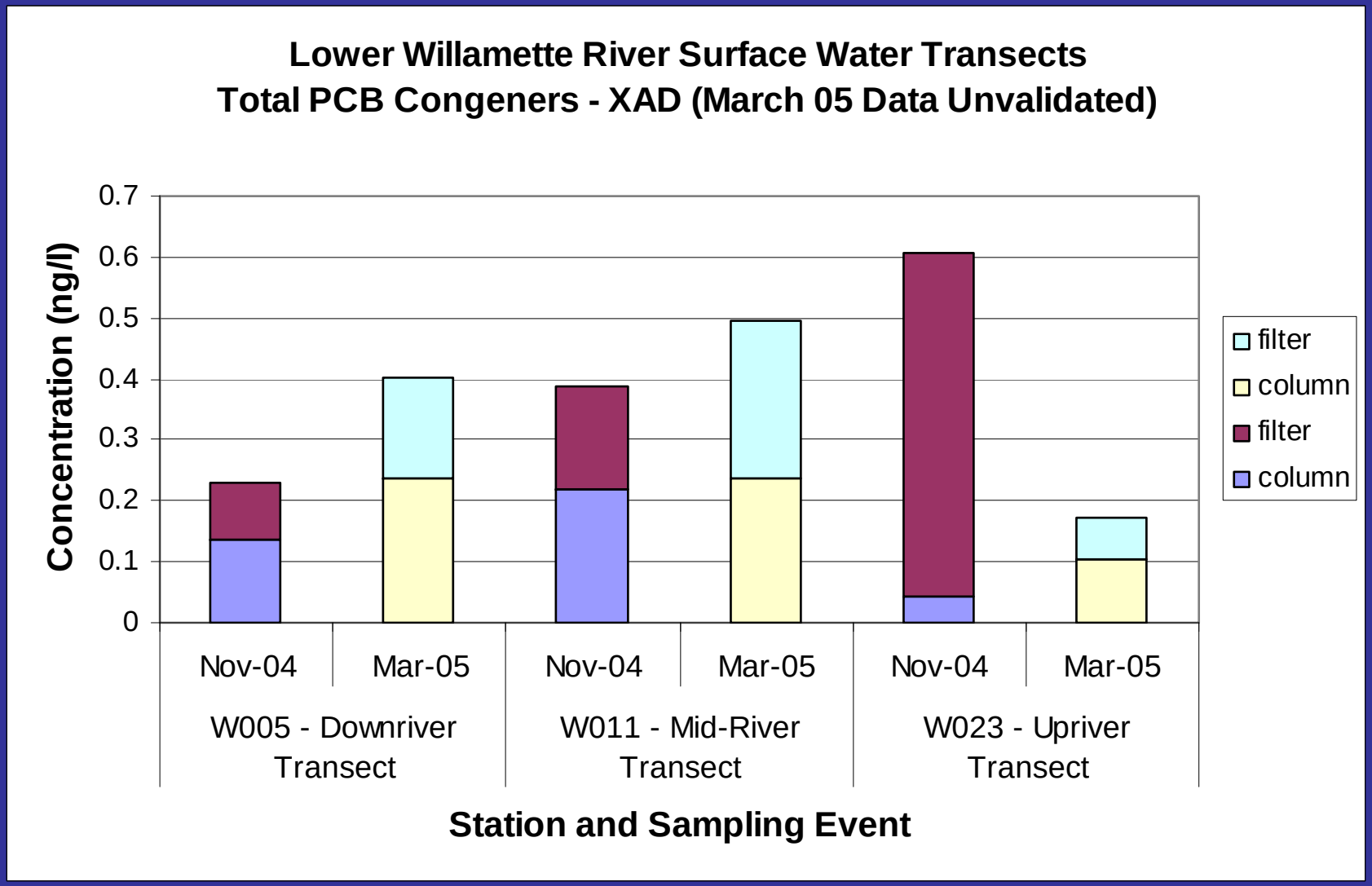


Willamette River Flows: 1972 - 2001

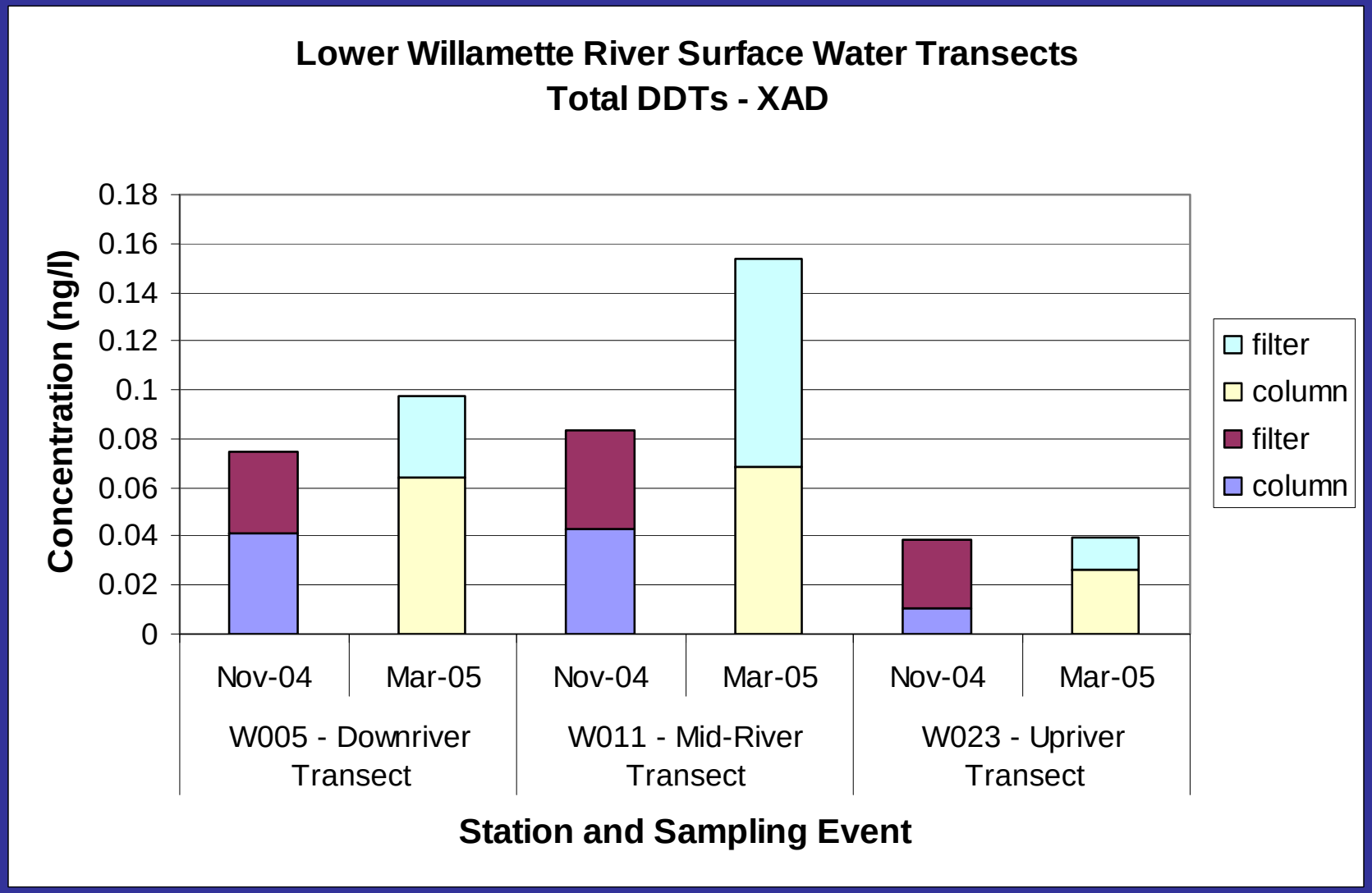



Surface Water Sampling Events and Average Flow Year
Flow (cfs)
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
1/1
1/17
2/1
2/16
3/3
3/18
4/2
4/17
5/2
5/17
6/1
6/16
7/1
7/16
7/31
8/15
8/30
9/14
9/29
10/14
10/29
11/13
11/28
12/13
12/28
Jan 2006 HF (168,000 cfs)
Jan 2007 HF (53,200 cfs)
Feb 2007 HF (60,900 cfs)
Mar 2005 LF (9,990 cfs)
Jul 2005 LF (10,100 cfs)
Sept 2006 LF (8,730 cfs)
Nov 2006 SI (22,900 cfs)
Nov 2004 LF (19,300 cfs)
Average Daily Flow (1998 – 2003)
Surface Water Sampling Event (average flow shown in parentheses)
Flow Event Type Abbreviations
HF = High Flow
LF = Low Flow
SI = Stormwater Influenced

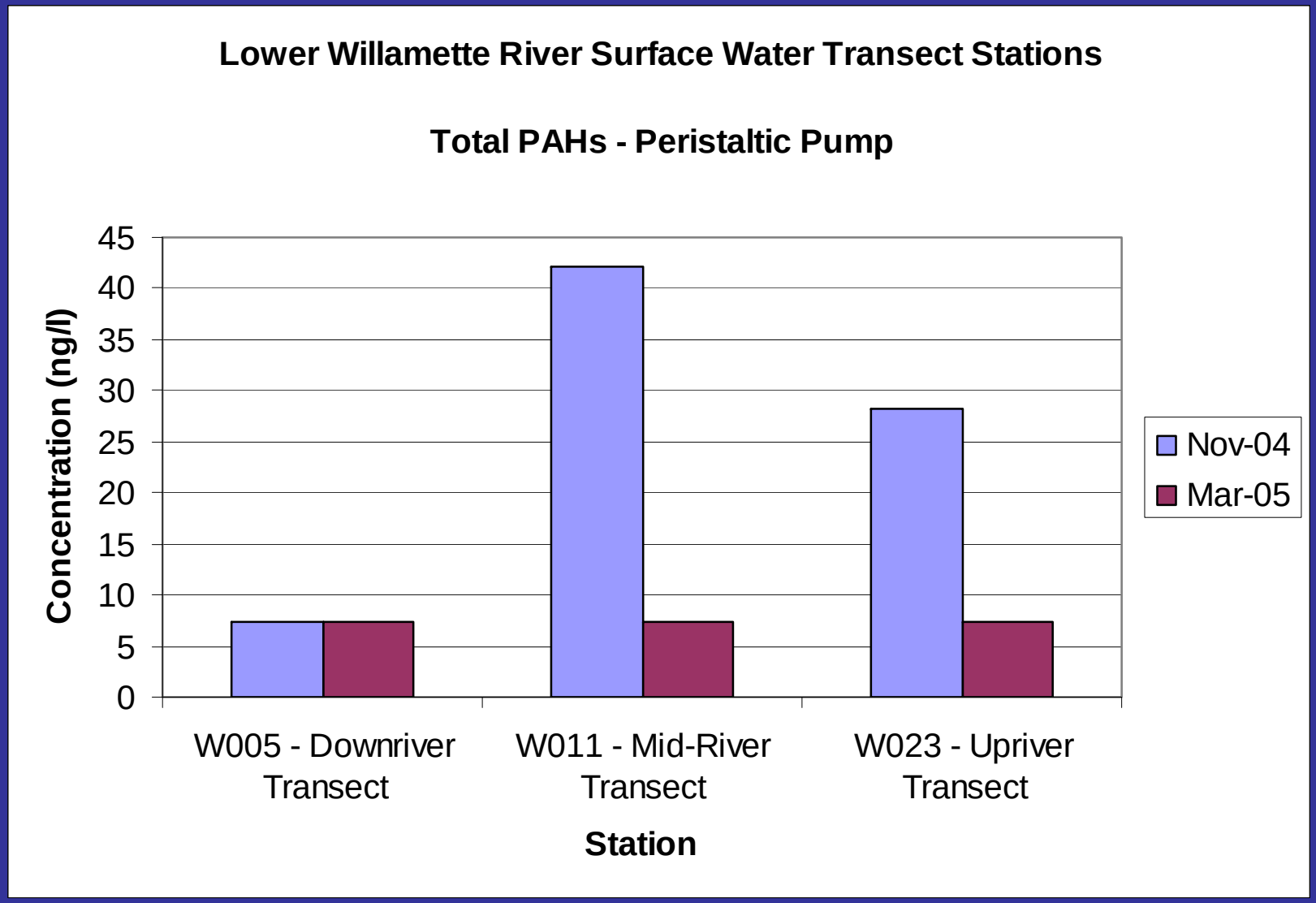
Total PCBs – Transect Samples



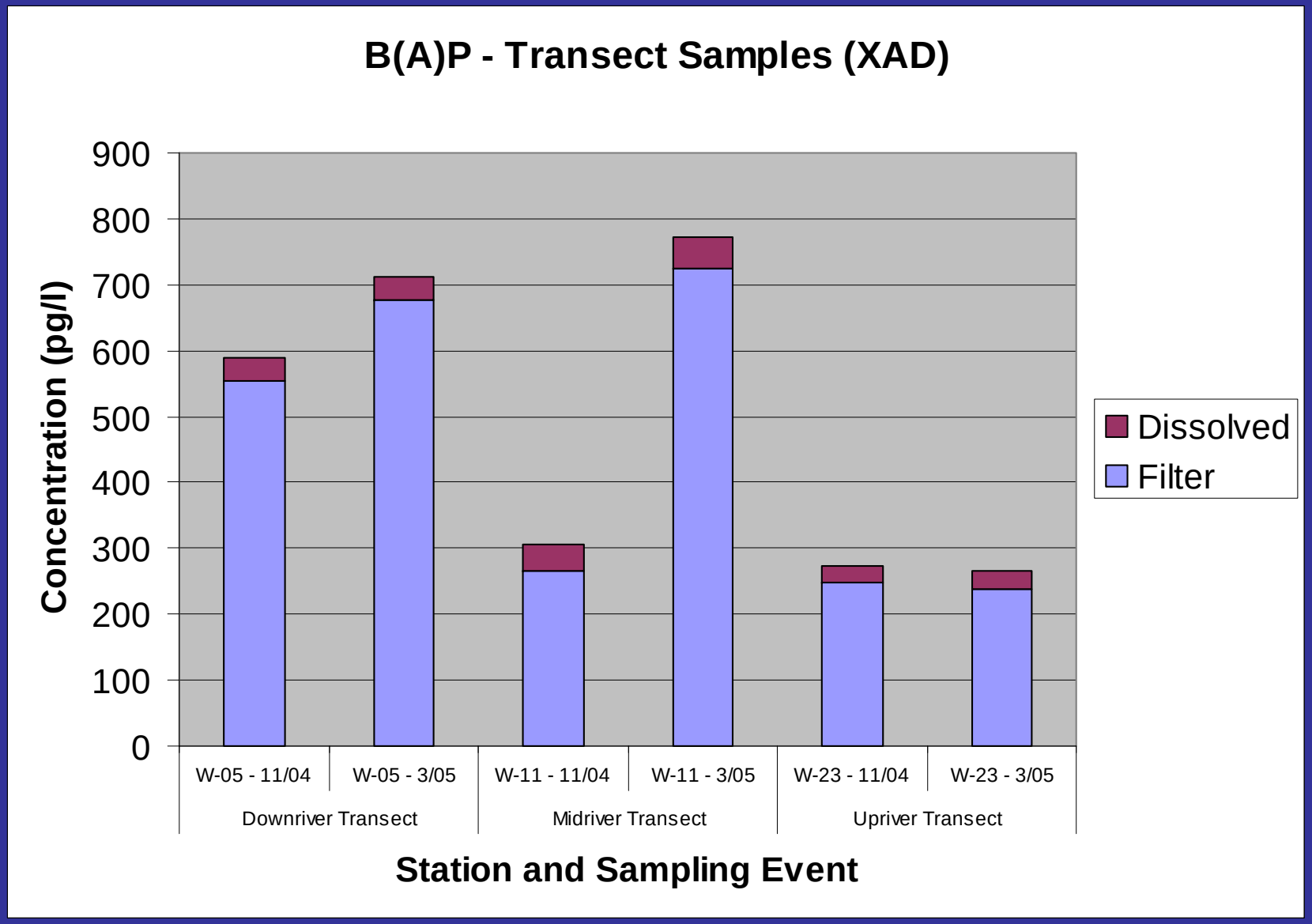
Total DDT – Transect Samples



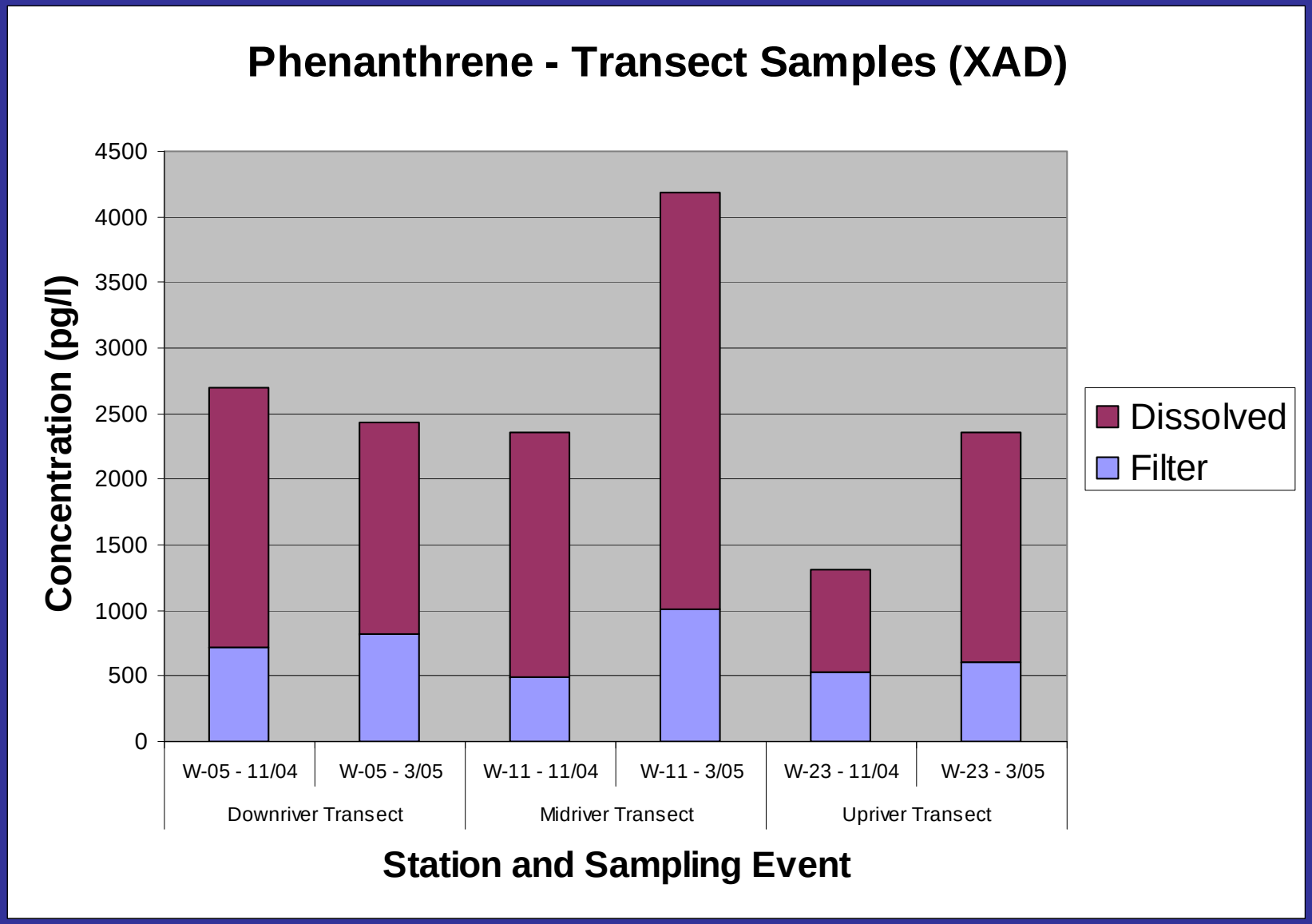
Total PAHs – Transect Samples



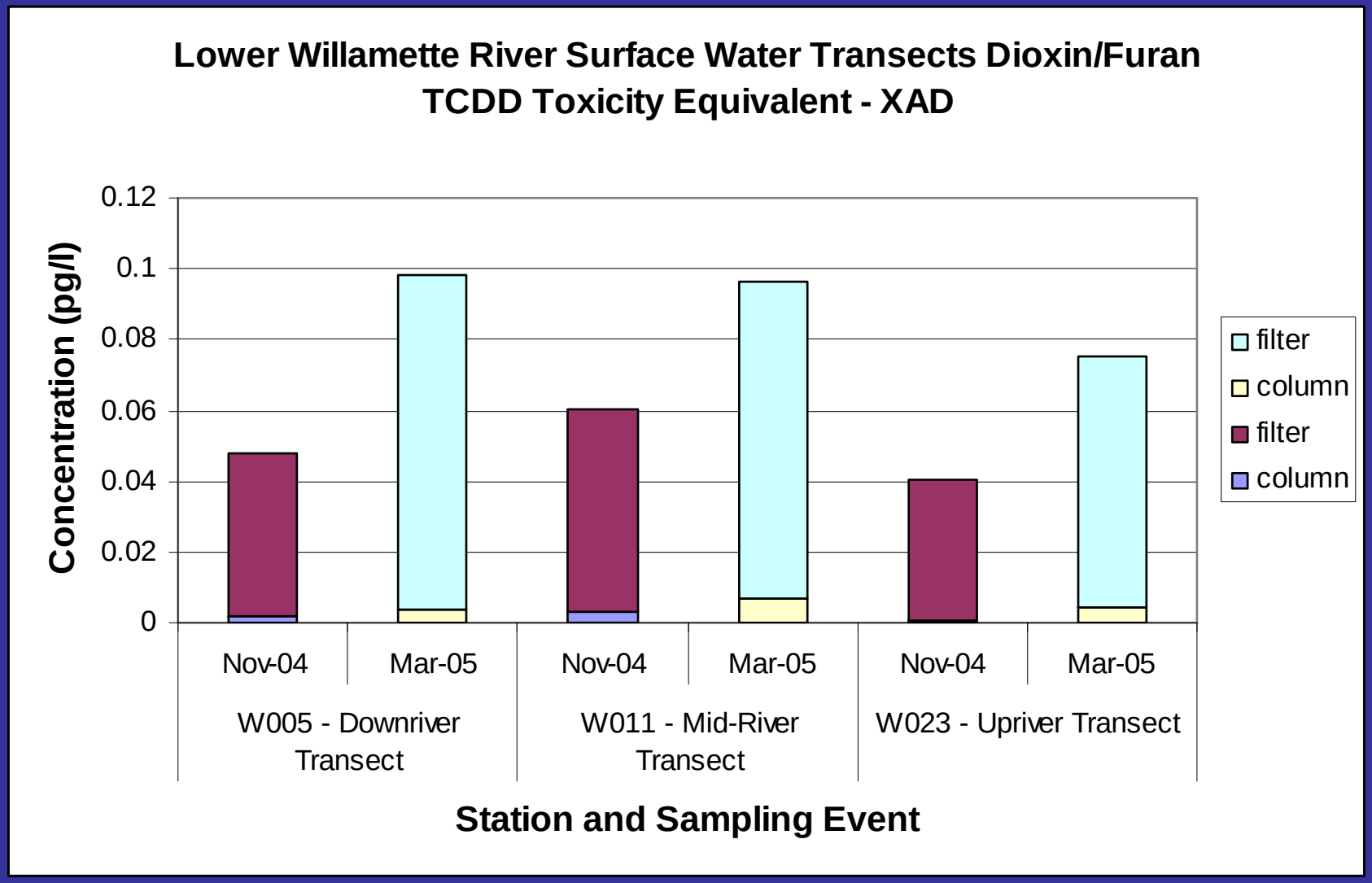
PAH – Transect Samples



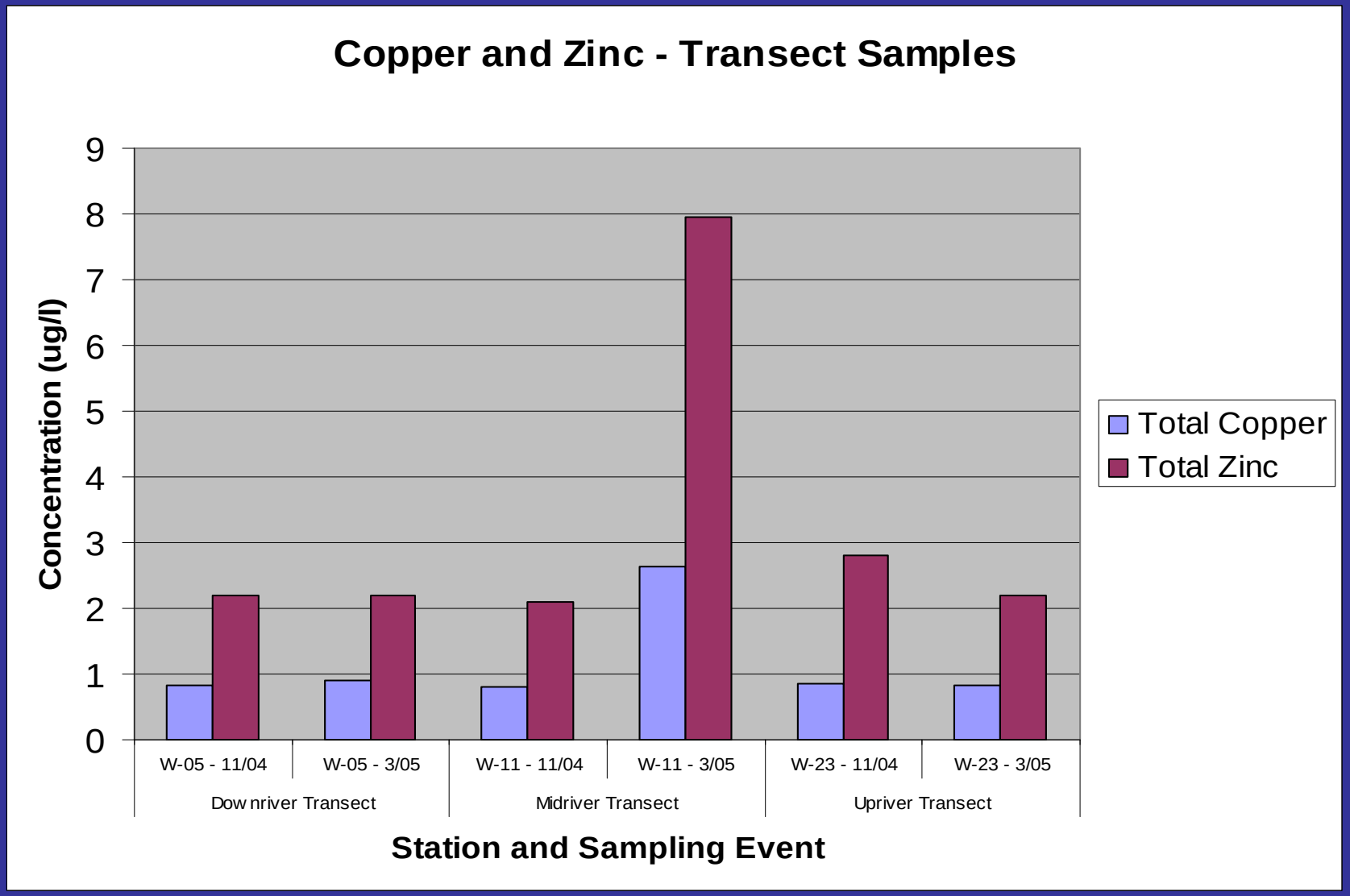
PAH – Transect Samples



Dioxin TEQ – Transect Samples



Total Metals – Transect Samples



Biota Tissue

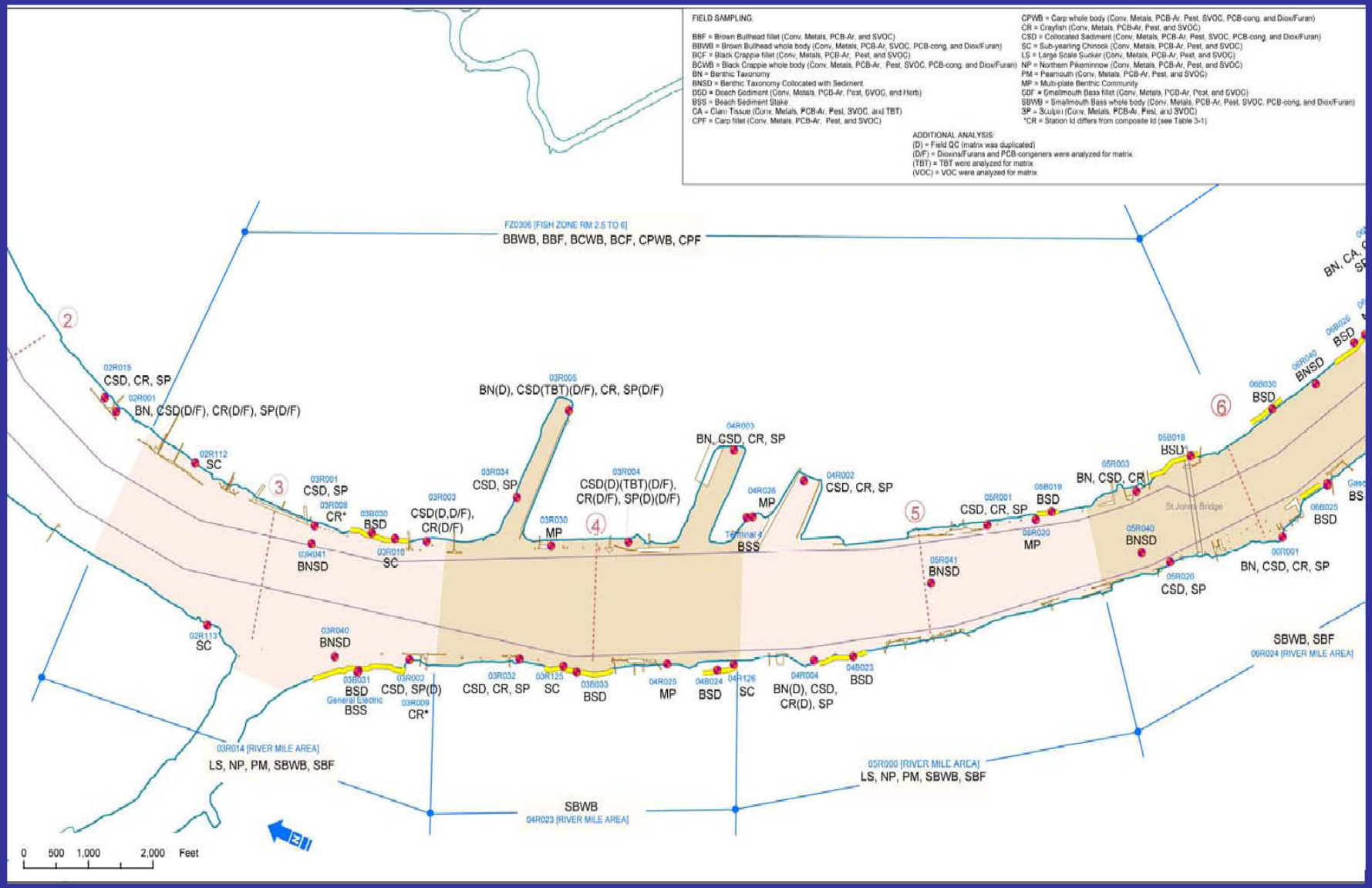
- Round 1- Fish and shellfish tissue
- ODHS tissue (sturgeon, lamprey and Chinook salmon)
- Round 2 - Benthic and epibenthic tissue
- Round 3A - Lamprey ammocoetes and sturgeon
- Round 3B - Source specific clams, crayfish, sculpin and bass; biota tissue to support food web model

Fish Tissue Sample Numbers and Types

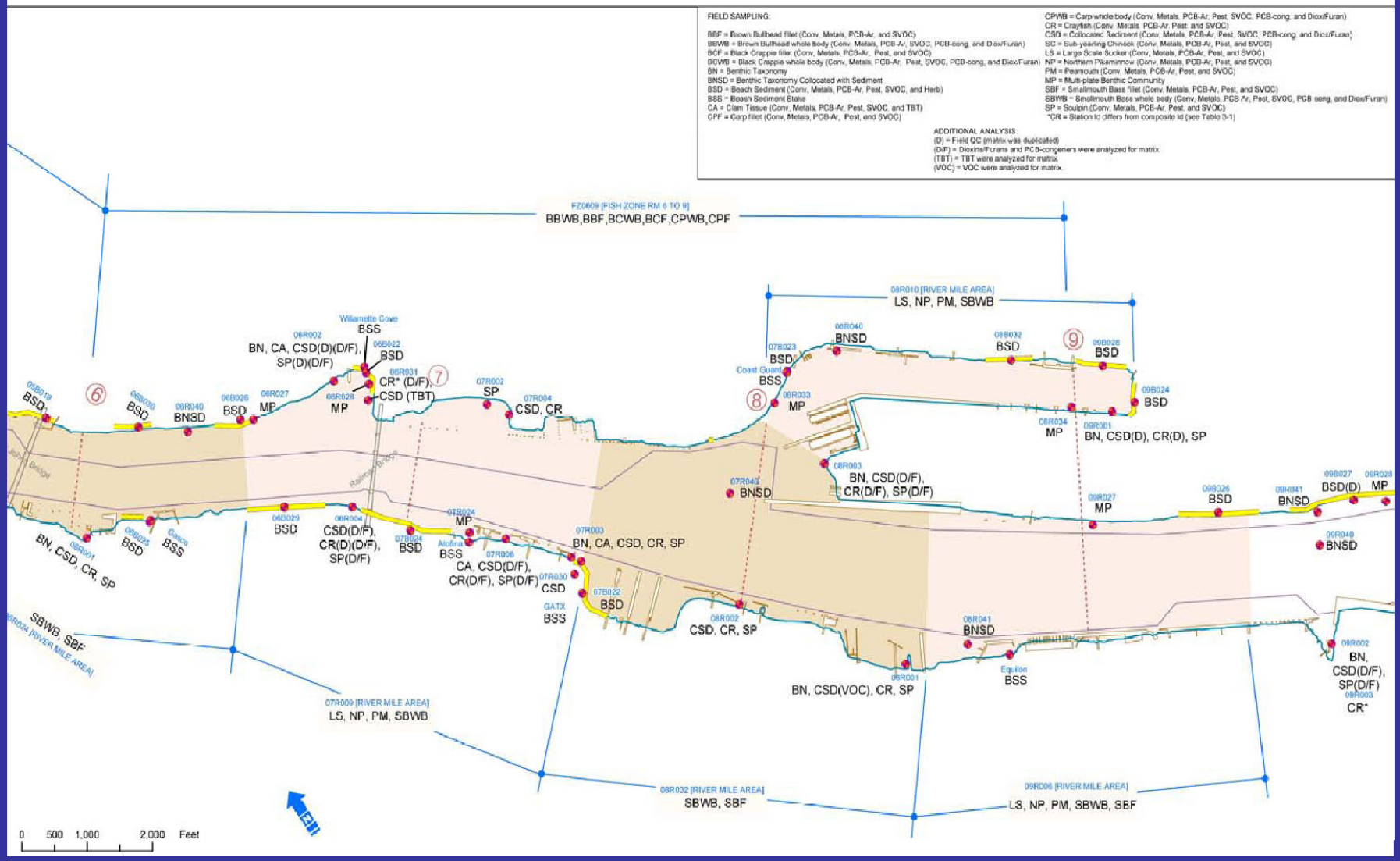
	Round 1		Round 2		Round 3		Total	
Species	**Whole Body**	**Fillet**	**Whole Body**	**Fillet**	**Whole Body**	**Fillet**	**Whole Body**	**Fillet**
Smallmouth Bass	14	5	0	0	19	19	33	24
Brown Bullhead	6	6	0	0	0	0	6	6
Carp	6	6	0	0	1	10	7	16
Juvenille Chinook	0	0	7	0	0	0	7	0
Adult Chinook	0	0	8	16	0	0	8	16
Black Crappie	4	4	0	0	0	0	4	4
Lamprey Ammocoetes	0	0	0	0	9	0	9	0
Adult Lamprey	0	0	4	0	0	0	4	0
Peamouth	4	0	0	0	0	0	4	0
Northern Pikeminnow	6	0	0	0	0	0	6	0
Sculpin	27	0	0	0	17	0	44	0
Largescale Sucker	6	0	0	0	0	0	6	0
White Sturgeon	0	0	0	5	15	0	15	5
Clams (Corbicula)	3	NA	31	NA	10	NA	44	NA
Crayfish	27	NA	0	NA	10	NA	37	NA

Notes: Adult Chinook fillet includes with skin and without skin; reported clam numbers do not include 46 laboratory exposed clam samples

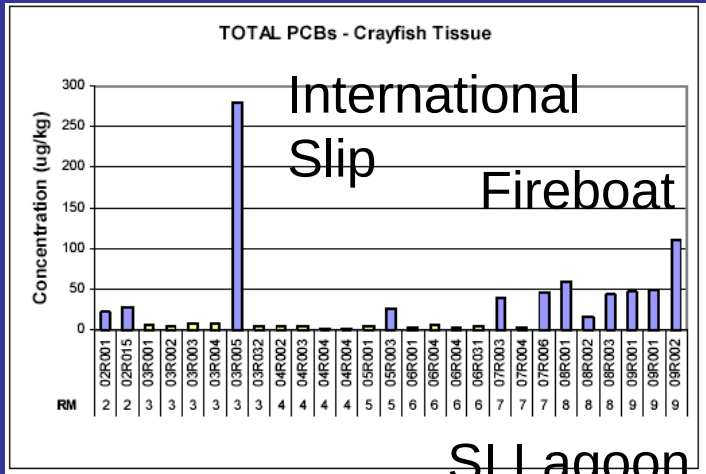
Tissue Sample Locations – RM 2 - 6

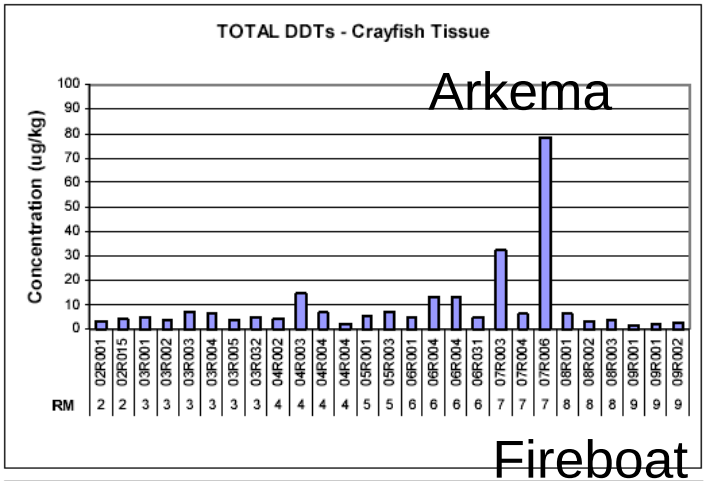


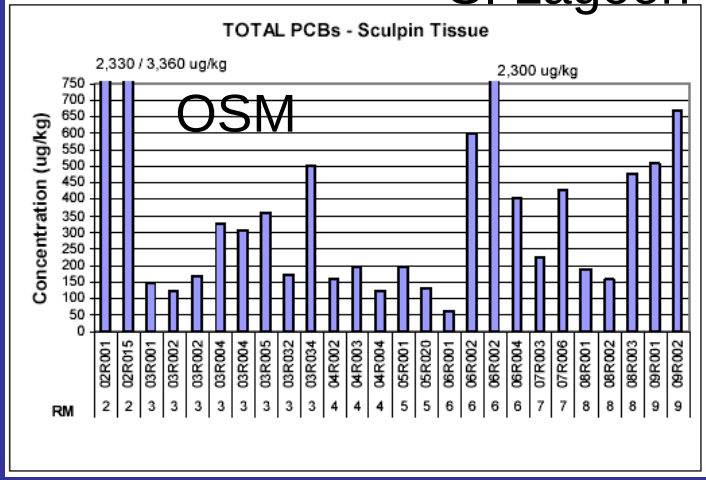
Tissue Sample Locations RM 6 - 10

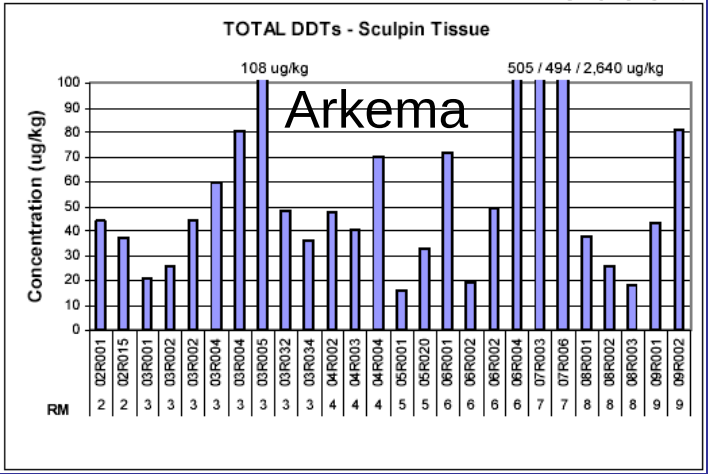


Crayfish and Sculpin by RM
Total PCBs and DDT

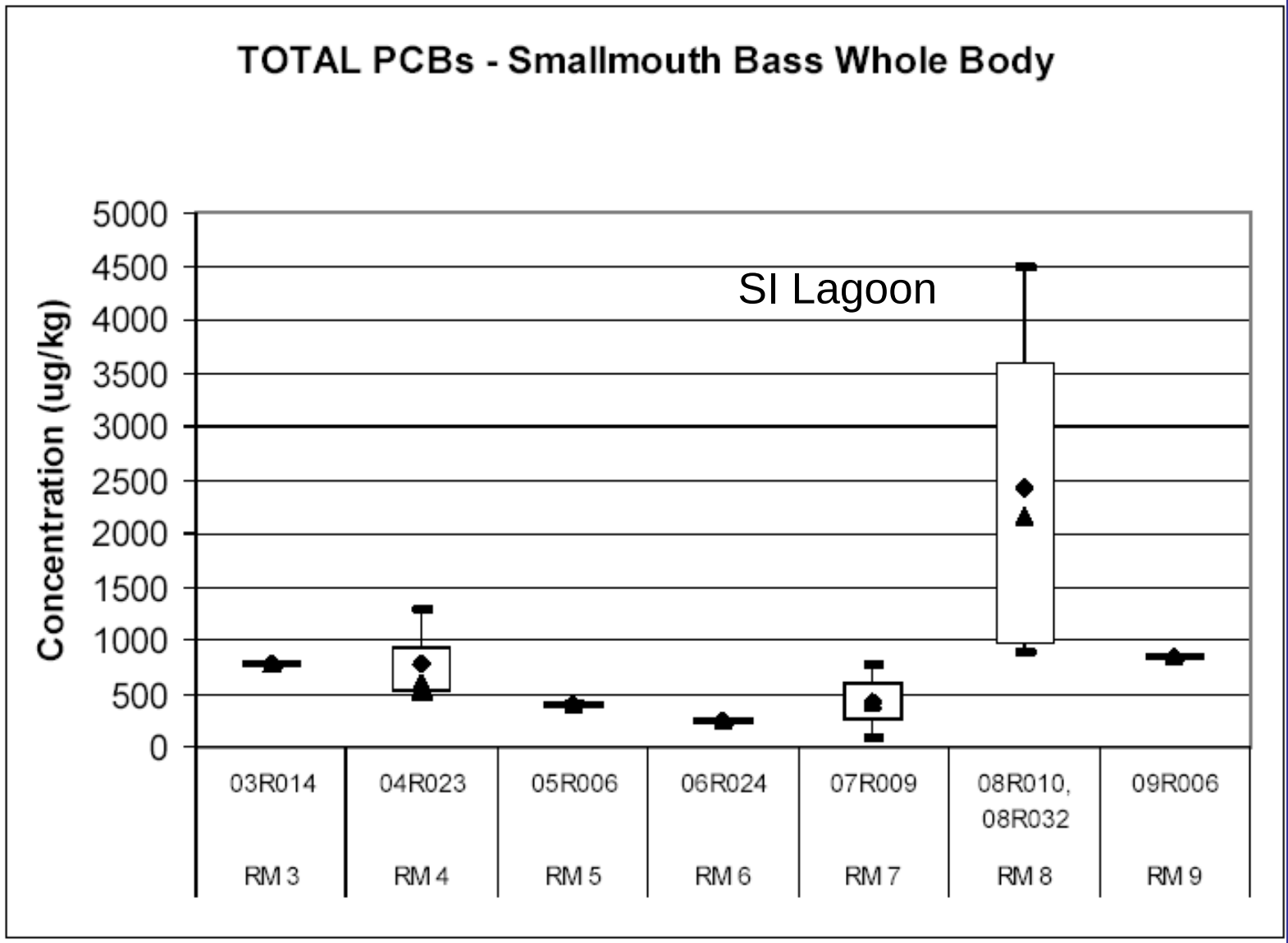




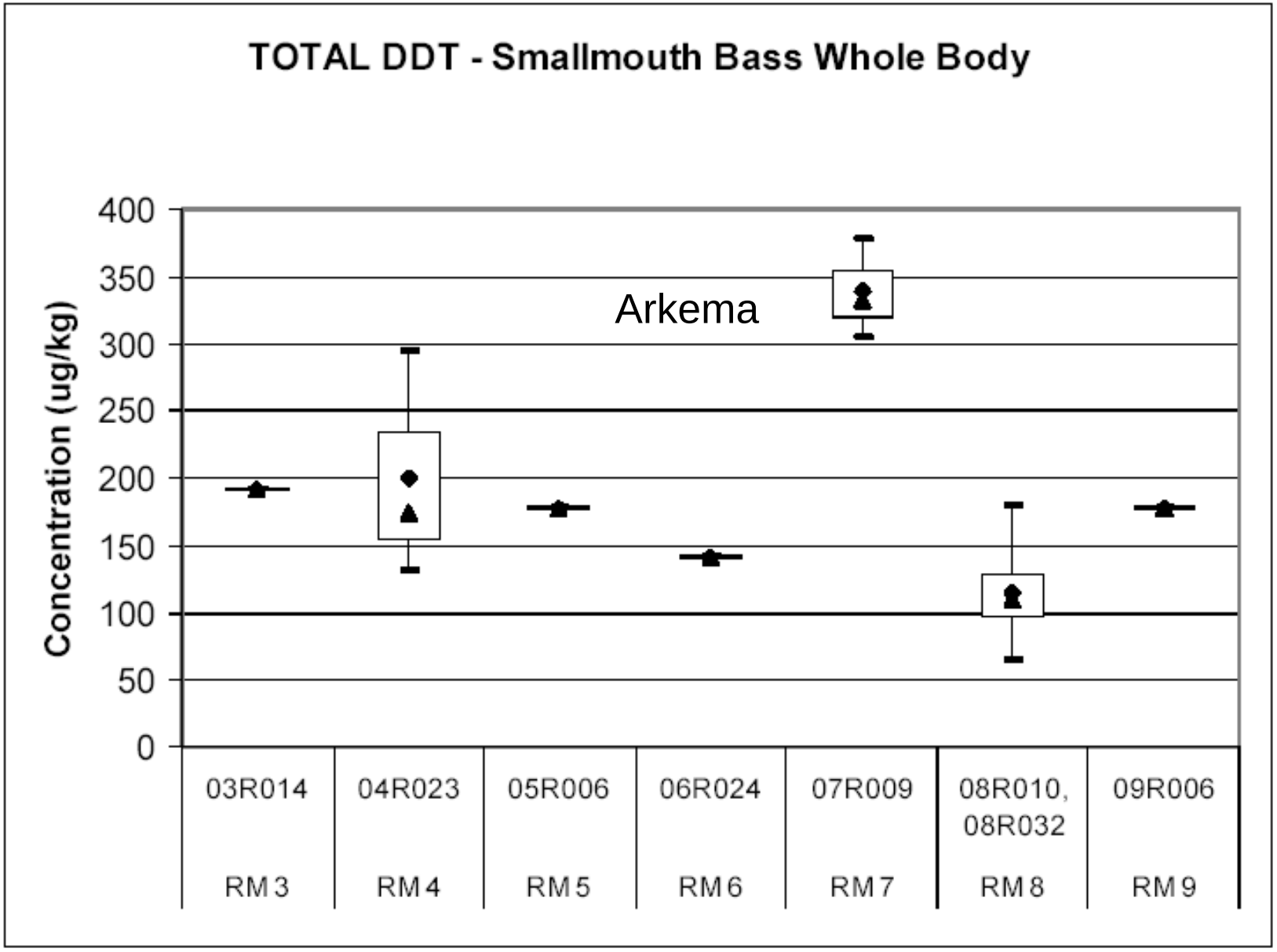




Total PCBs in Smallmouth Bass



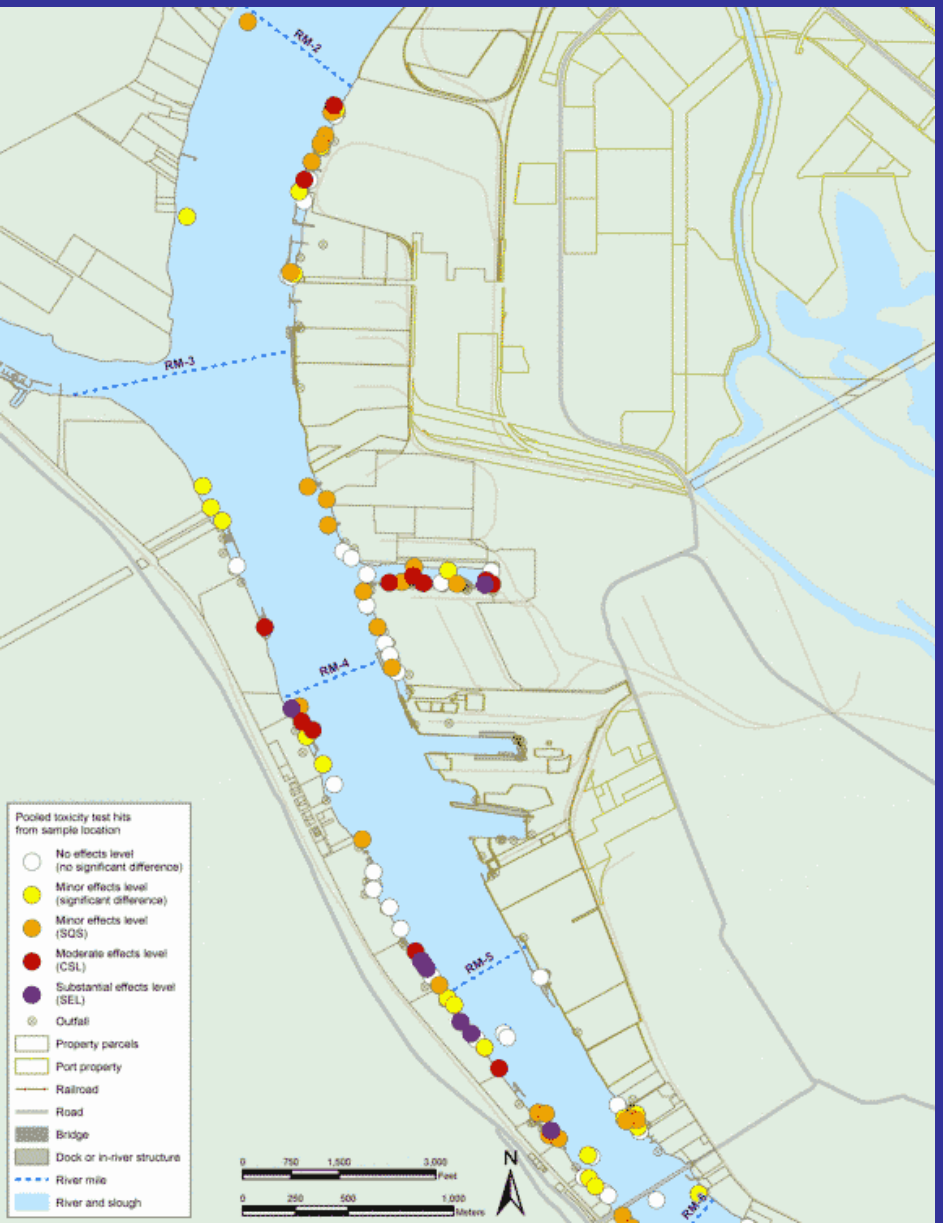
Total DDT in Smallmouth Bass

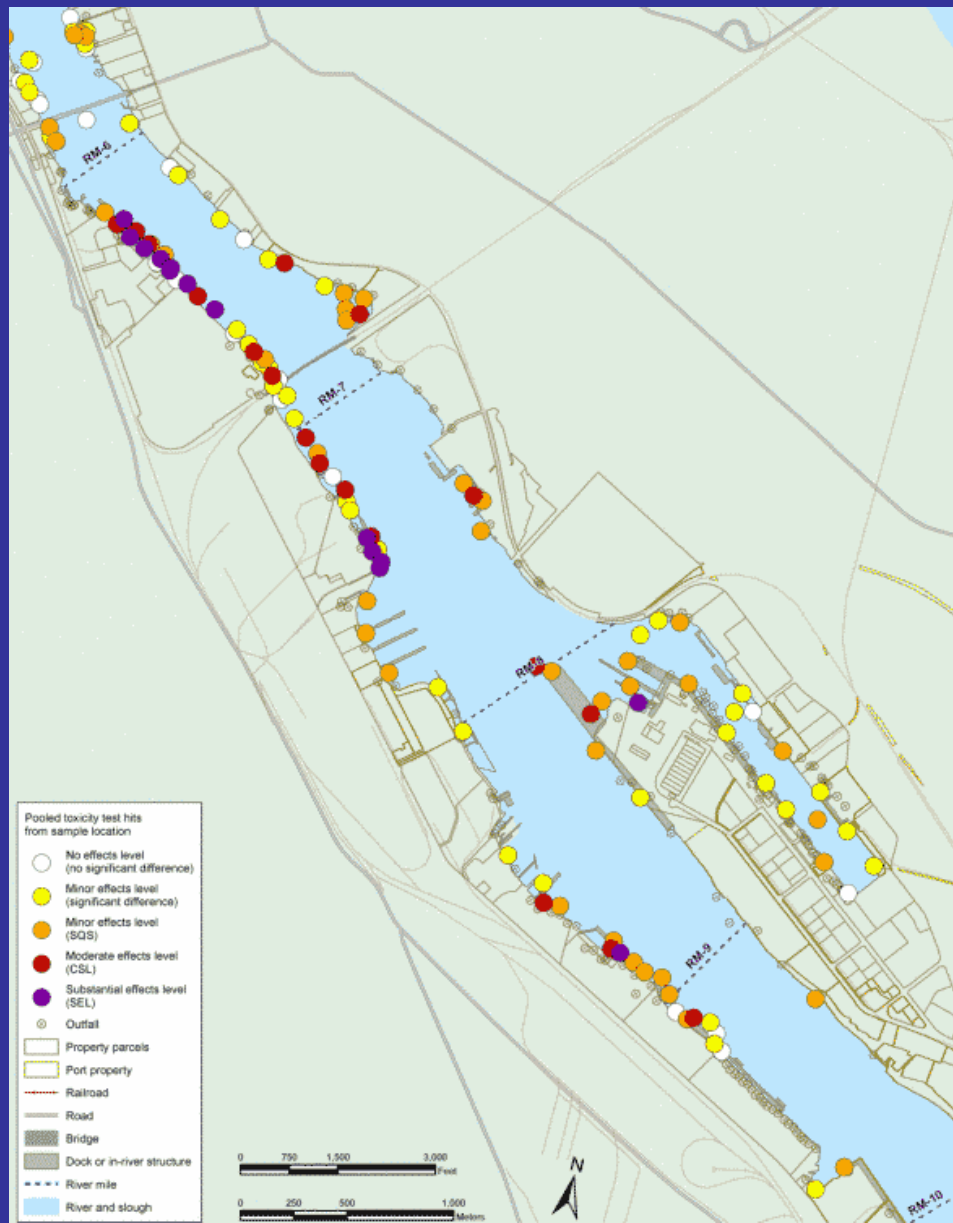


Toxicity and Bioaccumulation Testing

- Round 2 Data Collection Efforts
  - 233 Collocated sediment chemistry and bioassays
  - 10-day Chironomus and 28-day Hyalella toxicity tests
  - 33 Bioaccumulation tests (Lumbriculous and Corbicula)
- Round 3 Data Collection Efforts
  - XX Additional collocated sediment chemistry and bioassays

Preliminary Toxicity Results

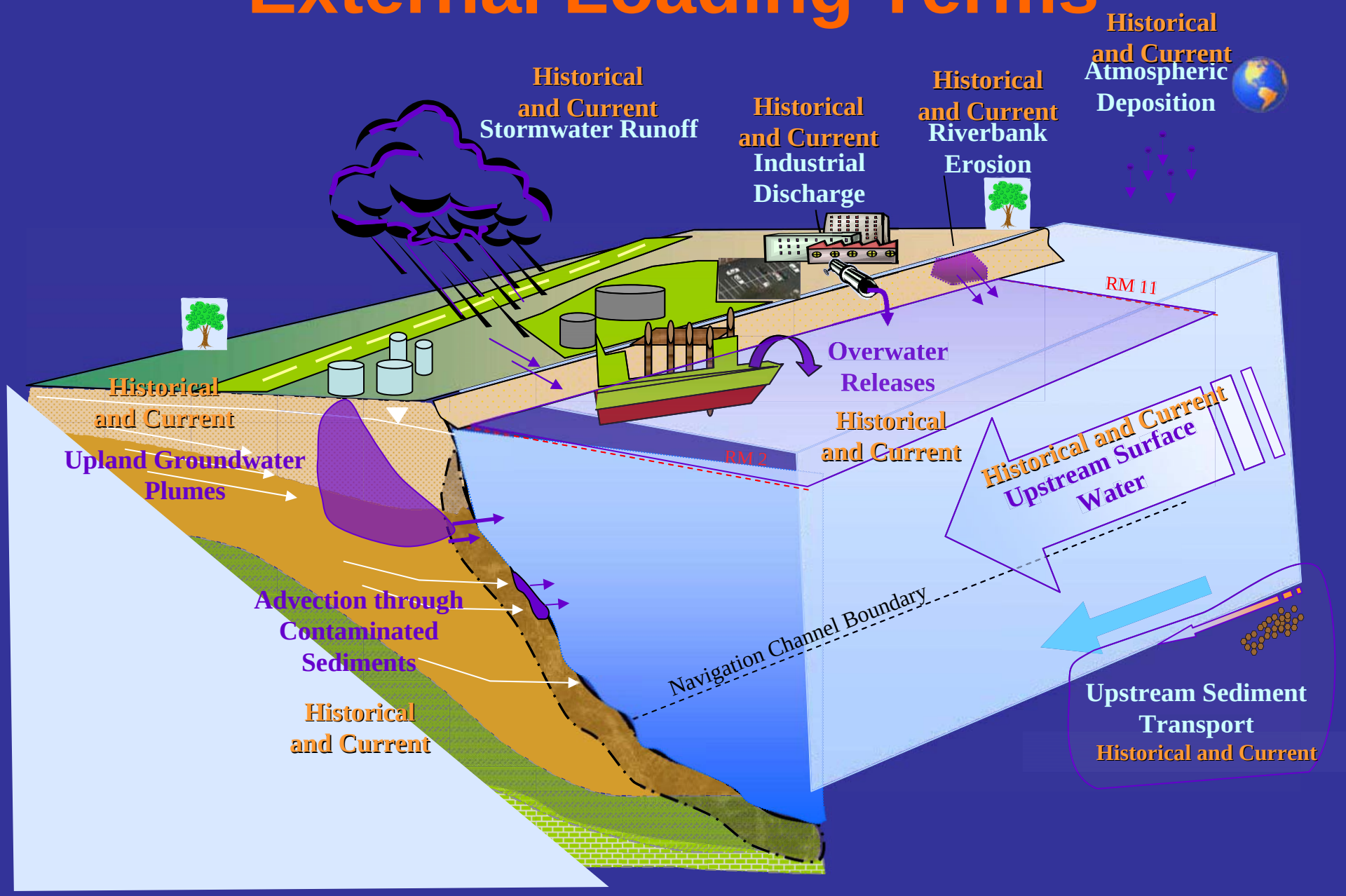




Upland In-Water Integration

- Approximately 20 miles of shoreline
- Over 60 upland facilities
- Stormwater - Hundreds of outfalls
- Groundwater – TZW data at 9 facilities
- Riverbank erosion – Contribution unknown
- Data Collection - consistency and timeframe
  - RI – Fate and transport evaluation
  - FS – Recontamination potential
  - Source Control – JSCS implementation

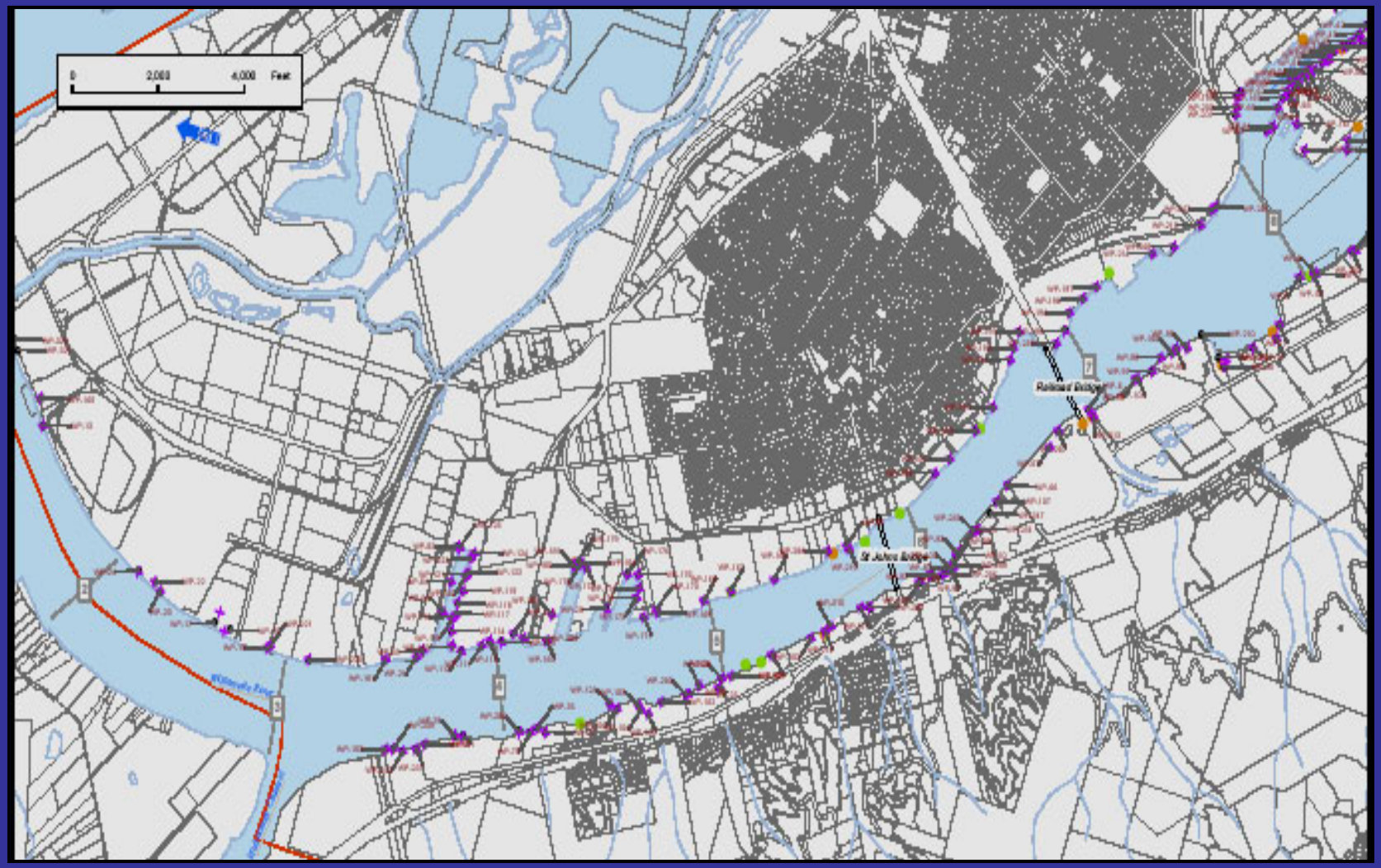
External Loading Terms



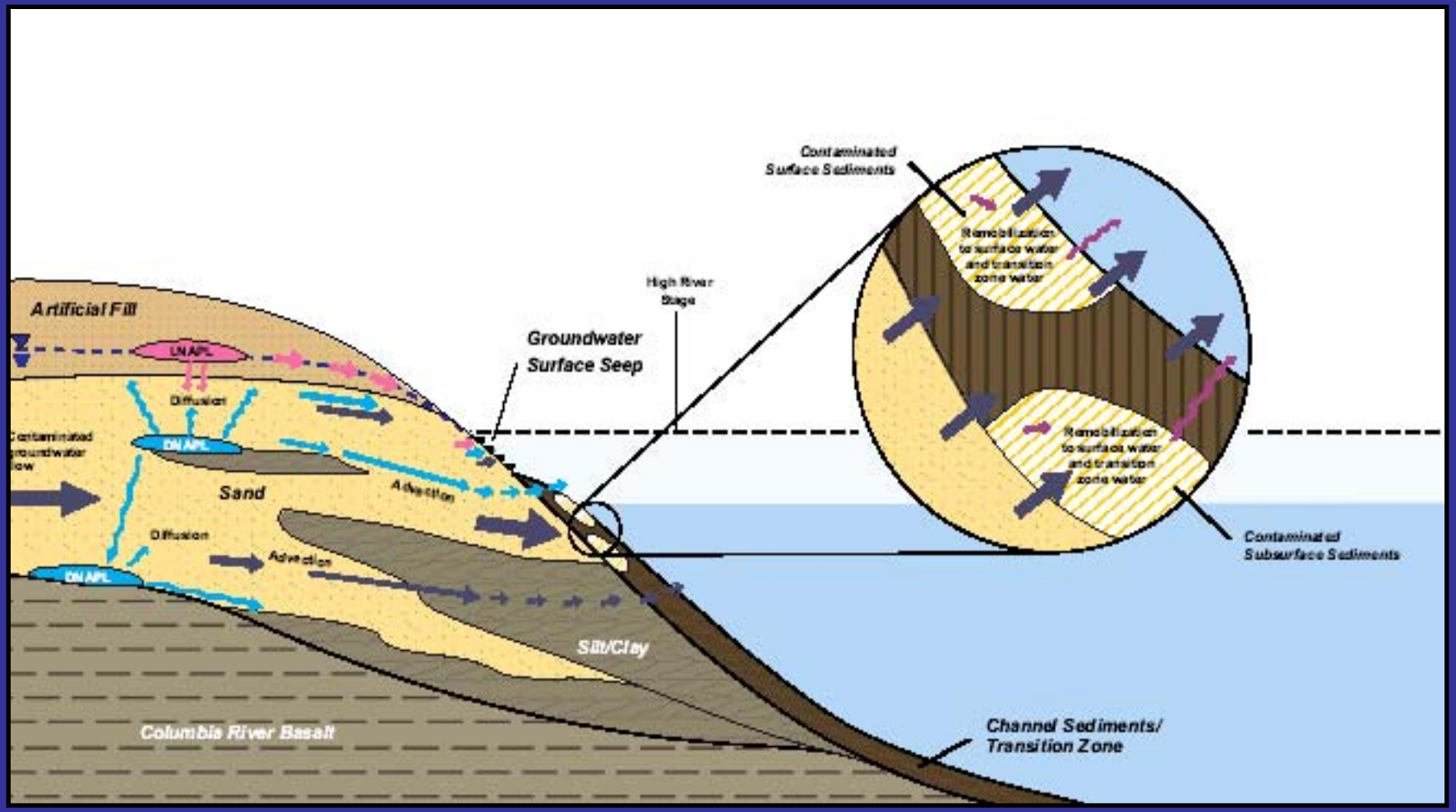
Stormwater sampling

- Objectives – provide data for evaluating loading potential and sediment recontamination
- Help understand relative magnitude of stormwater impacts to the harbor
- Stormwater tech team – DEQ, EPA, and LWG
- Preliminary sampling Feb – July; additional sediment trap sampling late fall

Over 200 City and Private Stormwater Outfalls



Groundwater Pathway



Groundwater Pathway Evaluation

- TZW collected at 9 sites based on evaluation of upland groundwater data
- TZW results exceed screening levels (MCLs, tap-water PRGs, chronic AWQCs and human health AWQCs0
- TZW to be evaluated in the context of other site data (e.g., bulk sediment chemistry, sediment bioassays and benthic tissue chemistry

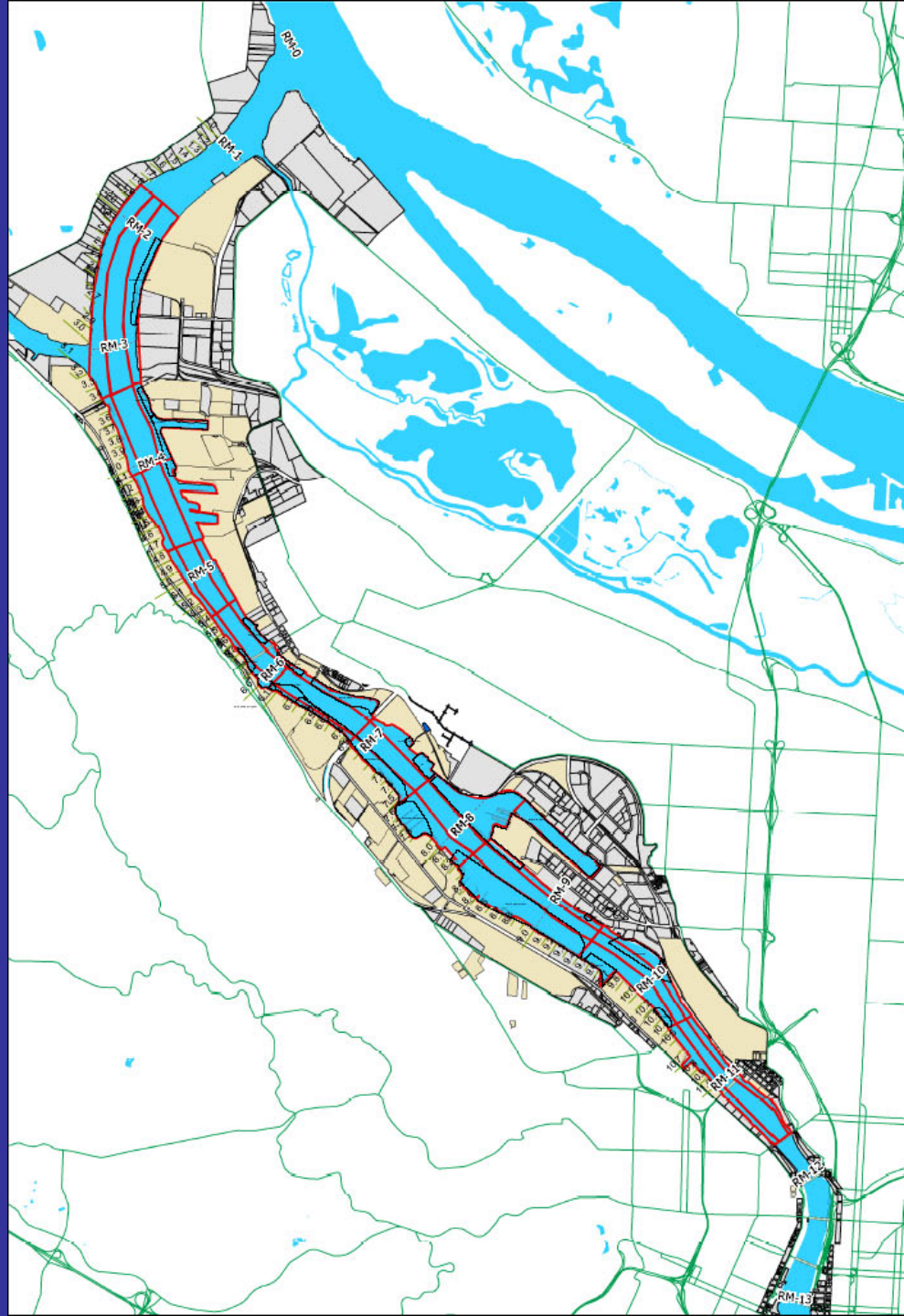
Fate and Transport Model

- Hybrid Model includes 3 linked models
  - Hydrodynamic-Sedimentation Model
  - Abiotic Fate and Transport Model
  - Food-Web Model
- Initial model set-up completed
- Working to resolve technical issues and develop loading estimates
- Supports RI CSM and comparative evaluation of alternatives in FS

Fate and Transport Segments

Fate and Transport Segment	AOPC(s)	Physical Considerations
RM 10.4 – 11.8	Upstream of upstream-most AOPC (Sulzer) to upper end of navigation channel (Broadway Bridge)	Higher bottom shear
RM 10 – 10.4	Sulzer and Goldendale/UPRR	Higher bottom shear in above RM 10
RM 9.4 – 10	Fireboat/GE and Outfall 47	Moderate bottom shear in channel; depositional in nearshore (AOPC) areas.
RM 8.2 – 9.4	Gunderson	River becoming more depositional – in particular along west bank; habitat areas along east bank.
Upper End of Swan Island Lagoon	Swan Island Lagoon	Depositional Off Channel Area; selected in part to be consistent with RM 8.2 – 9.4 segment
RM 7.5 – 8.2	Willbridge and Lower Swan Island Lagoon (Shipyard)	Entrance to Swan Island Lagoon, downstream end of Willbridge embayment, upstream end of Triangle Park embayment.
RM 6.9 – 7.5	Arkema	Upstream of higher bottom shear encountered at railroad bridge.
RM 6.0 – 6.9	GASCO and Siltronic	High bottom shear
RM 5.3 – 6.9	U.S. Moorings, St. Johns West and MarCom	Area of mixed bottom shear; habitat considerations along east bank (upper end) and west bank (lower end).
RM 4.7 – RM 5.3	PAH smear; presence of bulk fuel facilities (Shore Terminals, ExxonMobil and ARCO).	Lower bottom shear below MR 5.3; deep hole off Terminal 4.
RM 4.1 – 4.7	Terminal 4 Early Action Area	Linnton area beaches.
RM 3.4 – 4.1	Time Oil/Premier and Schnitzer Burgard	Higher bottom shear along west bank; upstream of habitat areas near entrance to Multnomah Channel.
RM 1.8 – 3.4	Oregon Steel Mills	Bend in river; depositional area, habitat considerations near entrance to Multnomah Channel and along Sauvie Island.

Contaminant Fate and Transport Segments



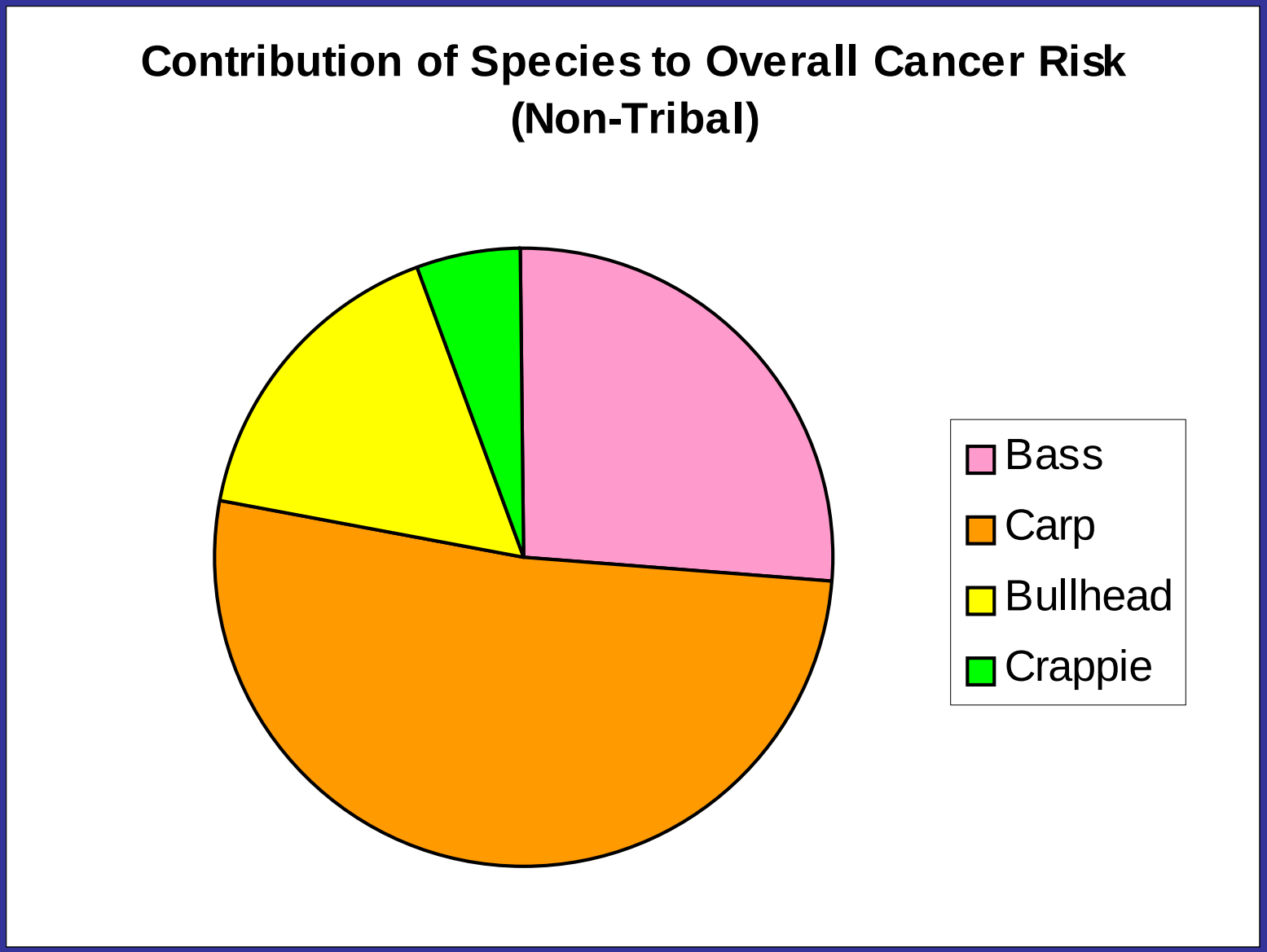
EPA review of Round 2 Report

- EPA's initial review/comments focused on data gaps
- Intent was to quickly get to FSPs, initiate field work, and complete data collection by end of 2007
- EPA not providing formal approval or requiring Round 2 Report be revised and re-submitted
- EPA comments on the Round 2 Report to guide the development of approvable RI and Baseline Risk Assessment (BRA) Reports.

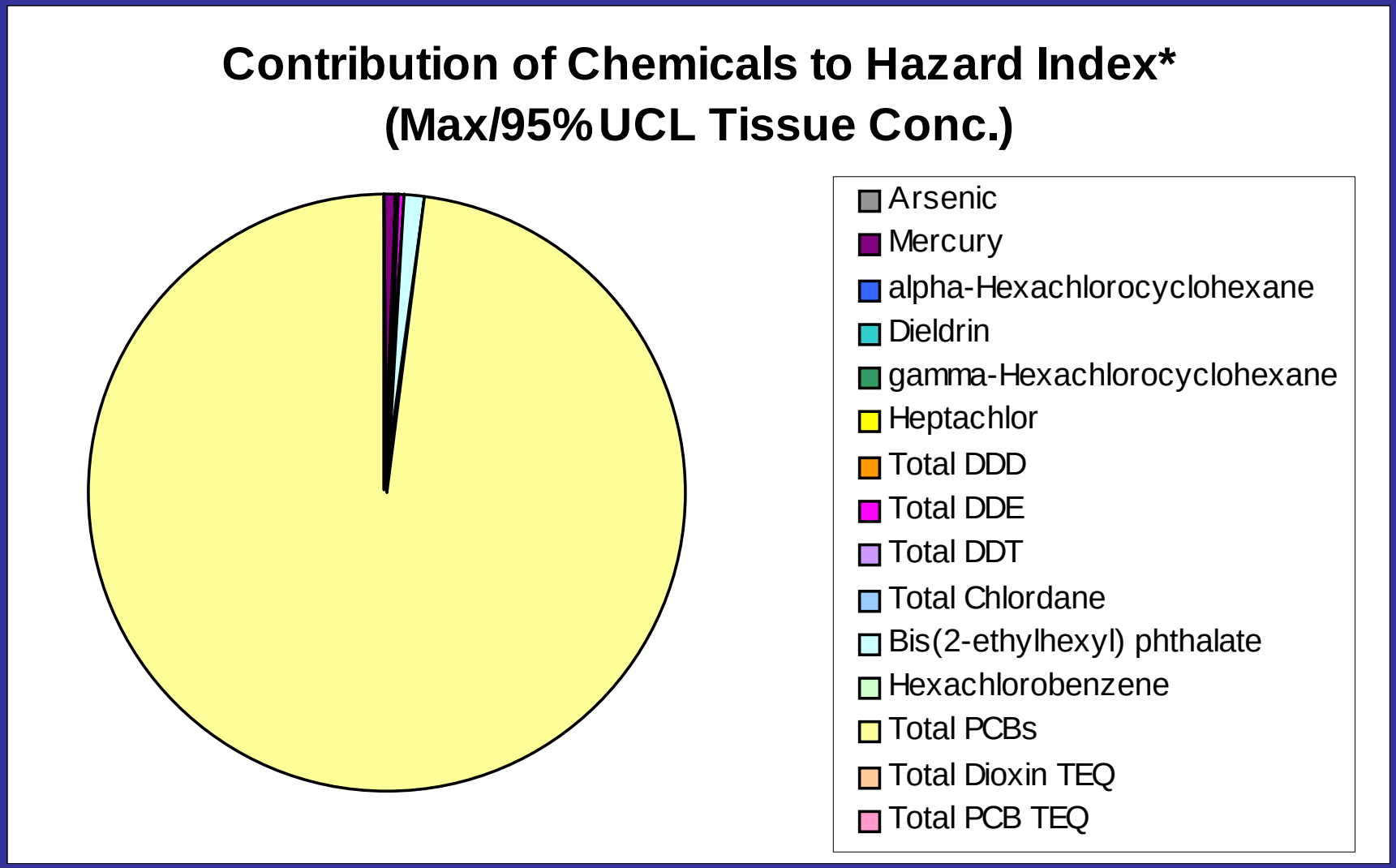
Preliminary Evaluation of Human Health Risk

- Potential risks from fish consumption are significantly higher than other scenarios
- Some risks associated with direct contact with contaminated sediments
- Some exceedance of Region 6 Tap-water PRGs in surface water

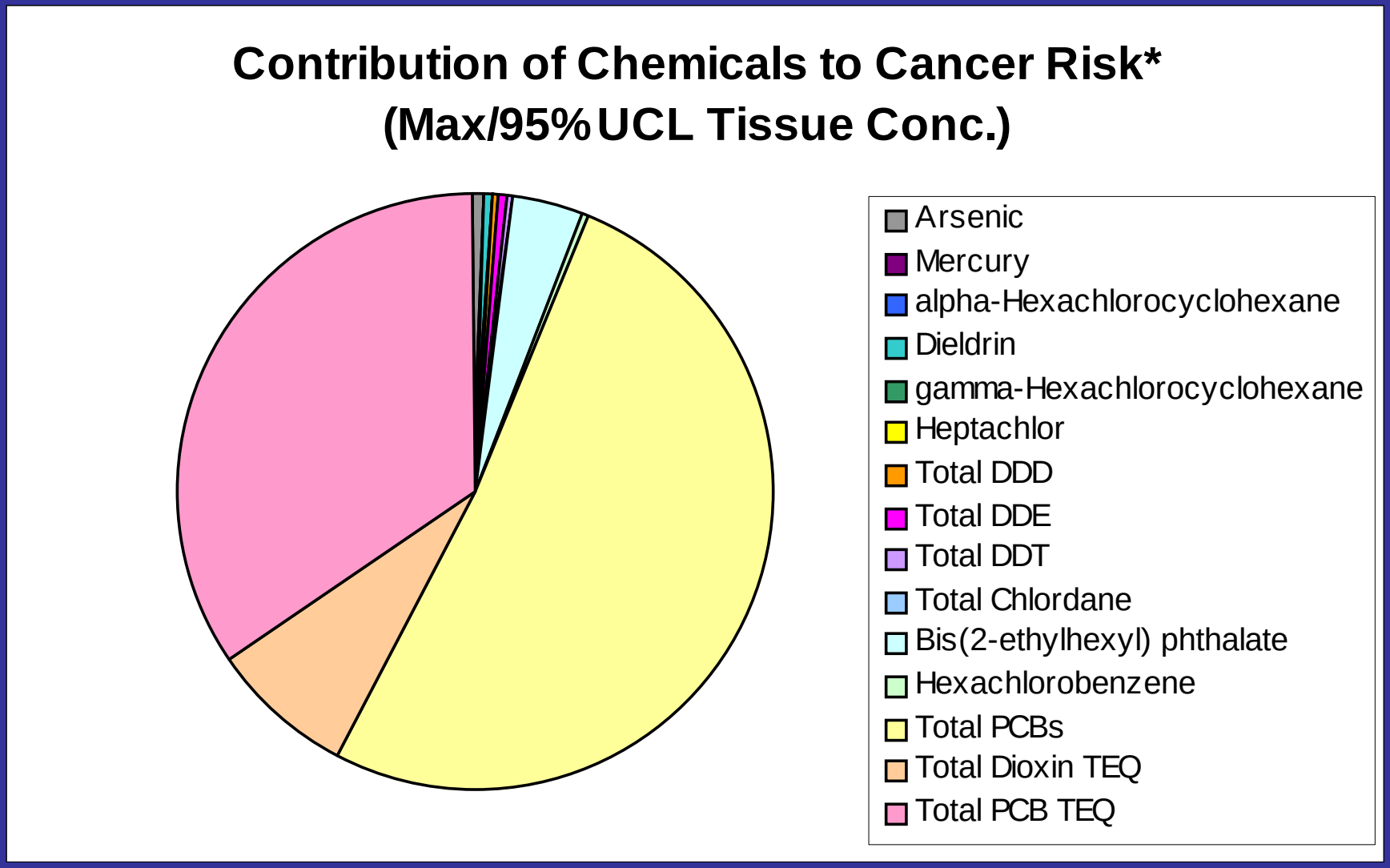
Human Health Risk Summary



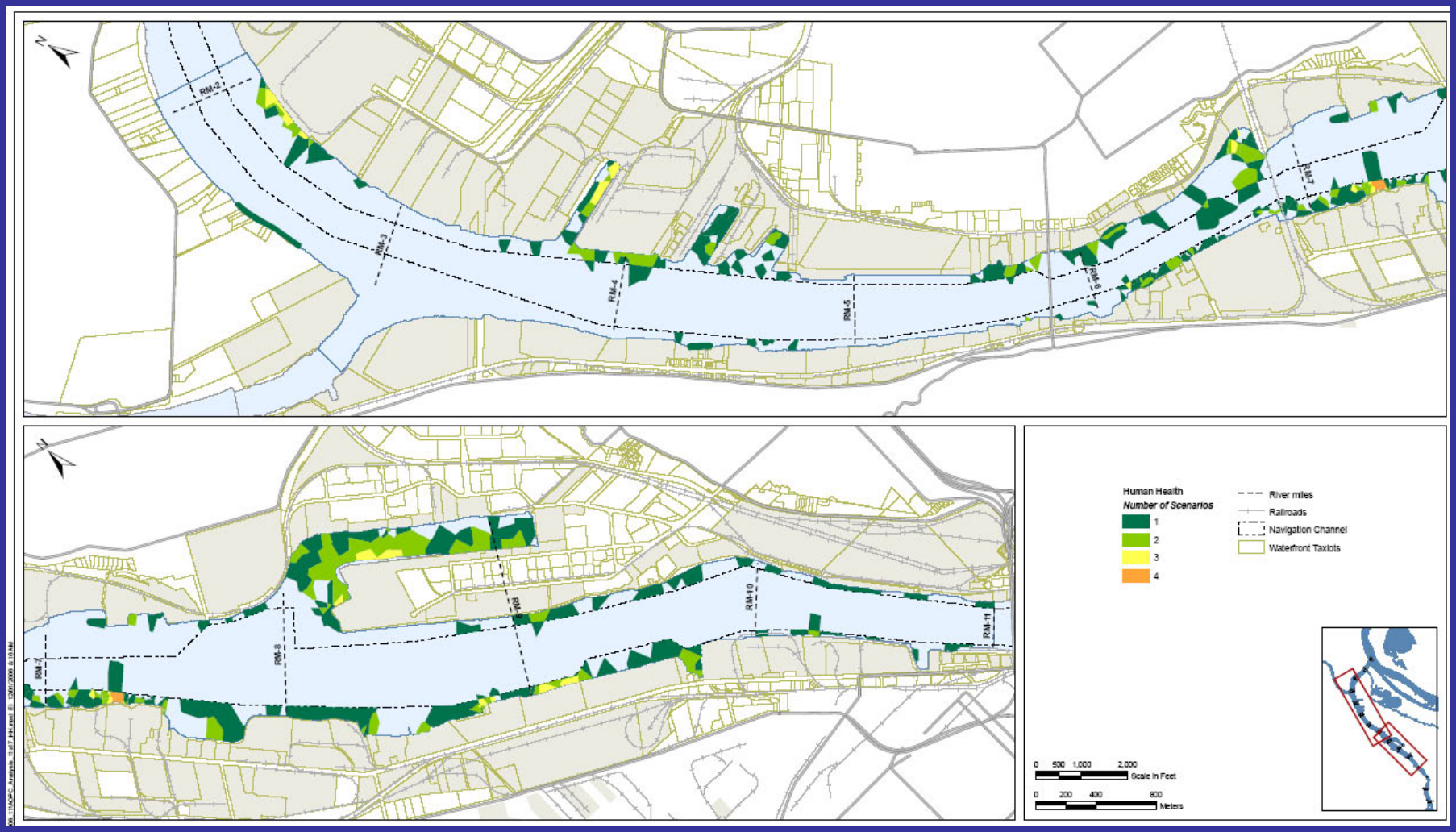
Human Health Risk Summary



Human Health Risk Summary



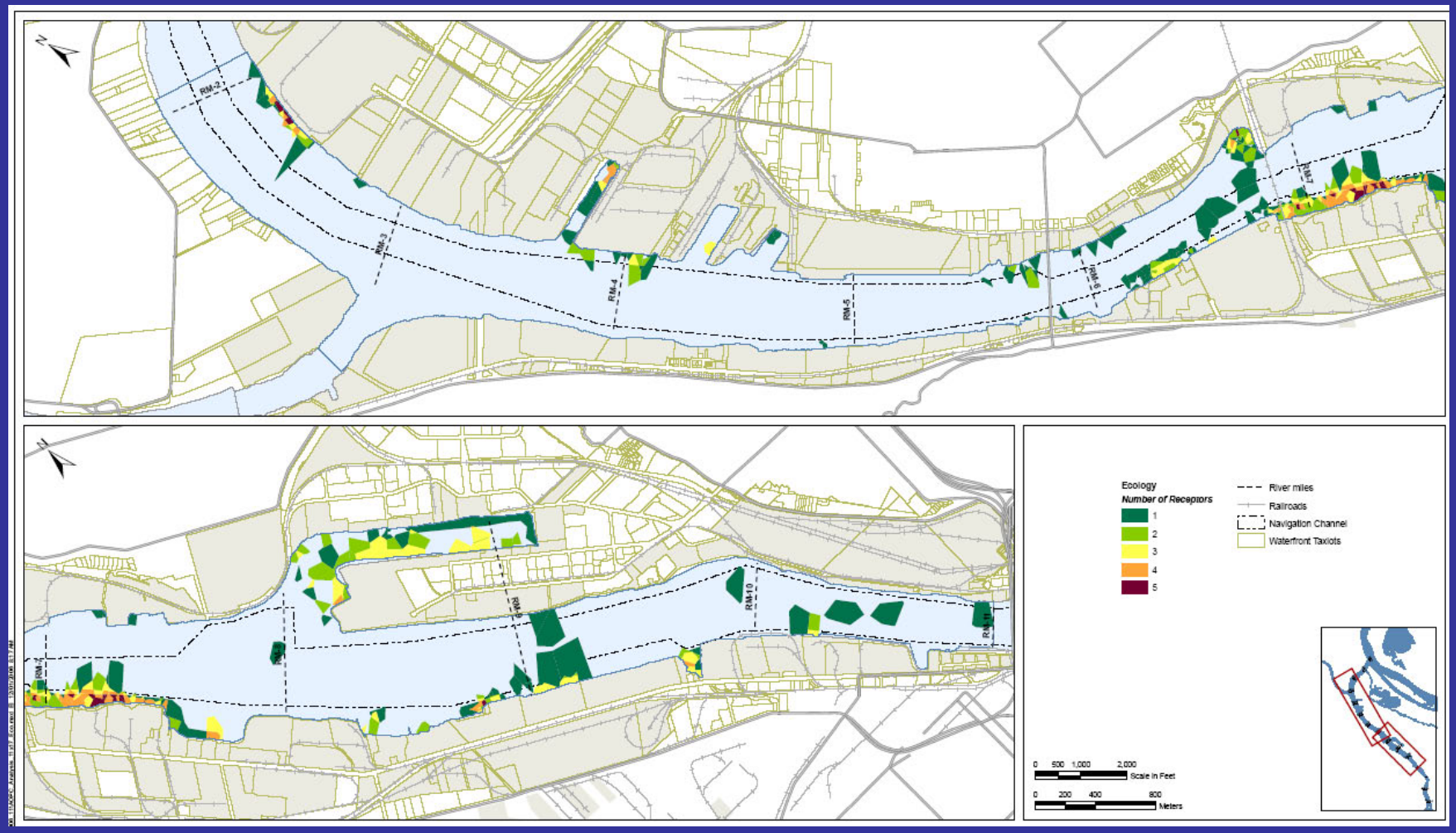
Human Health Risk

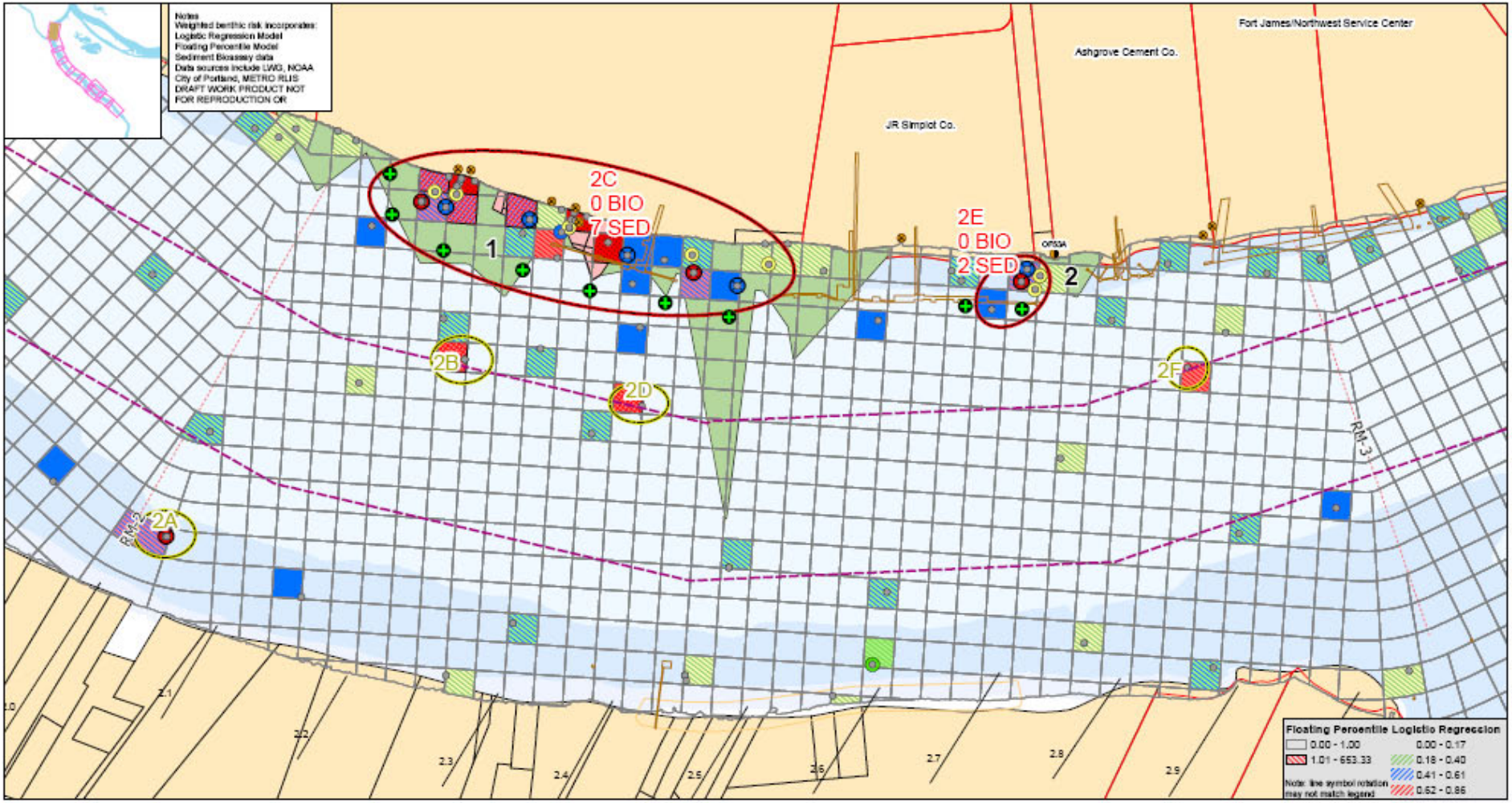


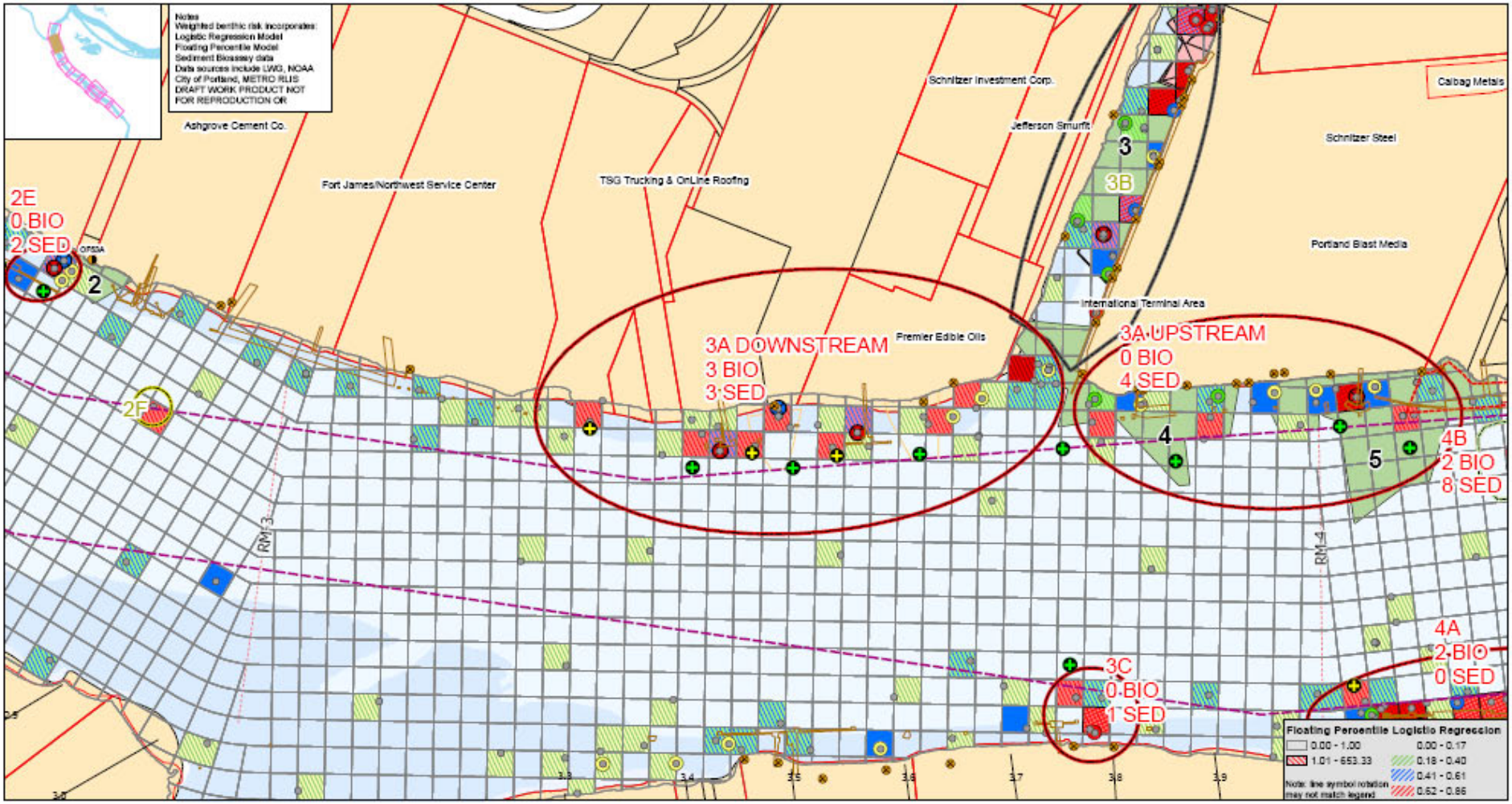
Preliminary Risk Evaluation for Ecological Risks

- Lines of Evidence Evaluated
  - Tissue Residue – Fish and Shellfish
  - Dietary Update – Fish, Birds and Mammals
  - Modeled egg tissue – Birds
  - Risks to benthic community

Ecological Risk Mapping




Notes
Weighted benthic risk incorporates:
Logistic Regression Model
Floating Percentile Model
Sediment Bioassay data
Data sources include LWG, NOAA
City of Portland, METRO RLIS
DRAFT WORK PRODUCT NOT
FOR REPRODUCTION OR
Fort James/Northwest Service Center
Ashgrove Cement Co.
JR Simplot Co.
2C
0 BIO
7 SED
1
2E
0 BIO
2 SED
2
2A
2B
2D
2F
RM-2
RM-3
Floating Percentile Logistic Regression
0.00 - 1.00
1.01 - 653.33
0.00 - 0.17
0.18 - 0.40
0.41 - 0.61
0.62 - 0.86
Sediment Bioassay
ALL_TOX
> 90%
80-90%
70 - 80%
< 70%
Hyalella 28 day Growth Only
70 - 80%
< 70%
Proposed 06/01/2007
Sample Type
Bioassay and Surface Sediment
Surface Sediment Only
LWG_FSP_Round3B_Proposed
Potential Risk Areas
Course of Action
POTENTIAL DATA GAP (RD 3B)
AREA OF INTEREST
NO ACTION
Weighted Benthic Risk
No surface sediment/toxicity data
Not Likely
Low
Medium
High
Very High
All benthic risk stations
Initial Areas of Potential Concern (LWG)
LWG Benthic IA/OPC
BNTH_RECPT
0 (Other Lines)
1 (Benthic Line)
AOPC_v3_draft
Outfalls
<all other values>
City of Portland
Navigation Channel (NOAA)
Dock Structures
Bridges
CSM Tasks 20040427
Proposed Rd 3B: River Miles 2-3
Bioassay & Surface Sediment Sampling
See NOAA tech memo for
benthic risk scaling methodology
NOAA ARD 06/07/2007



Sediment Bioassay
ALL_TOX
> 90%
80-90%
70 - 80%
< 70%
Hyalella 28 day Growth Only
70 - 80%
< 70%

Proposed 06/01/2007
Sample Type
Bioassay and Surface Sediment
Surface Sediment Only
LWG_FSP_Round3B_Proposed

Potential Risk Areas
Course of Action
POTENTIAL DATA GAP (RD 3B)
AREA OF INTEREST
NO ACTION

Weighted Benthic Risk
No surface sediment/toxicity data
Not Likely
Low
Medium
High
Very High

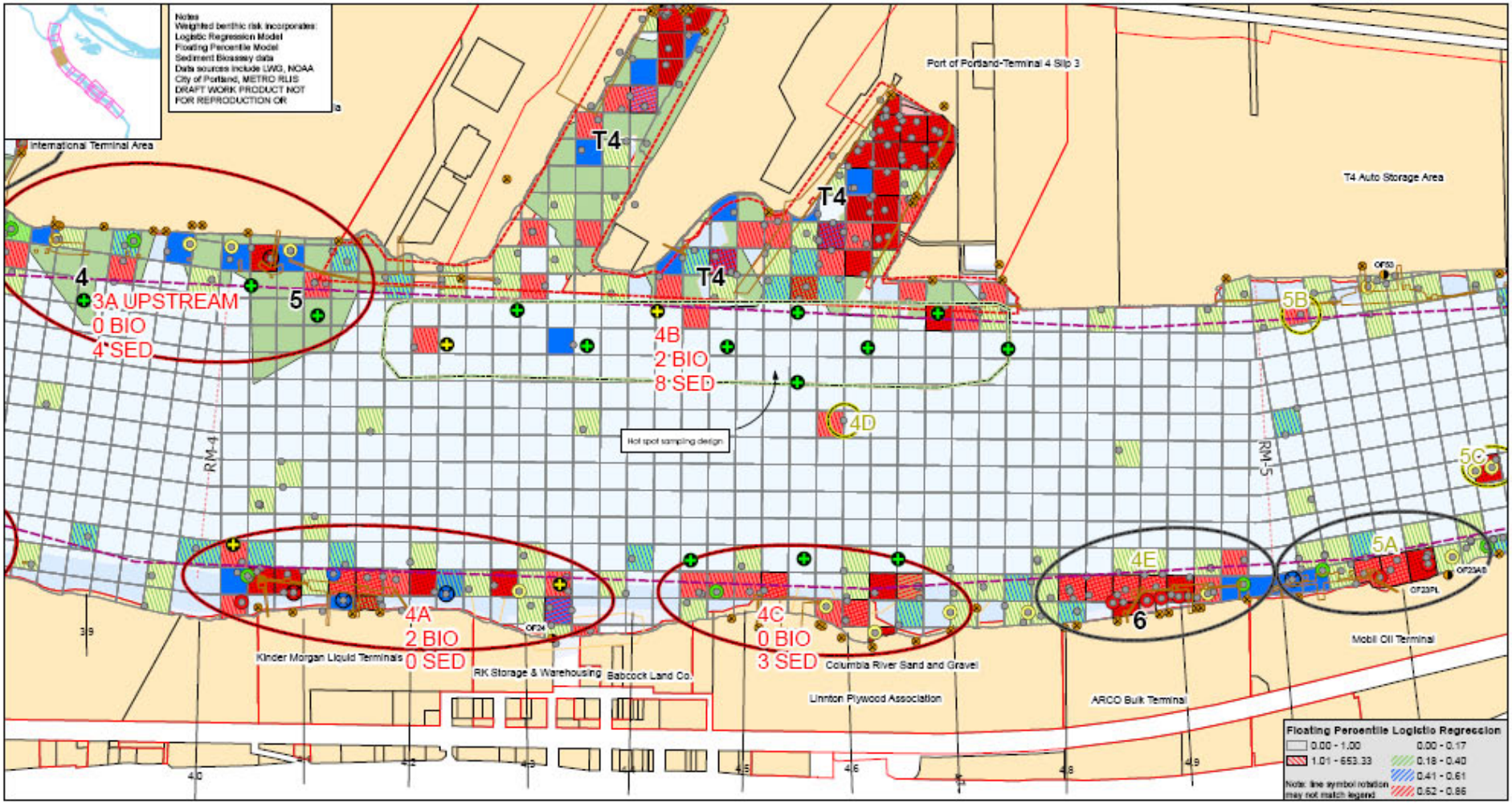
All benthic risk stations
Initial Areas of Potential Concern (LWG)
LWG Benthic IAOPC
BNTH_RECPT
0 (Other Lines)
1 (Benthic Line)
AOPC_v3_draft

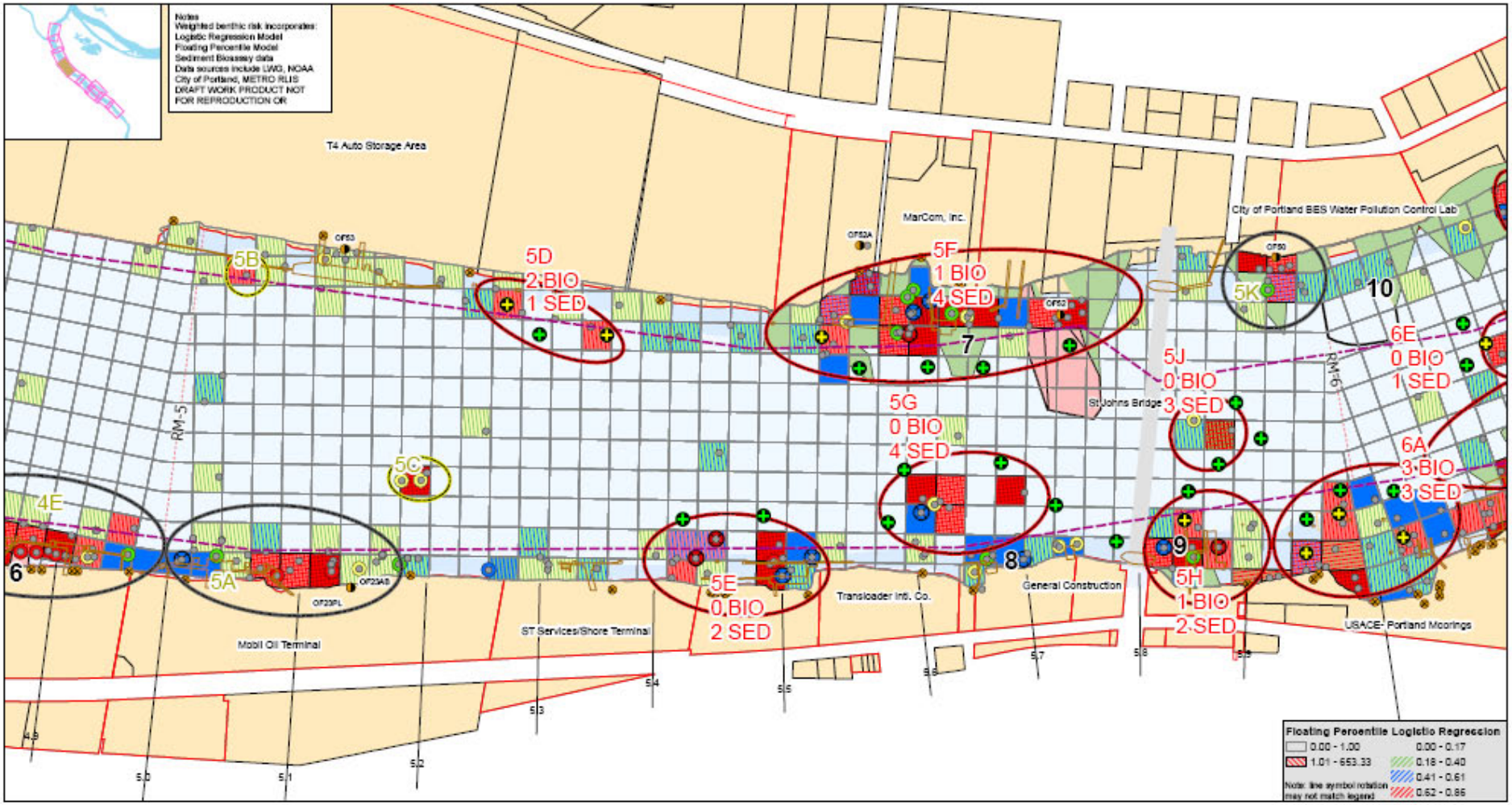
Outfalls
<all other values>
City of Portland
Navigation Channel (NOAA)
Dock Structures
Bridges
CSM Tasks 20040427

Proposed Rd 3B: River Miles 3-4
Bioassay & Surface Sediment Sampling

See NOAA tech memo for benthic risk scaling methodology

NOAA ARD 06/07/2007


Notes
Weighted benthic risk incorporates:
Logistic Regression Model
Floating Percentile Model
Sediment Bioassay data
Data sources include LWG, NOAA
City of Portland, METRO RLIS
DRAFT WORK PRODUCT NOT
FOR REPRODUCTION OR
International Terminal Area
Port of Portland-Terminal 4 Slip 3
T4 Auto Storage Area
T4
T4
T4
4
3A UPSTREAM
0 BIO
4 SED
5
4B
2 BIO
8 SED
Hot spot sampling design
4D
5B
5C
5A
4E
6
4A
2 BIO
0 SED
4C
0 BIO
3 SED
RM-4
RM-5
Kinder Morgan Liquid Terminals
RK Storage & Warehousing
Babcock Land Co.
Columbia River Sand and Gravel
Linnton Plywood Association
ARCO Bulk Terminal
Mobil Oil Terminal
Floating Percentile Logistic Regression
0.00 - 1.00
1.01 - 653.33
0.00 - 0.17
0.18 - 0.40
0.41 - 0.61
0.62 - 0.86
Note: line symbol rotation may not match legend
Sediment Bioassay
ALL_TOX
> 90%
80-90%
70 - 80%
< 70%
Hyalella 28 day Growth Only
70 - 80%
< 70%
Proposed 06/01/2007
Sample Type
Bioassay and Surface Sediment
Surface Sediment Only
LWG_FSP_Round3B_Proposed
Potential Risk Areas
Course of Action
POTENTIAL DATA GAP (RD 3B)
AREA OF INTEREST
NO ACTION
Weighted Benthic Risk
No surface sediment/toxicity data
Not Likely
Low
Medium
High
Very High
All benthic risk stations
Initial Areas of Potential Concern (LWG)
LWG Benthic IAOPC
BNTH_RECPT
0 (Other Lines)
1 (Benthic Line)
AOPC_v3_draft
Outfalls
<all other values>
City of Portland
Navigation Channel (NOAA)
Dock Structures
Bridges
CSM Tasks 20040427
Proposed Rd 3B: River Miles 4-5
Bioassay & Surface Sediment Sampling
See NOAA tech memo for benthic risk scaling methodology
NOAA ARD 06/07/2007



Sediment Bioassay

ALL_TOX

- > 90%
- 80-90%
- 70 - 80%
- < 70%

Hyalella 28 day Growth Only

- 70 - 80%
- < 70%

Proposed 06/01/2007

Sample Type

- Bioassay and Surface Sediment
- Surface Sediment Only
- LWG_FSP_Round3B_Proposed

Potential Risk Areas

Course of Action

- POTENTIAL DATA GAP (RD 3B)
- AREA OF INTEREST
- NO ACTION

Weighted Benthic Risk

- No surface sediment/toxicity data
- Not Likely
- Low
- Medium
- High
- Very High

- All benthic risk stations
- Initial Areas of Potential Concern (LWG)

LWG Benthic IA/OPC

BNTH_RECPT

- 0 (Other Lines)
- 1 (Benthic Line)
- AOPC_v3_draft

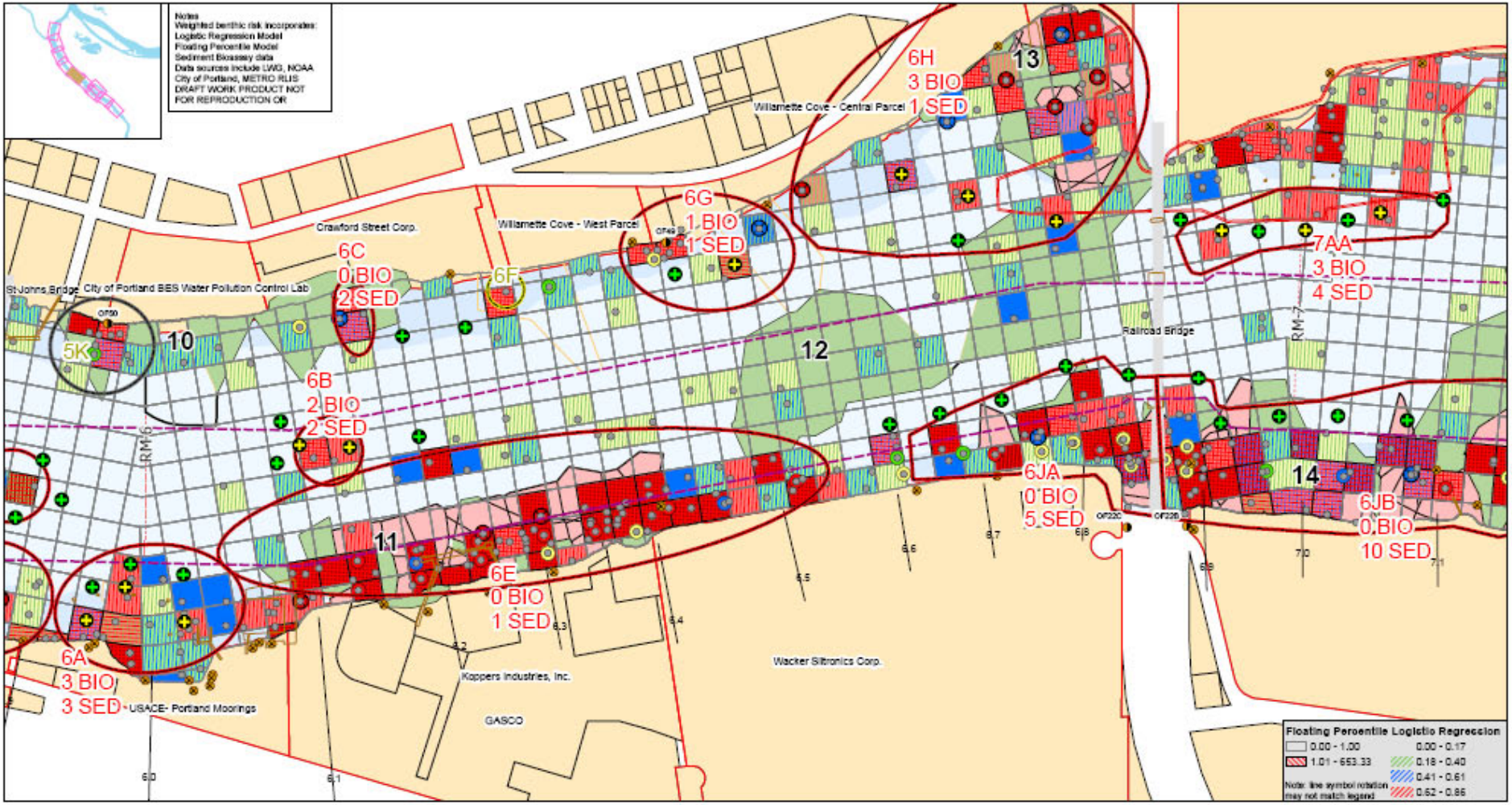
Outfalls

- <all other values>
- City of Portland
- Navigation Channel (NOAA)
- Dock Structures
- Bridges
- CSM Tasks 20040427

Proposed Rd 3B: River Miles 5-6 Bioassay & Surface Sediment Sampling

See NOAA tech memo for benthic risk scaling methodology

NOAA ARD 06/07/2007



Sediment Bioassay

ALL_TOX

- > 90%
- 80-90%
- 70 - 80%
- < 70%

Hyalella 28 day Growth Only

- 70 - 80%
- < 70%

Proposed 06/01/2007

Sample Type

- Bioassay and Surface Sediment
- Surface Sediment Only
- LWG_FSP_Round3B_Proposed

Potential Risk Areas

Course of Action

- POTENTIAL DATA GAP (RD 3B)
- AREA OF INTEREST
- NO ACTION

Weighted Benthic Risk

- No surface sediment/toxicity data
- Not Likely
- Low
- Medium
- High
- Very High

- All benthic risk stations
- Initial Areas of Potential Concern (LWG)

LWG Benthic IAOPC

BNTH_RECPT

- 0 (Other Lines)
- 1 (Benthic Line)
- AOPC_v3_draft

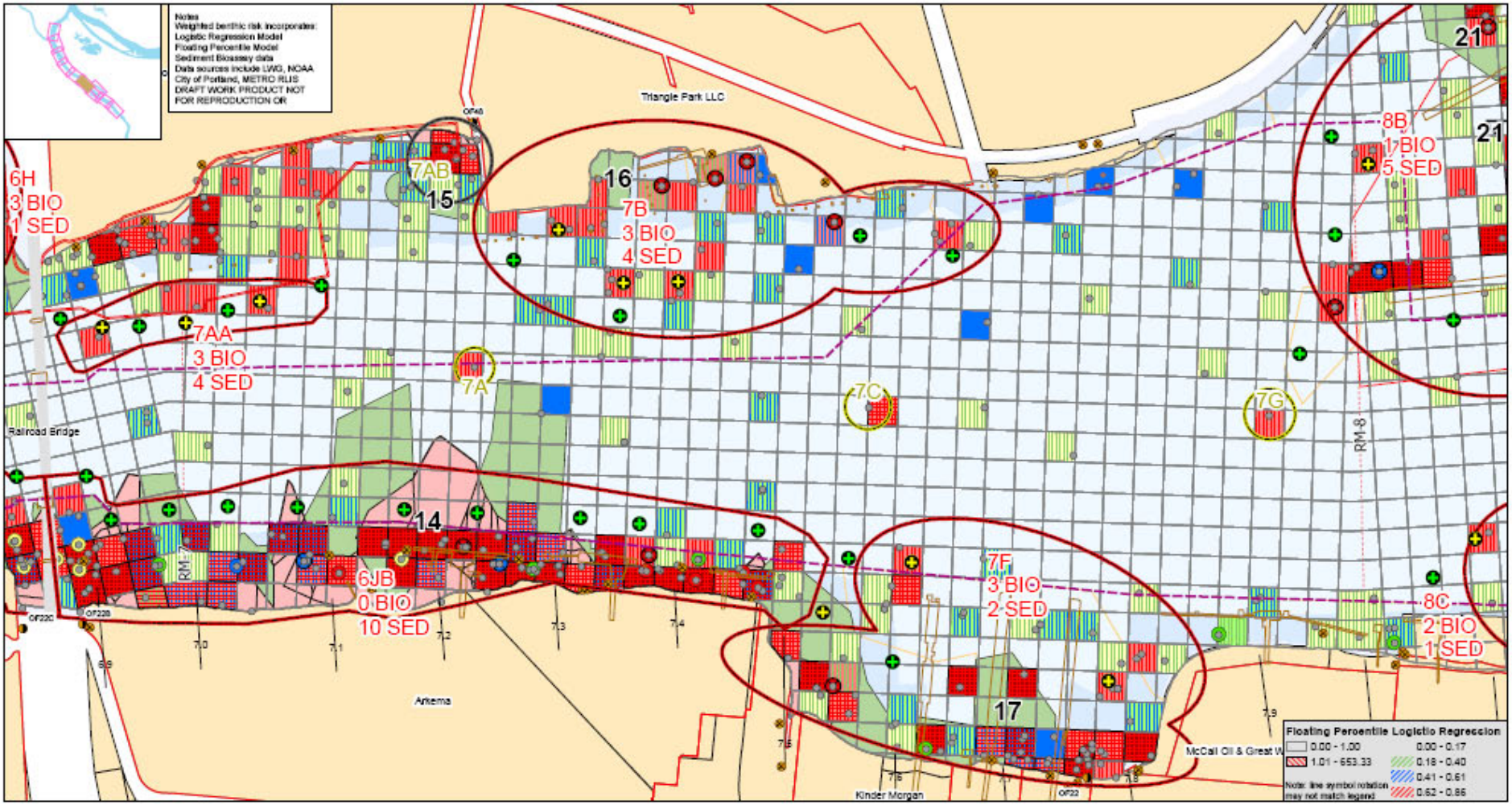
Outfalls

- <all other values>
- City of Portland
- Navigation Channel (NOAA)
- Dock Structures
- Bridges
- CSM Tasks 20040427

Proposed Rd 3B: River Miles 6-7 Bioassay & Surface Sediment Sampling

See NOAA tech memo for benthic risk scaling methodology

NOAA ARD 06/07/2007



Sediment Bioassay
ALL_TOX
> 90%
80-90%
70 - 80%
< 70%
Hyalella 28 day Growth Only
70 - 80%
< 70%

Proposed 06/01/2007
Sample Type
Bioassay and Surface Sediment
Surface Sediment Only
LWG_FSP_Round3B_Proposed

Potential Risk Areas
Course of Action
POTENTIAL DATA GAP (RD 3B)
AREA OF INTEREST
NO ACTION

Weighted Benthic Risk
No surface sediment/toxicity data
Not Likely
Low
Medium
High
Very High

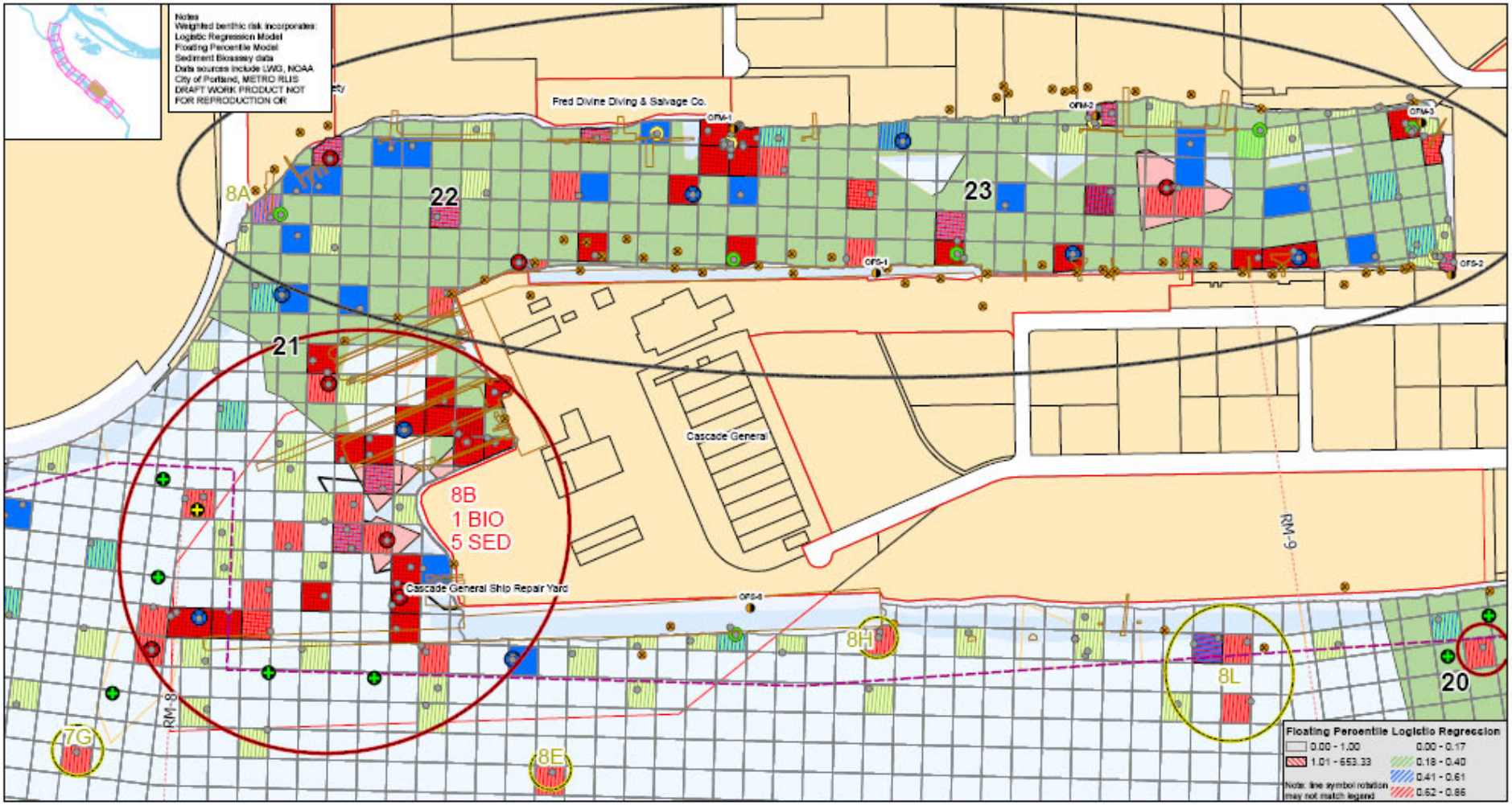
All benthic risk stations
Initial Areas of Potential Concern (LWG)
LWG Benthic IAOPC
BNTH_RECPT
0 (Other Lines)
1 (Benthic Line)
AOPC_v3_draft

Outfalls
<all other values>
City of Portland
Navigation Channel (NOAA)
Dock Structures
Bridges
CSM Tasks 20040427

Proposed Rd 3B: River Miles 7-8
Bioassay & Surface Sediment Sampling

See NOAA tech memo for benthic risk scaling methodology

NOAA ARD 06/07/2007



Sediment Bioassay

ALL_TOX

- > 90%
- 80-90%
- 70 - 80%
- < 70%

Hyalella 28 day Growth Only

- 70 - 80%
- < 70%

Proposed 06/01/2007

Sample Type

- Bioassay and Surface Sediment
- Surface Sediment Only
- LWG_FSP_Round3B_Proposed

Potential Risk Areas

Course of Action

- POTENTIAL DATA GAP (RD 3B)
- AREA OF INTEREST
- NO ACTION

Weighted Benthic Risk

- No surface sediment/toxicity data
- Not Likely
- Low
- Medium
- High
- Very High

- All benthic risk stations
- Initial Areas of Potential Concern (LWG)

LWG Benthic IA/OPC

BNTH_RECPT

- 0 (Other Lines)
- 1 (Benthic Line)
- AOPC_v3_draft

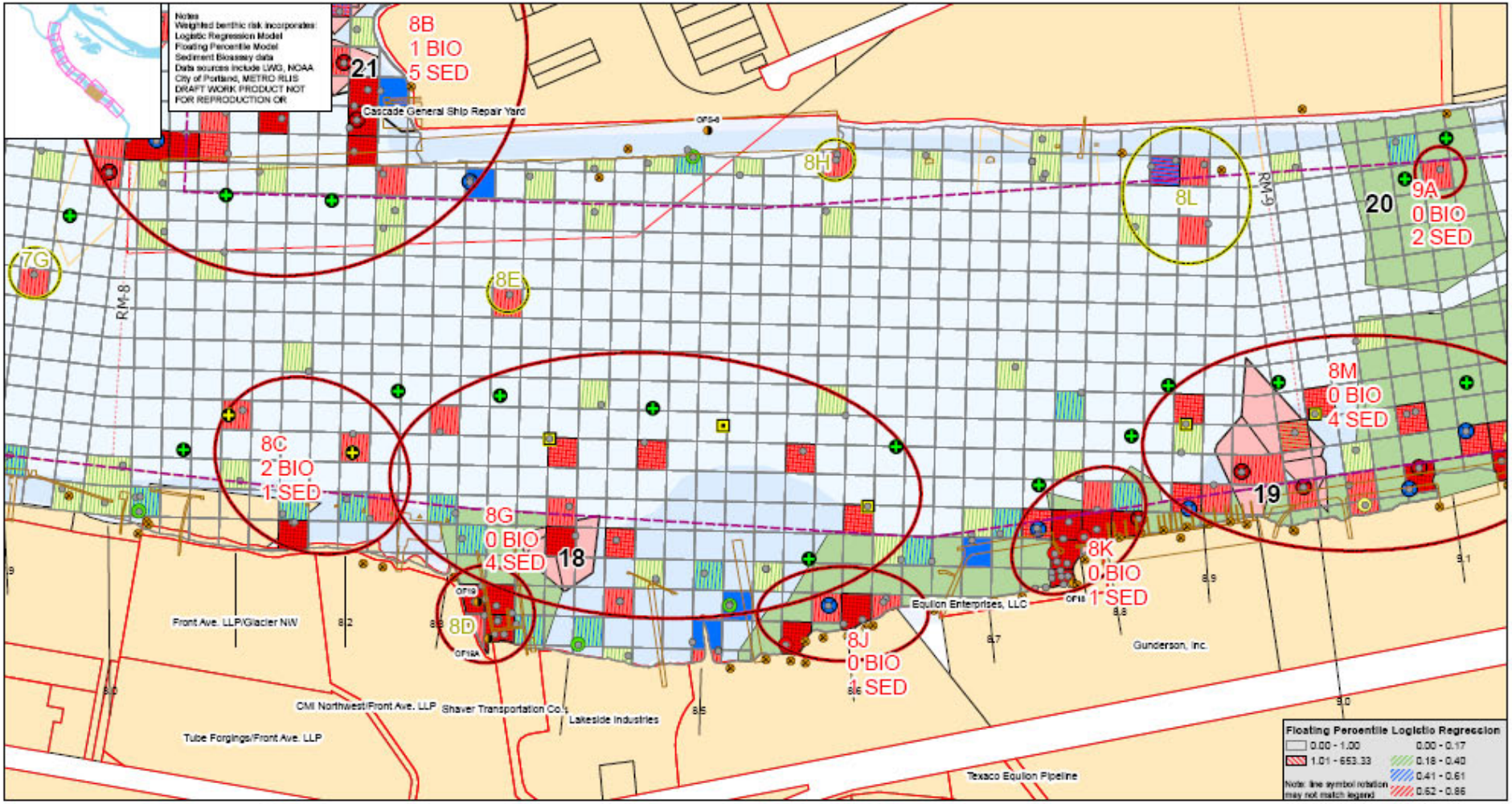
Outfalls

- <all other values>
- City of Portland
- Navigation Channel (NOAA)
- Dock Structures
- Bridges
- CSM Tasks 20040427

Proposed Rd 3B: River Miles 8-9a Bioassay & Surface Sediment Sampling

See NOAA tech memo for benthic risk scaling methodology

NOAA ARD 06/07/2007



Sediment Bioassay
ALL_TOX
> 90%
80-90%
70 - 80%
< 70%
Hyalella 28 day Growth Only
70 - 80%
< 70%

Proposed 06/01/2007
Sample Type
Bioassay and Surface Sediment
Surface Sediment Only
LWG_FSP_Round3B_Proposed

Potential Risk Areas
Course of Action
POTENTIAL DATA GAP (RD 3B)
AREA OF INTEREST
NO ACTION

Weighted Benthic Risk
No surface sediment/toxicity data
Not Likely
Low
Medium
High
Very High

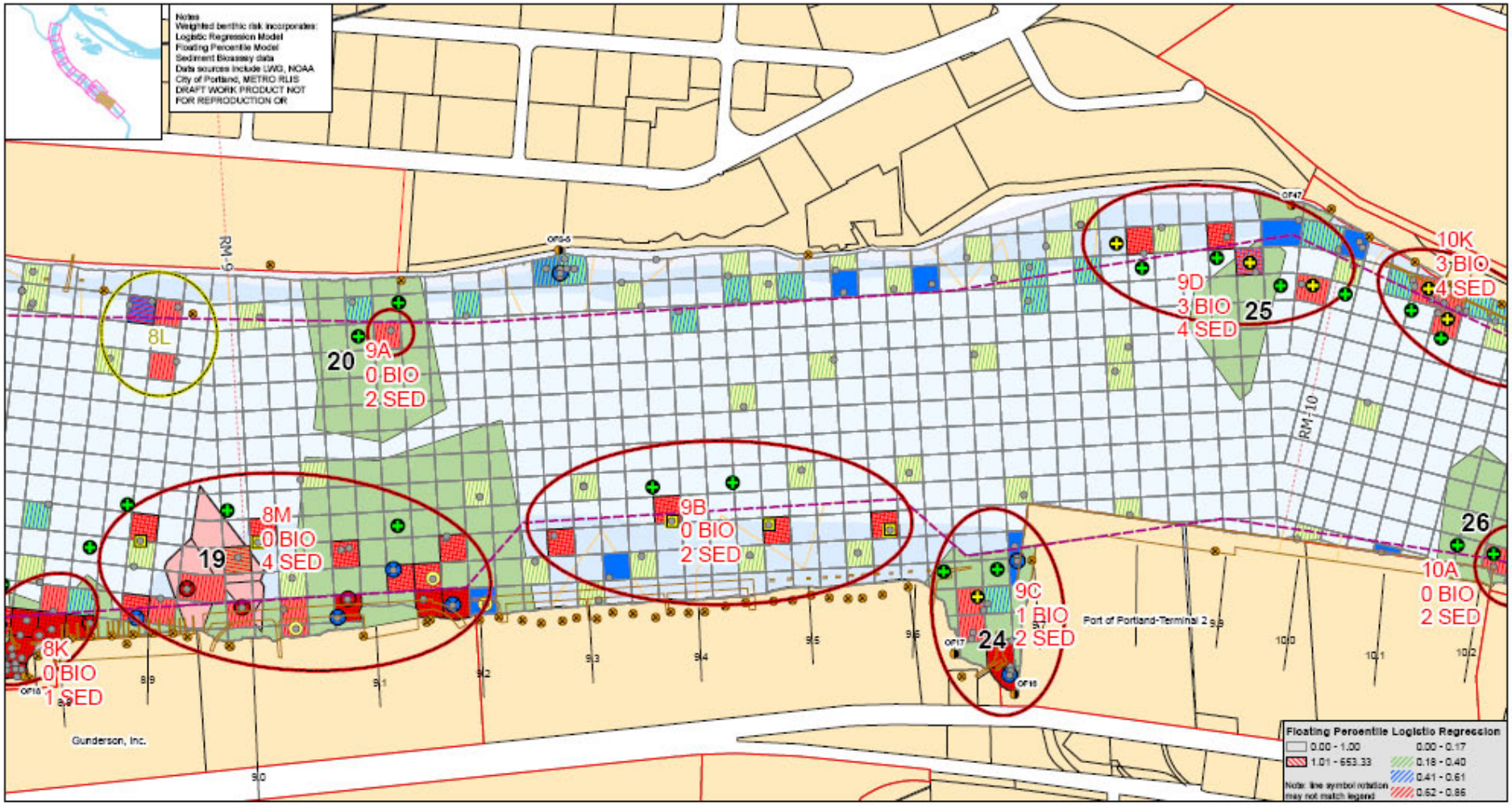
All benthic risk stations
Initial Areas of Potential Concern (LWG)
LWG Benthic IA/OPC
BNTH_RECPT
0 (Other Lines)
1 (Benthic Line)
AOPC_v3_draft

Outfalls
<all other values>
City of Portland
Navigation Channel (NOAA)
Dock Structures
Bridges
CSM Tasks 20040427

Proposed Rd 3B: River Miles 8-9b
Bioassay & Surface Sediment Sampling

See NOAA tech memo for benthic risk scaling methodology

NOAA ARD 06/07/2007



Sediment Bioassay
ALL_TOX
> 90%
80-90%
70 - 80%
< 70%
Hyalella 28 day Growth Only
70 - 80%
< 70%

Proposed 06/01/2007
Sample Type
Bioassay and Surface Sediment
Surface Sediment Only
LWG_FSP_Round3B_Proposed

Potential Risk Areas
Course of Action
POTENTIAL DATA GAP (RD 3B)
AREA OF INTEREST
NO ACTION

Weighted Benthic Risk
No surface sediment/toxicity data
Not Likely
Low
Medium
High
Very High

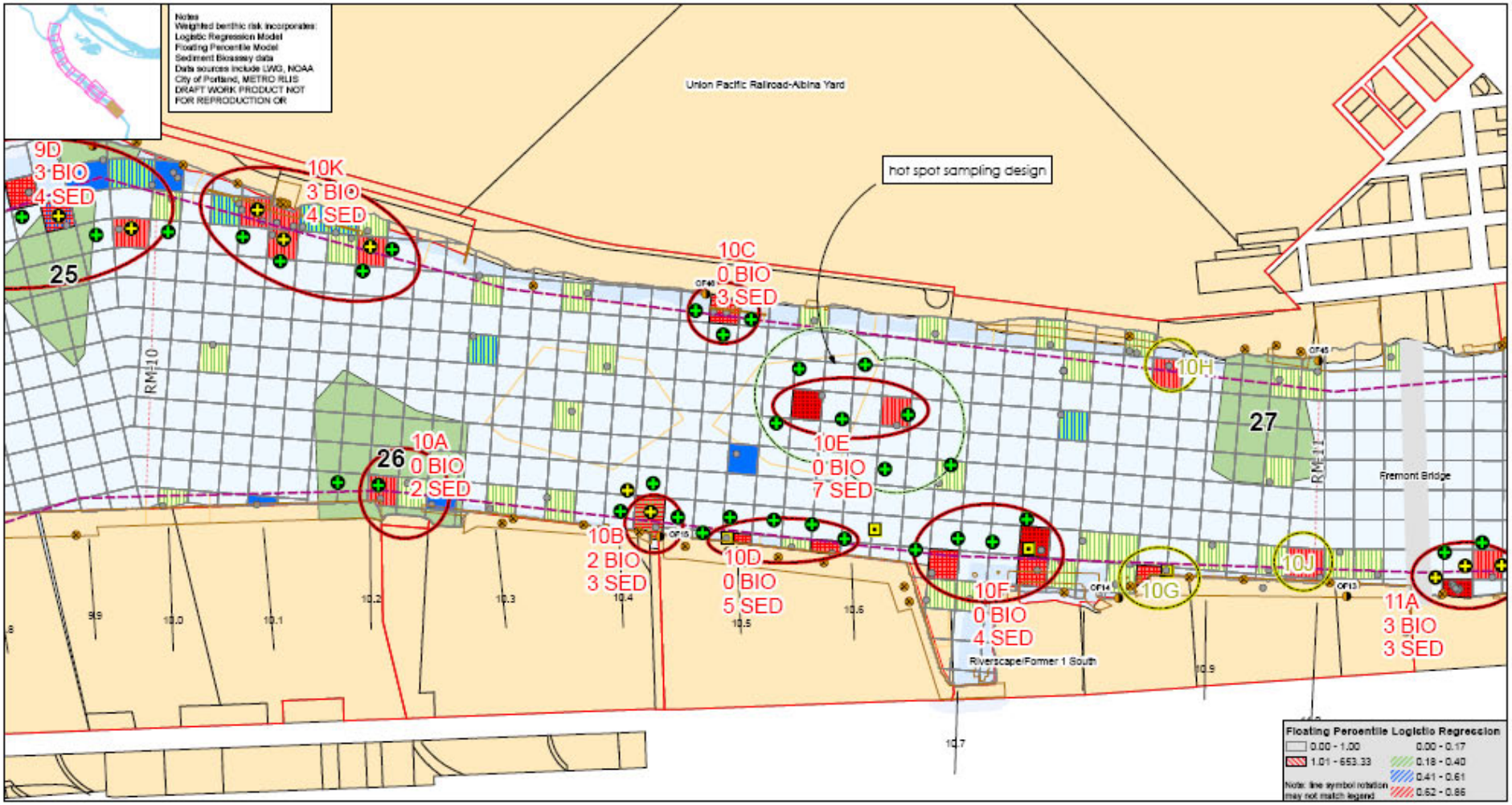
All benthic risk stations
Initial Areas of Potential Concern (LWG)
LWG Benthic IA/OPC
BNTH_RECPT
0 (Other Lines)
1 (Benthic Line)
AOPC_v3_draft

Outfalls
<all other values>
City of Portland
Navigation Channel (NOAA)
Dock Structures
Bridges
CSM Tasks 20040427

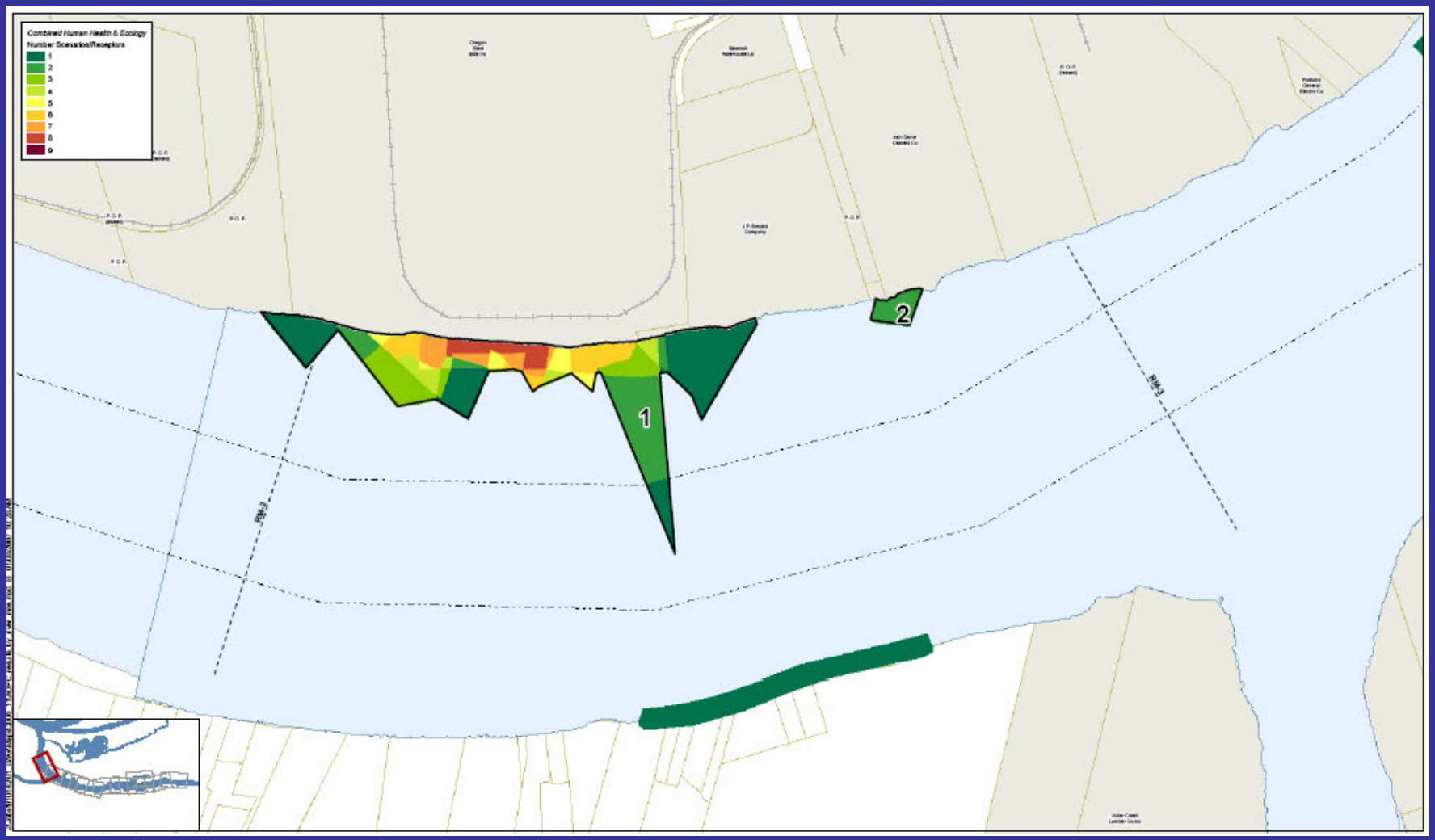
Proposed Rd 3B: River Miles 9-10
Bioassay & Surface Sediment Sampling

See NOAA tech memo for benthic risk scaling methodology

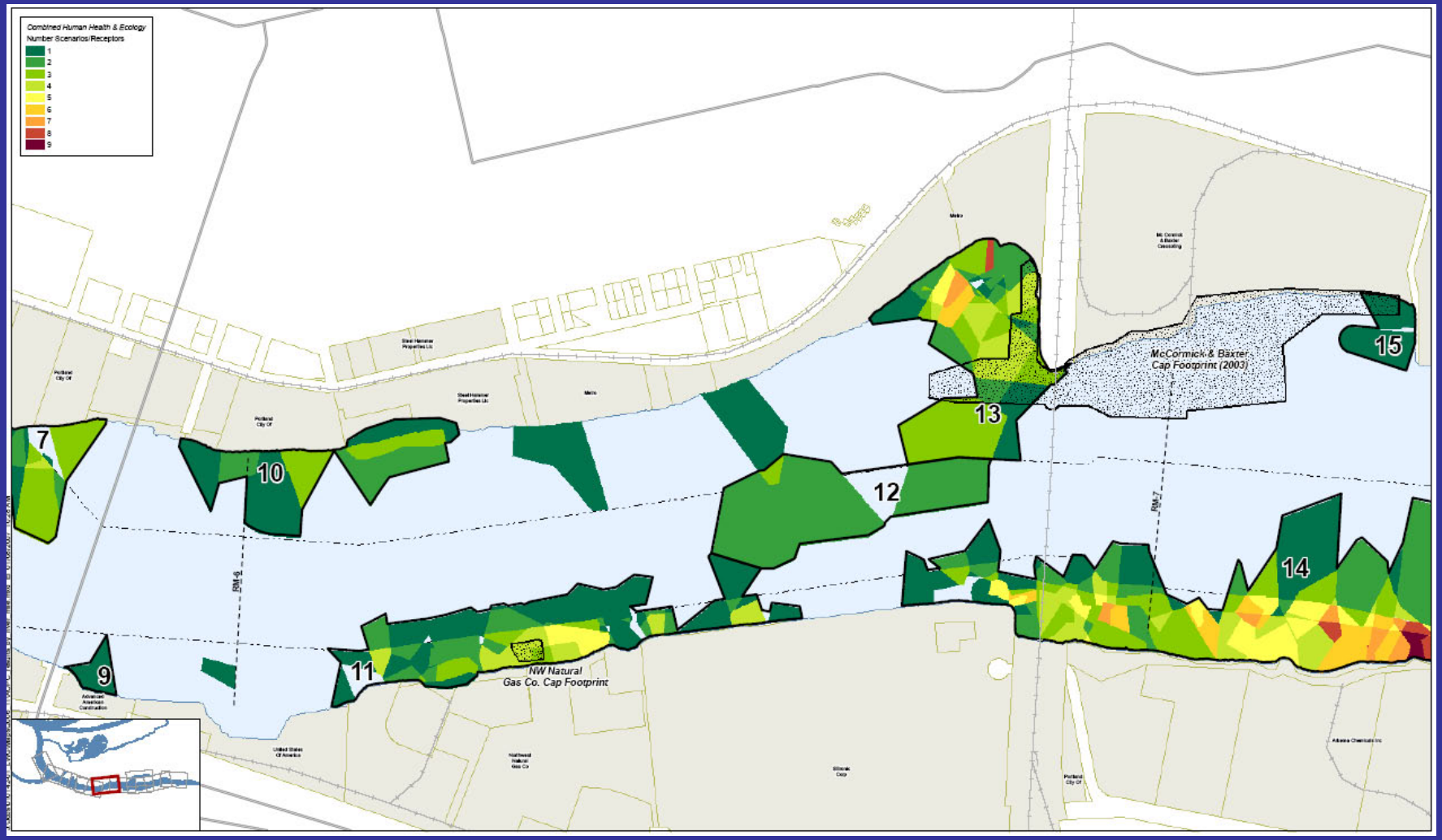
NOAA ARD 06/07/2007


Notes
Weighted benthic risk incorporates:
Logistic Regression Model
Floating Percentile Model
Sediment Bioassay data
Data sources include LWG, NOAA
City of Portland, METRO RLIS
DRAFT WORK PRODUCT NOT
FOR REPRODUCTION OR
Union Pacific Railroad-Albina Yard
hot spot sampling design
9D
3 BIO
4 SED
10K
3 BIO
4 SED
25
10C
0 BIO
3 SED
10H
27
10E
0 BIO
7 SED
26
10A
0 BIO
2 SED
10B
2 BIO
3 SED
10D
0 BIO
5 SED
10F
0 BIO
4 SED
10G
10J
11A
3 BIO
3 SED
RM 10
RM 11
Fremont Bridge
Riverscape/Former 1 South
Floating Percentile Logistic Regression
0.00 - 1.00
1.01 - 653.33
0.00 - 0.17
0.18 - 0.40
0.41 - 0.61
0.62 - 0.86
Sediment Bioassay
ALL_TOX
> 90%
80-90%
70 - 80%
< 70%
Hyalella 28 day Growth Only
70 - 80%
< 70%
Proposed 06/01/2007
Sample Type
Bioassay and Surface Sediment
Surface Sediment Only
LWG_FSP_Round3B_Proposed
Potential Risk Areas
Course of Action
POTENTIAL DATA GAP (RD 3B)
AREA OF INTEREST
NO ACTION
Weighted Benthic Risk
No surface sediment/toxicity data
Not Likely
Low
Medium
High
Very High
All benthic risk stations
Initial Areas of Potential Concern (LWG)
LWG Benthic IAOPC
BNTH_RECPT
0 (Other Lines)
1 (Benthic Line)
AOPC_v3_draft
Outfalls
<all other values>
City of Portland
Navigation Channel (NOAA)
Dock Structures
Bridges
CSM Tasks 20040427
Proposed Rd 3B: River Miles 10-11
Bioassay & Surface Sediment Sampling
See NOAA tech memo for
benthic risk scaling methodology
NOAA ARD 06/07/2007

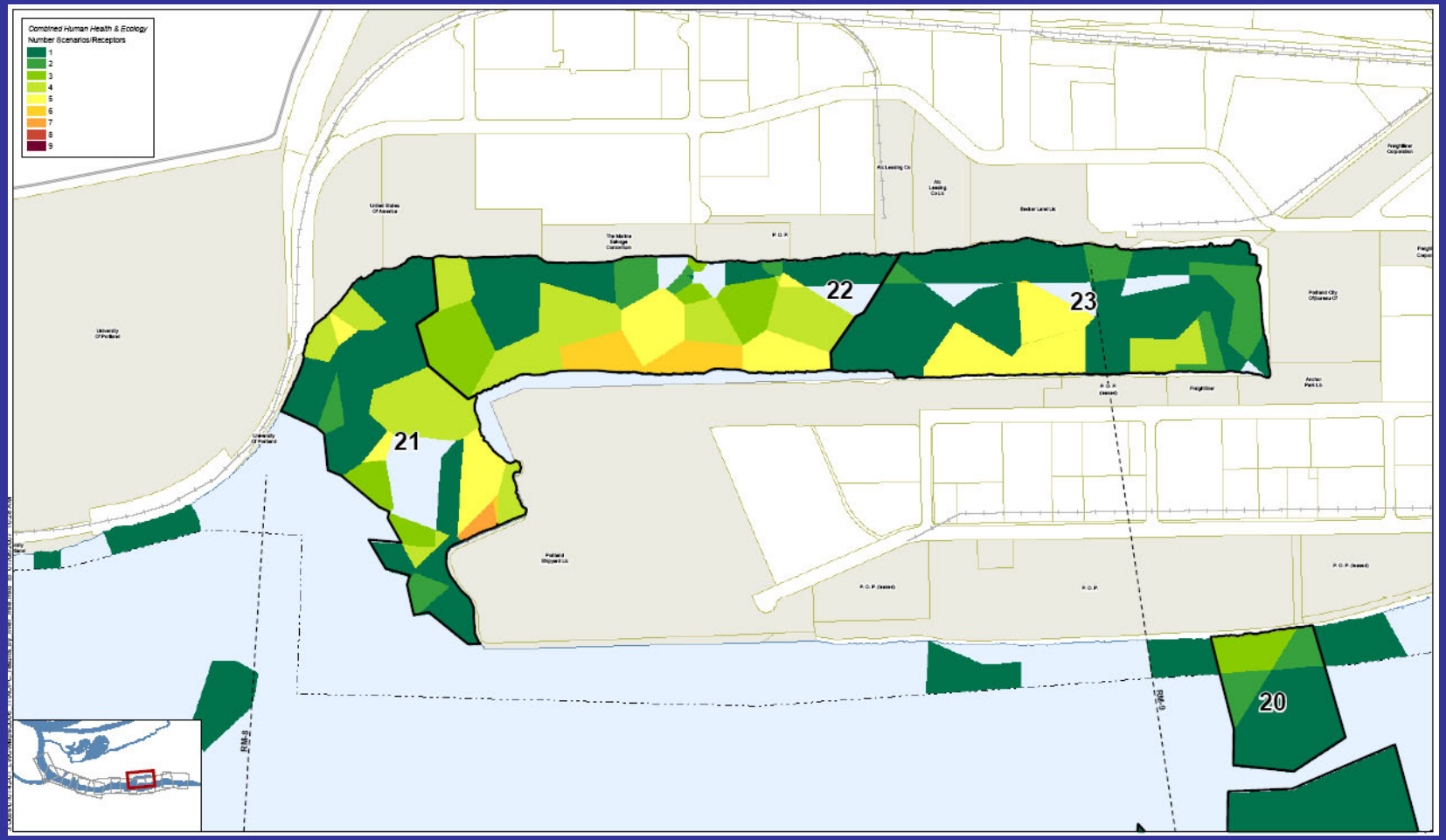
River Mile 2 -3



River Mile 6 - 7



Swan Island Lagoon



Current Status

- Field data collection for RI and baseline risk assessment is complete
- EPA general comments on the Round 2 Report (January 15, 2008)
- EPA's Problem Formulation for the Ecological Risk Assessment (February 15, 2008)
- EPA's comments on Preliminary Remediation Goals (PRGs) as presented in Section 10 of the Round 2 Report (March 20, 2008)
- FS Guidance (March 28, 2008)
- TRV Comments (April 11, 2008)