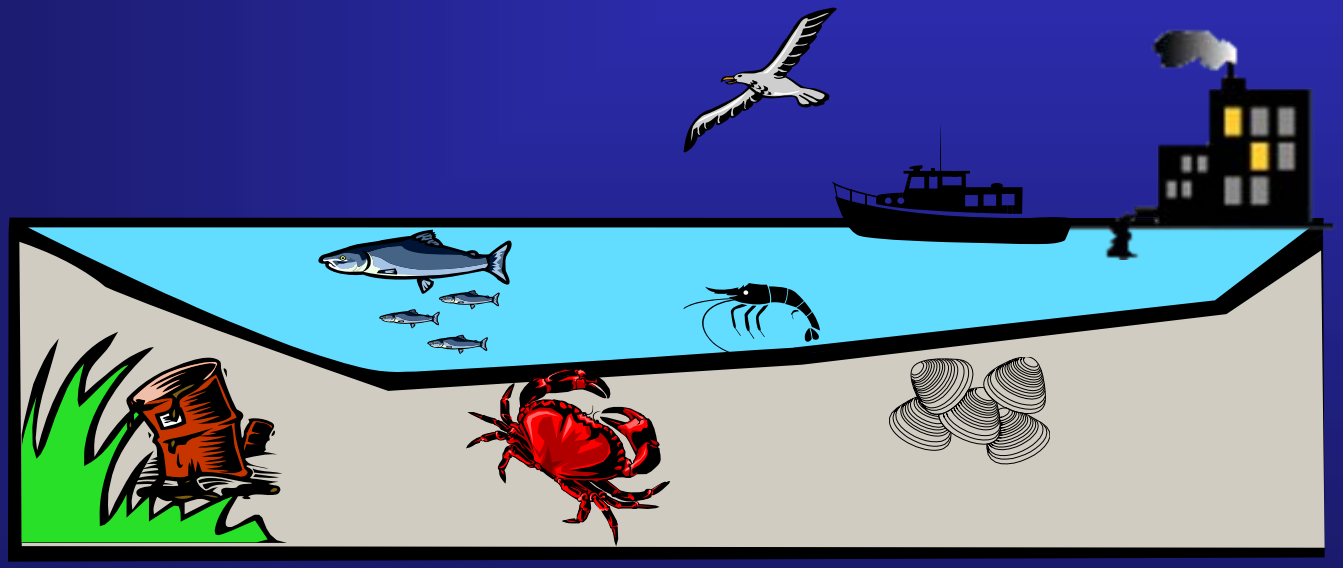
Natural Resource Damage Assessment at Portland Harbor

March 11, 2008



Portland Harbor Natural Resource Trustee Council

Purpose of Meeting

- **Provide context - NRD statutory and regulatory framework**
- **Review trustee understanding of the site**
- **Present approach for conducting the injury determination phase of the damage assessment**

Portland Harbor Natural Resource Trustees

- **Nez Perce, Umatilla, Warm Springs, Yakama, Siletz, Grand Ronde**
- **Department of the Interior**
- **National Oceanic Atmospheric Administration (NOAA)**
- **Oregon Department of Fish and Wildlife**

Introduction to Natural Resource Damage Assessments

Overview Fundamental Concept

- **Natural resource damage assessments designed to determine the value of natural resources injured as a result of a release of oil or hazardous substances**
- **Damages separate and distinct from the cost of cleaning up released substances**
- **Damages determined after considering impacts and benefits of proposed remedial actions**

Primary Statutory Authority

- **Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)**
  - For releases of hazardous wastes
  - Section 107 allows recovery for "damages from injury to, destruction of, or loss of natural resources, including the reasonable costs of assessing such injury, destruction or loss resulting from such a release."

Primary Statutory Authority

- **Oil Pollution Act of 1990 (OPA)**
  - For oil spills
  - Section 1002 provides basically identical language to CERCLA
  - Amended the Clean Water Act, which also allows for natural resource damages (Section 311 (f))

CERCLA Liabilities

1. **CERCLA Remedy (Clean-up liability)**
   - -- Response costs associated with releases
   - -- Proactive in nature
   - -- Address hazardous substances today to protect human health and the environment tomorrow
   - -- Managed by EPA and DEQ

CERCLA Liabilities

2. **NRDA and Restoration**

-- Makes the public "whole" for **injuries** to natural resources resulting from releases of contaminants

-- Purpose is compensation, not punishment

-- Objective is to restore resources to "but-for" condition ("baseline" conditions) and compensate for public losses

-- Focus is on injuries associated with releases of contaminants or impacts of remedy—not physical impacts of other stressors

-- Managed by Natural Resource Trustees

Basic Elements of a Natural Resource Damage Claim

A. Release of hazardous substance or oil from a "facility" or a "vessel"

B. Injury to natural resources

1. Natural resources are broadly defined, and include "land, fish, wildlife, biota, air, water, groundwater, drinking water supplies and other such resources…"

Basic Elements of a Natural Resource Damage Claim

B. Injury to natural resources, as defined in the DOI NRDA Regulations

-- a “measurable adverse change, either long or short term, in the chemical or physical quality or viability of a natural resource”

Basic Elements of a Natural Resource Damage Claim

-- Other injuries include reproduction inhibition in fish and wildlife, loss of habitat functions, or the exceedance of an air or water quality standard (just a few examples)

C. Causation – Causal link between the released substance and injury must be established

Basic Elements of a Natural Resource Damage Claim

D. Damages resulting from injury to natural resources

-- Refers to the costs and loss of economic value associated with injury to the resource

-- Restoration Costs – the primary measure of damages is the cost to restore, replace, or acquire the equivalent of natural resources injured by a spill or a release

Basic Elements of a Natural Resource Damage Claim

-- Compensable Value – in addition to the cost of restoration

- Direct use values - Examples include the market value of resources, recreational values and subsistence use

- Passive use values - Examples include option and existence values, tribal spiritual and cultural values

Basic Elements of a Natural Resource Damage Claim

-- **Human services (create value)**

- **Recreational (swimming, fishing, birding, boating)**
- **Direct use (drinking water, navigation)**
- **Cultural (tribal spiritual uses, cultural uses)**
- **Passive (existence, option, bequest)**

Basic Elements of a Natural Resource Damage Claim

-- Damage Assessment Costs – reasonable and necessary costs to perform assessment of injuries

Assessment Pursuant to DOI Regulations Background

- **43 CFR Part 11 - promulgated pursuant to CERCLA Section 9651(c) - originally applicable for NRDAs conducted pursuant to CERCLA and CWA**

- **OPA called for NOAA to promulgate rules for oil spills**

- **Use not mandatory, assessments prepared pursuant to regulations is entitled to a rebuttable presumption in any court or administrative proceeding**

Assessment Pursuant to DOI Regulations Preassessment Screen

- **Quick assessment of existing information to determine whether it is appropriate to do a damage assessment**

Assessment Pursuant to DOI Regulations Assessment Plan

- **Lays out scientific & economic methodologies to be used**
  - -- Studies and analyses--Type A or B?
  - -- Coordination w/ multiple trustees
  - -- Notify PRPs of “Intent to Perform”
  - -- Statement of trustee authority
  - -- Preliminary estimate of damages
  - -- Publish proposed plan for comment

Assessment Pursuant to DOI Regulations Assessment Phase

- **Injury Determination:**
    a. Release
    b. Pathways
    c. Exposed natural resources
    d. Identify injury and loss

Assessment Pursuant to DOI Regulations Injury Quantification

- **Measure extent of injury identified in injury determination phase**
- **Identify extent that injury differs from baseline or "but for" condition**
- **Identify services normally produced by the injured resource, i.e., recreational use, commercial use, etc.**
- **Measure disruption of services because of injury and determine recovery time with and without restoration**

Assessment Pursuant to DOI Regulations Damage Determination

- **Encompassed in Damage Assessment and Restoration Plan**

  -- Identify restoration or replacement necessary to return to baseline

  -- Determine compensable value of the resources, including lost value of service until they return to baseline (can use cost of compensatory restoration)

Assessment Pursuant to DOI Regulations Resolution of NRD liability

- **Settlement**

  -- CERCLA 122j – trustees may grant a covenant not to sue if appropriate measures are taken to protect and restore natural resources

- **Litigation**

Applying NRDA at Portland Harbor

Portland Harbor NRD Goals

- **Recovery for:**

  -- injuries to natural resources and services provided by those resources as a result of releases of hazardous substances at Portland Harbor

  -- damage assessment costs

- **Restore, replace or acquire the equivalent of the injured natural resources and services provided by those resources**

Portland Harbor NRD Goals

- **Work Cooperatively with EPA and PRPs**
- **Adapt NRD process, if PRPs financially support current assessment and allocation, to facilitate early settlements**

What Trustees Have Heard From Some PRPs

- **Want to work cooperatively with Trustees**
- **Want to settle NRD liability sooner rather than later**
- **Willing to fund injury assessment work if it will lead to earlier settlement**

Portland Harbor NRD Geographic Scope

- **42 USC § 9601(9) - "facility" – "where a hazardous substance has …come to be located."**

- **NRD assessment area being defined by the data and science:**

  -- Uplands of EPA study area

  -- Willamette River – EPA study area +

  -- Lower Columbia River

Portland Harbor
4-Phased NRD Approach

Phase 1 – Begin assessment, with focus on injury determination and review of existing information relevant for all assessment components

Phase 2 – Collect new information as needed to assess and estimate injury and damages and plan restoration; early settlement possible

Phase 3 – Final injury/damage determination and quantification

Phase 4 – Settlement/litigation

Phase 1–Begin Injury Assessment

- **Time - 4/08 – 4/09**

- **Elements:**

  -- Literature and data reviews

  -- Injury assessment and preliminary quantification plan

  -- Initial studies plans and implementation

  -- Administration

Phase 1 Literature and Data Reviews

- **Geographic Scope of Literature Review**
  - Portland Harbor NRD assessment area
  - Relevant literature and data from other sites
- **Geographic Scope of Data Review**
  - Portland Harbor NRD assessment area (all information sources)
- **Substantive Scope of Reviews**
  - Injury issues (releases, pathways, exposure, impacts, losses)
  - Quantification issues (of natural resources, services, or values)
  - Damage issues
    - **Losses caused by injuries (scaled directly to restoration or valuation)**
    - **Gains caused by restoration (based on cost or value)**

Phase 1 Injury Assessment and Preliminary Quantification Plan

- **Compile and summarize literature and data reviews**
- **Identify data gaps**
- **Determine data gaps to be filled – representative resources**
- **Draft QA/QC plan for the assessment**

Phase 1 Initial Studies

- **Study plans for initial studies**
  - Lamprey Sediment Exposure - pilot
  - Juvenile Salmon Tissue
  - Osprey Eggs
- **Specific QA/QC plans for initial studies**
- **Implement initial studies**

Phase 1 Administrative Functions

- **Case manager**
- **Public involvement plan**
- **Decision tree NRDA roadmap –If/then statements**

Separately Funded Efforts

- **Liability allocation**
- **Restoration banking**
- **Specific restoration projects or pilot projects**
- **Partial settlements**

Phase 2 – Continuation of Assessments, Estimates

- **Studies**
  - Selected study plans and QA/QCs
  - Implement selected studies and analyze results

- **Determinations**
  - Releases and pathways
  - Fate and transport
  - Baseline considerations

Phase 2 Continuation of Assessments, Estimates

- **Informed Estimates (iterative with conservative assumptions as needed)**
  - Injury and loss estimates
  - Restoration and gain possibilities
  - Quantification estimates (balancing losses and gains)
  - Damage estimates (value of losses or cost of restoration)
    - **Lost Use**
    - **Primary Restoration**

Phase 2 Settlement Approach

- **Estimate total natural resource damages**
  - Primary restoration cost
  - Value of lost use or cost of restoration
  - Damage assessment costs
- **Apply allocation factor**
- **Credit for assessment costs paid**
- **Reasoned, defensible basis for judicial approval**

Phase 3 – Finalize Injury/Damage Determination

- **Complete remaining studies**
- **Finalize report of assessment**
  - Pathway determination
  - Injury determination
  - Quantification
  - Damage determination
  - Total assessment costs
- **Demand for sum certain**

Phase 4 – Litigation

If settlements not reached

- **Tort-like remedy – 42 USC § 9607**
- **Joint and Several Liability**
- **Statute of Limitation**
  - 3-5 years after EPA remedy completed
- **Damages**
  - Cost to restore, replace, or acquire equivalent natural resources
  - Value of lost use – natural resources and services
  - Reasonable assessment costs

Trustee Activities at Portland Harbor

Trustee Activities at Portland Harbor

- **Late 1990s -- Trustees began working together**
- **December, 2000 -- Site listed on NPL**
- **2001 -- Trustee/EPA/DEQ MOU**
- **2002 -- Trustee MOU**

Trustee Activities at Portland Harbor

- **2001-Present -- Trustee input to RI process**
- **2003-04 -- Cooperative Assessment with some PRPs; ongoing w/City of Portland**
- **2007 -- Pre-assessment screen issued**
  - Mailed to parties on EPA general notice list
  - Invited participation in injury assessment

Trustee Activities at Portland Harbor

- **2007 -- Preliminary restoration planning, developed criteria for salmon, lamprey, sturgeon, and wildlife**
- **January 2008 – Trustees issue notice of intent to perform damage assessment and invitation to meet**
- **Present – Exploring cooperative process for liability allocation**

Preassessment Screen Overview

Is there a need to conduct a formal natural resource damage assessment?

Criteria:

- Has a discharge or release occurred?
- Could natural resources under trusteeship have been injured?
- Could the quantity and concentration potentially cause injury?
- Are data readily available to collect at reasonable cost?
- Will clean-up and response actions sufficiently remedy injury?

Preassessment Screen Determination

Discharges and releases have occurred in sufficient quantity and concentrations to potentially cause injury in the Portland Harbor

- **Water:** *Exceed criteria DDT, DDE, PCBs, PAHs*
- **Sediment:** *Bioassay test failures*
- **Invertebrates:** *Transfer to clam predators, RM 6 to 8.6*
- **Juvenile salmonids:** *PCBs exceed protective values*
  Resident fish: *Consumption advisories, exceed values protective of fish predators*
- **Bird eggs:** *Exceed protective values for reproduction*
- **Mammals:** *Exposed to concentrations that could impact reproduction—otter livers*

Clean-up actions alone will not make resource “whole”…

Determination:

Response actions from cleanup will not sufficiently remedy injury in Portland Harbor without further action

- *Clean-up actions*: should minimize or eliminate exposure
- *Direction and objective of cleanup*: will NOT fully restore injured resources or address lost services since 1980

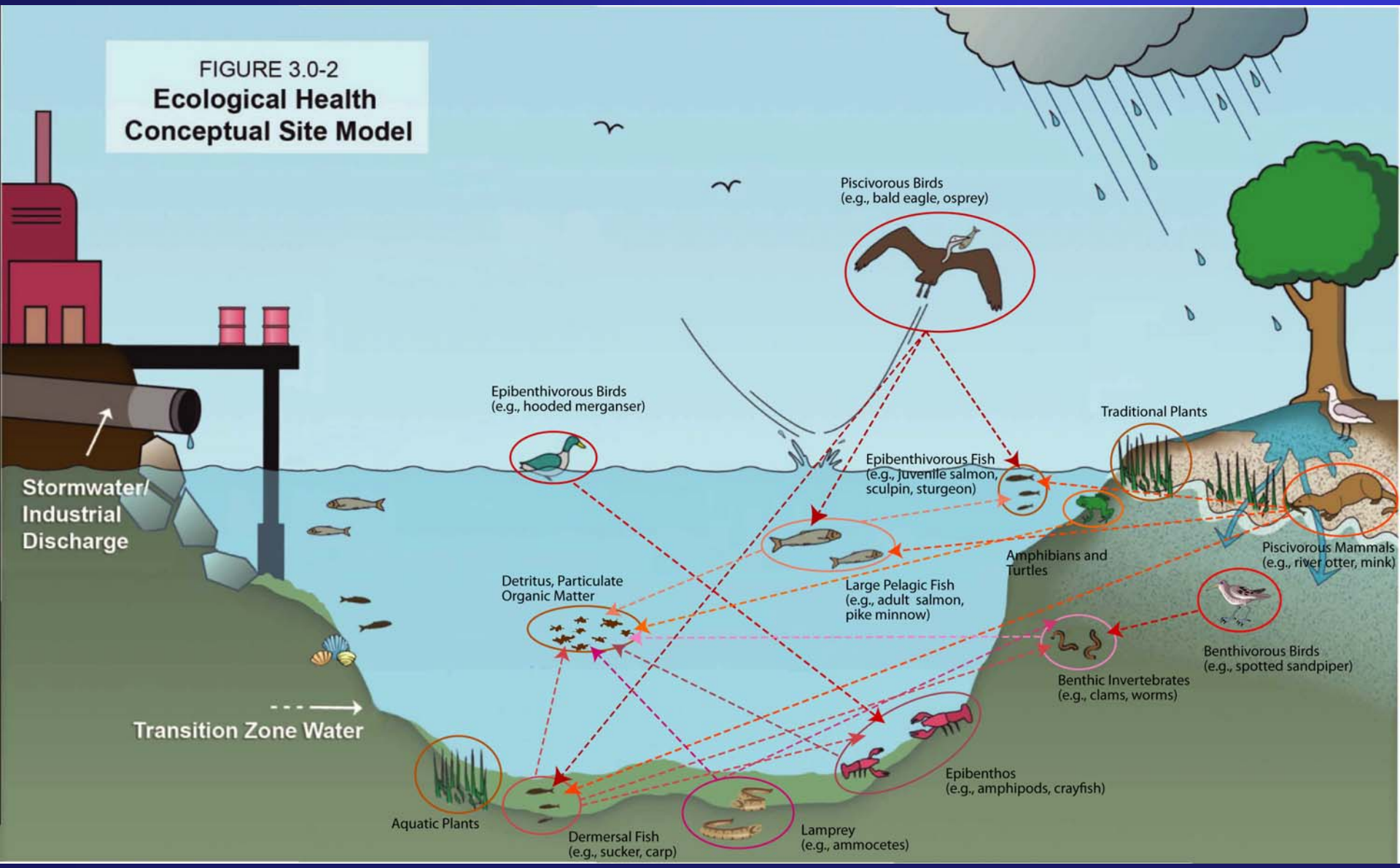
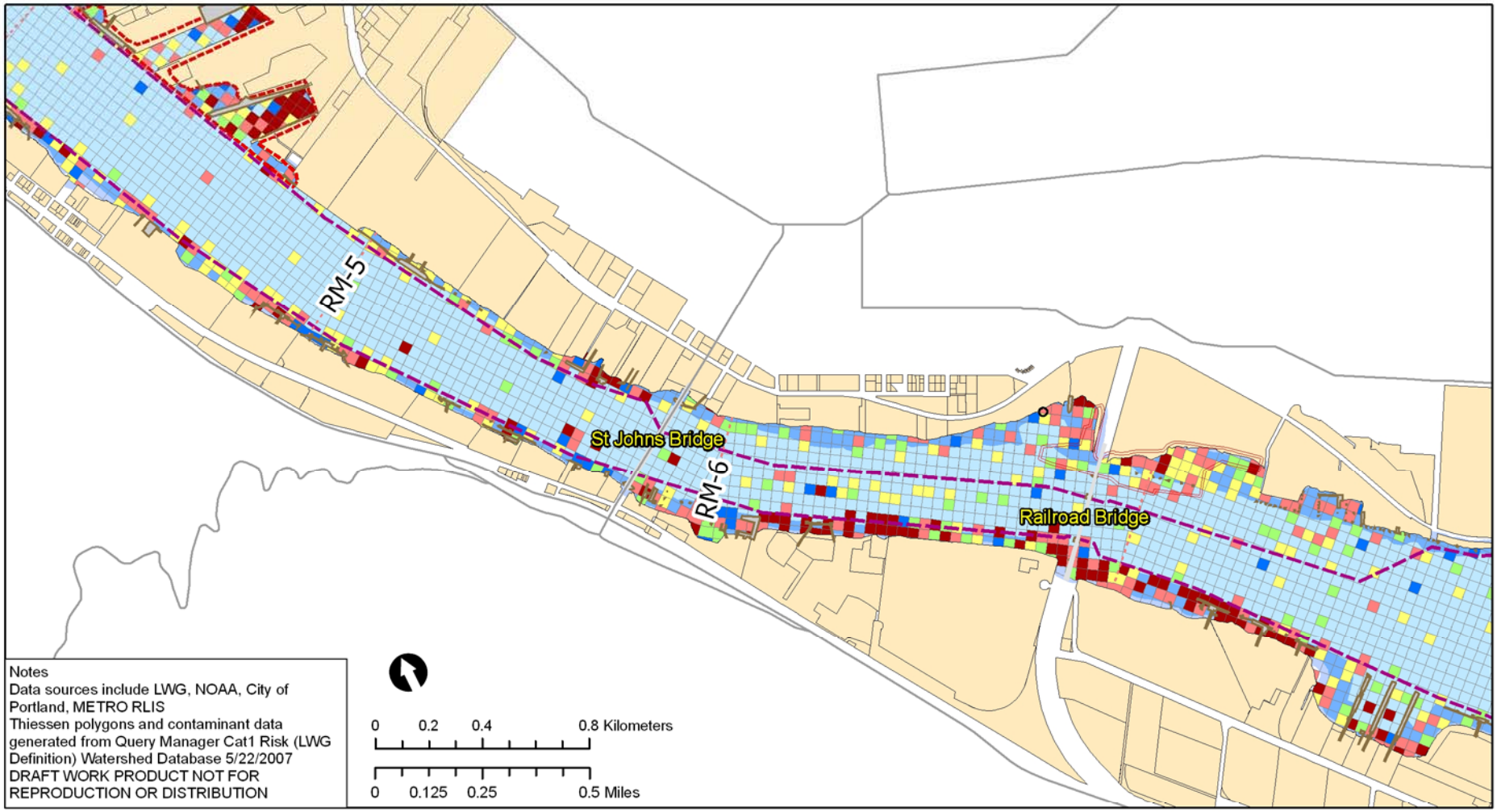


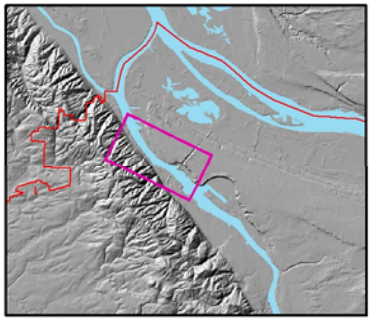
FIGURE 3.0-2
Ecological Health
Conceptual Site Model
Piscivorous Birds
(e.g., bald eagle, osprey)
Epibenthivorous Birds
(e.g., hooded merganser)
Traditional Plants
Epibenthivorous Fish
(e.g., juvenile salmon,
sculpin, sturgeon)
Stormwater/
Industrial
Discharge
Amphibians and
Turtles
Piscivorous Mammals
(e.g., river otter, mink)
Large Pelagic Fish
(e.g., adult salmon,
pike minnow)
Detritus, Particulate
Organic Matter
Benthivorous Birds
(e.g., spotted sandpiper)
Benthic Invertebrates
(e.g., clams, worms)
Transition Zone Water
Epibenthos
(e.g., amphipods, crayfish)
Aquatic Plants
Dermersal Fish
(e.g., sucker, carp)
Lamprey
(e.g., ammocetes)

Sediment

- **Serves as the base of the food web**
- **Repository of contamination**
- **Extensive chemistry data is available**
- **Sediment toxicity has been both observed and predicted**
- **Additional data is being collected as part of RI**



Notes
Data sources include LWG, NOAA, City of Portland, METRO RLIS
Thiessen polygons and contaminant data generated from Query Manager Cat1 Risk (LWG Definition) Watershed Database 5/22/2007
DRAFT WORK PRODUCT NOT FOR REPRODUCTION OR DISTRIBUTION



ph_benthicrisk_scale2_JOIN2_070321

Weighted Benthic Risk

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

- River Miles (RM)
- Arterials
- Bridges
- Dock Structures
- Navigation Channel (NOAA)
- T-4 Early Action Site Boundary
- McCormick_Baxter_Cap_022307
- Waterfront Taxlots

Willamette River

- Non-Nearshore
- Nearshore
- Riparian

PORTLAND HARBOR:

Weighted Benthic Risk:
Bioassay Data
Logistic Regression
Floating Percentile

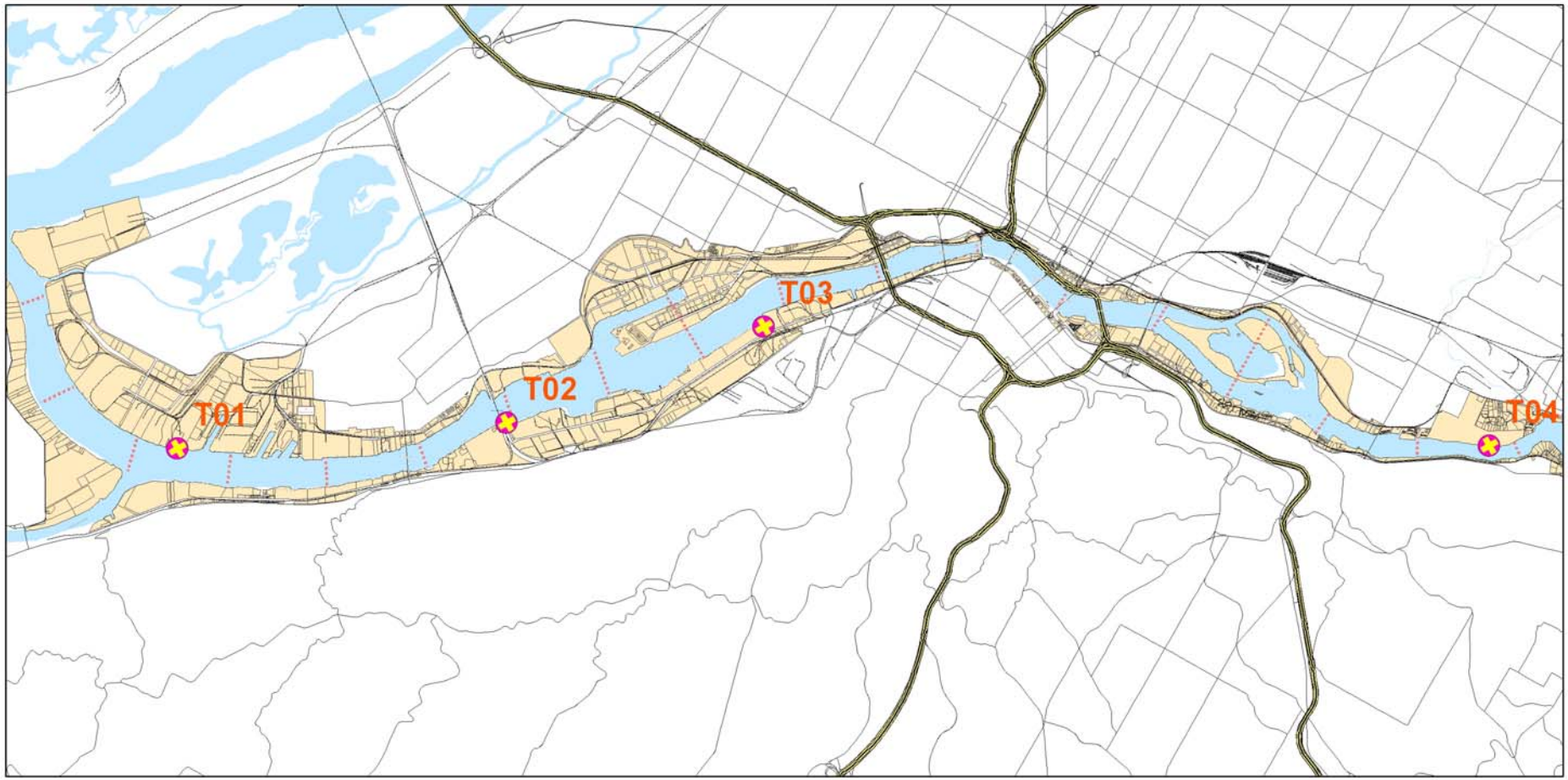
DRAFT

NOAA ARD 08/09/2007

c:\gis\projects\portlandharbor2\arc_projects\ph_nrd_20070806.mxd

Salmon

- **Juvenile salmon use the Portland Harbor site (longer residence time with sub-yearlings)**
- **Whole bodies and stomach content chemical analysis**
- **Salmon from the site are contaminated above upstream concentrations**
- **Studies also conducted as part of Lower Columbia River Estuary Partnership**



B. Shorr NOAA 01/31/2007
c:\gis\projects\portlandharbor2\arc_projects\ph_base_011107.mxd

Notes

Portland Harbor Juvenile Salmonid Data:
Station Locations

0 0.35 0.7 1.4 Miles
0 0.5 1 Kilometers

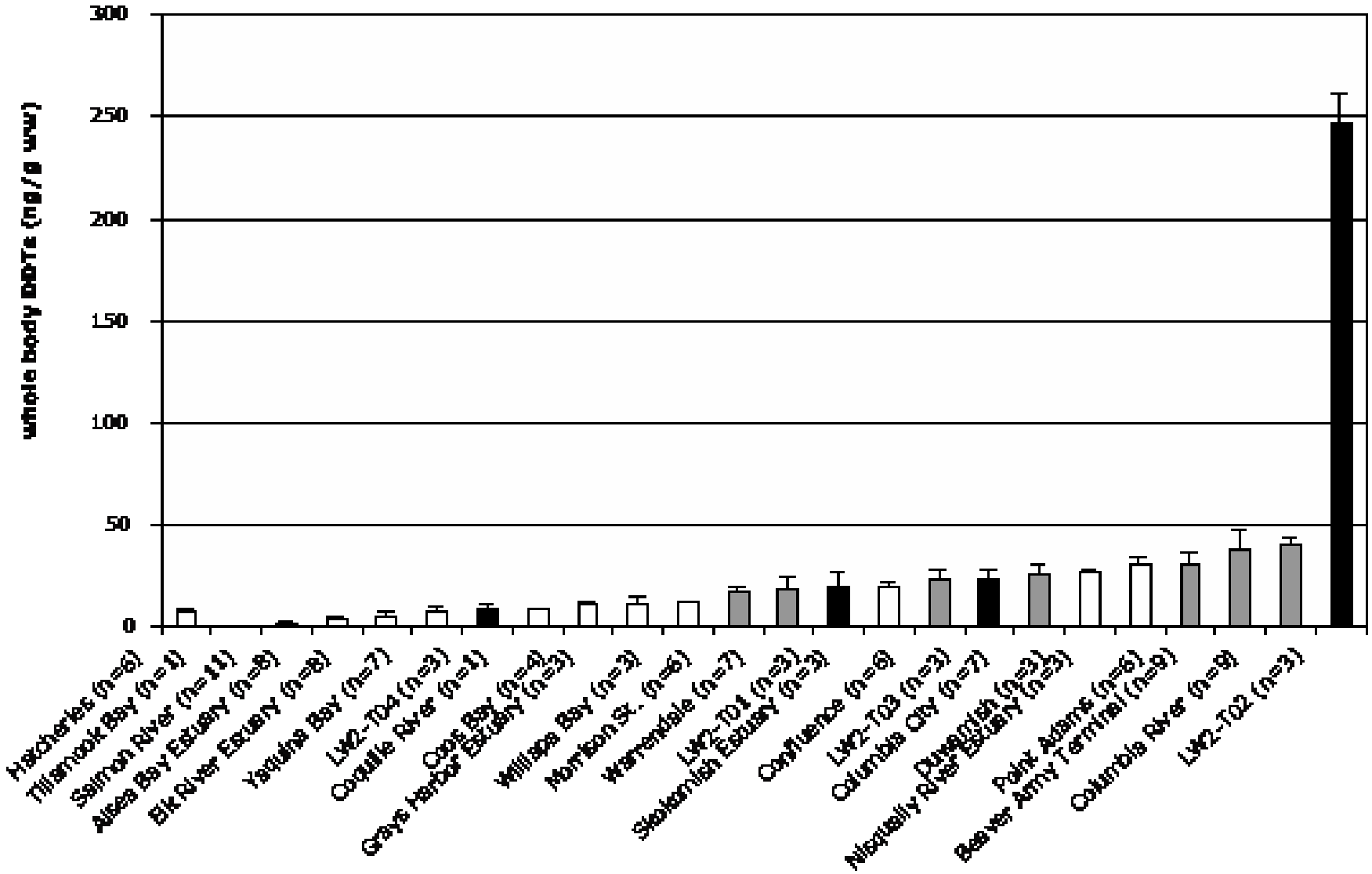
DRAFT
River Miles 0-23

Juvenile Salmon

- **Contaminant concentrations (DDT and PCBs) pose a risk of sublethal effects to these fish, including impacts to growth and maturation**

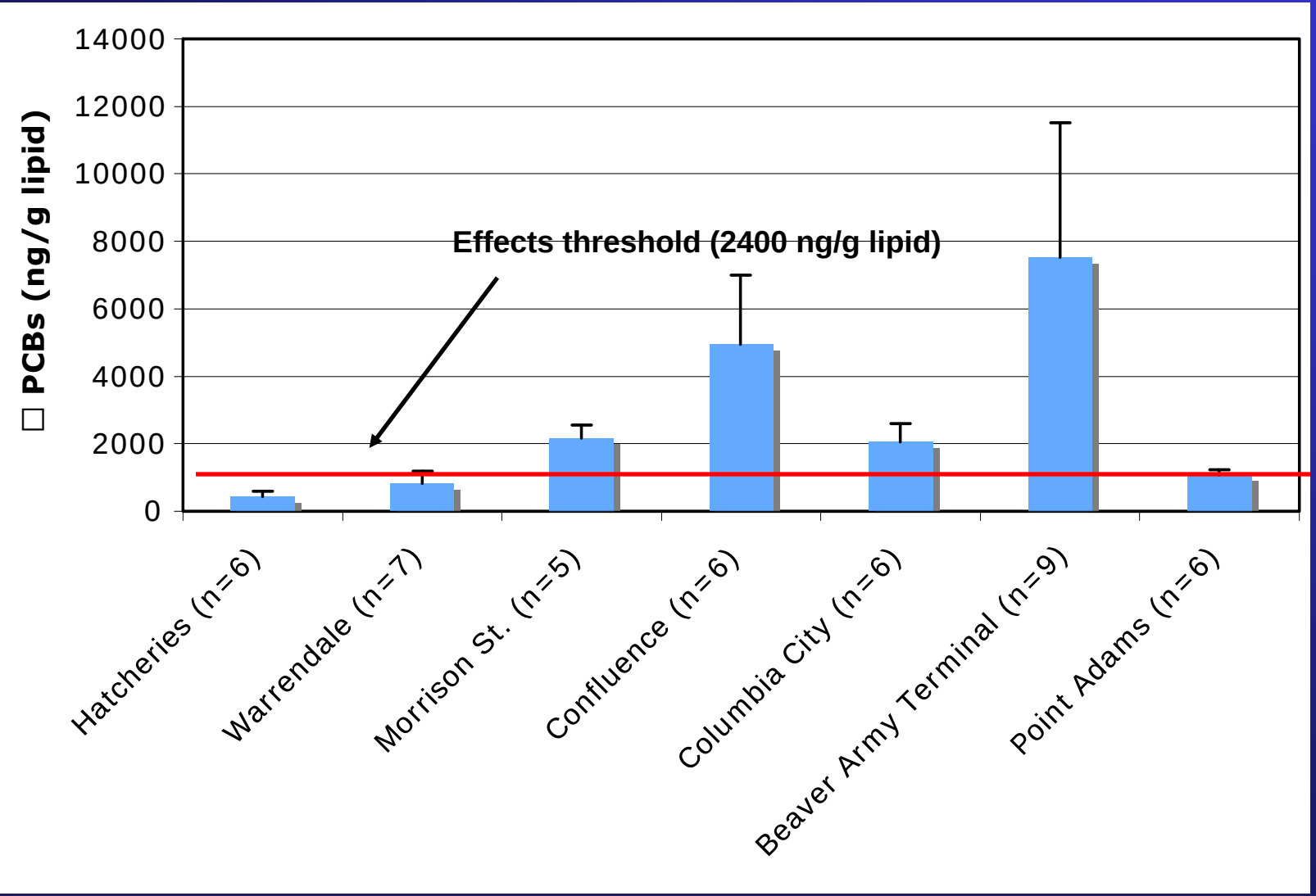
- **PAHs in prey items and whole-body tissues threaten immune system function, growth, and long-term survival**

tDDT, whole body, wet weight (ppb)



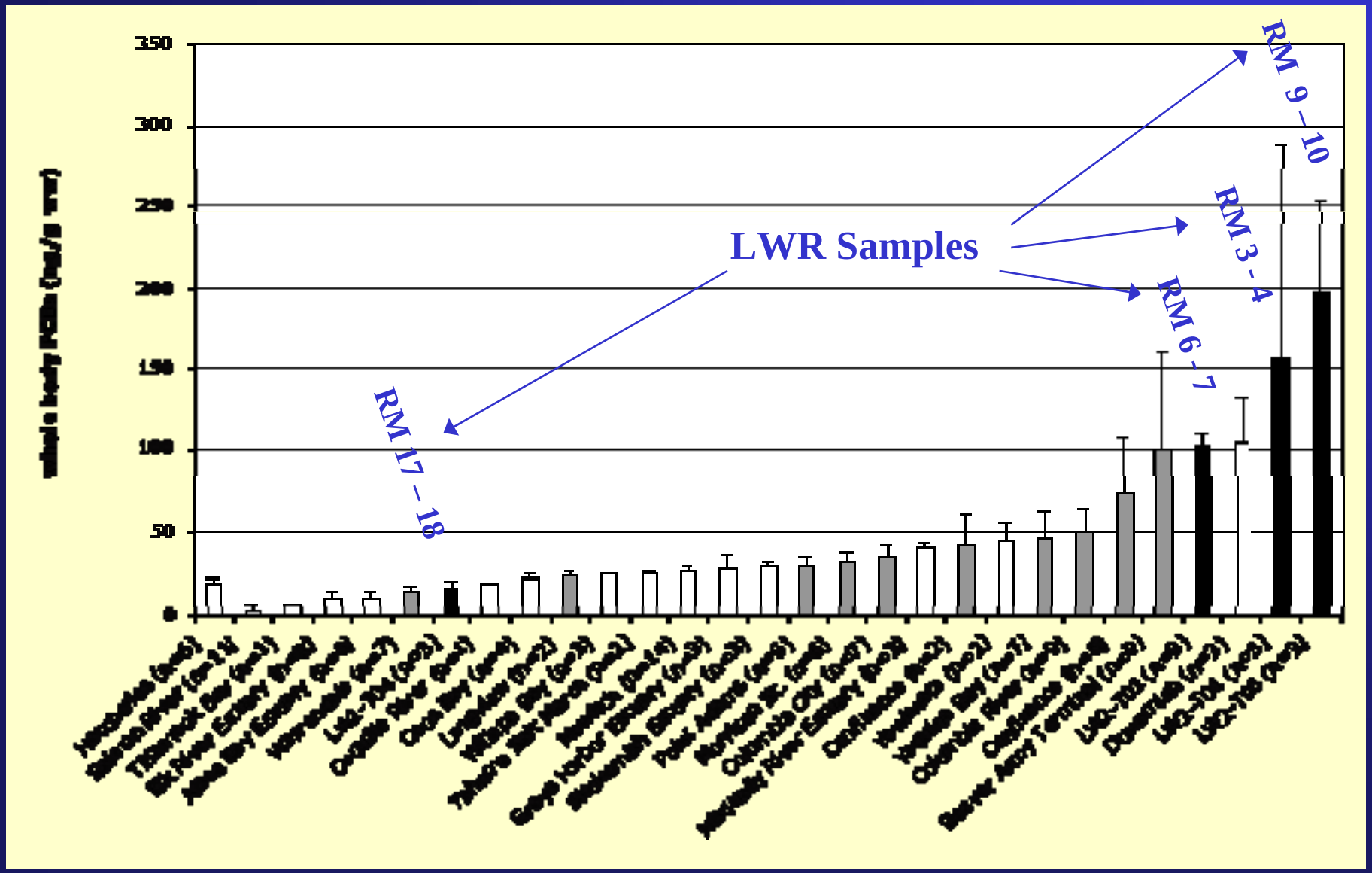
NOAA, Lyndall Johnson unpublished data

PCBs in Juvenile Salmon, whole bodies, ng/g lipid



NOAA, Lyndall Johnson unpublished data

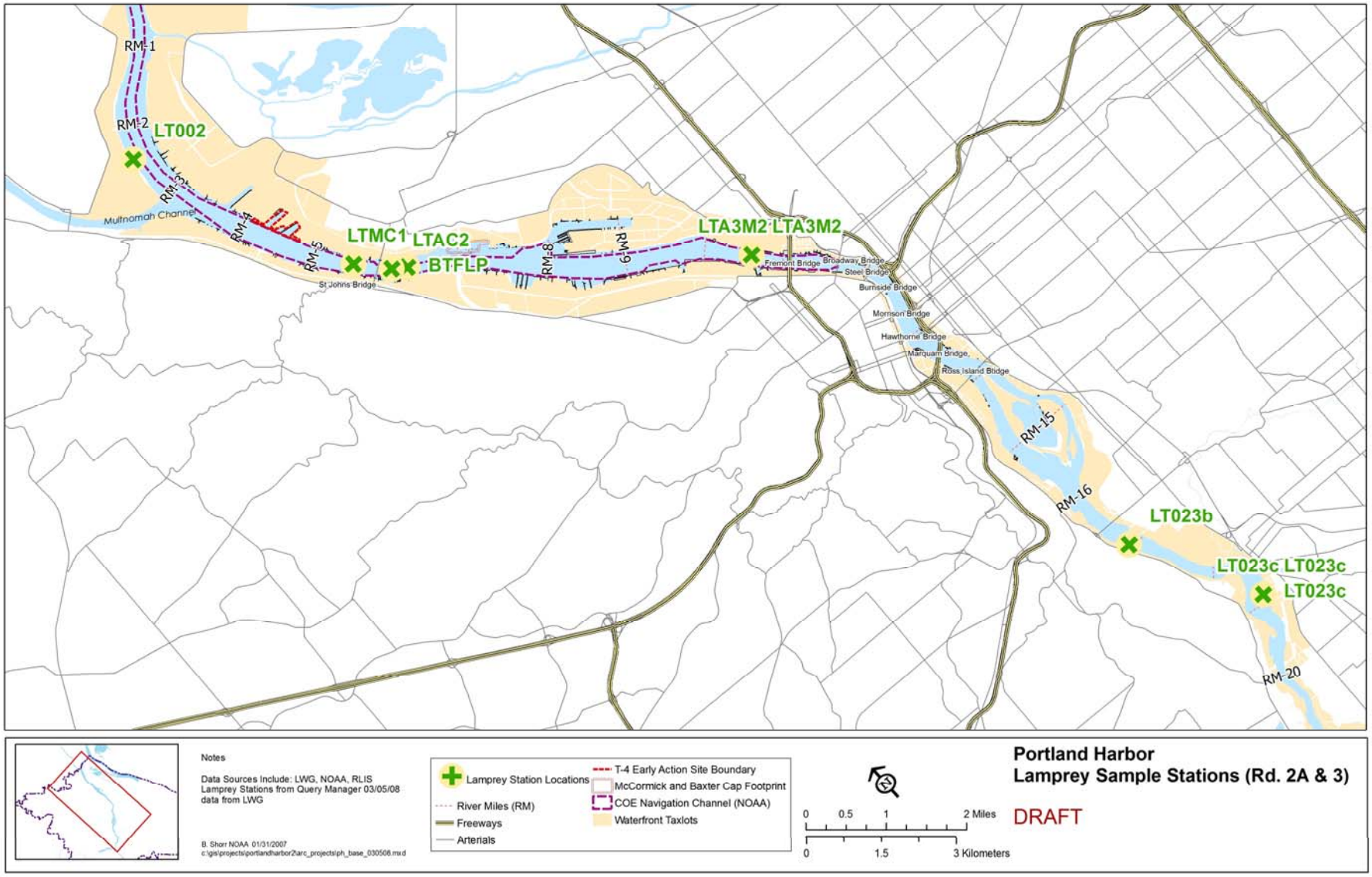
PCBs, whole body, wet weight (ppb)



NOAA, Lyndall Johnson unpublished data

Lamprey Ammocoetes

- **Data summary**
  - Limited data on tissue concentrations from Portland Harbor
  - Estimates of water exposure and sensitivity from toxicity tests pending
- **Results**
  - Ammocoetes are present in the harbor and exposed to contaminated sediments
  - Water toxicity tests results will be helpful (still pending) but not definitive of potential injury type or magnitude



Notes

Data Sources Include: LWG, NOAA, RLIS
Lamprey Stations from Query Manager 03/05/08
data from LWG

B. Shorr NOAA 01/31/2007
c:\gis\projects\portlandharbor2\arc_projects\ph_base_030508.mxd

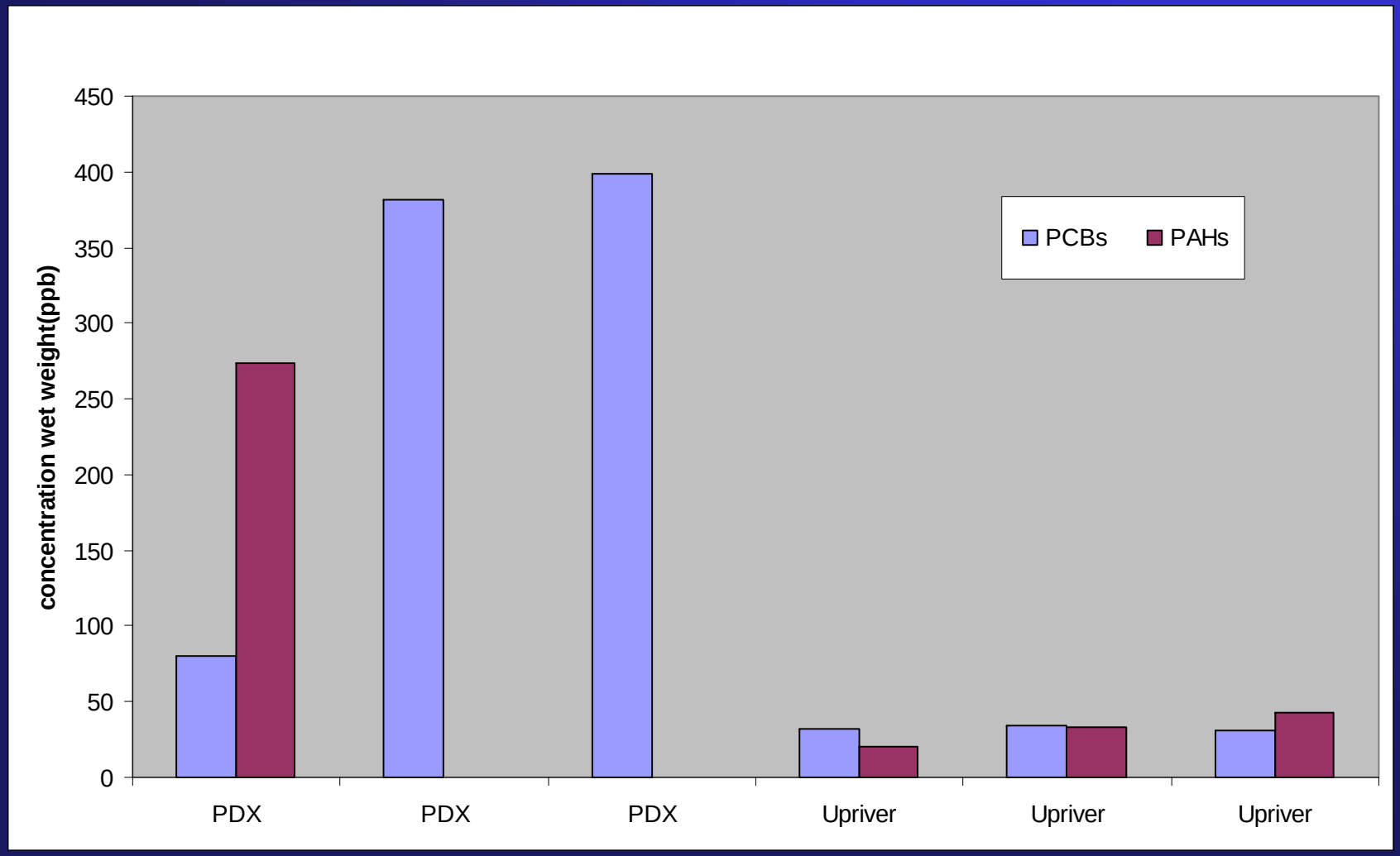
Lamprey Station Locations
River Miles (RM)
Freeways
Arterials
T-4 Early Action Site Boundary
McCormick and Baxter Cap Footprint
COE Navigation Channel (NOAA)
Waterfront Taxlots

0 0.5 1 2 Miles
0 1.5 3 Kilometers

Portland Harbor
Lamprey Sample Stations (Rd. 2A & 3)

DRAFT

Contaminants in Ammocoetes, whole body, wet weight (ppb)



Lamprey Ammocoetes

- Data gap on sediment pathway, sublethal effects/other injuries, and sediment avoidance, restoration

Sturgeon (cooperative study)

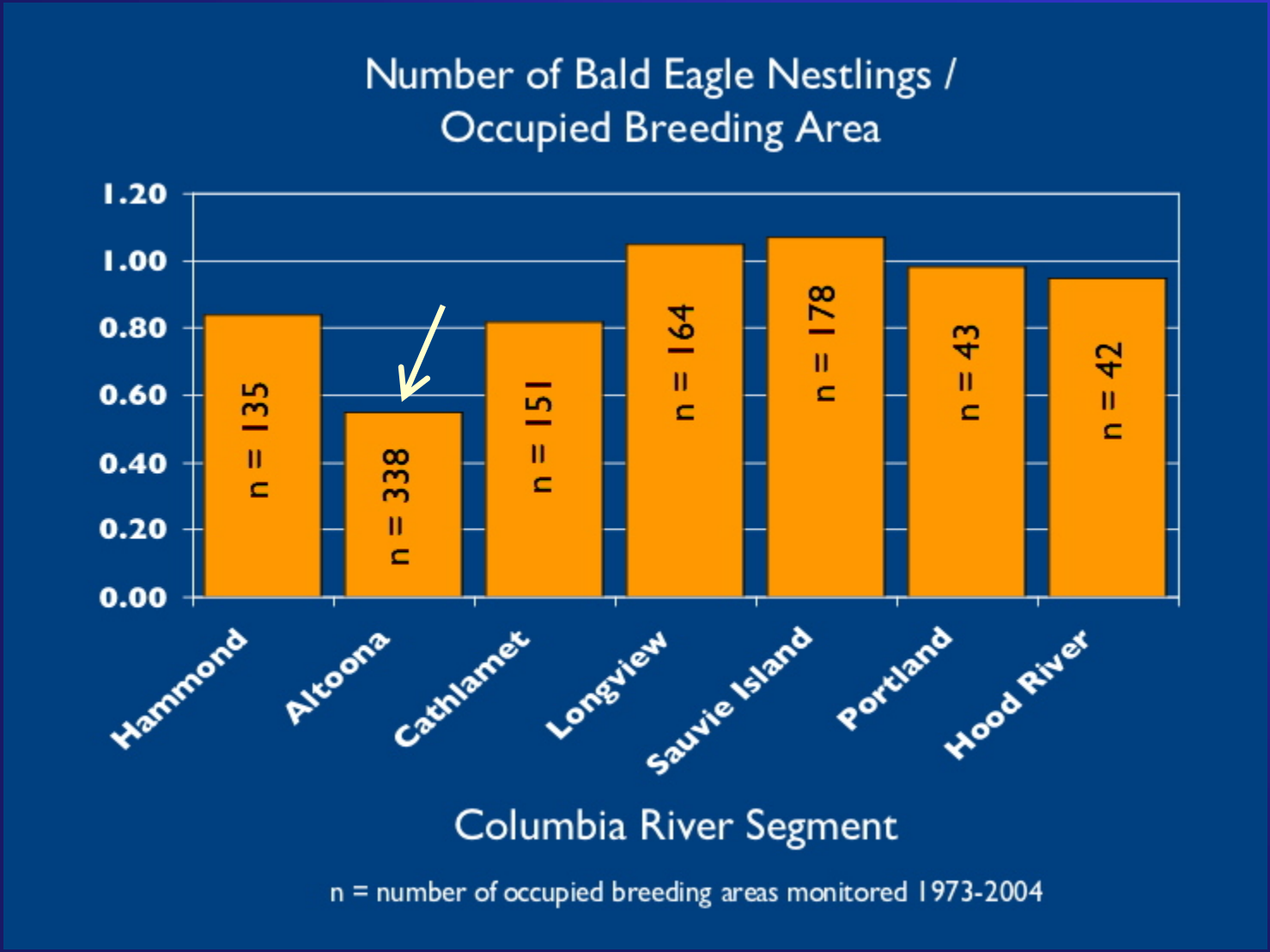
- 15 whole body sturgeon available
- Sturgeon liver and blood analysis pending
- Sturgeon health assessments pending

Osprey and Eagles

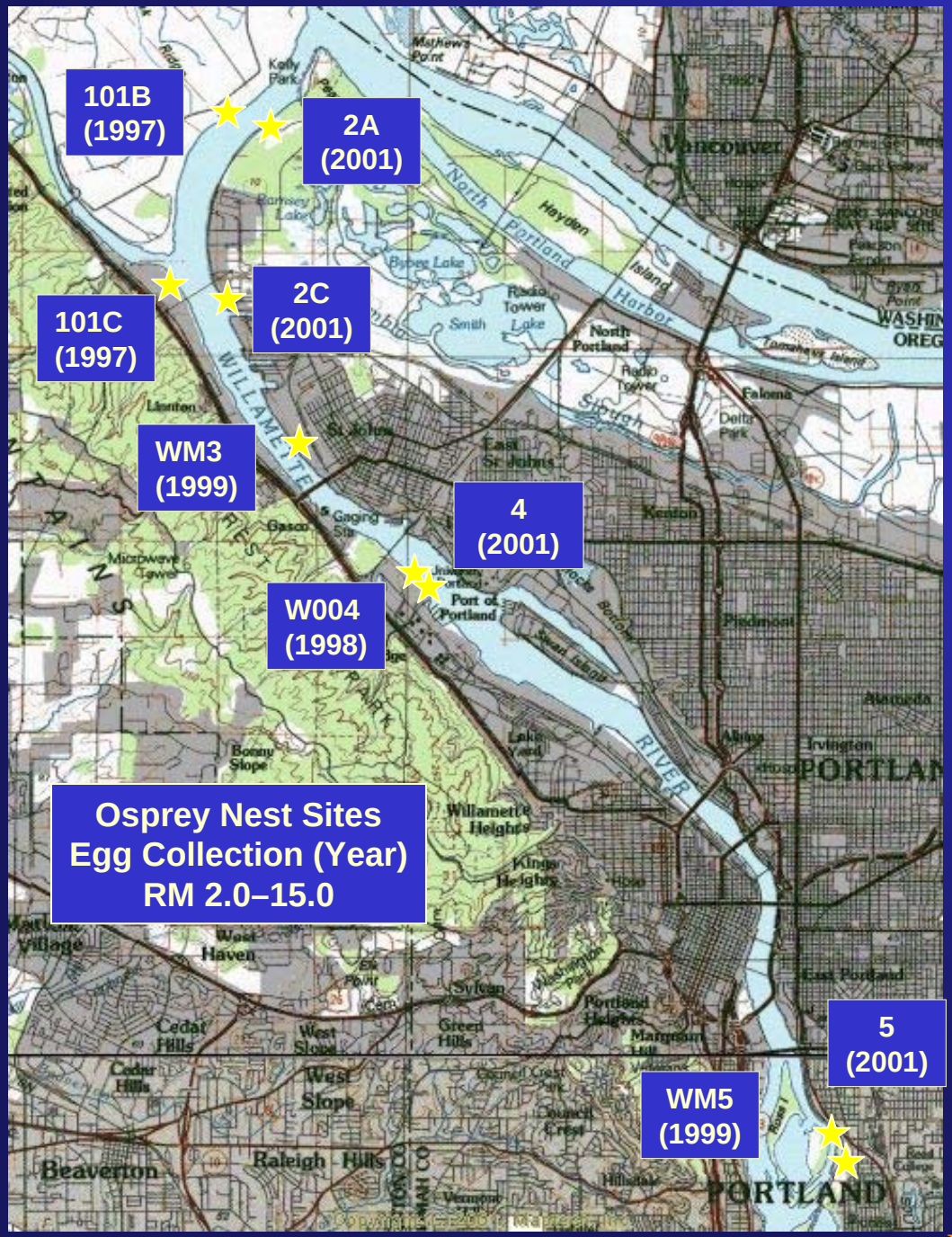
- **Local studies indicate contaminant related problems**
  - Bald eagle productivity low egg RM 13 to 31 in LCR
  - Elevated egg DDE, PCBs, dioxins, PBDEs
  - Osprey exhibit lowered productivity in contaminated areas
  - Elevated egg DDE, PCBs, PBDEs from LWR

NOTE: Data for osprey relating eggshell thickness to DDE concentrations that were presenting in the slideshow is in draft from and will be released upon approval from USGS. Contact Jeremy Buck, USFWS, at 503-231-6179 if you have questions regarding this data.

Bald Eagle Productivity LCR



Data compiled by Frank Isaacs, Oregon Eagle Foundation (Isaacs et al. 2007)



Prey remains collection basket

Map and photos from Chuck Henny, USGS, Corvallis

Restoration Planning

- **Criteria developed (so far) for early projects**
  - Salmon/lamprey
    - **Focus on development of shallow water habitat**
  - Sturgeon
    - **Need to improve benthos as prey for sturgeon**
  - Wildlife
    - **Focus on riparian habitat**
      - nest trees, forage perches, riparian forest, wetlands

Summary of Trustee Interests

- **Willamette and Lower Columbia Rivers are significant natural resources**
- **Contamination is of great concern**
- **Restoration is possible**

Summary of Trustee Interests

- **Injury Indicators:**
  - Fish consumption advisories
  - Water quality standard exceedance
  - Sediment toxicity to benthos
  - Sediment chemistry exceeds thresholds
  - Biota are contaminated above levels of concern
    - **Salmon**
    - **Fish eating birds**
    - **Lamprey**

Summary of Trustee Interests

- **Injury Indicators:**
  - Habitat degradation from contamination
  - Public use and enjoyment degraded by contamination
  - Cultural uses degraded by contamination

Summary of Trustee Interests

- **Restoration Opportunities:**
  - Important habitat remnants are threatened by development
  - Habitat improvement is feasible
  - Human use and enjoyment can be enhanced
  - Cultural use can be improved and expanded

BREAK

Part 2—Next Steps

Allocation of NRD Liability

- **At sites like Portland Harbor, multiple sources and mixed contaminants create joint and several liability**
- **Trustees will agree to settle with willing parties on several (divided) liability basis**
- **Individual settlements require defensible means of allocating liability**

Allocation of NRD Liability
What Trustees are Hearing

- **Why now?**
- **Will cause confusion and delays in the remedial allocation process**
- **What's to allocate?**

Allocation of NRD Liability
Why Now?

- **Trustees expect EPA 2010 ROD schedule to be met, are working toward that goal, intend to be prepared to enter into timely settlements**
- **Liability allocation is expensive and time-consuming**

Allocation of NRD Liability
Why Now?

- **Duplicating effort and cost is in no one's interest**
- **Cooperating in the allocation process to position for early settlements**

Allocation of NRD Liability Confusion and Delay

- **Responsible for Remedial and NRD – processes are related**
- **Trustees' needs can be incorporated into key points of remedial allocation process**

Allocation of NRD Liability
What's to Allocate?

- **Information from RI process**
- **Data from other relevant studies**
- **Studies to be implemented as part of Phase 1**
- **Work in subsequent phases of damage assessment process**

Injury Assessment Plan Approach

Development of Injury Assessment Plan

- **Guidance in US DOI NRDA regulations**
- **Preparation and planning for the injury determination**
- **Build on Preassessment Screen (2007) and Remedial Investigation information where possible**

General Outline for IAP

- Introduction
- Description of Assessment Area
- Confirmation of Exposure
- Injury Assessment
- Injury Quantification Approach
- References
- Appendix - Quality Assurance Program
- Appendix - Literature Reviewed

Scoping Considerations

- **Assessment area**
- **Coordination and use of RI data**
- **Issues to be assessed include:**
  - Surface and groundwater resources
  - Soils and air resources
  - Biological resources
  - Recreational services
  - Cultural services
  - Other services

Evaluation of Existing and Relevant Information

Existing, Relevant Information

- **Regardless of the phase and topic area, the Trustees intend to take full advantage of existing, relevant information**
  - Preliminary estimates with conservative assumptions
  - Complete determinations where practical

Existing, Relevant Information

- **Phase I (injury determination phase): analytical chemistry results**
  - Ongoing cleanup efforts at Portland Harbor
  - Literature review for other sampling efforts and studies throughout the Willamette and Columbia River basins

Existing, Relevant Information

- **Phase I: system dynamics**
  - RI/FS modeling of PH hydrodynamics, sediment transport, contaminant fate and transport, and food web exposure
  - RI/FS modeling of groundwater contamination
  - Literature review for other studies of Willamette and Columbia River system dynamics

Existing, Relevant Information

- **Phase 1: public losses**
  - RI/FS risk assessments
  - Literature review for PH injury studies and data
  - Literature review for injury studies throughout Willamette and Columbia Rivers
  - Literature review for injury studies from other relevant sites

Existing, Relevant Information

- **Phase 1: public losses, cont.**

  --Literature review for PH studies of recreational, cultural, or other impacts from contamination

  --Literature for similar studies throughout basin

  --Literature review for similar studies from other relevant sites

Existing, Relevant Information

- **Evaluate newly available information in context of existing information**
  - During phase 1 (injury determination emphasis)
  - During subsequent phases

Injury Assessment Studies

- **Lamprey pilot study to evaluate sediment toxicity**
  - Ammocoetes
  - 28 day laboratory exposure
  - Field collected sediment, from 4-5 stations, 1-2 reference stations, prepared sediment control
  - Mortality and growth endpoints, histopathology
  - Contaminant uptake

Injury Assessment Studies

- **Salmon analysis to evaluate potential injury in the lower Willamette and Columbia**
  - Build on Lower Columbia River Estuary and Ecosystem Monitoring
  - Data collection this spring
  - Propose chemical analysis of whole body sub-yearling salmon added to monitoring
  - 7 stations, 3 composites each

Injury Assessment Studies

- **Analysis of osprey eggs to evaluate injury**
  - 10 eggs total from 10 nest sites
  - 8 nests from RM 0-10
  - 2 nests from RM 10 to Willamette Falls
  - Collections start mid-May
  - Productivity overflights in late May and late June
  - Proposed connection to RI monitoring

Funding and Participation Agreement and Budget

Responsible Party Involvement Benefits

- **Savings in time and money – avoid duplication of effort**
- **Opportunity to have input into the NRD process**
- **Better positioned for earlier settlement**

Budget Elements

- **Administrative Tasks**
  - Case Management
  - Public Involvement
  - Decision Tree
- **Injury Assessment Plan**
  - QA/QC Plan
  - Literature/Data Review
- **Initial Study Designs and Implementation**
- **Partial Past Costs**

BUDGET

• **Administrative**	**$ 100,000**
• **Assessment Plan**	**593,187**
• **Selected Studies**	**337,740**
– Juvenile Salmon Analysis	
– Osprey Egg Analysis	
– Lamprey Pilot Study	
• **Contractor Support**	**208,887**
• **NR Trustee Costs**	**819,763**
• **Partial past Costs**	**102,804**
TOTAL	**$2,162,381**

Funding and Participation Agreement

PRP Involvement Phase 1

- **Participation in Trustee scoping meeting**
- **Participation in development of decision tree/road map**
- **Meeting with Trustees to be briefed on draft IAP**
- **Opportunity to review and comment on draft IAP before the public**

PRP Involvement Phase 1

- **Conference call with Trustees to discuss how your comments were considered**
- **Meeting with Trustees to discuss the public comments**
- **Opportunity to review and comment on phase 1 study plans prior to implementation**

Timeframe/Next Steps

- **Contact Billy Barquin by April 2, 2008**
  - (503) 225-0777
  - wbarquin@hk-law.com