



**DEPARTMENT OF THE NAVY**  
NAVAL SUBMARINE BASE NEW LONDON  
GROTON, CONNECTICUT 06349-5000

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23 APRIL 2004

From: Commanding Officer, Naval Submarine Base New London  
To: Distribution

Subj: RESTORATION ADVISORY BOARD (RAB) MEETING

Encl: (1) Proposed Agenda  
(2) Draft 4 February 04 RAB Minutes

1. The next RAB meeting has been scheduled for May 5, 2004 at 12:00 PM, at the Naval Submarine Base New London (SUBASE), Route 12 and Crystal Lake Road, Groton, CT. This meeting will provide a tour of the Area A Downstream site and the Torpedo Shops at SUBASE. Details and directions are provided in enclosure (1).
2. The local press and public are invited to attend this meeting. Questions from the public are welcome during this meeting.
3. Enclosure (1) is the meeting agenda. Enclosure (2) is the draft minutes from the previous RAB meeting. Please contact Ms. Melissa Griffin at (860) 694-5191, if you have any questions.

A handwritten signature in black ink that reads "Michael Brown".

MICHAEL BROWN  
Environmental Director,  
By direction of  
the Commanding Officer

Subj: RESTORATION ADVISORY BOARD (RAB) MEETING

Distribution:

SUBASENLON (Commanding Officer)

EFANE (Mark Evans)

CTDEP (Mark Lewis)

CINCLANTFLT (Mark Dussia)

USEPA (Kymberlee Keckler)

NE Region PAO

NE Region REC (Andy Stackpole)

New London Health Dept. (Brain Savageau)

Ledgelight Health District (Felix Prokop III)

Uncas Health District (Arthur Cohen)

Town of Waterford (Thomas Wagner)

ATSDR (Carole Hossam)

Town of Groton (Deborah Jones)

City of New London (Pamela Kilbey-Fox)

CT Dept. of Agriculture (Jim Citak)

NOAA (Kenneth Finkelstein, Ph.D.)

Groton City Conservation Commission (L.J. Chmura, Chairman)

Groton City Conservation Commission (Dave Paskausky)

Tetra Tech NUS (Corey Rich)

Foster Wheeler (Joe Fischl)

Foster Wheeler (Larry Kahrs)

Foster Wheeler (Patricia Ghoring)

Connecticut College/Botany Dept.

EPA Region 1 Community Relations Coordinator (Ms. Pam Harting-Barrat PhD)

EA Engineering (Mr. Charles McLeod)

New London Day (Mr. Robert Hamilton)

Mr. Steve Cicoria

Mr. Noah Levine

Mr. Larry Gibson

Mrs. Deborah Motycka Downie

Mr. Andrew Parrella

Ms. Susan Orill

Mr. Norman Richards

Mr. Harry Watson

Mr. John Vitkevich

Batelle Corporation (Ms. Patty White)

Mr. John Nugent (CT College Government Dept.)

Ms. Virginia de Lima (USGS)

*SUBMARINE BASE NEW LONDON*  
**RESTORATION ADVISORY BOARD**  
**MEETING**

12:00 PM May 5, 2004

Area A Downstream and Torpedo Shops  
RT. 12 and Crystal Lake Rd., Groton, CT

**AGENDA**

1. **Review of Minutes From Last Meeting** *5 Minutes*  
*Melissa Griffin (SUBASE New London)*
  
2. **Tour of Area A Downstream and Torpedo Shops** *50 Minutes*  
*Tetra Tech FW, Mark Evans (EFA Northeast), Melissa Griffin*

All RAB members and participants from the public are to meet at 11:45 AM at the Pass and ID building adjacent to the SUBASE Main Gate on Crystal Lake Road. Transportation to the site will leave promptly at 12:00 PM. All participants should wear appropriate clothes and footwear for a short hike along unimproved trails in the Area A Downstream site.

3. **Set Future Meeting Date** *5 Minutes*  
*Melissa Griffin*

Enclosure (1)

## Meeting Minutes

### Restoration Advisory Board Installation Restoration Program Naval Submarine Base New London Groton, Connecticut

4 February 2004

Attendees:

Melissa Griffin (NLSB)  
Mark Evans (EFANE)  
Dick Conant (NLSB)  
Noah Levine (RAB Member)  
Deborah Downie (RAB Community Co-Chair)  
Corey Rich (Tetra Tech NUS)  
Larry Gibson (Public)  
Sue Orrill (RAB Member)  
Plato Doundoulakis (Public)  
Kristin Doundoulakis (Public)  
Kymberlee Keckler (USEPA)  
David Peterson (USEPA)  
Donald Gunster (Battelle)  
Dean Neptune (Neptune and Company)  
Joe Fischl (Tetra Tech FW)  
Michael Brown (NLSB)  
Capt. Jim Ratte (NLSB)  
Felix Prokaptin (Ledge Light Health)

1. Mr. Dick Conant opened the RAB meeting at 6:35 PM. The meeting began with an award presentation. Captain James Ratte presented Ms. Sue Orrill with a plaque honoring her years of service as the RAB Community Co-Chair. Mr. Conant then turned the meeting over to Ms. Melissa Griffin for the review of the minutes from the last meeting held on 9 September 03 at the Best Western Olympic Inn. Hearing no objections or changes, the 9 September 03 minutes were accepted.
2. Mr. Dean Neptune, of Neptune and Company, presented the results of the Thames River Pilot Study; see attached presentation. Mr. Neptune summarized the risk assessment approach used and walked the group through each of the steps in the process. The contaminants of potential concern (COPCs) within Zones 4 and 7 after screening and refinement were identified. For invertebrates living on or near the bottom of the river (benthic invertebrates) in Zone 4 the COPCs are metals, PAHs, total PCBs and pesticides. The COPCs in Zone 4 for fish eating birds (piscivorous birds) are metals: chromium, lead, and zinc. In Zone 7, COPCs for

benthic invertebrates are metals, PAHs, and pesticides and for piscivorous birds, metals: chromium, lead, and zinc.

The recommended next steps for Zones 4 and 7 include further evaluation of on-shore sources of COPCs in the river and a completing a Baseline Ecological Risk Assessment (BERA). For the inner portion of Pier 1 it was recommended to forgo the risk assessment and proceed straight to clean up due to the elevated levels of contamination. The outer portion of Pier 1 would be addressed as part of the Zone 4 and 7 BERA.

3. Mr. Joe Fischl, of Tetra Tech FW, presented the Area A Downstream Year 3 Functions and Values Assessment; see presentation attached. Mr. Fischl explained that the goal of the long term monitoring was to show that post-remedial functions and values of the wetlands were equal or greater to those before remediation. The Army Corps' 1995 New England Highway Method was used to determine 13 functions and values at the site. Between one and five principal functions and values increased at each of the six wetland areas within the site. Wildlife habitat value was enhanced for all of the restored wetlands.

Wetland Habitat Indicators for Nongame Species, or WETHings, was used to predict potential habitat for New England wetland-dependent species including reptiles, amphibians and mammals. WETHings predicted habitat for 35 wetland-dependent species; 14 of the 35 species were observed on base and 11 of the species were actually seen in the restoration area. Habitat was also predicted for three state-listed species of special concern, the Eastern Ribbon Snake, which was seen on site, the Blue-spotted Salamander, and the Northern Leopard Frog.

4. The next RAB has been scheduled for 12 PM on 5 May 2004. The RAB will meet for a tour of the Area A Wetlands and the Torpedo Shop. Having no further business, Ms. Griffin closed the RAB meeting at 8:20 PM.

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**Functions and Values  
of Restored Wetlands  
at  
Area A Downstream/OBDA**

**Restoration Advisory Board Meeting**

**February 4, 2004**



## **Introduction**

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- **Third year post restoration annual monitoring**
- **Function and Value Assessment conducted**
- **Preliminary Results**



## **Long Term Monitoring Goal**

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- **Post-remedial functions and values of restored wetland equal to or greater than pre-remedial functions and values**



## **Function and Value Assessment Methods**

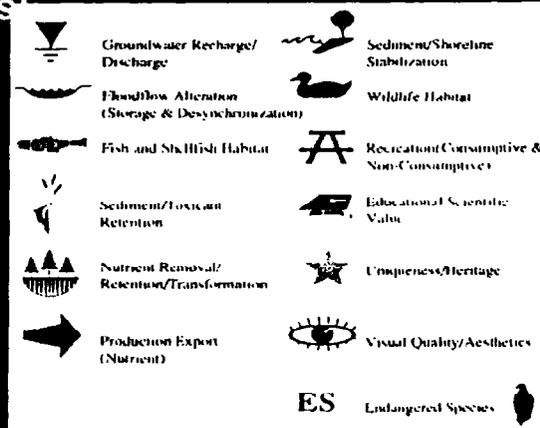
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- **U.S. Army Corps of Engineers 1995 New England Division, Highway Methodology**
- **Wetland Habitat Indicators for Nongame Species (WETHings)**



## New England Highway Method

- Evaluates 13 wetland functions and values



## New England Highway Method - Procedures

- Define wetland boundaries
- Field evaluate:
  - physical characteristics of wetland
  - functions and values exhibited
- Provide rationale for conclusions



## **WEThings**

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- Predicts potential habitat for New England wetland-dependent:
  - amphibians
  - reptiles
  - mammals



## **WEThings - Procedures**

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- Define wetland boundaries
- Identify preliminary list of species that might use site wetlands.
- Field evaluate vegetation, substrate, hydrology, and specific upland features.
- Generate species list using WEThings computer program.
- Review and interpret generated lists.



## New England Highway Methods - Results

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- Functions and values increased for all restored wetlands
- Principal functions increased for six of the seven restored wetlands
- Increase of 3 to 8 functions and values per wetland
- Increase of 1 to 5 principal functions per wetland

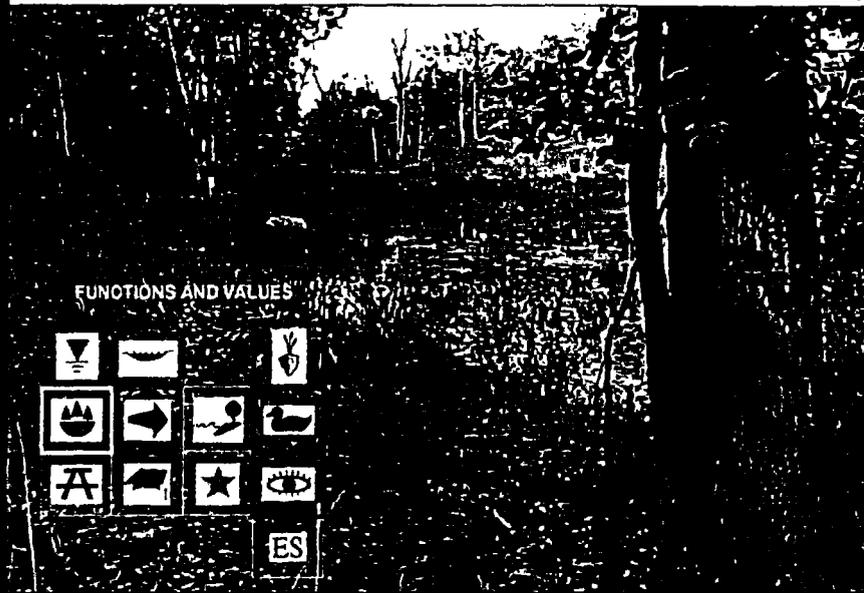


## Upper Pond Wetland

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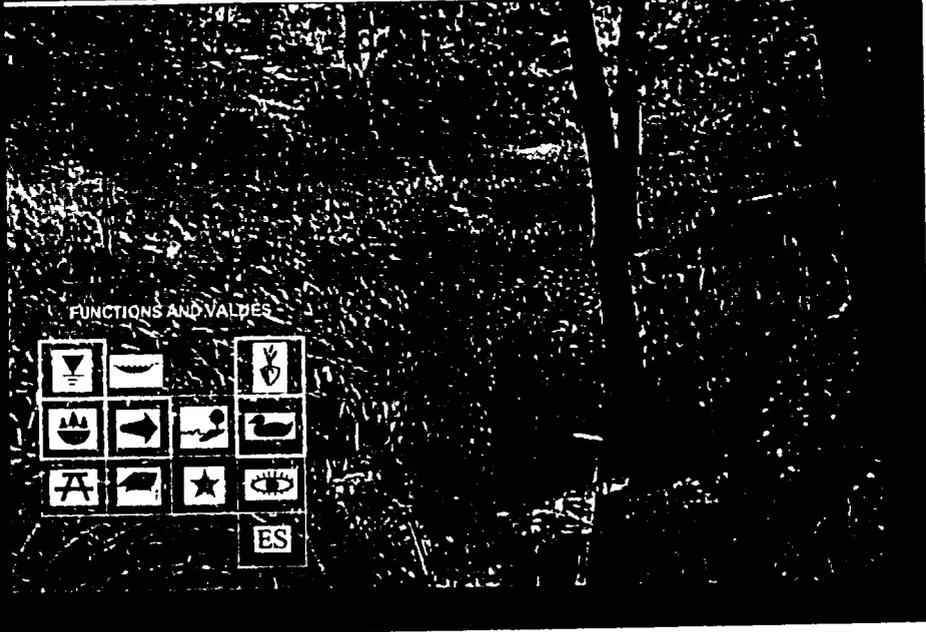
# Lower Pond Wetland



# OBDA Pond Wetland



## Stream 1 Wetland



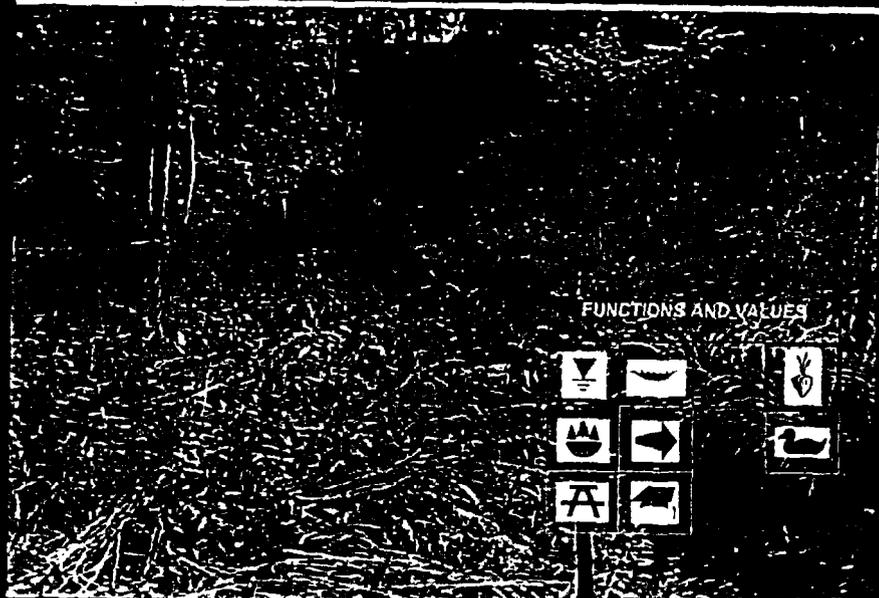
## Stream 2 Wetland



## Stream 3 Wetland



## Stream 4 Wetland



## WEThings - Results

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### AMPHIBIANS

Mudpuppy  
Blue-spotted salamander  
Spotted salamander  
Red-spotted newt  
*Four-toed salamander*  
Eastern spadefoot toad  
Eastern American toad  
Fowler's toad  
Gray treefrog  
Northern spring peeper  
Bullfrog  
Green frog  
Wood frog  
Northern leopard frog  
Pickerel frog

### REPTILES

*Spotted turtle*  
*Common snapping turtle*  
Northern water snake  
Eastern ribbon snake

### MAMMALS

Water shrew\*  
Star-nosed mole  
Beaver  
Muskrat  
Mink  
Masked shrew  
Smoky shrew  
Little brown myotis  
Silver-haired bat  
Eastern pipistrelle  
Keen's myotis  
Small-footed myotis  
Southern bog lemming  
Meadow jumping mouse  
Black bear\*  
Raccoon  
Ermine  
White-tailed deer  
Moose\*



## WEThings - Results

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- Predicted habitat for 35 wetland-dependent species
- Number of species predicted per wetland ranged from 14 to 31
- 14 of 35 predicted species were observed on-site (11) or on-base (3)



## **WEThings - Results**

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- **Predicted habitat for 3 state-listed species of special concern:**
  - Blue-spotted salamander
  - Northern leopard frog
  - Eastern ribbon snake (documented onsite)



## **Preliminary Conclusion**

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- **Post-remedial functions and values of restored wetlands were equal to or greater than pre-remedial functions and values for all restored wetlands**
- **Restored wetlands provide habitat for 35 wetland-dependent species**



## **What's next?**

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- **Submit Year 3 Draft Report to EPA**
- **Determine future monitoring**



# Thames River Naval Submarine Base – New London Ecological Screening Risk Assessment and Next Steps

## RAB MEETING

Battelle  
and  
Neptune and Company, Inc.  
February 4, 2004

**Battelle**



## Overview

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- Review Pilot Study Results for Zone 4, Zone 7, and Pier 1
- Present the Draft Screening Ecological Risk Assessment
- Recommendations for Next Steps

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## Naval Submarine Base – New London

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## Overview of Risk Assessment Approach

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### Tier 1. Screening Level Risk Assessment (SLRA)

- Step 1. Pathway identification and toxicity evaluation
- Step 2. Exposure estimates and risk calculations
- Step 3a. Refinement
  - Evaluate conservative assumptions
  - Compare to background conditions

### Tier 2. Baseline Ecological Risk Assessment (BERA)

- Detailed assessment of exposure and hazard

### Tier 3. Evaluation of Remedial Alternatives

- Developing risk based cleanup values

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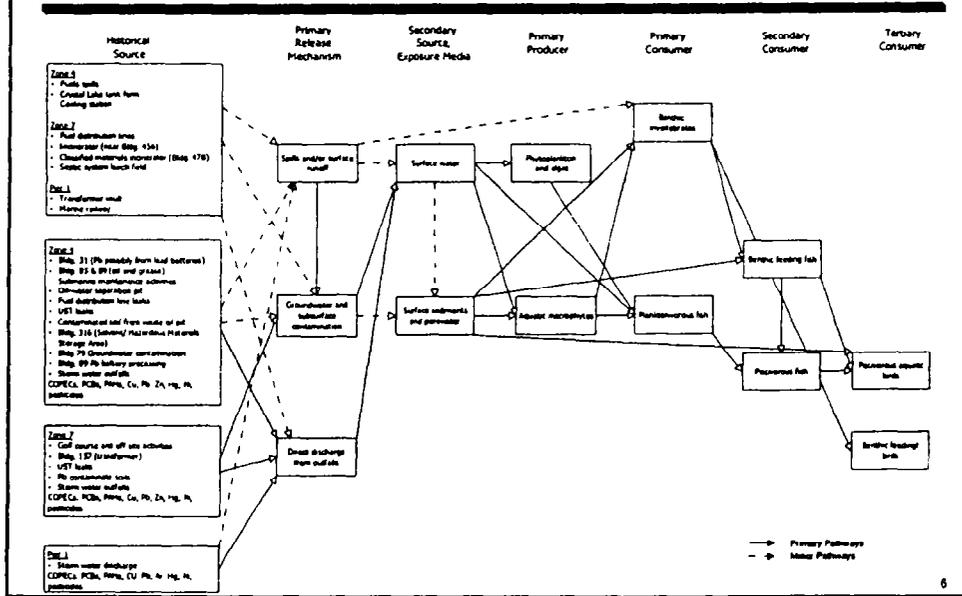
## Objectives of the Pilot Study

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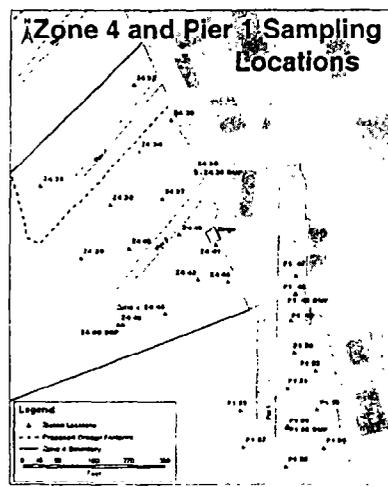
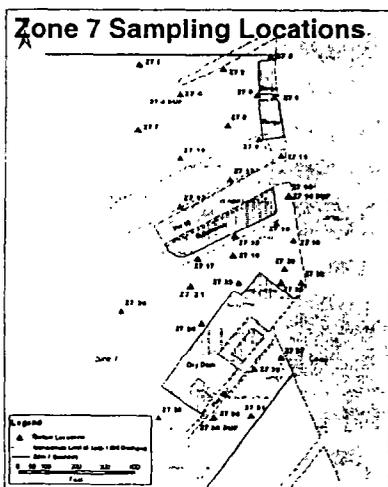
- Define the nature and extent of contamination in Zone 7, Zone 4, and Pier 1 surface sediments
- Determine if the dredging that occurred in Zone 7 in 1996 effectively removed some or all of the sediments that previously posed a potential ecological concern.
- In Zones 7 and 4, conduct a screening-level risk assessment (through Step 3a) to determine if sediments pose an unacceptable ecological risk and require further evaluation in a Baseline Ecological Risk Assessment
- In Pier 1 area, determine the contaminants of potential ecological concern (COPECs) for further evaluation in a BERA.
- The Pilot Study data will be used to support the development of data quality objectives (DQOs) and a Work Plan for additional investigation
- Field program was conducted in June 2003

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# Conceptual Site Model Off-Shore Lower Submarine Base

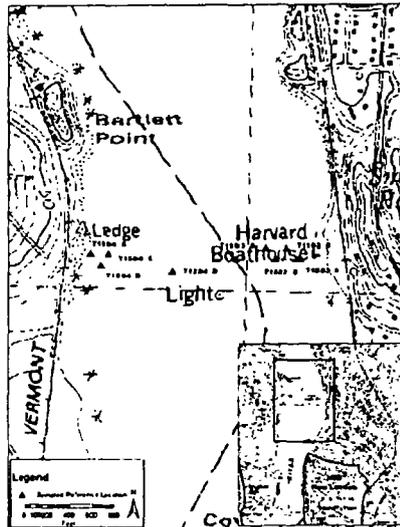


# Pilot Study Sample Site Locations



## Reference Area Sample Locations

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## Hazard Quotient (HQ) Calculation

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$$\text{Risk} = \text{Exposure} \times \text{Toxicity}$$

$$\text{HQ} = \frac{[\text{COPEC}]}{\text{NOAEL or TRV}}$$

where,

[COPEC] = concentration of individual chemical at the site sample

NOAEL = No observed adverse effects level for the COPEC

TRV = Toxicity reference value for the COPEC

and,

HQ < 1 suggest no adverse environmental impact

HQ ≥ 1 suggests potential for adverse impact, further study often required

## Ecological Risk Assessment Step 2 Screening

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### Screening Endpoints Evaluated

- Protection of benthic-dwelling organisms
  - Comparison of maximum sediment COPC concentrations to standard sediment screening benchmarks
  - EPA Region 3 Benchmarks (ER-Ls and AETs) used preferentially, then benchmarks from NOAA SQRT
- Protection of Piscivorous Birds
  - Conservative food chain model to double-crested cormorant using maximum concentrations
  - BSAFs from EPA National Sediment Quality Survey, and TRVs from ORNL and EPA SSG

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## Ecological Risk Assessment Step 2 Screening

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- Protection of Benthic Feeding Birds
  - Not evaluated due to limited habitat and foraging area
  - Most off-shore area is greater than 25 feet
- Protection of Piscivorous and Omnivorous Mammals
  - Not evaluated due to limited habitat and foraging area
  - Industrialized area
  - Limited supporting shoreline habitat

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## Step 3a COPC Refinement Steps

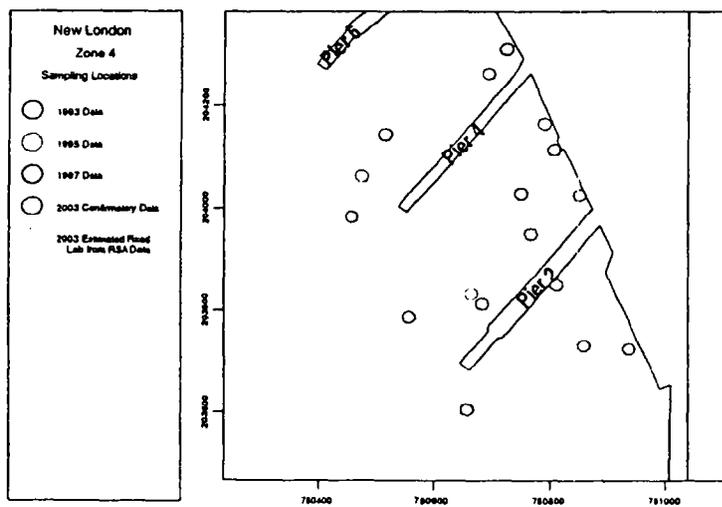
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- Sediment COPC concentrations for each area to sediment screening benchmarks
  - If refined HQ < 1, then drop COPC from further evaluation
  - Compare 95% UCL food chain doses to avian TRVs, if refined food chain HQ < 1, then drop COPC from further evaluation
- Compare data distribution of COPCs in each area to upstream Thames River Reference Area
  - If COPC data distributions are not different than Thames Reference Area, then drop COPC from further evaluation

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## Zone 4 Sample Site Locations

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## Zone 4

### Step 2 Screening Results

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Protection of benthic-dwelling organisms; COPCs Retained:

- Detected and exceeded benchmarks:
  - 10 metals,
  - 17 PAHs,
  - total PAHs,
  - total PCBs,
  - DDx compounds
  - alpha-chlordane
  - dieldrin

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## Zone 4

### Step 2 Screening Results

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Protection of benthic-dwelling organisms; COPCs Retained (continued):

- Detected (no benchmarks available):
  - 7 PAHs,
  - trans-nonachlor
  - barium
- Not detected (DLs > benchmarks):
  - gamma-BHC

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## Zone 4

### Step 2 Screening Results

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#### Protection of Piscivorous Birds

- COPCs with maximum NOAEL HQs >1:
  - chromium
  - copper
  - lead
  - mercury
  - zinc
  - 4,4'-DDE
  - total PAHs
  - dieldrin

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## Zone 4

### Step 2 Screening Results

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#### Protection of Piscivorous Birds (continued)

- COPCs with maximum LOAEL HQs >1:
  - chromium
  - lead
  - mercury
  - zinc
  
- All other constituents eliminated as food chain COPCs
  - total PCB HQ = 0.90

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## Zone 4

### Step 3a Refinement

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- COPCs Not Different Than Thames River  
Reference Area:
  - mercury
  - 4,4-DDD
  - 4,4-DDT
- All other constituents statistically elevated in Zone 4

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## Zone 4

### Step 3a Refinement

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- Benthic Invertebrates and Upper Trophic Levels
- Step 2 sediment COPCs with 95% UCLs < sediment screening benchmarks:
    - 4,4'-DDD
    - 4,4'-DDT
  - Step 2 food-chain COPCs with:
    - 95% UCL doses < NOAEL TRVs:
      - copper
      - dieldrin
      - total PAHs

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## Zone 4

### Summary of COPCs

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#### Chemical Constituents Remaining After Screening and COPC Refinement

- Benthic Invertebrates:
  - 10 Metal
  - 24 PAHs
  - total PCBs
  - 4,4-DDE
  - alpha-chlordane
  - dieldrin
  - trans-nonachlor

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## Zone 4

### Summary of COPCs

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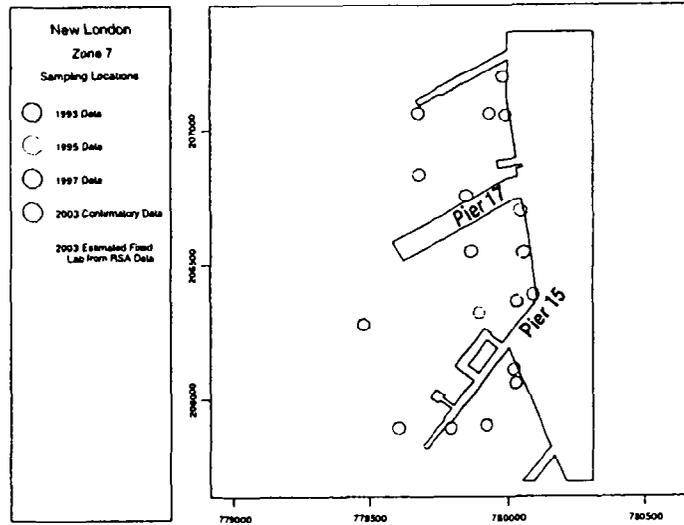
#### Chemical Constituents Remaining After Screening and COPC Refinement (continued)

- Piscivorous Birds (Dose > TRV):
  - chromium
  - lead
  - zinc

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## Zone 7 Sample Site Locations

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## Zone 7 Step 2 Screening Results

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Protection of benthic-dwelling organisms; COPCs Retained:

- Detected and exceeding benchmarks:
  - 9 metals
  - 17 PAHs
  - total PAHs
  - total PCBs
  - DDX compounds
  - alpha-chlordane
  - dieldrin

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## Zone 7

### Step 2 Screening Results

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Protection of benthic-dwelling organisms; COPCs Retained (continued):

- Detected (no benchmarks available):
  - barium
  - 7 PAHs
  - trans-nonachlor
- Not Detected (DLs > benchmarks):
  - gamma-BHC

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## Zone 7

### Step 2 Screening Results

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Protection of Piscivorous Birds

- Constituents with maximum NOAEL HQs >1:
  - chromium
  - lead
  - mercury
  - zinc
  - 4,4'-DDT
- Constituents with maximum LOAEL HQs >1:
  - chromium
  - lead
  - zinc
- All other constituents eliminated as food chain COPCs
  - total PCB HQ = 0.16
  - total PAH HQ = 0.65

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## Zone 7

### Step 3a Refinement

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- Constituents Not Different Than Thames River Reference Area:
  - cadmium
  - mercury
  - silver
  - 4,4'-DDD
  - alpha-chlordane
  - dieldrin
  
- All other constituents statistically elevated in Zone 7

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## Zone 7

### Step 3a Refinement

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#### Benthic Invertebrates and Upper Trophic Levels

- Step 2 sediment COPCs with 95% UCLs < sediment screening benchmarks:
  - cadmium
  - silver
  - benzo(b)fluoranthene
  - benzo(k)fluoranthene
  - acenaphthylene
  - naphthalene
  - 4,4'-DDD

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## Zone 7

### Step 3a Refinement

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#### Benthic Invertebrates and Upper Trophic Levels (continued)

- Step 2 food-chain COPCs
  - 95% UCL doses < NOAEL TRVs:
    - 4,4'-DDT
  
  - 95% UCL doses > NOAEL TRVs (retained as COPCs)
    - chromium
    - lead
    - zinc

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## Zone 7

### Summary of COPCs

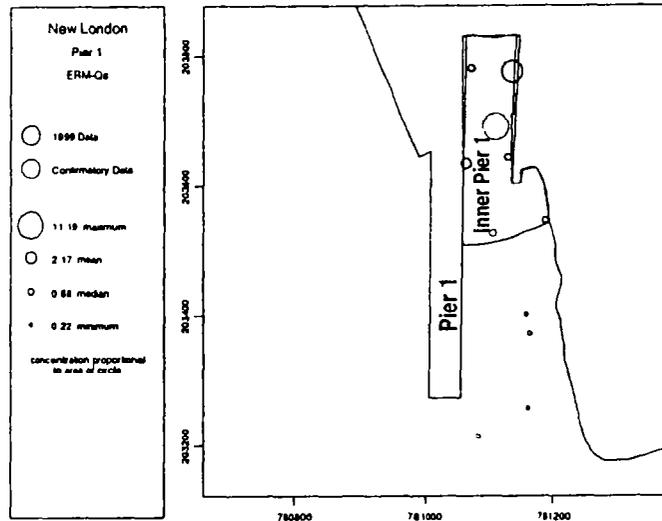
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#### Chemical Constituents Remaining After Screening and COPC Refinement

- Benthic Invertebrates:
  - 8 metals
  - 21 PAHs
  - 4,4'-DDT
  - trans-nonachlor
- Piscivorous Birds
  - chromium
  - lead
  - zinc

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## Pier 1 ERM-Qs Bubble Plot



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## Zones 4 and 7 Recommended Next Steps

- Further evaluation of on-shore sources of COPCs
- Baseline Ecological Risk Assessment (BERA)
  - Assessment Endpoint:
    - Protection of Benthic Invertebrate Populations/Communities
    - Maintenance of Populations of Piscivorous Birds
  - Measurement Endpoint:
    - 28 day *Leptocheirus plumulosus* (amphipod) bioassay
    - Food chain model to double-crested cormorant
    - Use field collected forage fish tissue as site specific dose input

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## **Pier 1**

### **Recommended Next Steps**

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- No risk assessment for inner area of Pier 1
- Proceed directly to Tier 3; cleanup action for Inner Area
  - Sediment depth and physical parameters
  - Sediment chemistry information
  - Toxicity bioassay
  - Remedial design data needs
  - Develop site-specific clean-up level
- Outer Area of Pier 1 to be addressed as part of baseline risk assessment of Zones 4 and 7
- Pier 1 Outer Area Ecological Problem Formulation and CSM consistent with Zones 4 and 7

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