MONITORED NATURAL RECOVERY EVALUATION OF COTTONWOOD BAY SEDIMENTS

Presented by:
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COTTONWOOD BAY/MOUNTAIN CREEK LAKE – DALLAS, TX

- 2,700 acre public reservoir
- Former US Navy facilities located on the NW shore
- Developer purchased the land and environmental liability from the Navy

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BACKGROUND

- 2011 TCEQ Corrective Action Order to the Navy to address contaminated sediment
- Dredge sediment exceeding Protective Concentration Levels (PCLs)
- 2013–14 sediment sampling demonstrated decreasing surface sediment concentrations
- Is monitored natural recovery an appropriate and cost-effective remedy for the site?

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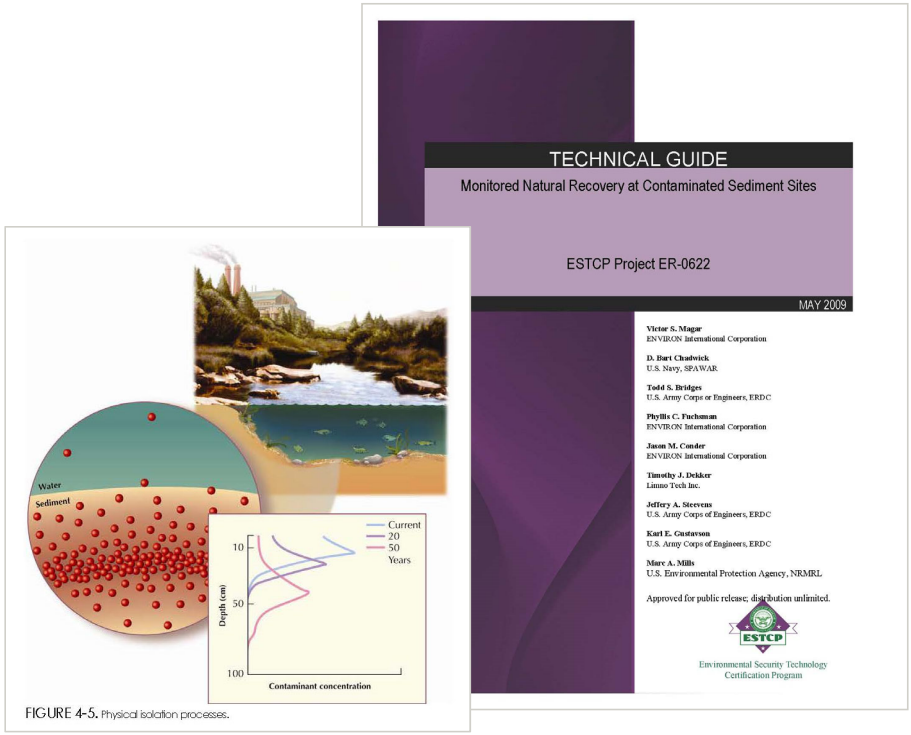
MONITORED NATURAL RECOVERY (MNR)

MNR is a sediment response action that leaves contaminated sediments in place and relies on ongoing natural processes to reduce risks.

- Burial and reduced contaminant exposure
- Contaminant transformation/degradation
- Sorption/precipitation and reduced mobility/bioavailability
- Contaminant dispersion



MNR LINES OF EVIDENCE FOR COTTONWOOD BAY

01	Ecological and human health risks
02	Surface sediment recovery
03	Sediment deposition rates/sediment stability
04	Temporal trends in fish tissue concentrations

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2015 DATA GAPS SAMPLING

2015 Sampling and Analyses		Corresponding MNR Line of Evidence
Risk assessments	→	**Ecological and human health risks**
Sediment coring and chemistry analyses	→	**Surface sediment recovery**
Sediment geochronology analyses	→	**Sediment deposition/sediment stability**
Fish tissue chemistry	→	**Temporal trends in fish**

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ECOLOGICAL & HUMAN HEALTH RISK ASSESSMENTS

- Screening-level ecological risk assessment
  - Porewater sample and analysis
  - AVS/SEM analysis
  - Spiked sediment studies
  - Bulk sediment concentrations
- Human health risk assessment
  - Compared 95% UCLs of COC concentrations to Texas Risk Reduction Program (TRRP) direct contact values
  - Evaluated fish tissue concentrations for multiple COCs

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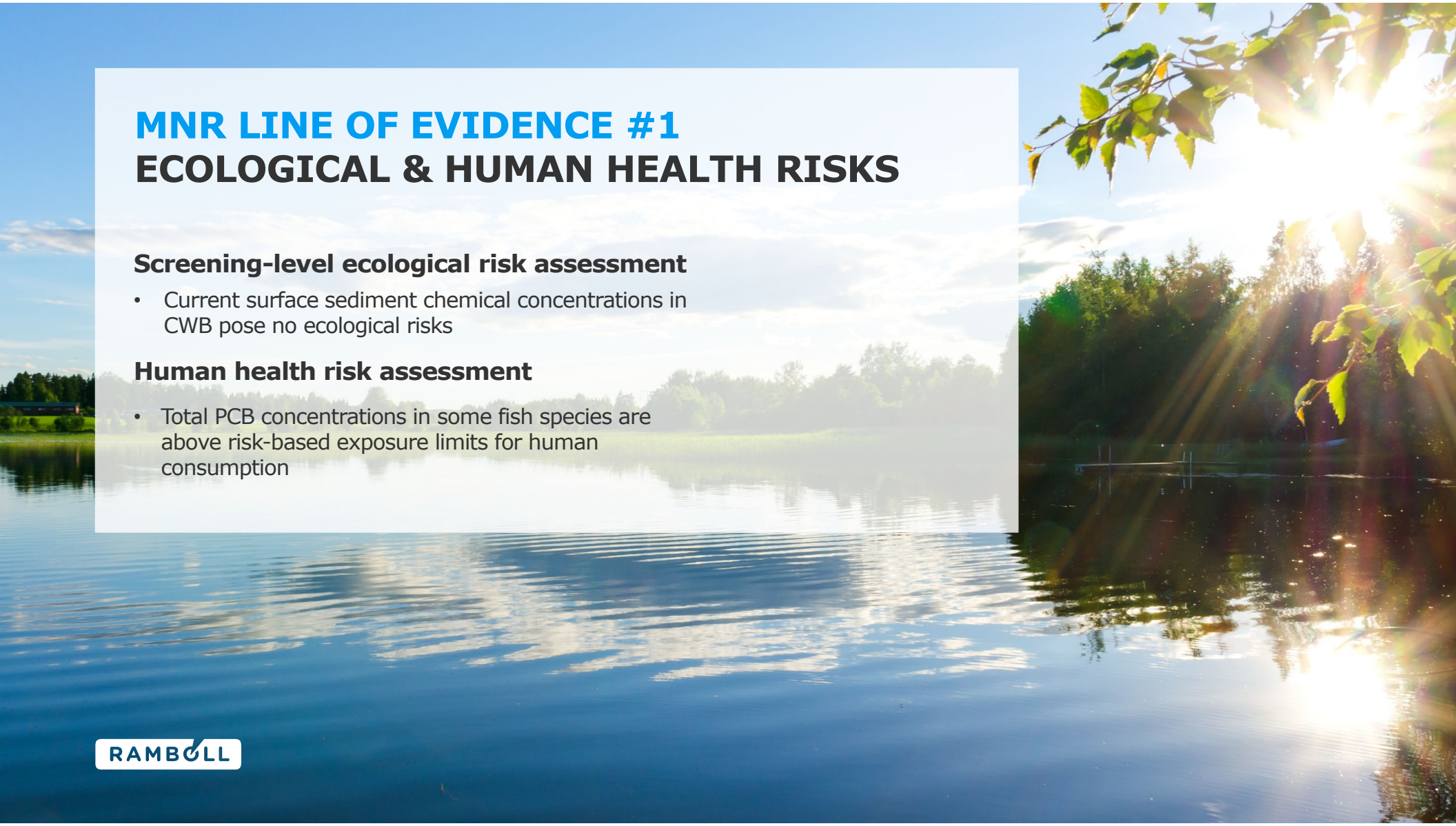

MNR LINE OF EVIDENCE #1
ECOLOGICAL & HUMAN HEALTH RISKS

Screening-level ecological risk assessment

- Current surface sediment chemical concentrations in CWB pose no ecological risks

Human health risk assessment

- Total PCB concentrations in some fish species are above risk-based exposure limits for human consumption

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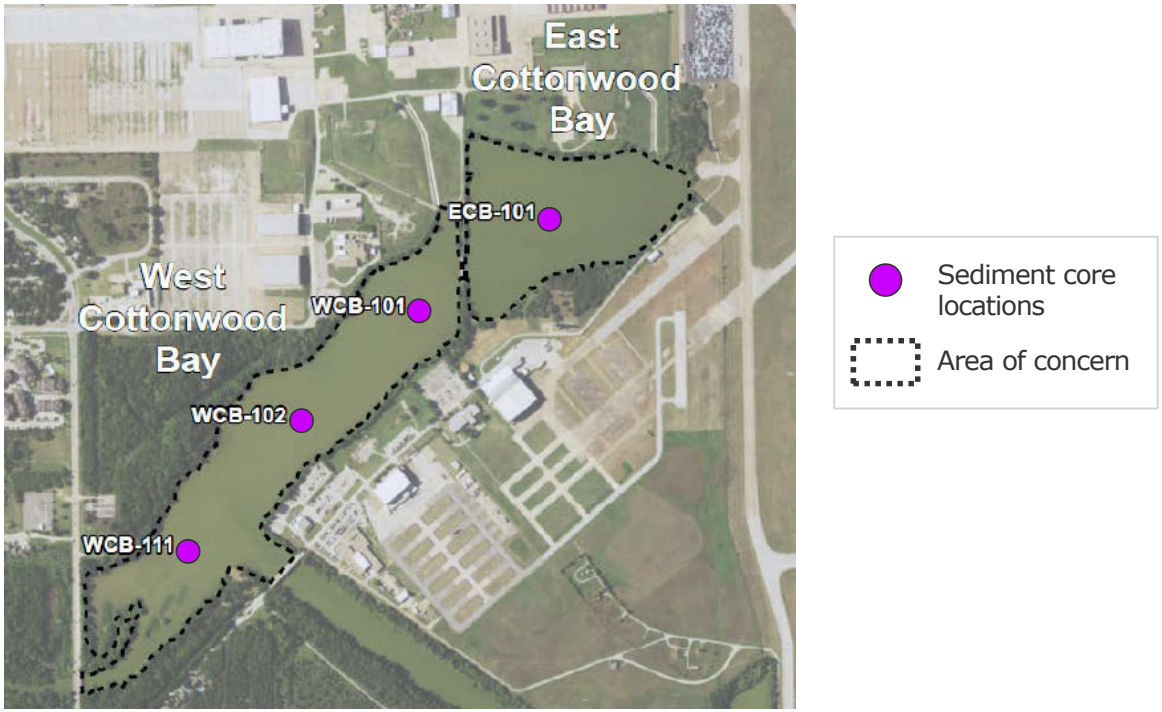
2015 SEDIMENT CHEMISTRY CORE LOCATIONS



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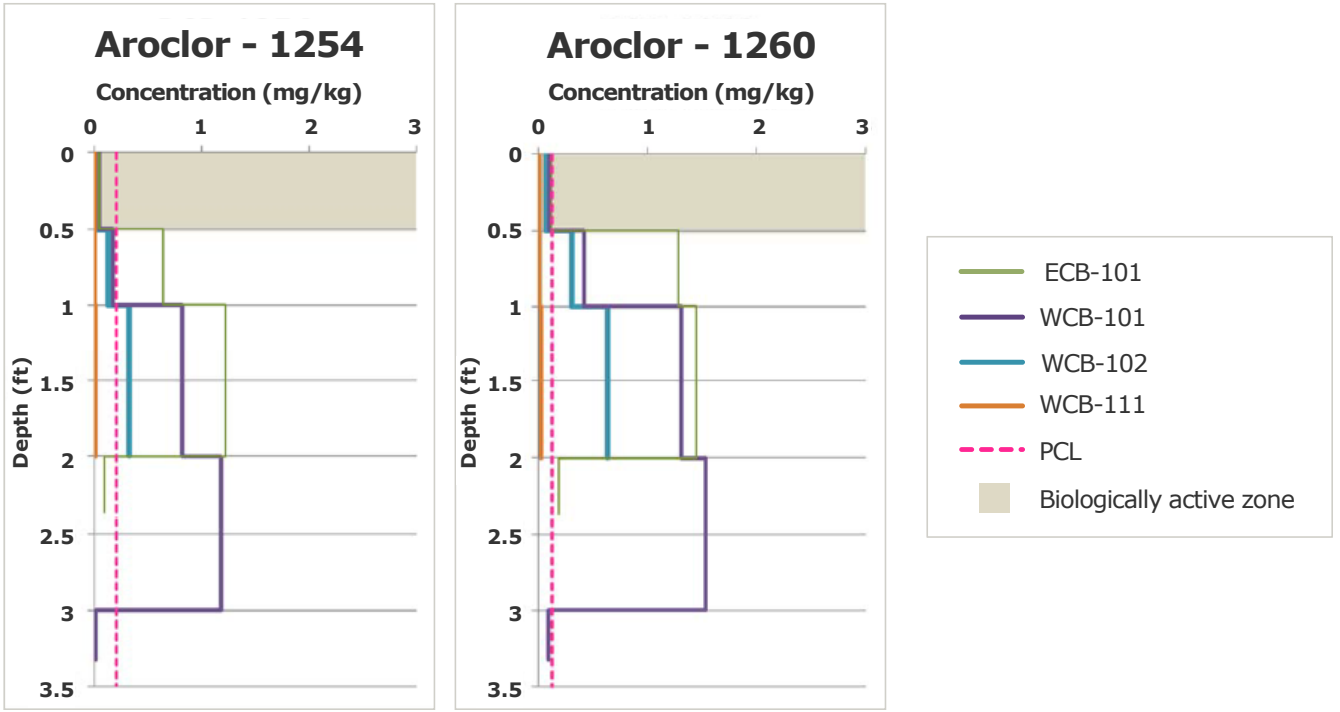
SEDIMENT CORE VERTICAL PROFILES
PCBS



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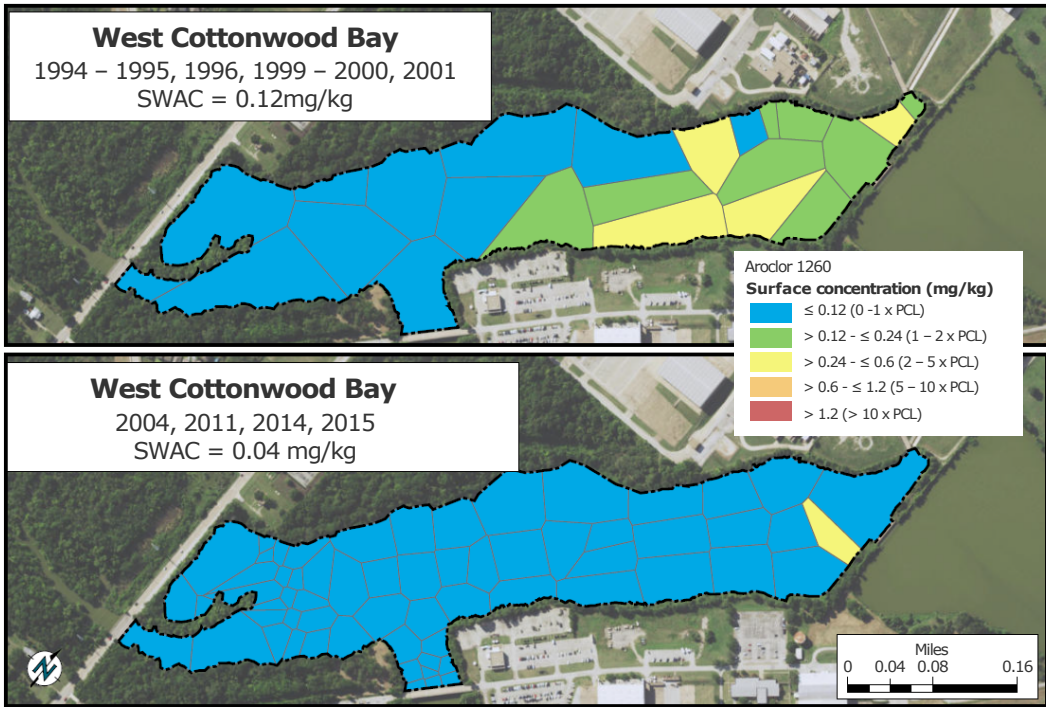
TEMPORAL TRENDS IN SURFACE SEDIMENT CONCENTRATIONS

- Surface weighted average concentrations (SWACs) were used to compare surface PCB concentrations over time
- Aroclor concentrations in East and West Cottonwood Bay showed decreasing SWACs over time



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MNR LINE OF EVIDENCE #2
SURFACE SEDIMENT RECOVERY

Surface sediment COC concentrations are recovering

- Decreasing surface sediment COC concentration over time
- High COC concentrations at depth, isolated by a surface layer of clean sediments

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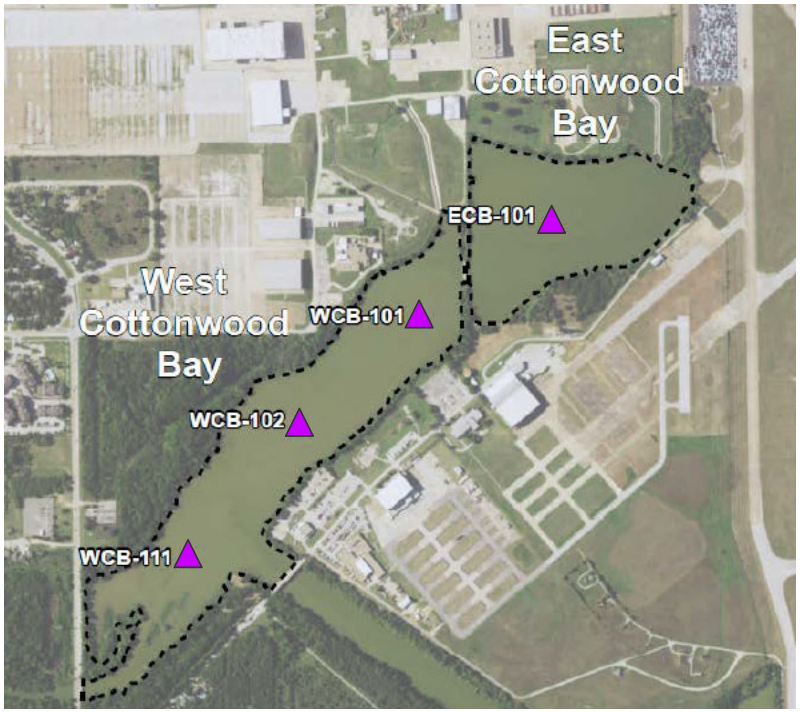
2015 SEDIMENT GEOCHRONOLOGY CORE LOCATIONS



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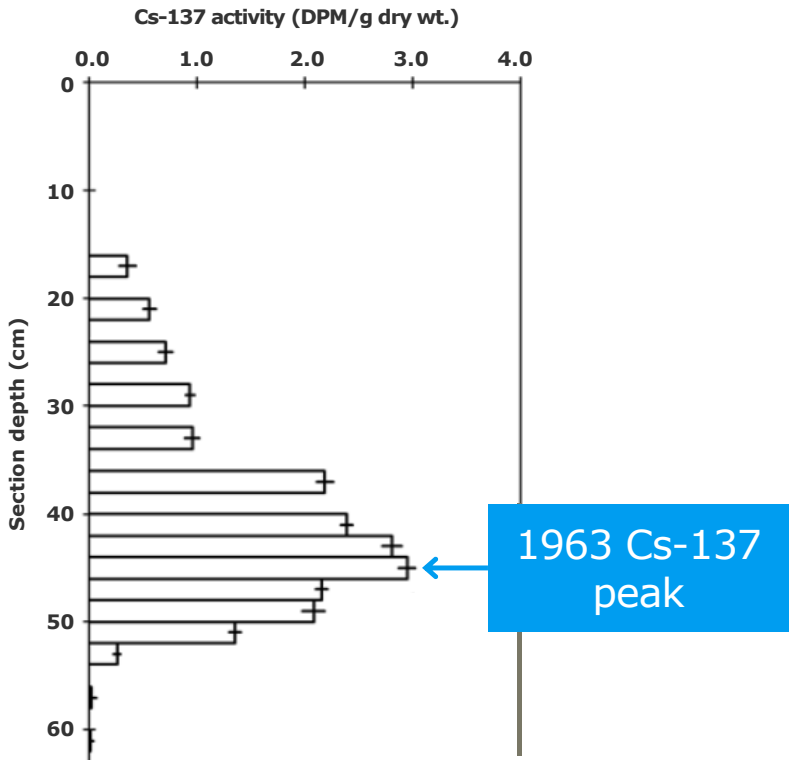
SEDIMENT AGE DATING

- Radioisotopes dating using Pb-210 and Cs-137
- Cottonwood Bay current sedimentation rates

  1.2 to 1.6 cm/year

- Rates are consistent with 1995 data (USGS 2003)

  1 to 1.3 cm/year



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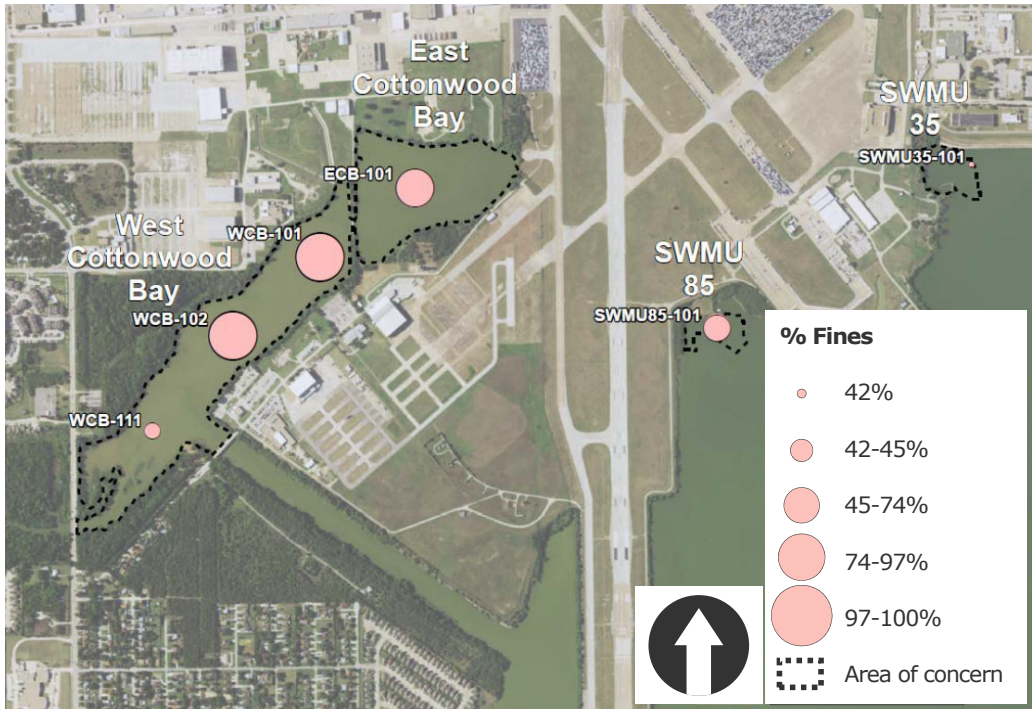
2015 PARTICLE SIZE DISTRIBUTION IN SURFACE SEDIMENTS

The high proportion of fines is consistent with a quiescent, depositional environment



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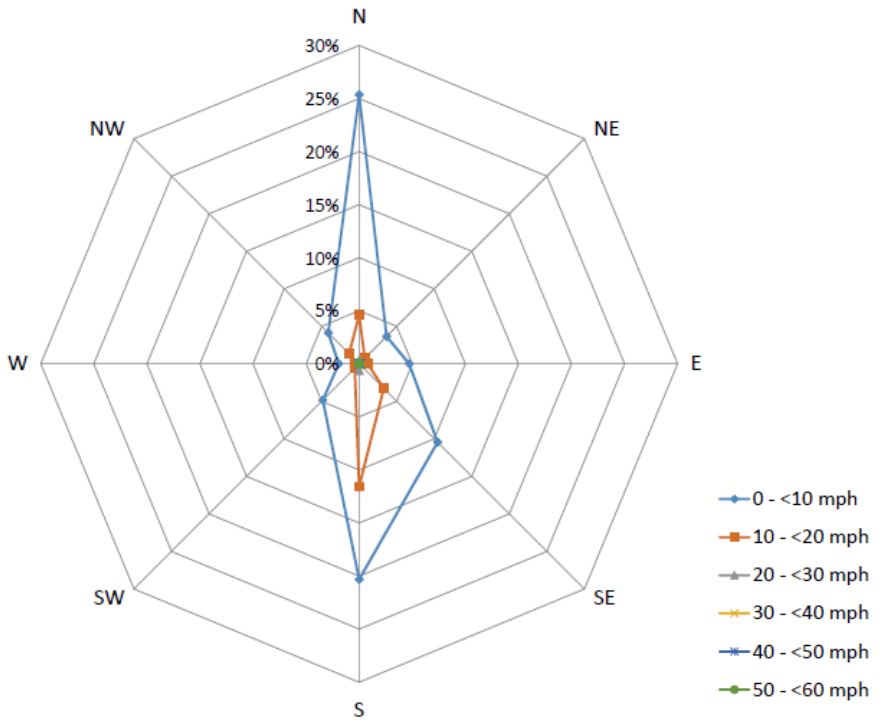
WIND DRIVEN RESUSPENSION

- Evaluated potential erosion due to wind events
- Sediment scour prediction

Scour < 1 mm



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MNR LINE OF EVIDENCE #3
SEDIMENT STABILITY

Sediments are stable

- Geochronology results demonstrate sedimentation rates of 1.2–1.6 cm/year in Cottonwood Bay
- Small grain size of surface sediments show a low energy, depositional environment
- Wind events are not expected to result in significant sediment resuspension

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TEMPORAL TRENDS IN FISH TISSUE CONCENTRATIONS

- 1994–2008 fish tissue data available from the site
- Additional fish samples collected in 2015
- Temporal trends evaluated using the same species and tissue types (fillet or whole body)

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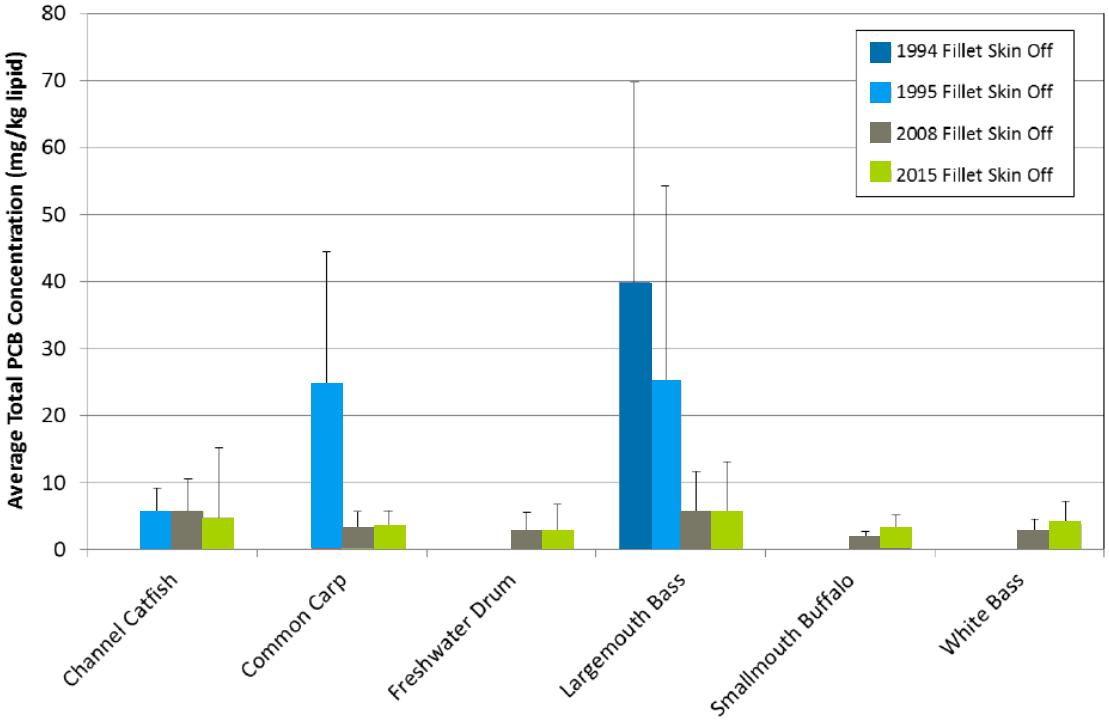
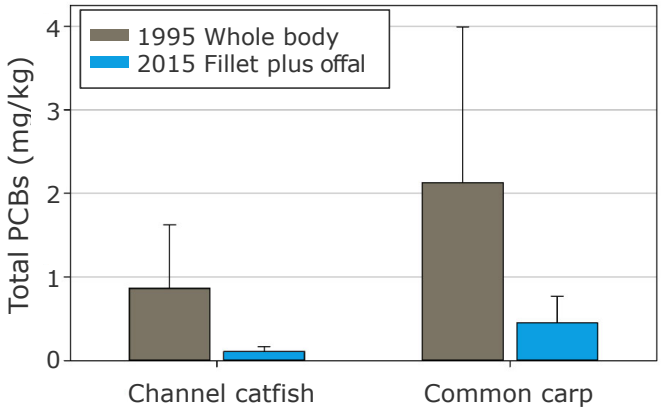
TEMPORAL TRENDS IN FISH TISSUE PCB CONCENTRATIONS





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MNR LINE OF EVIDENCE #4

TEMPORAL TRENDS IN FISH TISSUE PCB CONCENTRATIONS

PCB concentrations in fish tissue have generally decreased since the mid-1990s

- Observed trends in fish tissue concentrations typically lag behind changes in surface sediment concentrations

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CONCLUSIONS

Multiple lines of evidence demonstrate MNR is an appropriate remedy to address surface sediment risks effectively

- Ecological risks are low and acceptable; potential human health risks result from consumption of fish with elevated PCB levels
- Surface sediment concentrations are decreasing over time
- Sediments are depositional and stable
- Fish tissue PCB concentrations are decreasing over time

Natural recovery processes are expected to achieve site-specific remedial goals in an acceptable time period

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MNR REMEDY FOR COTTONWOOD BAY
LONG-TERM MONITORING PROGRAM

An MNR Response Action Plan for Cottonwood Bay has been partially-approved by TCEQ

Composite Surface Sediment Sampling

Demonstrate decreasing surface sediment PCB levels over time

Bathymetric Surveys

Confirm sediment stability over time

Fish Tissue Sampling

Demonstrate decreasing fish tissue PCB levels over time

Incoming Suspended Sediment Sampling

Support surface sediment and fish tissue time to recovery evaluations

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QUESTIONS?

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