

# LAVACA BAY, TX

LAURA HUNT

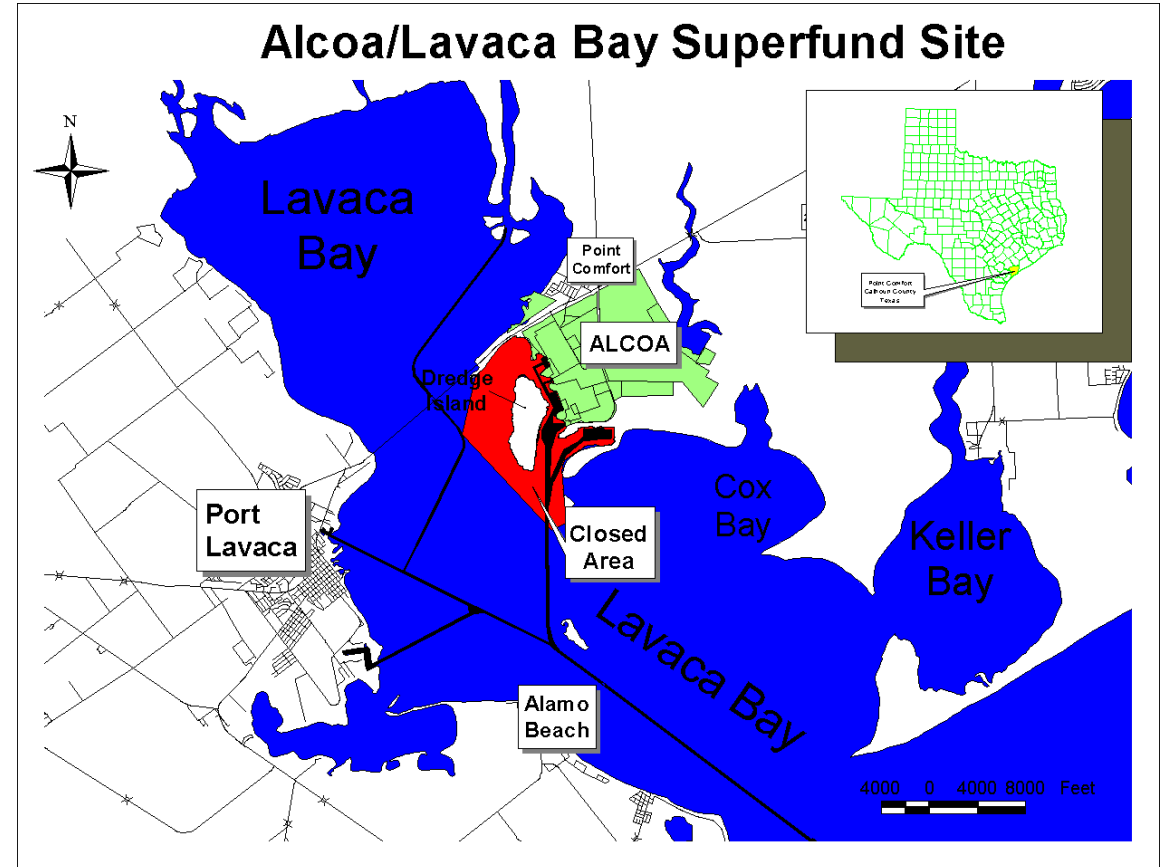
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 6

# Lavaca Bay Site Overview



# Background

- 1948-80: Aluminum smelter
- 1959: Bauxite refining starts
- 1966-1979: Chlor-Alkali Process Area (CAPA) operated
- 1988: Portion of Lavaca Bay closed
- March 1994: Placed on NPL
- December 2001: Record of Decision
- July 2007: Construction complete
- 2011, 2016, 2021: Five-Year Reviews





# Project Area



# Source Characterization

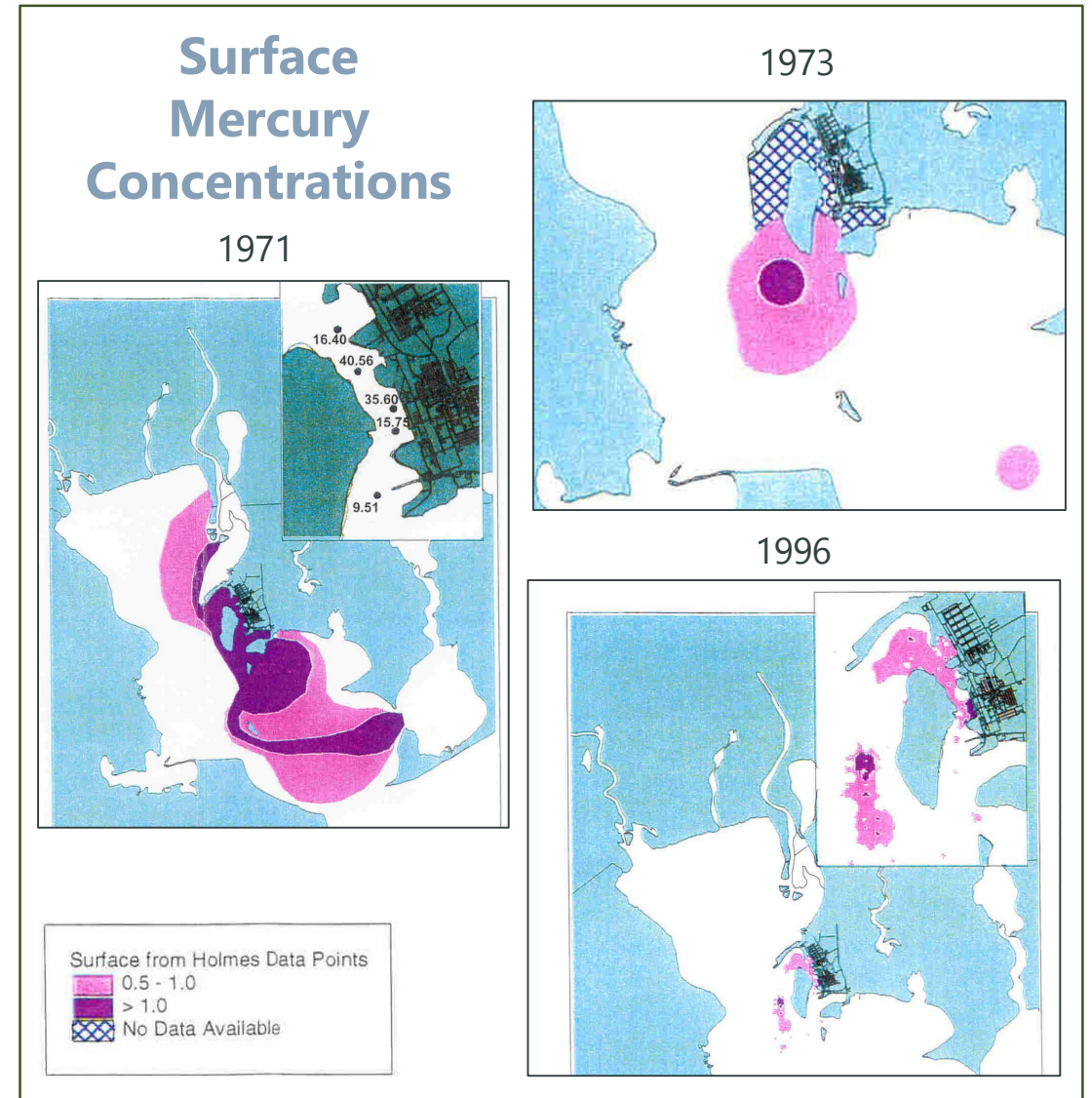
- RI/FS from 1994 to 2001
- Site COCs are mercury and PAHs
- Key ongoing sources of mercury
  - Chlor-Alkali Process Area
    - Estimated 40 lb/yr discharge to bay
  - Dredge Island stormwater runoff
    - Estimated 8 to 13 lbs/yr runoff to bay
  - Existing sediments along Alcoa Channel





# Bay System RI Findings

- Radiochemistry study
  - Historic releases buried through sedimentation
  - Mercury in surface sediment due to ongoing sources
  - Recovery half-times are 1 to 9 years
- Hurricane model
  - Storm will not resuspend mercury buried at depth



# Objectives of Remediation

- Remedial Action objectives
  - Address ongoing unpermitted discharges
  - Reduce sediment mercury levels in bay habitats
  - Reduce mercury levels in finfish
- Target cleanup goals
  - Marsh: 0.25 ppm mercury
  - Open water: 0.5 ppm mercury
  - Fish tissue in Closed Area same as outside Closed Area
- ROD for Final Action issued December 2001



# Summary of Remedy

- Early Actions

- Dredge Island: removal action (1998-2001)
- CAPA: groundwater extraction (1998)
- CAPA/North of Dredge Island: dredging treatability studies (1998)

- ROD Actions

- Witco Channel: dredged 200,000 cubic yards (2001)
- Witco Marsh: dredged 60,000 cubic yards (2006)
- Monitored natural recovery





# Primary Pre- and Post-Remedy Effectiveness Monitoring Elements

- Mercury was primary COC monitored
- Remedy monitoring
  - Open-water sediment
  - Marsh sediment
  - Red drum
  - Blue crab

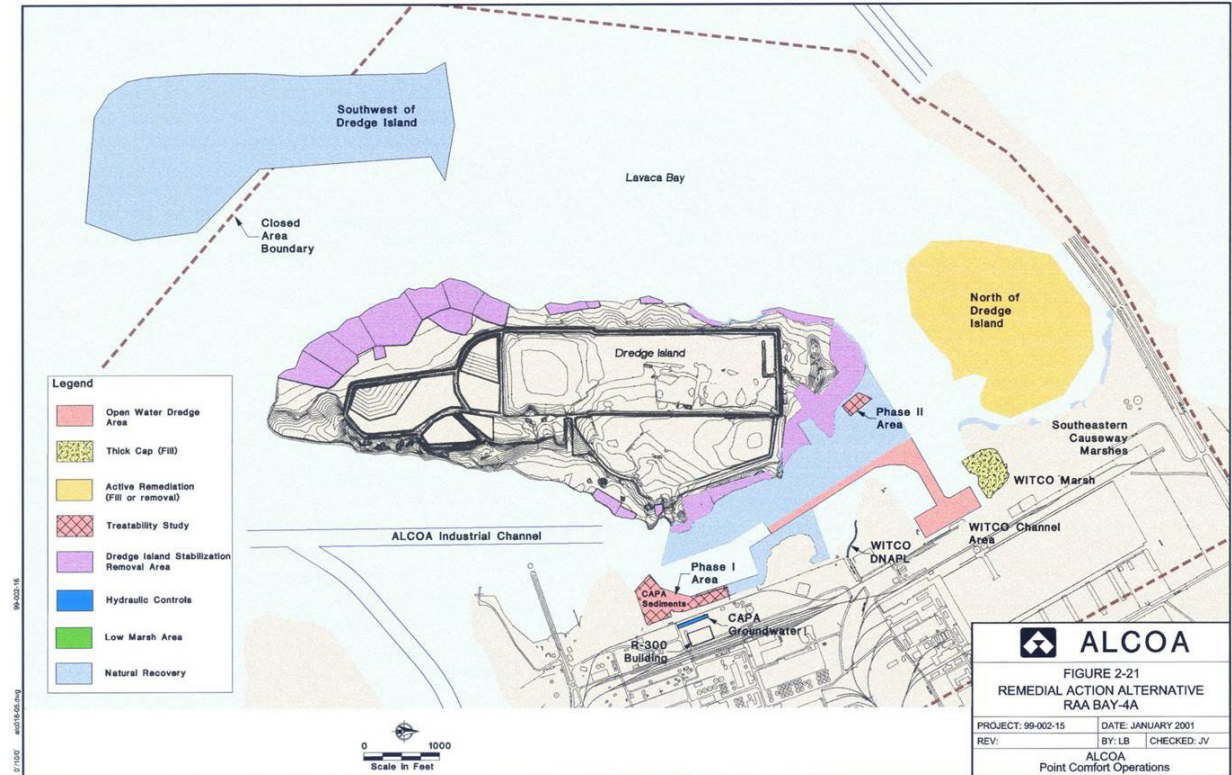


# Did the Remedy Achieve Short- and/or Long- Term Remediation Objectives for Surface Sediment?

- Open water PRG: 0.5 ppm mercury
  - – 2004: 0.293 ppm
  - – 2005: 0.276 ppm
- Marsh PRG: 0.25 ppm mercury
  - 2015: All marshes less than 0.25 ppm mercury
- Lessons learned
  - Early actions effective in achieving sediment remediation goals

# Significant Remedy Scope or Schedule Deviations

- 2007 Explanation of Significant Differences
  - Removed requirement for thin-layer cap north of Dredge Island
- Lessons learned
  - Achieving sediment cleanup levels is not equal to achieving fish cleanup objective

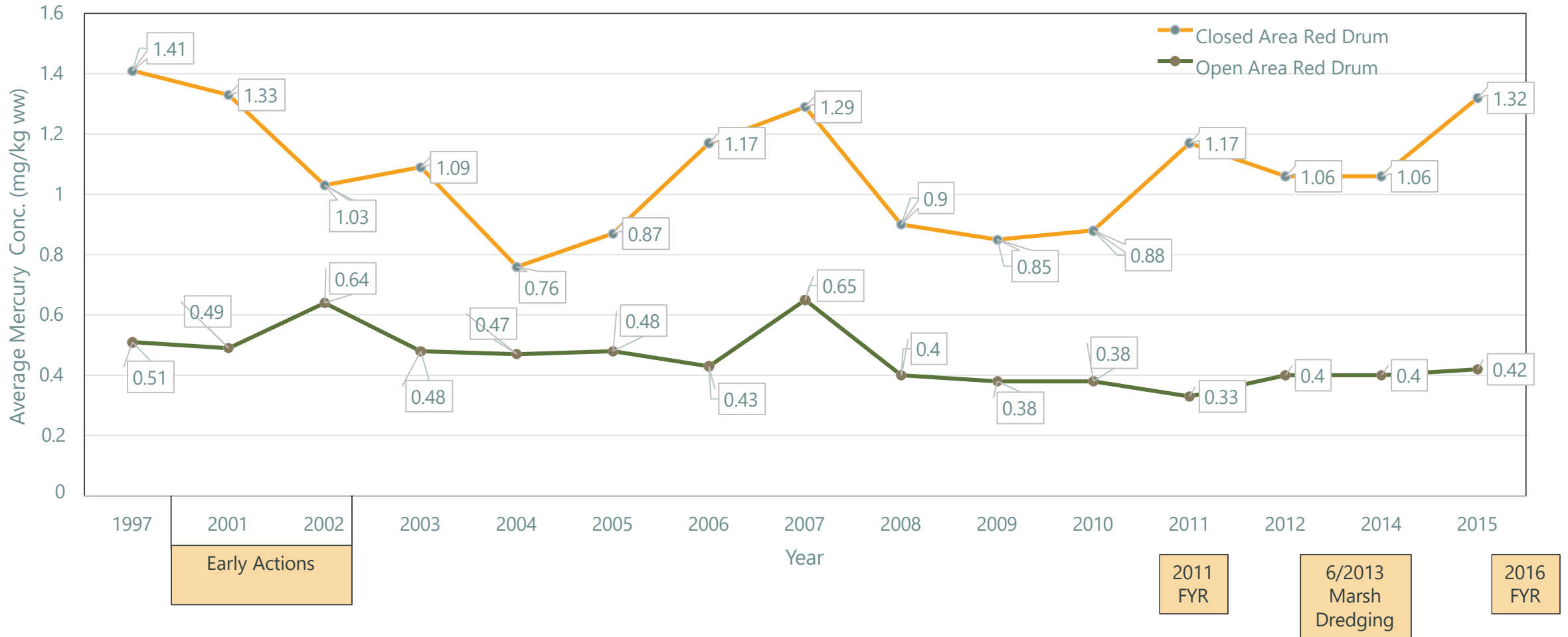




# Is the Remedy on Track to Achieve Long-Term Remediation Objectives for Water and/or Biota?

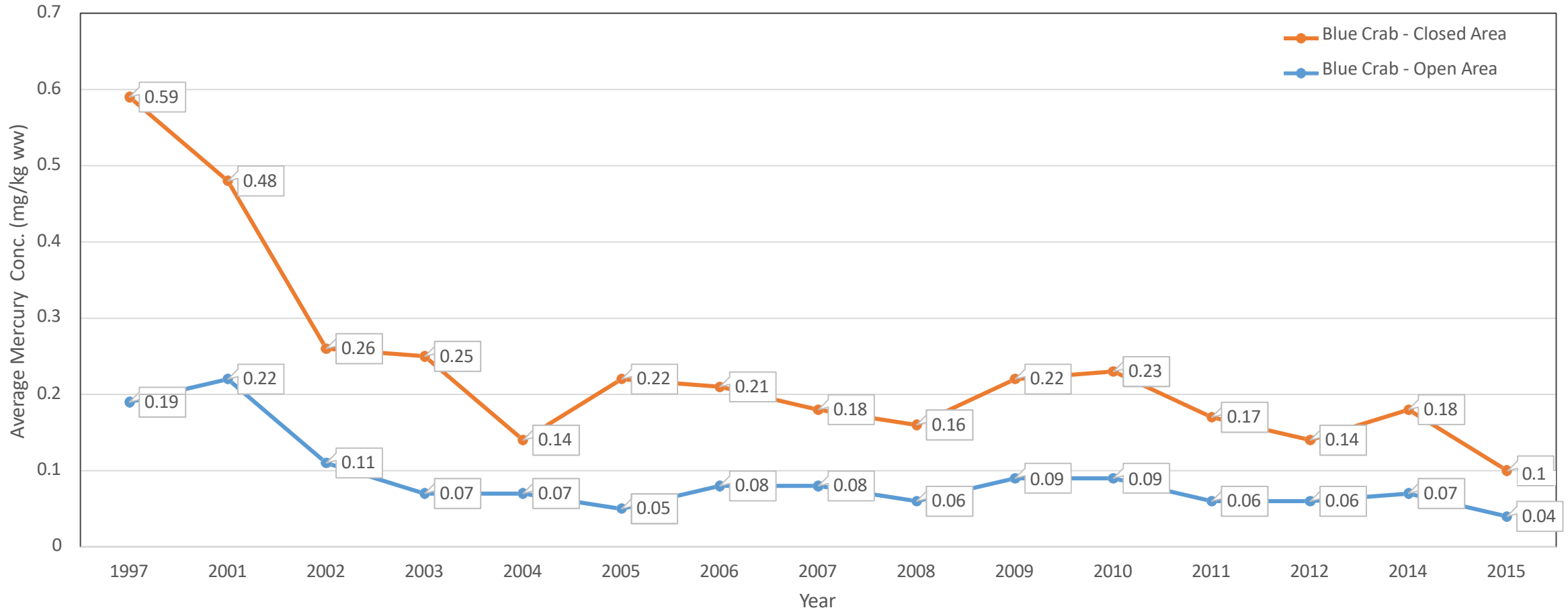
- Time will tell
- 2011 Five-Year Review: additional actions to accelerate fish tissue recovery
- 2016 Five-Year Review: long-term protectiveness deferred
- 2021 Five-Year Review: long-term protectiveness deferred
- Lessons learned
  - Do not claim victory too soon
  - Recovery times longer than predicted

# Red Drum Mercury Concentrations



Sediment Remedy Effectiveness Retrospective Workshop

# Juvenile Blue Crab Mercury Concentrations

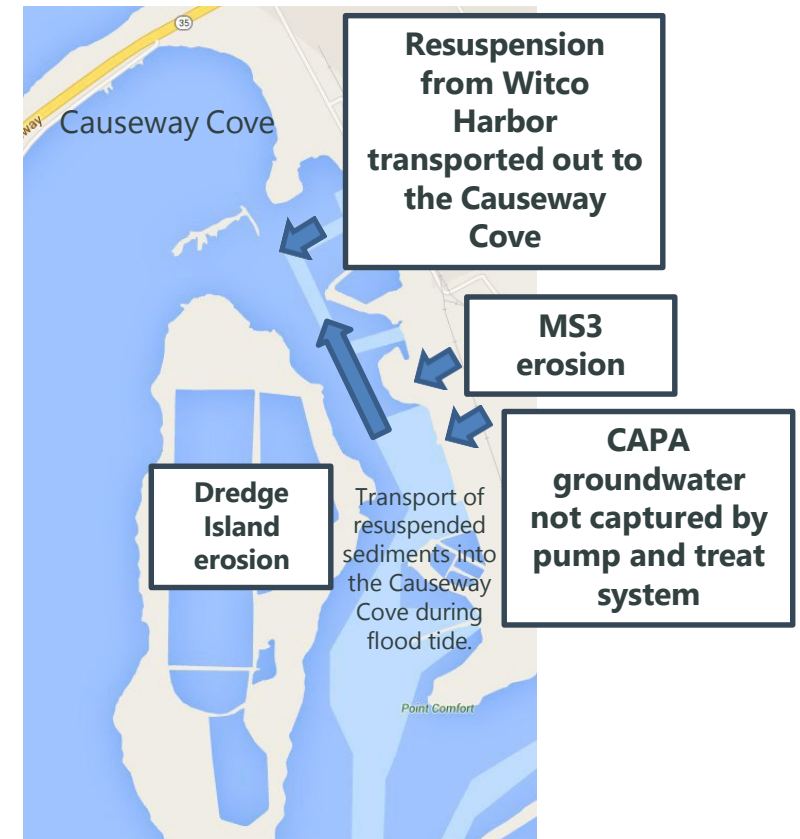


Sediment Remedy Effectiveness Retrospective  
Workshop

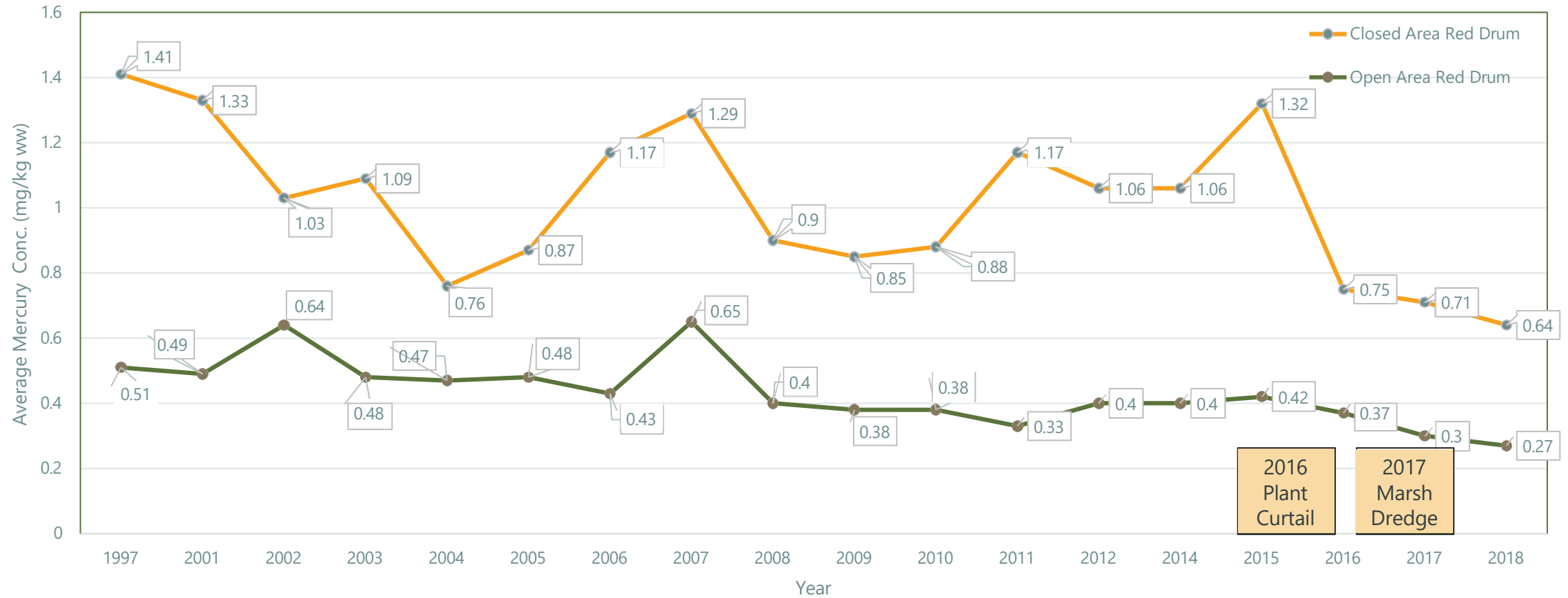


# Is the Remedy on Track to Achieve Long-Term Remediation Objectives for Water and/or Biota?

- Conducted field studies to evaluate factors influencing mercury in fish tissue concentration
- Developed response action plan using 2016 data
  - Dredged 400,000 cubic yards of impacted sediment
  - Removed all marsh habitats



# Red Drum Mercury Concentrations

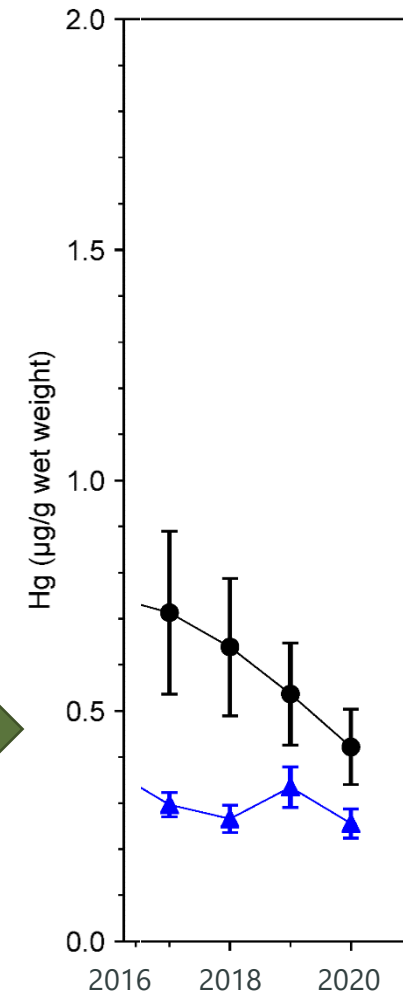


Sediment Remedy Effectiveness Retrospective Workshop

# 2020 Red Drum Mercury 2020 Findings

The Closed Area mean concentration is approaching the mean concentration in the Open Area

<u>Year</u>	<u><math>\Delta</math> THg (<math>\mu\text{g/g}</math>)</u>
2017	0.41
2018	0.37
2019	0.21
2020	0.16





# Key Take-Home Messages

- Baseline data are critical to evaluating remedy success
- Early actions resulted in decreases of mercury in sediment and fish
- Residual sources may be more important than originally believed
- Reductions in fish mercury levels do not occur in proportion to reductions in sediment total mercury concentrations in areas where fish feed
- Low mercury levels in marshes can still be methylation hot beds
- Proactive team (industry/regulators) leads to action