

McKay Bay
Sediment Quality Action Plan
Site Characterization
and Next Steps

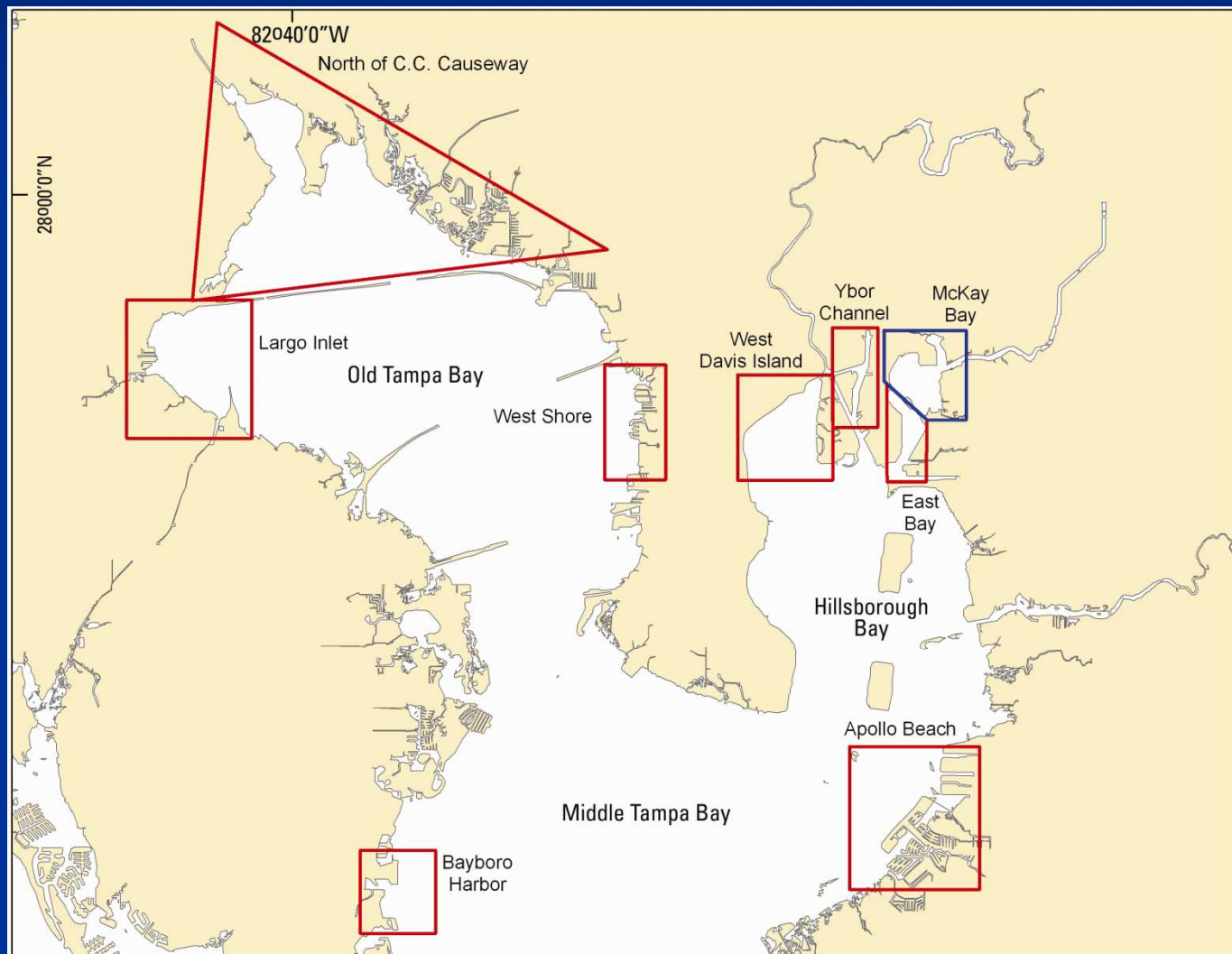
Gerold Morrison (BCI)
Ed Sherwood (TBEP)

TBEP TAC May 3, 2011

Project area



Priority sediment management areas identified by TBEP sediment quality assessment group (SQAG)



Identifying sediment contaminants of concern (COCs)

- **McConnell, R., R. DeMott, and J. Schulten. 1996.** Toxic contamination sources assessment - Risk assessment for chemicals of potential concern and methods for identification of specific sources. Tampa Bay Estuary Program Technical Publ. No. 09-96. St. Petersburg, FL
- **McConnell, R., and T. Brink, T. 1997.** Sources of sediment contaminants of concern and recommendations for prioritization of Hillsborough and Boca Ciega sub-basins. Tampa Bay Estuary Program Technical Publ. No. 03-97. St. Petersburg, FL
- **Parsons Engineering Sciences, Inc. (PES) 1998.** McKay Bay water quality management plan. Southwest Florida Water Management District. Brooksville, FL

**Sediment COCs
in McKay Bay and
East Bay
based on human
health risk
assessment
(Source: PES 1998)**

Area	Category	COC
Upper McKay Bay	High Molecular Weight PAHs	Benzo(α)anthracene Benzo(α)pyrene Benzo(α)fluoranthene Chrysene
Remainder of McKay Bay Plus East Bay	Pesticides	Aldrin Chlordane, total DDD DDE DDT Heptachlor Heptachlor epoxide Hexachlorobenzene Lindane
	PCBs	Total PCBs
	High Molecular Weight PAHs	Benzo(α)anthracene Benzo(α)pyrene Benzo(α)fluoranthene Chrysene

**Sediment COCs
in Upper (NE)
McKay Bay
based on ecological
risk assessment
(Source: PES 1998)**

Area	Category	COC
Upper McKay Bay	Low Molecular Weight PAHs	Phenanthrene Total LPAHs
	High Molecular Weight PAHs	Benzo(α)anthracene Benzo(α)pyrene Benzo(α)fluoranthene Chrysene Fluoranthene Pyrene Total HPAHs
	Metals	Cadmium Chromium Copper Lead Mercury Zinc Total Metals

**Sediment COCs
in remainder of
McKay Bay
and East Bay based
on ecological risk
assessment
(Source: PES 1998)**

Category	COC	
Pesticides	Chlordane DDT and derivatives Endrin Heptachlor	Lindane Hexachlorobenzene Heptachlor epoxide total Pesticides
PCBs	PCBs, total	
PAHs	Total LPAHs Benzo(α)anthracene Benzo(α)pyrene Benzo(α)fluoranthene	Total HPAHs Pyrene Fluoranthene Chrysene
Metals	Cadmium Lead Silver	Chromium Mercury total Metals

EPC sediment contaminant monitoring data (collected 1993 – 2009)

- Data set includes several categories of sediment contaminants (metals, PAHs, PCBs, and pesticides)
- Also includes other biological, physical and chemical parameters (e.g., benthic invertebrate abundance and diversity; sediment grain size and organic content)

Interpreting contaminant levels

- Laboratory bioassays have been used to identify “threshold effects levels” (TELs) and “probable effects levels” (PELs) for a number of sediment contaminants
- These values can be used to evaluate potential biotic impacts
- For applications of this approach in Tampa Bay, see:
 - **MacDonald et al. 2004.** Development, evaluation, and application of sediment quality targets for assessing and managing contaminated sediments in Tampa Bay, Florida. *Arch. Environ. Contam. Toxicol.* 46:147-61.

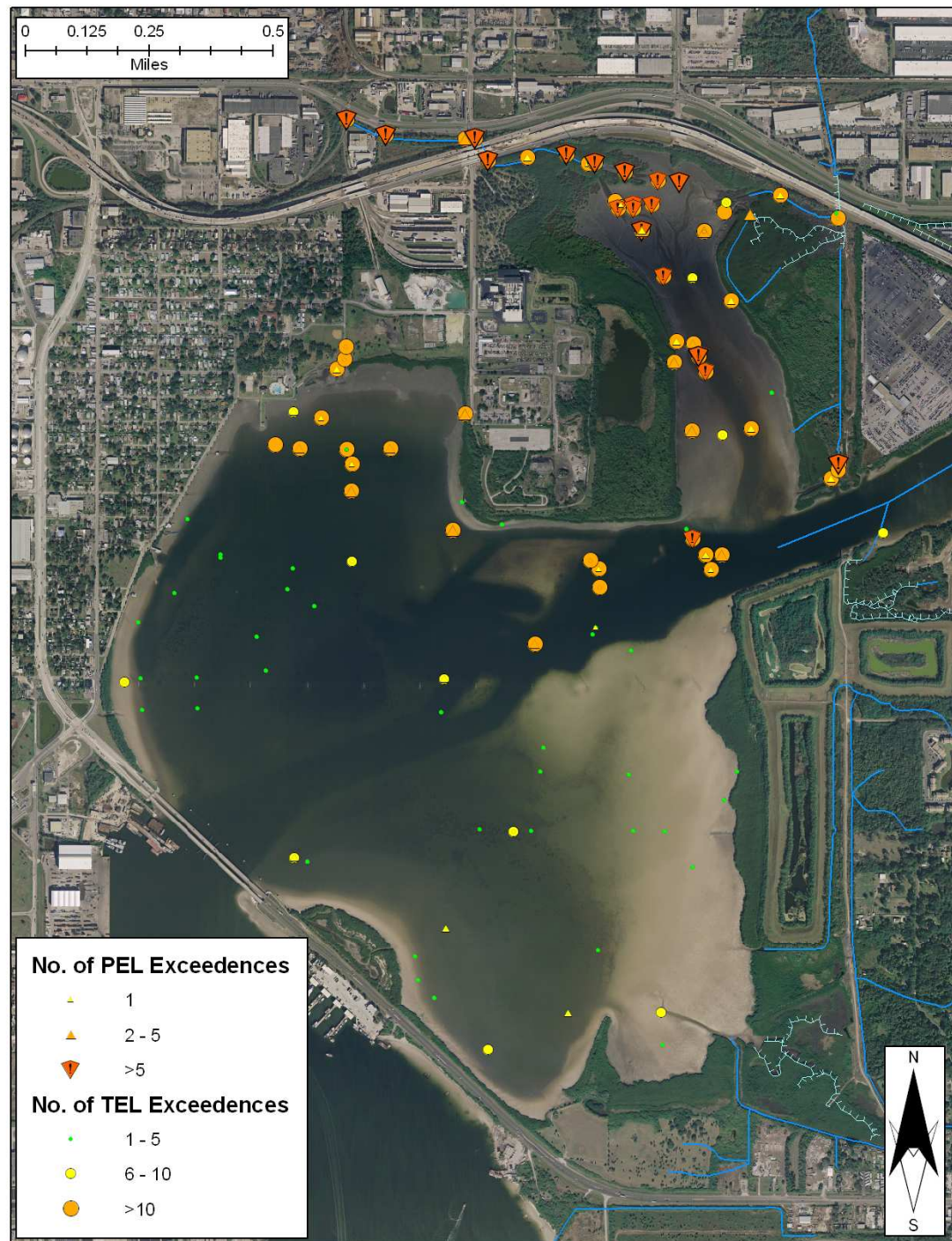
or

- **MacDonald et al. 2002.** TBEP Tech. Publ. 10-02

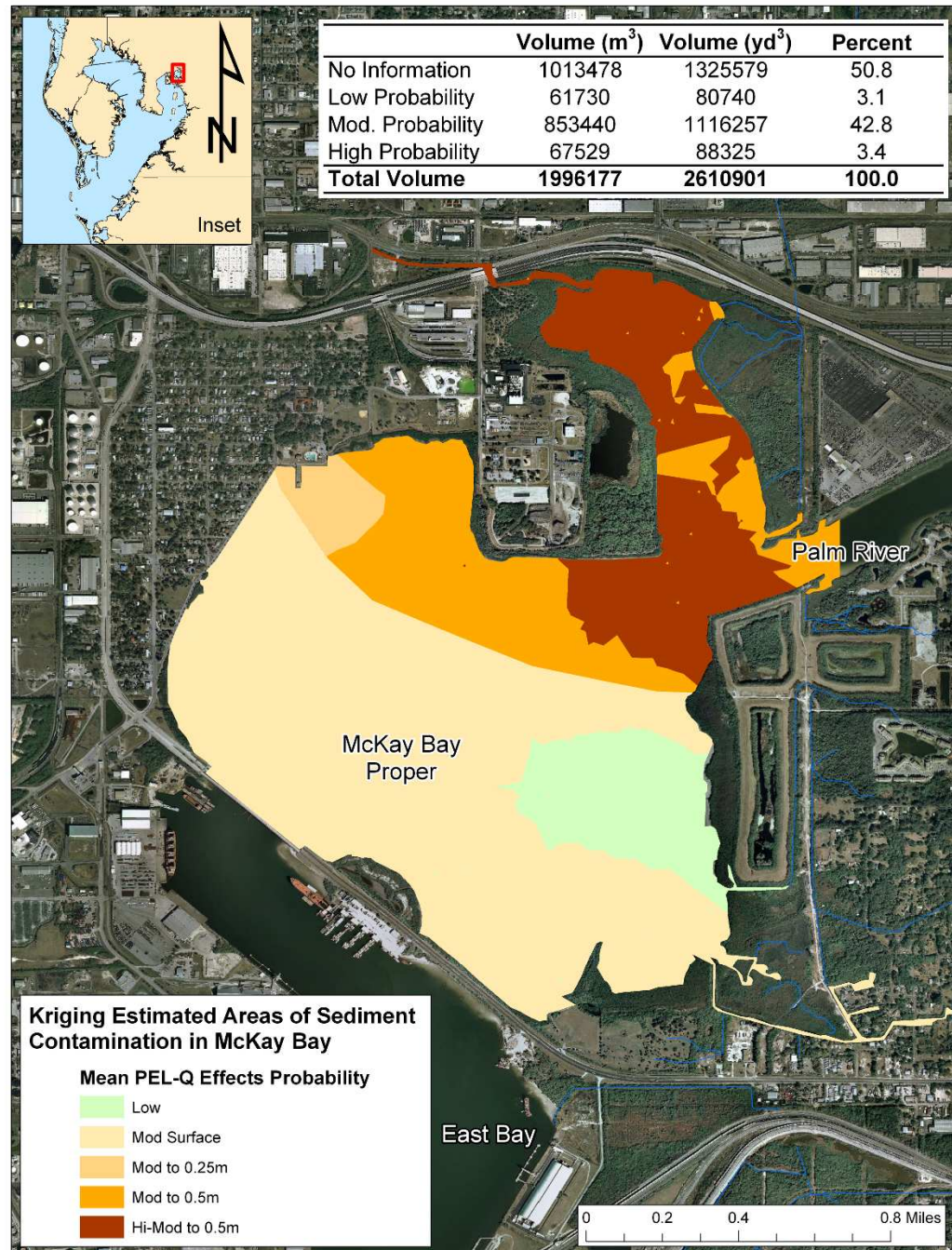
Interpreting contaminant levels relative to their TEL and PEL values

- Low concentrations ($< \text{TEL}$) are unlikely to have biotic impacts (in the form of direct toxic effects)
- Intermediate concentrations ($> \text{TEL}, < \text{PEL}$) may have direct biotic impacts
- High concentrations ($> \text{PEL}$) are expected to have direct biotic impacts

TEL and PEL exceedances in the EPC (1993 -2009) data set



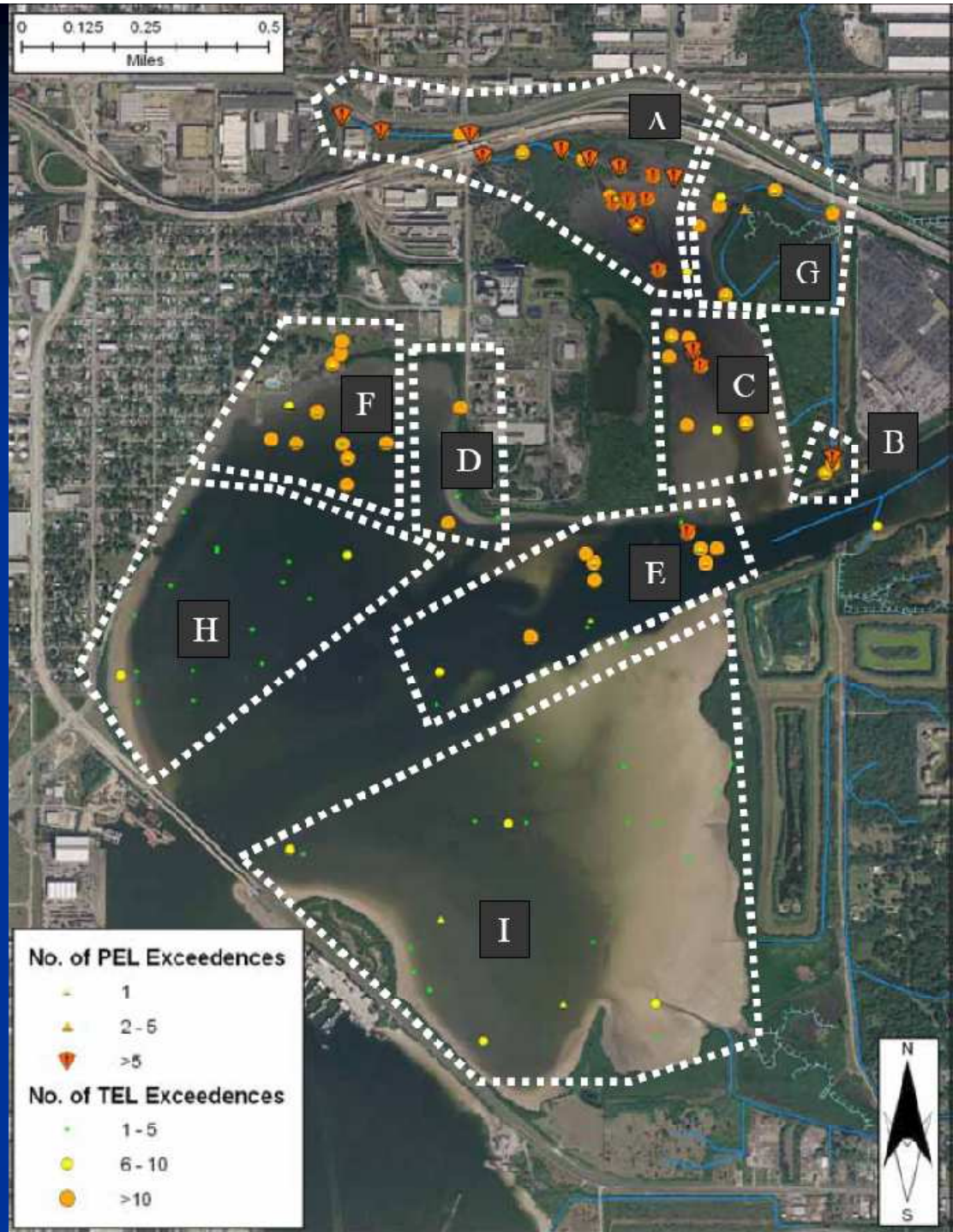
Estimated
volumes of
contaminated
sediments
based on mean
PEL quotients
(PEL-Q)



Identifying potential sediment quality management areas (SQMAs)

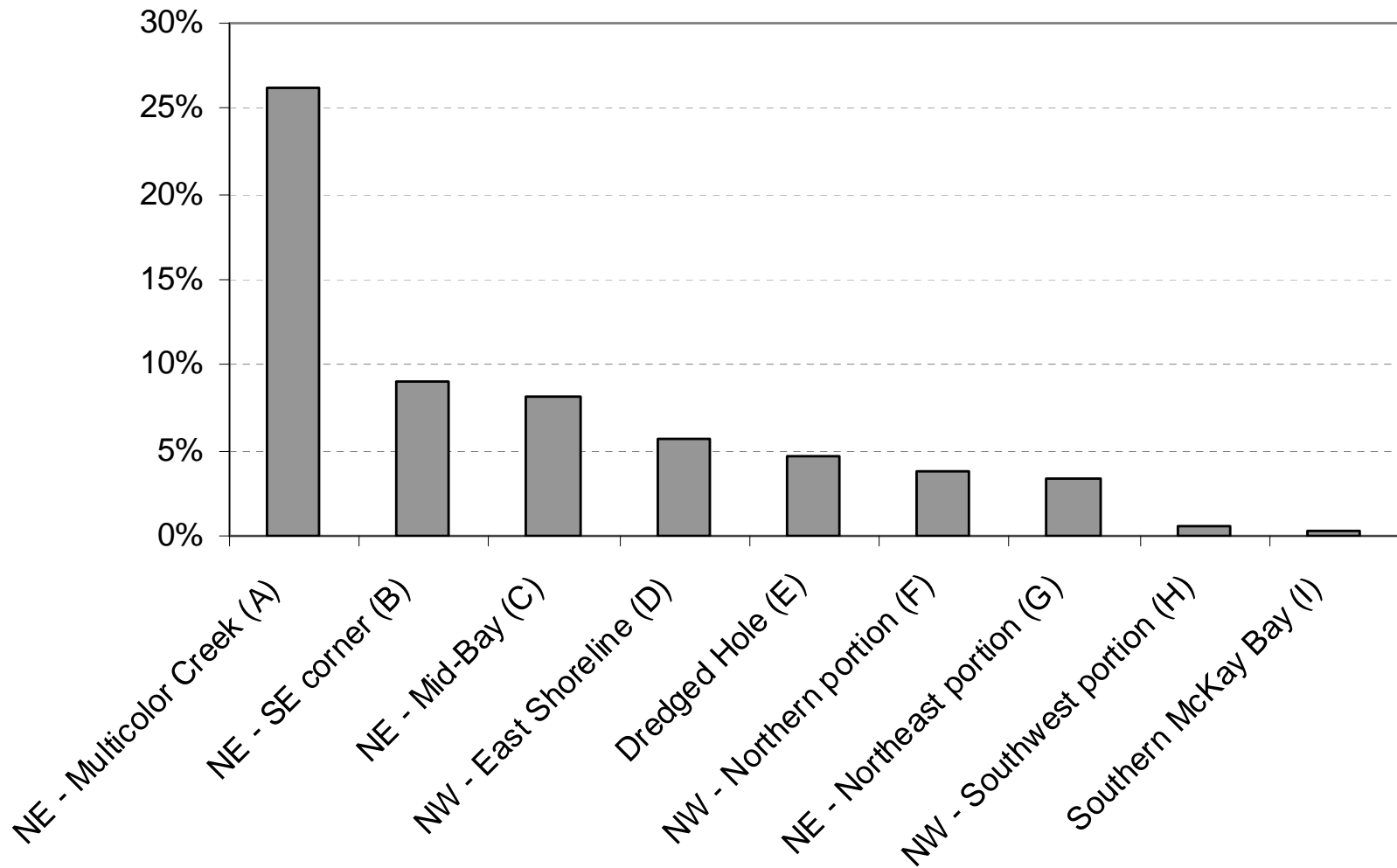
- Differences in frequency of TEL and PEL exceedances
- Differences in the COCs exceeding TELs and PELs
- Differences in contributing source areas

Proposed SQMAs
(Prioritized based on
percentage of
analyses exceeding
PELs)



Frequency of PEL exceedances

Percentage of analyses exceeding PELs

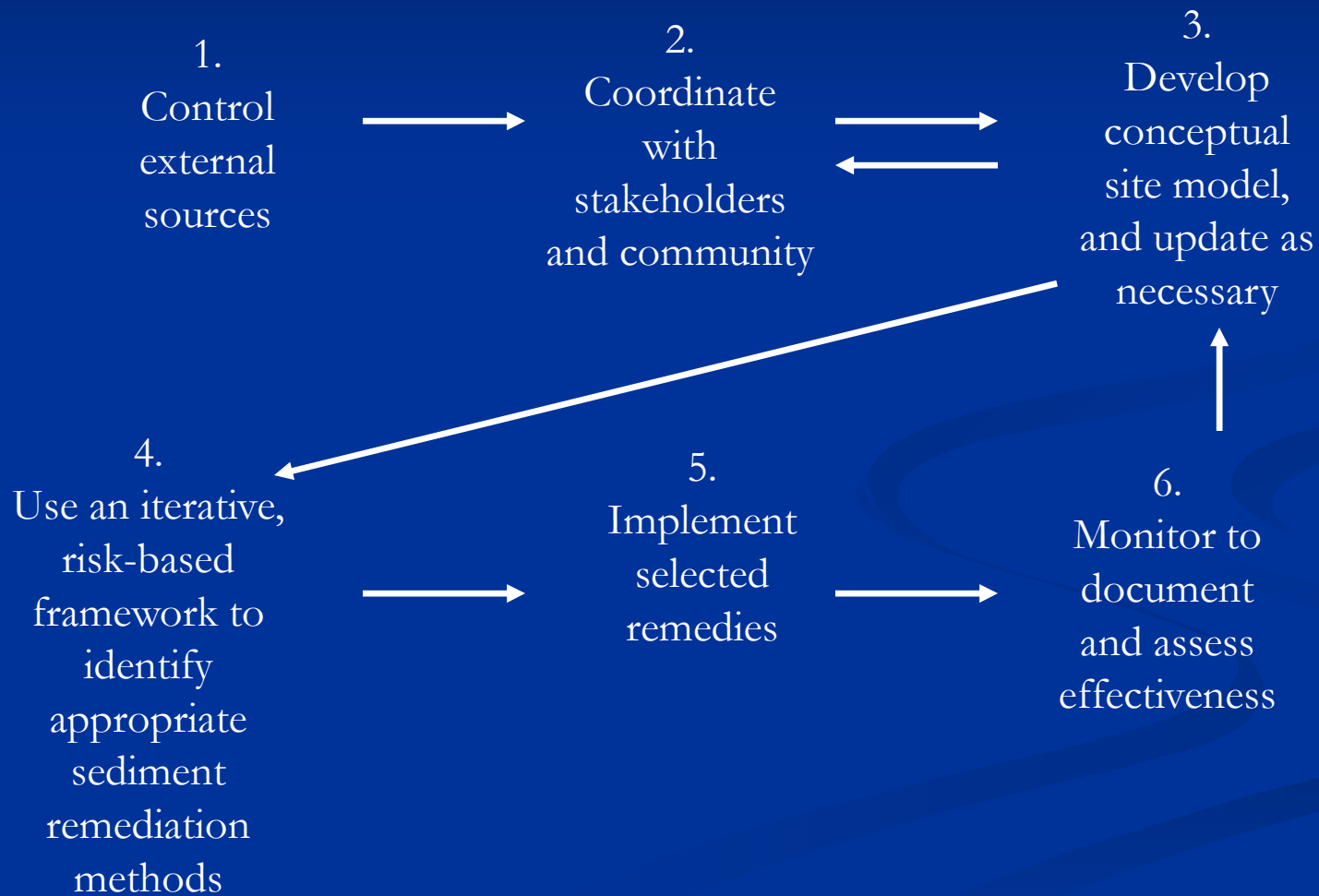


Developing and implementing a Sediment Quality Action Plan

Goals

- Sediment quality goals adopted by TBEP partners (CCMP 1996, 2006)
 - Protect relatively clean areas of the bay from toxic contamination
 - Minimize risks to bay wildlife and humans associated with contamination in already-impacted areas.

Suggested process for action plan development and implementation (adapted from NRC 2001, EPA 2002)



Step 1. Control External Sources

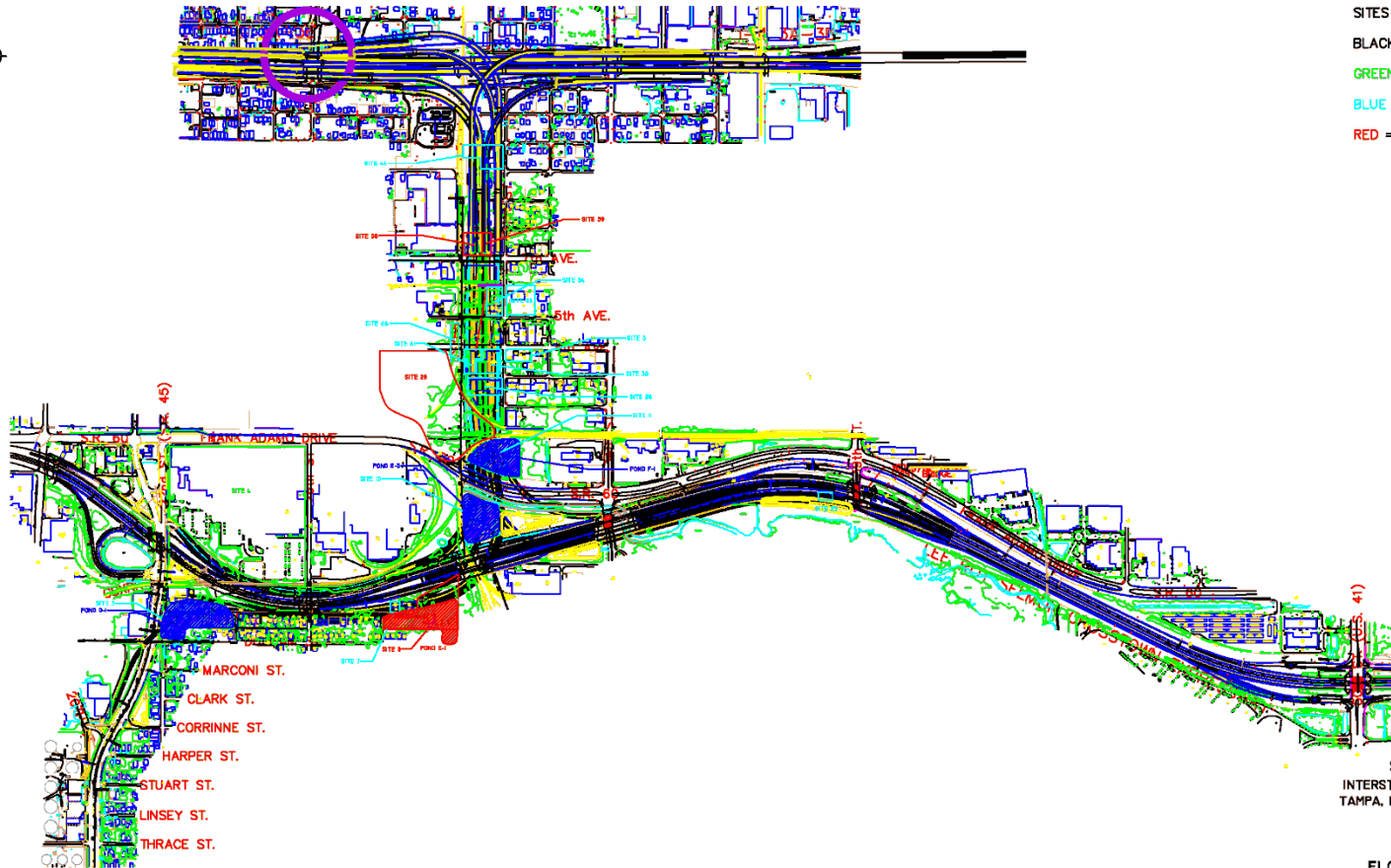
- Appears to be the key 'next step' for this water body
- See information from FDOT Crosstown Connector project (Appendix A of report)
- Prior to construction, FDOT funded a Level II assessment of 30 parcels it had recently purchased within the Connector corridor that fall within the McKay Bay watershed

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LEGEND:

- SITES OUTLINED IN:
- BLACK = NONE RISK RATING
 - GREEN = LOW RISK RATING
 - BLUE = MEDIUM RISK RATING
 - RED = HIGH RISK RATING

FIGURE I

SITE LOCATION MAP
INTERSTATE 4/CROSTOWN CONNECTOR
TAMPA, HILLSBOROUGH COUNTY, FLORIDA

PREPARED FOR

FLORIDA DEPARTMENT OF
TRANSPORTATION DISTRICT VII
TAMPA, FLORIDA



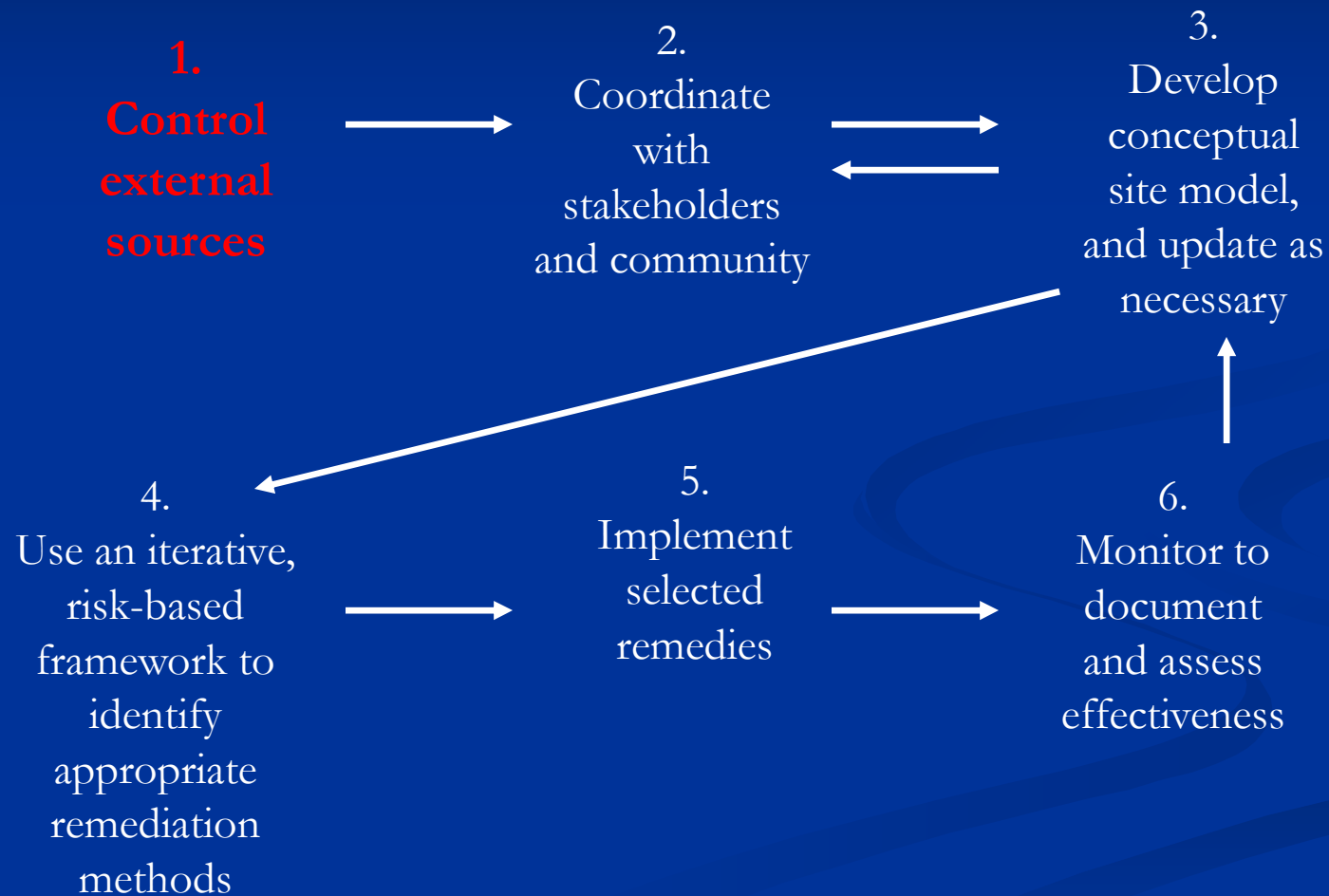
NOTE:

SITE 21 IS OFF OF THE MAP GREATER THAN 1,000 FEET TO THE EAST

Soil and Groundwater Contamination at Crosstown Connector sites

- Using on-site sampling data, 7 of the 30 parcels were classified as “no risk” (no contaminants exceeded regulatory limits)
- 11 were classified as “medium risk” (e.g., one or more soil contaminants exceeded the State’s residential cleanup target levels)
- 17 were classified as “high risk” (one or more soil or groundwater contaminants exceeded industrial cleanup target levels, groundwater cleanup target levels, or NPDES discharge limits)

Suggested sediment management process (adapted from NRC 2001, EPA 2002)



Other steps to take while external sources are being addressed:

- Assess concentrations of bioaccumulative COCs in fish and shellfish tissues (whole body and edible tissues)
- Use that information to update the human and ecological risk assessments that were performed by PES (1998);
- Continue monitoring COC levels in McKay Bay sediments at appropriate time intervals (e.g., every five years), to document status and trends in contaminant types, concentrations, and spatial distribution;
- Develop and update conceptual site model as new information becomes available.

Overview

- Numerous PEL exceedances are present in upper McKay Bay (= high probability of direct biotic impacts)
- Watershed appears to contain numerous active source areas (need to be controlled)
- In the bay, bioaccumulation studies (e.g., in fish, molluscs) needed to assess food web mobility of contaminants
- Bioaccumulation data can be used to update risk assessments (human and ecological)
- Updated risk assessments can be used to make decisions regarding need for or timing of in-bay sediment remediation

Suggested sediment management process (adapted from NRC 2001, EPA 2002)

