NOAA's

Query Manager & MarPlot

Database Tools

ARD Watershed Database & Mapping Projects

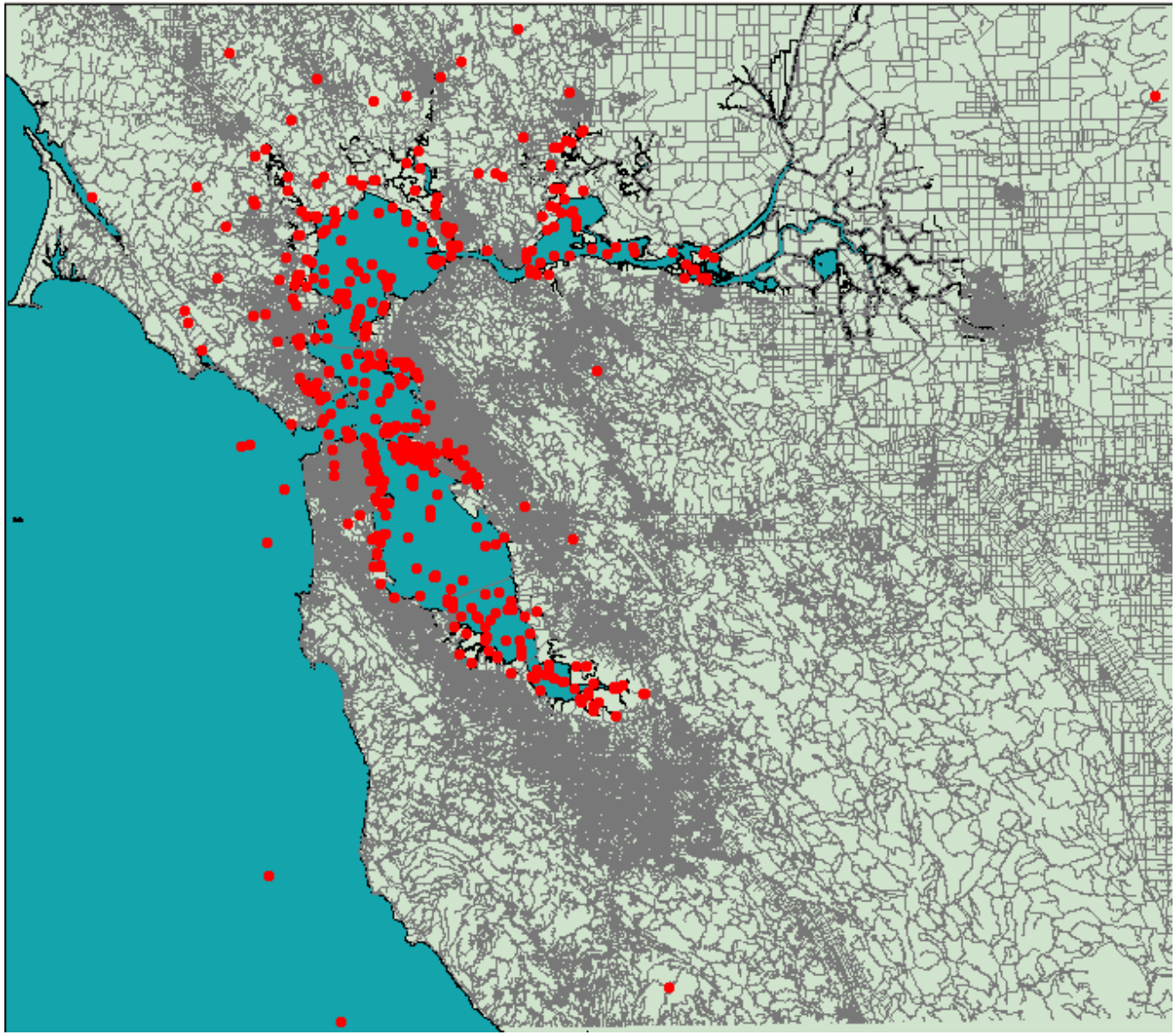
- **Provide technical support to Coastal Resource Coordinators (CRCs) and EPA during remedial process**
- **Provide *site-specific* and *watershed-wide* use of data and technology to protect and restore trust resources**
- **Support coordination and data sharing**
- **Use a suite of standardized tools (QM database and application, GIS project structure and tools)**
- **Provide scalable technology to support users (QM/Marplot – QM/ArcView – QM/ArcIMS)**

Current CPRD Watershed Projects

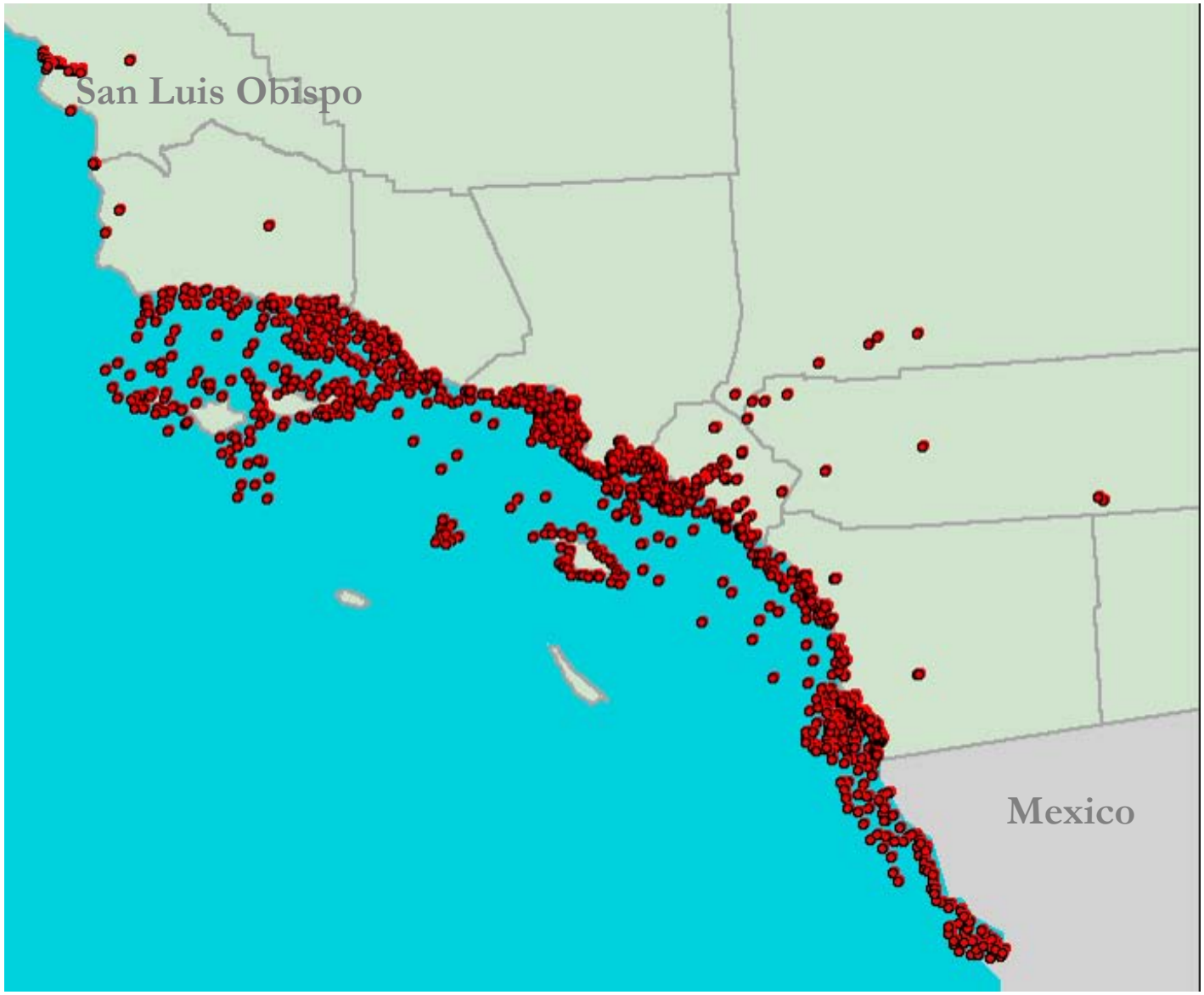
Charles River, MA
New Bedford Harbor, MA
Hudson River, NY
Newark Bay, NJ/NY
Christina River, DE
Anacostia River, DC
Elizabeth River, VA
St. Andrew Bay, FL
St. John River, FL
Hurricane Mitch, Central America

Kalamazoo River, MI
Sheboygan River, WI
St. Louis River, MN
Calcasieu Estuary, LA
San Francisco Bay, CA
Southern California, CA
Portland Harbor, OR
Puget Sound, WA
Metlakatla, AK
Pearl Harbor, HI

San Francisco Bay Watershed Stations



Southern California Watershed Stations



Application of Query Manager to Remedial Investigations and Ecological Risk Assessment

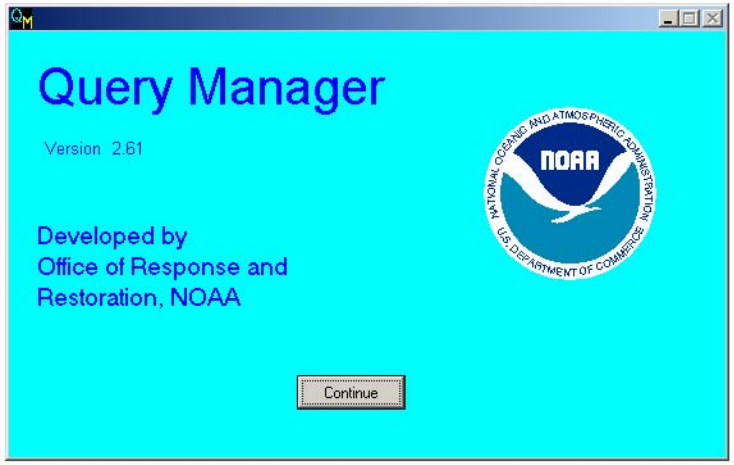
- Evaluation of existing data
- Data screening (comparison to SQGs)
- Identification of data gaps, gradients
- EcoRisk (weight of evidence)
- Use of risk models
- Remedial effectiveness monitoring
- Data availability (all parties)

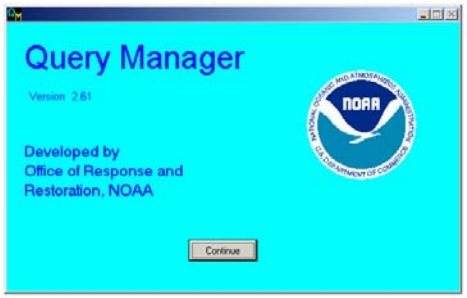
Query Manager Application

Based on standard relational database structure

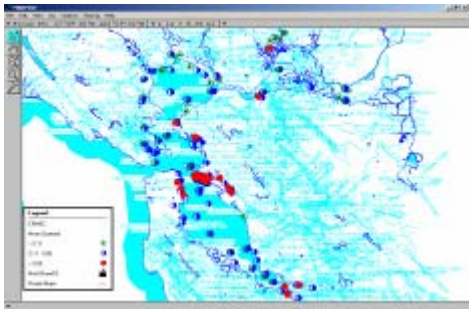
Menu of flexible, built-in database queries to facilitate

- Data integration and management (*old* and *new*)
- Data exploration
- Data delivery/export
- Data sharing





Query Manager 2.61



Self-contained, non-proprietary, run-time application (free, no software required)

Standardized watershed databases include studies from a variety of sources

Menu of standard flexible queries for evaluation of sediment (surface and subsurface) chemistry, tissue chemistry, and sediment toxicity

Effect models: human health cancer/noncancer risk, dioxin toxic equivalency (TEQ), PAH toxic unit, logistic regression model probability of toxicity

Application and Databases Downloadable from ARD web site: http://response.restoration.noaa.gov/querymanager

QA/QC work performed by NOAA

NOAA does not perform chemical data validation on data provided by others

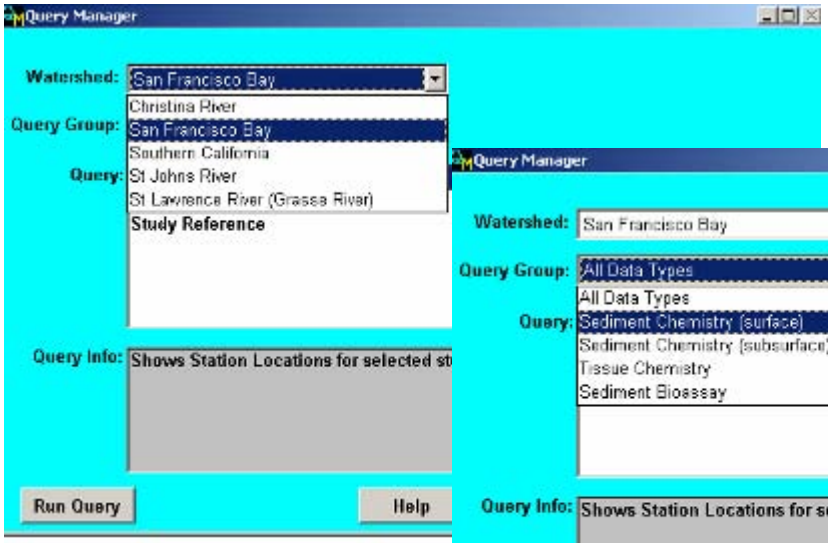
We do check for missing or unusual results and compare the electronic data to the hardcopy report (if available)

We verify that we do not introduce any errors when bringing the data into the Query Manager database

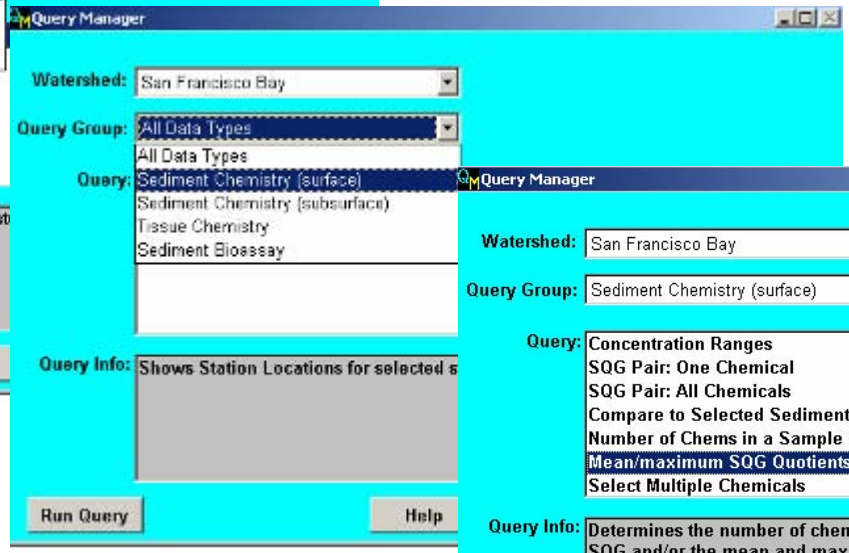
Data manipulation performed by NOAA

- Standardize chemical names and units, perform any necessary unit conversions
- Calculate sums for chemical classes, including PAHs, PCBs, DDTs
- Ensure replicates are handled properly
- Check relational structure
- Make sure station locations are reasonable (e.g., in the right watershed, in water) and address obvious coordinate issues.
- Include study notes on replicates, summing methods, coordinate datum, and other information on the data

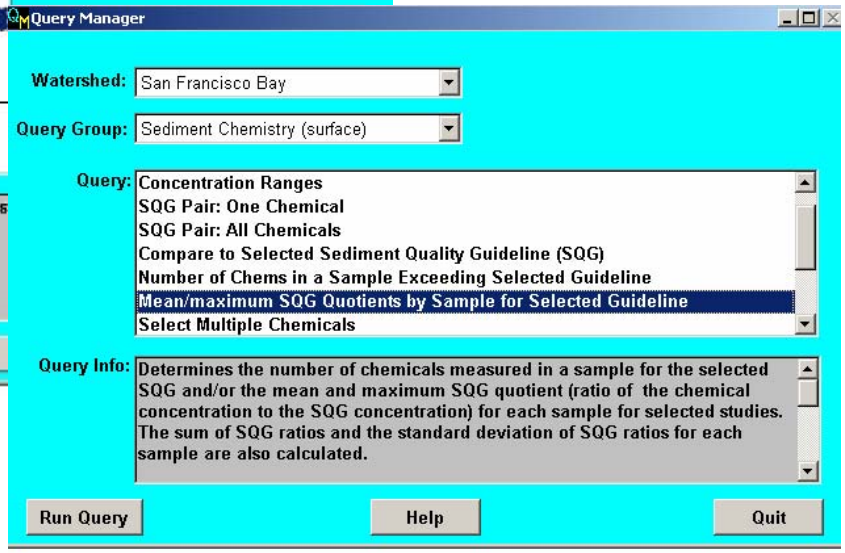
Data Exploration: Watershed Selection & Query



Select Watershed



Select Media



Select Query

Query Groups within Query Manager

All Data Types: Displays station locations, study notes and references

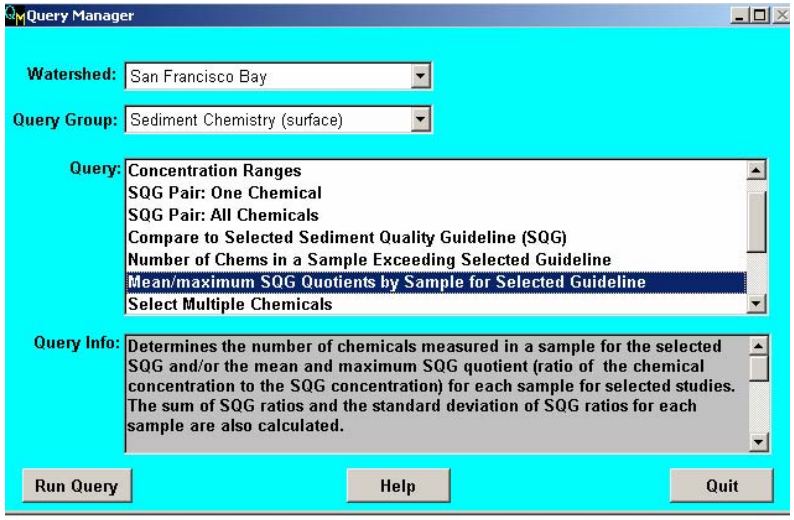
Sediment Chemistry (surface): Queries relating to surface sediment with lower depth of sample <30.5 cm (12 inches) in depth.

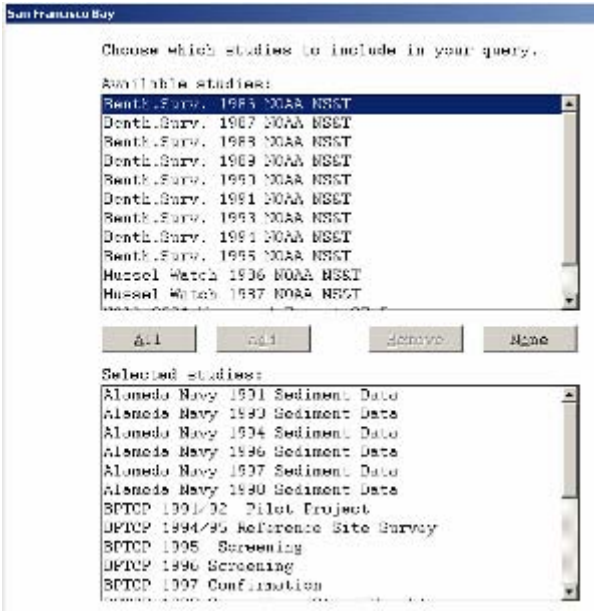
Sediment Chemistry (subsurface): Queries relating to sediment cores with upper depth of sample > 305 cm (12 inches) in depth. Optional inclusion of surface sediment data.

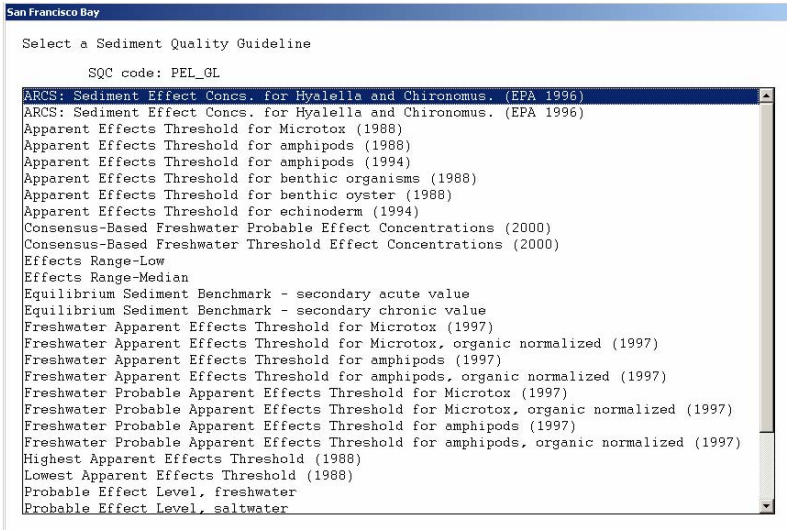
Tissue Chemistry: Queries tissue chemistry and calculates Dioxin Toxic Equivalency

Sediment Bioassay: Queries sediment bioassay results by test endpoints, species, and response values.

Data Exploration: Query, Study and Guideline







Query Manager Risk Tools: *Data Screening* - Sediment Quality Guidelines

Effects Range Low/Median (ERL/ERM - 28)

Effect Level Threshold/Probable (TEL/PEL) (FW/23 & Marine/34)

Apparent Effects Threshold (AET 50 - 127)

WA State Sediment Quality Standards/Cleanup Screening Levels (47)

Equilibrium Sediment Benchmarks (ESB) secondary acute/chronic values (34)

Consensus-Based Freshwater Threshold/Probable Effect Concentrations (TEC 29/PEC 28)

Great Lakes Sediment Effect Concentrations (50)

Freshwater Apparent Effects Threshold (AET 21 - 40)

Freshwater Probable Apparent Effects Threshold (PAET 21 - 40)

Query Manager Risk Models

PAH toxic unit models

- EPA Equilibrium partitioning model based on 13 individual PAHs (DiToro & McGrath 2000; Swartz et al. 1995)

Dioxin toxic equivalency (TEQ) model

- Calculates TEQs based on tissue concentrations of dioxin, dibenzofuran, and PCB congeners for birds, fish and mammals

Logistic regression probability of toxicity

- Mixture model predicts the probability of toxicity (proportion of samples expected to be toxic) from sediment chemistry based on 37 individual chemical models (Field et al. 2002)

Data Exploration: Results

Quo Mean (ERM92) 01

Siteid	Studyid	Studyname	Stationid	Sampleid	Labrep	Sampdate	Sqgchems	Numbdl	Numsqgxced	Avgsqgquo	Maxsqgquo
0925	D6	Bight 2003 Regional Marine Monitoring	4321	01	1	20030902	25	7	0	0.01	0.06
0908	D4	Newport Bay Sediment Toxicity	NB1	Sep00	1	20000919	25	17	0	0.03	0.14
0908	D4	Newport Bay Sediment Toxicity	NB9	Sep00	1	20000919	25	13	0	0.03	0.14
0908	D4	Newport Bay Sediment Toxicity	NB1	May01	1	20010507	25	10	0	0.04	0.30
0908	D4	Newport Bay Sediment Toxicity	NB7	Sep00	1	20000919	25	17	0	0.04	0.16
0925	D6	Bight 2003 Regional Marine Monitoring	4075	01	1	20030818	25	15	0	0.04	0.27
0925	D6	Bight 2003 Regional Marine Monitoring	4168	01	1	20030818	25	9	0	0.06	0.34
0925	89	Bight 1998 Regional Marine Monitoring	2148	01	01	19980721	25	14	0	0.07	0.31
0925	D6	Bight 2003 Regional Marine Monitoring	4288	01	1	20030818	25	8	0	0.07	0.44
0908	D4	Newport Bay Sediment Toxicity	NB6	Sep00	1	20000919	25	12	0	0.08	0.35
0908	D4	Newport Bay Sediment Toxicity	NB7	May01	1	20010504	25	13	0	0.08	0.33
0925	D6	Bight 2003 Regional Marine Monitoring	4104	01	1	20030819	25	8	0	0.08	0.44
0925	D6	Bight 2003 Regional Marine Monitoring	4305	01	1	20030818	25	9	0	0.08	0.39
0908	D4	Newport Bay Sediment Toxicity	NB8	May01	1	20010504	25	8	0	0.09	0.48
0925	D6	Bight 2003 Regional Marine Monitoring	4257	01	1	20030903	25	1	0	0.09	0.55
0908	D4	Newport Bay Sediment Toxicity	NB10	Sep00	1	20000919	25	12	0	0.10	0.43
0908	D4	Newport Bay Sediment Toxicity	NB8	Sep00	1	20000919	25	9	0	0.10	0.58
0925	D6	Bight 2003 Regional Marine Monitoring	4017	01	1	20030819	25	7	0	0.10	0.47
0908	D4	Newport Bay Sediment Toxicity	NB10	May01	1	20010504	25	8	0	0.11	0.73
0908	D4	Newport Bay Sediment Toxicity	NB2	Sep00	1	20000921	25	15	0	0.11	0.69
0908	D4	Newport Bay Sediment Toxicity	NB6	May01	1	20010504	25	11	0	0.11	0.47
0925	D6	Bight 2003 Regional Marine Monitoring	4065	01	1	20030902	25	1	0	0.11	0.87
0925	D6	Bight 2003 Regional Marine Monitoring	4221	01	1	20030818	25	9	0	0.11	0.55
0925	D6	Bight 2003 Regional Marine Monitoring	4337	01	1	20030818	25	7	0	0.11	0.64
0908	D4	Newport Bay Sediment Toxicity	NB2	May01	1	20010507	25	12	0	0.12	0.64
0908	D4	Newport Bay Sediment Toxicity	NB5	Sep00	1	20000919	25	15	0	0.12	0.66
0925	D6	Bight 2003 Regional Marine Monitoring	4129	01	1	20030903	25	2	0	0.12	0.69
0908	D4	Newport Bay Sediment Toxicity	NB5	May01	1	20010507	25	13	0	0.13	0.60
0908	D4	Newport Bay Sediment Toxicity	NB9	May01	1	20010504	25	5	0	0.14	0.77
0925	D6	Bight 2003 Regional Marine Monitoring	4193	01	1	20030902	25	1	0	0.14	0.93
0925	D6	Bight 2003 Regional Marine Monitoring	4423	01	1	20030902	25	1	0	0.14	0.68
0925	K0	Region 4 and 8 Confirmation (Leg 45)	850110			19960620	19	0	0	0.14	0.93
0925	89	Bight 1998 Regional Marine Monitoring	2146	01	01	19980721	25	7	2	0.17	1.35
0925	89	Bight 1998 Regional Marine Monitoring	2147	01	01	19980721	25	7	2	0.18	1.36
0925	D6	Bight 2003 Regional Marine Monitoring	4177	01	1	20030903	25	1	2	0.18	1.37
0925	89	Bight 1998 Regional Marine Monitoring	2145	01	01	19980721	25	8	2	0.20	1.92
0908	D4	Newport Bay Sediment Toxicity	NB4	Sep00	1	20000919	25	9	1	0.21	1.41
0925	89	Bight 1998 Regional Marine Monitoring	2143	01	01	19980723	25	8	2	0.22	1.97

Mapping to Marplot

Query Manager

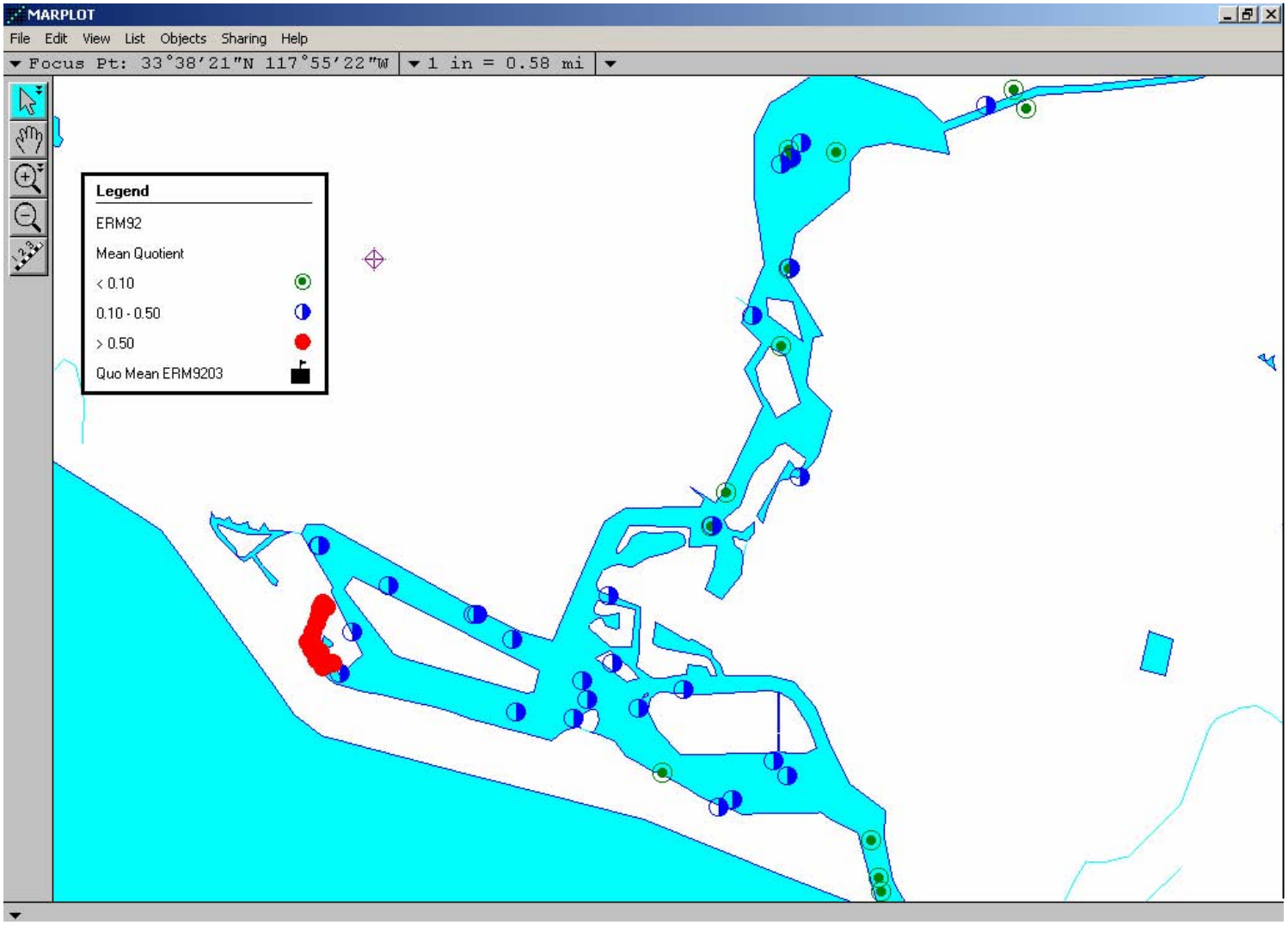
File Edit Query Browse MARPLOT Tools Help

Quo Mean (ERM92) 01

- Go to MARPLOT
- Get Info on Selected MARPLOT Objects
- Show Selected on Map CTRL+S
- Show All on Map CTRL+A
- ✔ Rescale When Show on Map
- Set Show Names Scale...
- Set Icons -> Dots Scale...
- Build Map Index

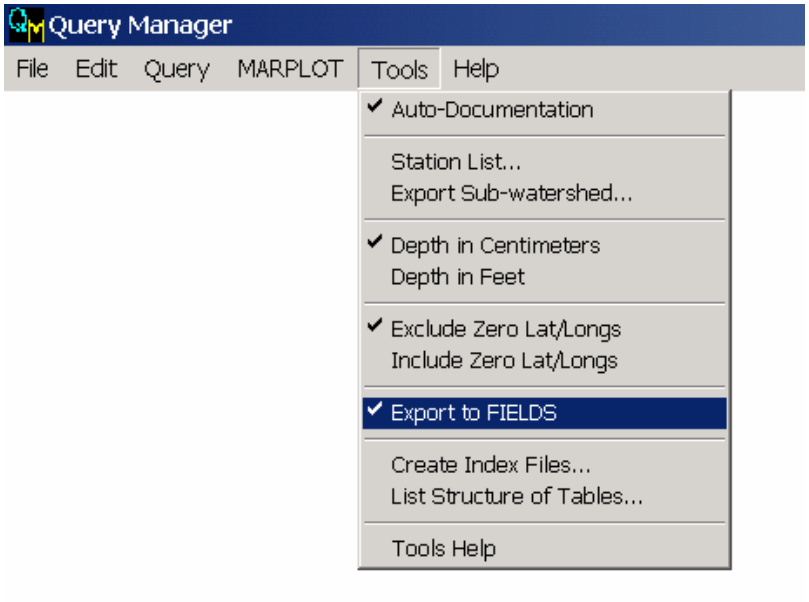
Siteid	Studyid		Stationid	Sampleid	Labrep	Sampdate	Sqgchems	Numbdl
0925	D6	Bight 20	4321	01	1	20030902	25	70
0908	D4	Newpor	NB1	Sep00	1	20000919	25	170
0908	D4	Newpor	NB9	Sep00	1	20000919	25	130
0908	D4	Newpor	NB1	May01	1	20010507	25	100
0908	D4	Newpor	NB7	Sep00	1	20000919	25	170
0925	D6	Bight 20	4075	01	1	20030818	25	150
0925	D6	Bight 20	4168	01	1	20030818	25	90
0925	89	Bight 1998 Regional Marine Monitoring	2148	01	01	19980721	25	140
0925	D6	Bight 2003 Regional Marine Monitoring	4288	01	1	20030818	25	80
0908	D4	Newport Bay Sediment Toxicity	NB6	Sep00	1	20000919	25	120
0908	D4	Newport Bay Sediment Toxicity	NB7	May01	1	20010504	25	130
0925	D6	Bight 2003 Regional Marine Monitoring	4104	01	1	20030819	25	80
0925	D6	Bight 2003 Regional Marine Monitoring	4305	01	1	20030818	25	90
0908	D4	Newport Bay Sediment Toxicity	NB8	May01	1	20010504	25	80
0925	D6	Bight 2003 Regional Marine Monitoring	4257	01	1	20030903	25	10
0908	D4	Newport Bay Sediment Toxicity	NB10	Sep00	1	20000919	25	120
0908	D4	Newport Bay Sediment Toxicity	NB8	Sep00	1	20000919	25	90
0925	D6	Bight 2003 Regional Marine Monitoring	4017	01	1	20030819	25	70
0908	D4	Newport Bay Sediment Toxicity	NB10	May01	1	20010504	25	80
0908	D4	Newport Bay Sediment Toxicity	NB2	Sep00	1	20000921	25	150
0908	D4	Newport Bay Sediment Toxicity	NB6	May01	1	20010504	25	110
0925	D6	Bight 2003 Regional Marine Monitoring	4065	01	1	20030902	25	10
0925	D6	Bight 2003 Regional Marine Monitoring	4221	01	1	20030818	25	90
0925	D6	Bight 2003 Regional Marine Monitoring	4337	01	1	20030818	25	70
0908	D4	Newport Bay Sediment Toxicity	NB2	May01	1	20010507	25	120
0908	D4	Newport Bay Sediment Toxicity	NB5	Sep00	1	20000919	25	150
0925	D6	Bight 2003 Regional Marine Monitoring	4129	01	1	20030903	25	20
0908	D4	Newport Bay Sediment Toxicity	NB5	May01	1	20010507	25	130
0908	D4	Newport Bay Sediment Toxicity	NB9	May01	1	20010504	25	50
0925	D6	Bight 2003 Regional Marine Monitoring	4193	01	1	20030902	25	10
0925	D6	Bight 2003 Regional Marine Monitoring	4423	01	1	20030902	25	10
0925	K0	Region 4 and 8 Confirmation (Leg 45)	850110			19960620	19	00

Results Mapped in Marplot



Query Manager Tools

- Auto Documentation
- Station Lists
- User defined Sub-watershed
- Export to FIELDS data structure

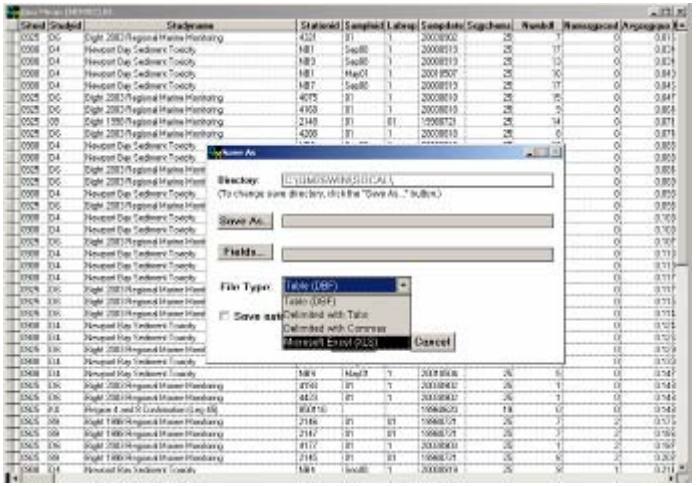


Data Export

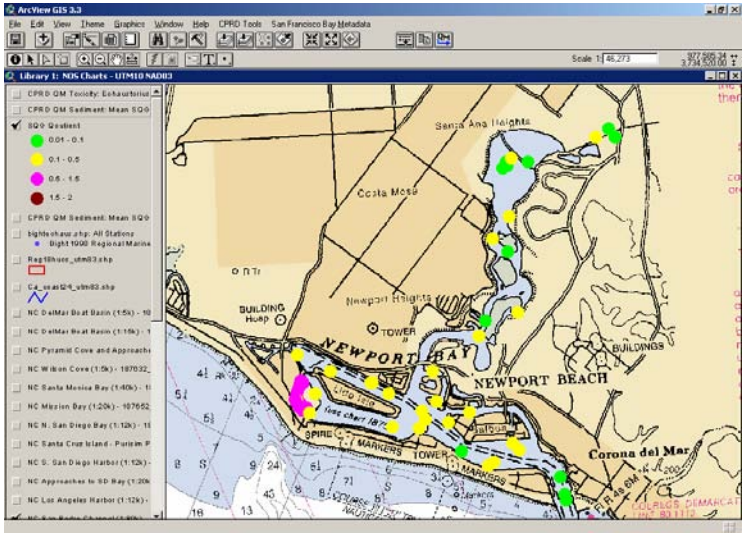
Extract data for

- ArcView
- Graphics
- Statistical analysis

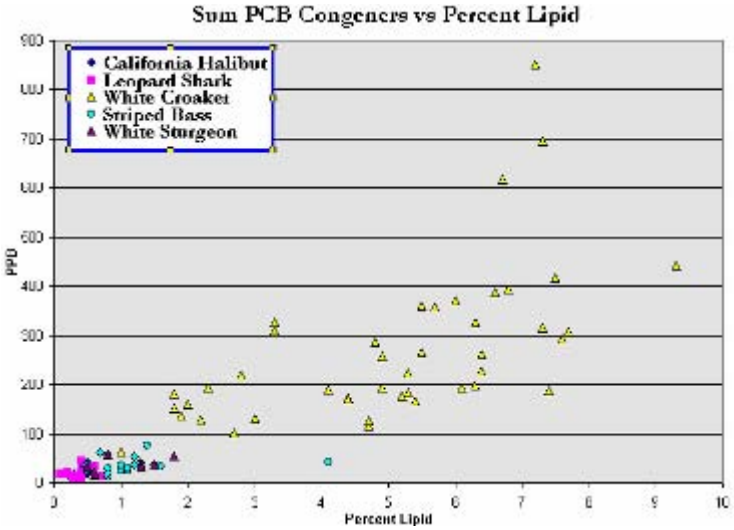
QM Output Data Table



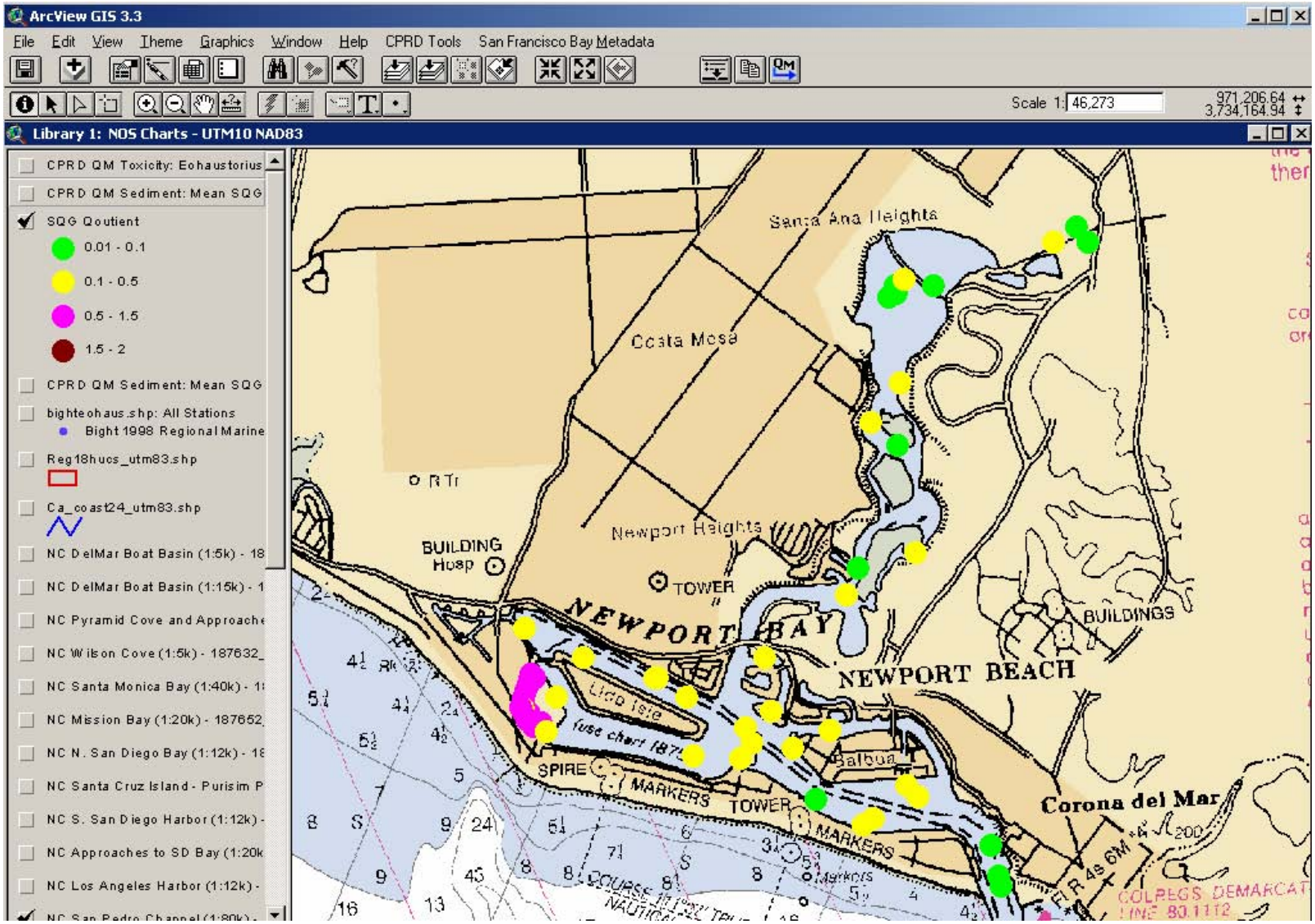
ArcView



Graphics

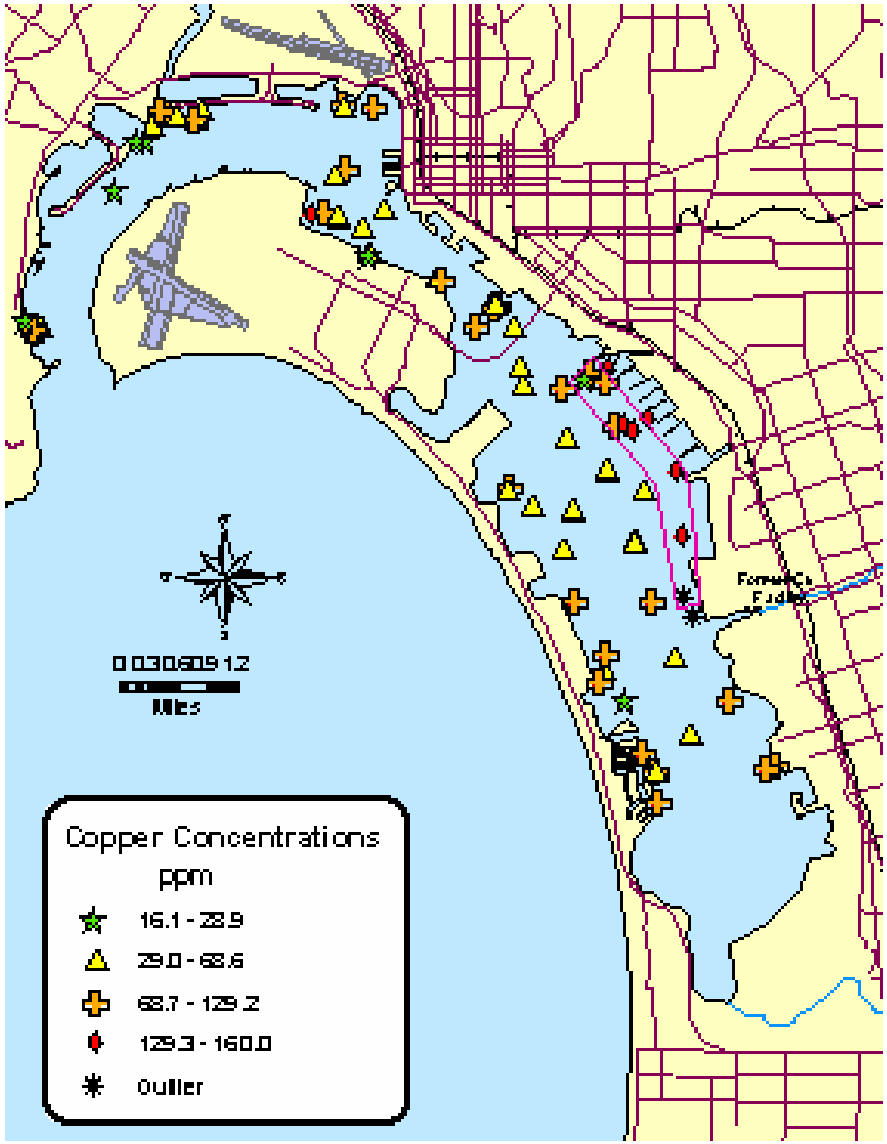


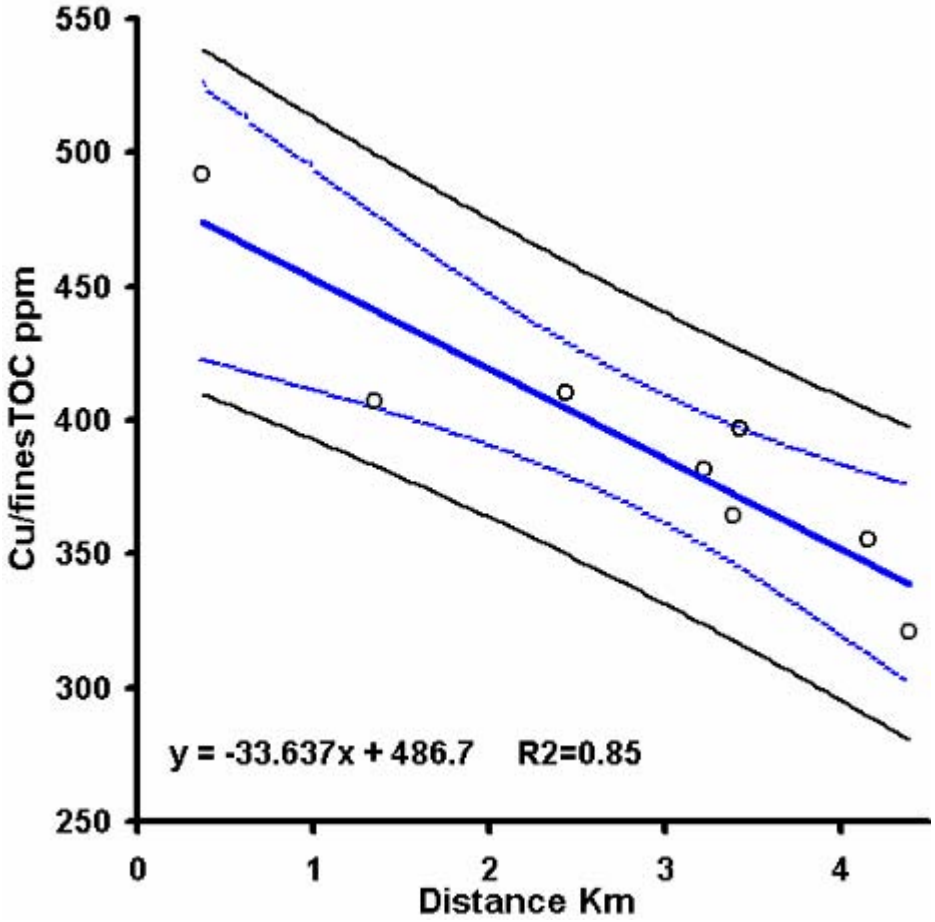
Results Mapped in ArcView



Examples

Ambient Copper in San Diego Bay





Dredge Volume Calculations

Steps To Determine Dredge Volumes

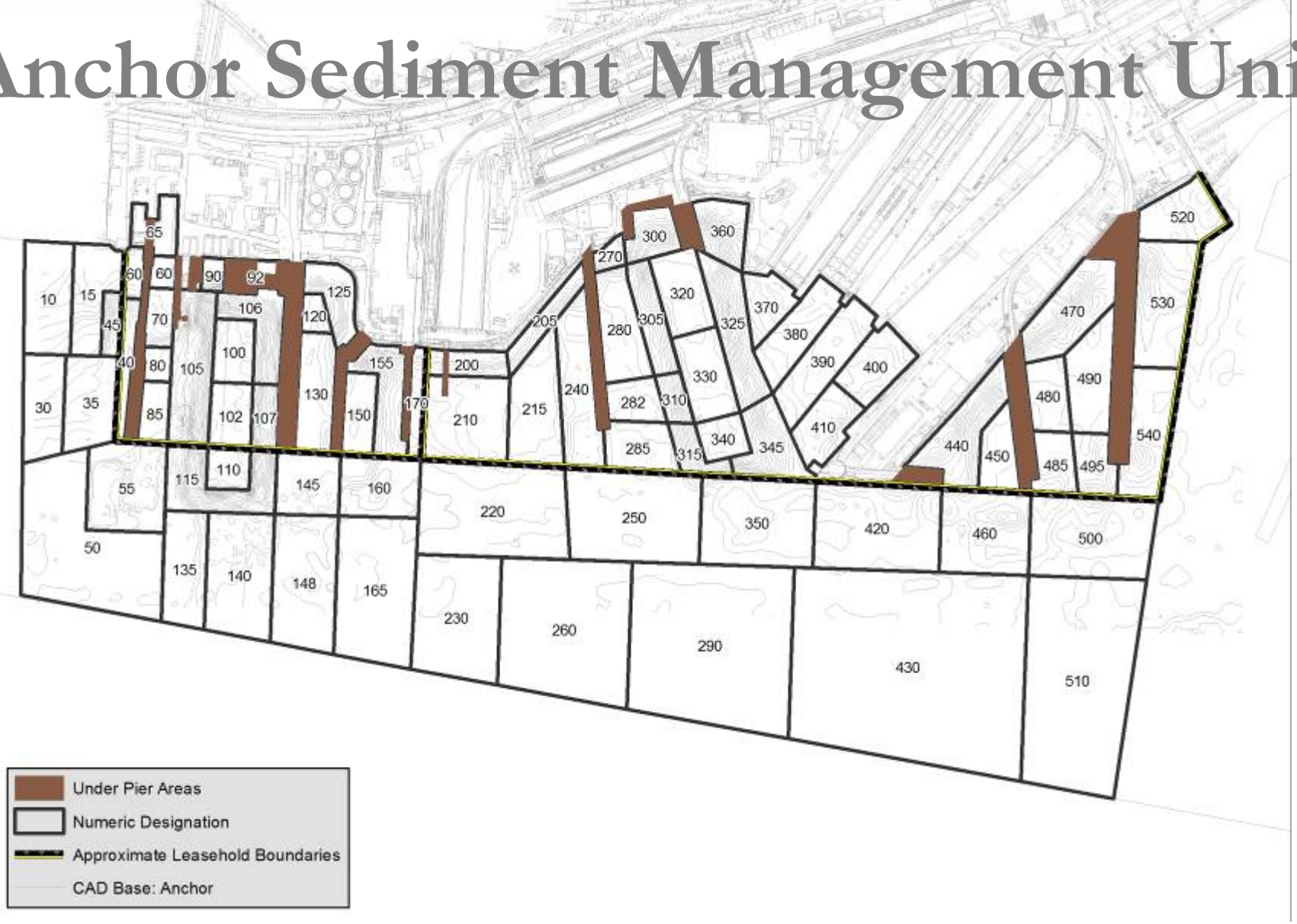
Import data from Query Manager into ArcView

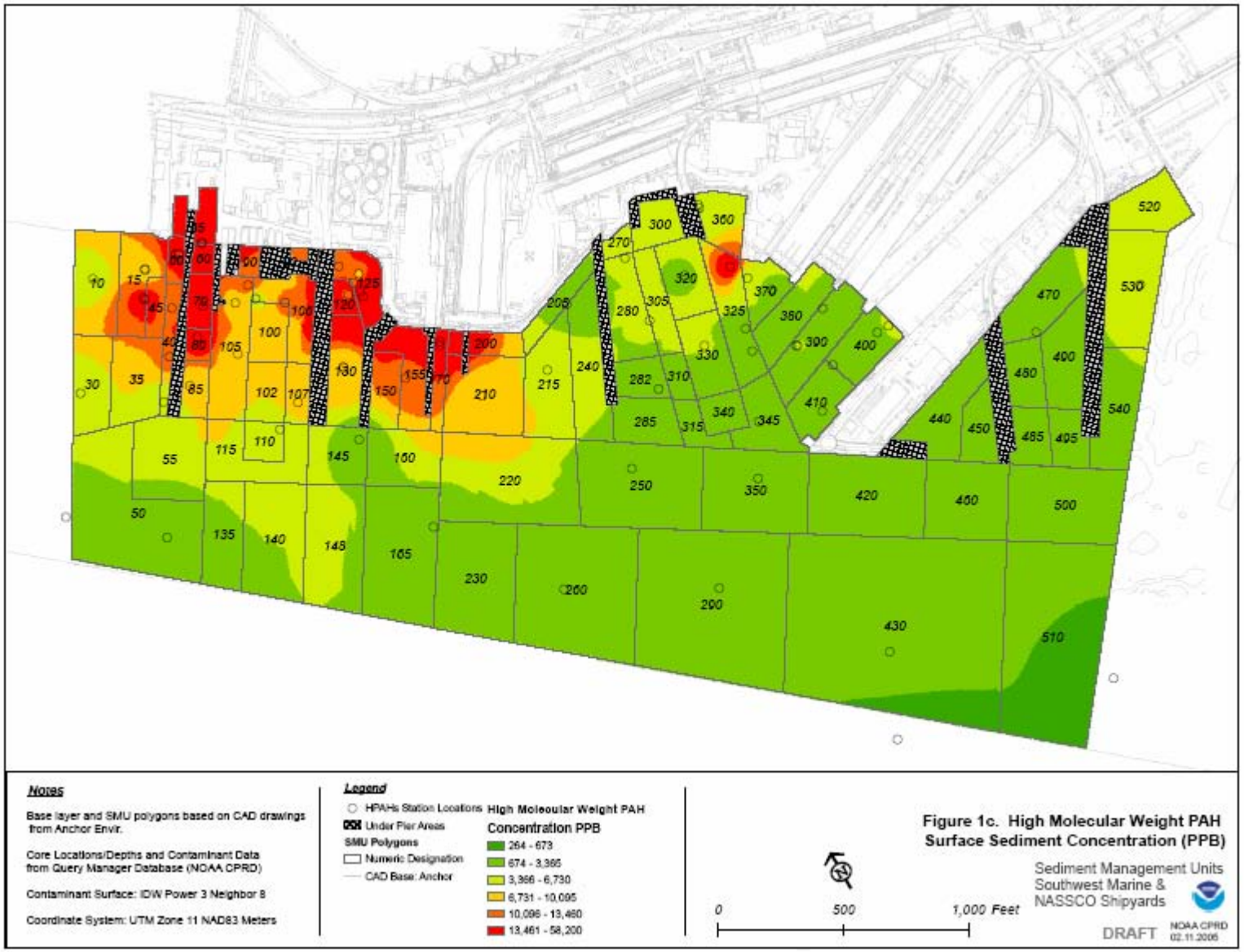
Average concentrations for all stations with identical lat and long.

Interpolate surface distributions for contaminants using IDW with 8 nearest neighbors and a power of 3.

Determined that the drivers would be the organics.

Anchor Sediment Management Units




Notes
Base layer and SMU polygons based on CAD drawings from Anchor Envir.
Core Locations/Depths and Contaminant Data from Query Manager Database (NOAA CPRD)
Contaminant Surface: IDW Power 3 Neighbor 8
Coordinate System: UTM Zone 11 NAD83 Meters
Legend
HPAHs Station Locations
Under Pier Areas
SMU Polygons
Numeric Designation
CAD Base: Anchor
High Molecular Weight PAH
Concentration PPB
264 - 673
674 - 3,365
3,366 - 6,730
6,731 - 10,095
10,096 - 13,460
13,461 - 58,200
0
500
1,000 Feet
Figure 1c. High Molecular Weight PAH
Surface Sediment Concentration (PPB)
Sediment Management Units
Southwest Marine &
NASSCO Shipyards
DRAFT
NOAA CPRD
02.11.2006

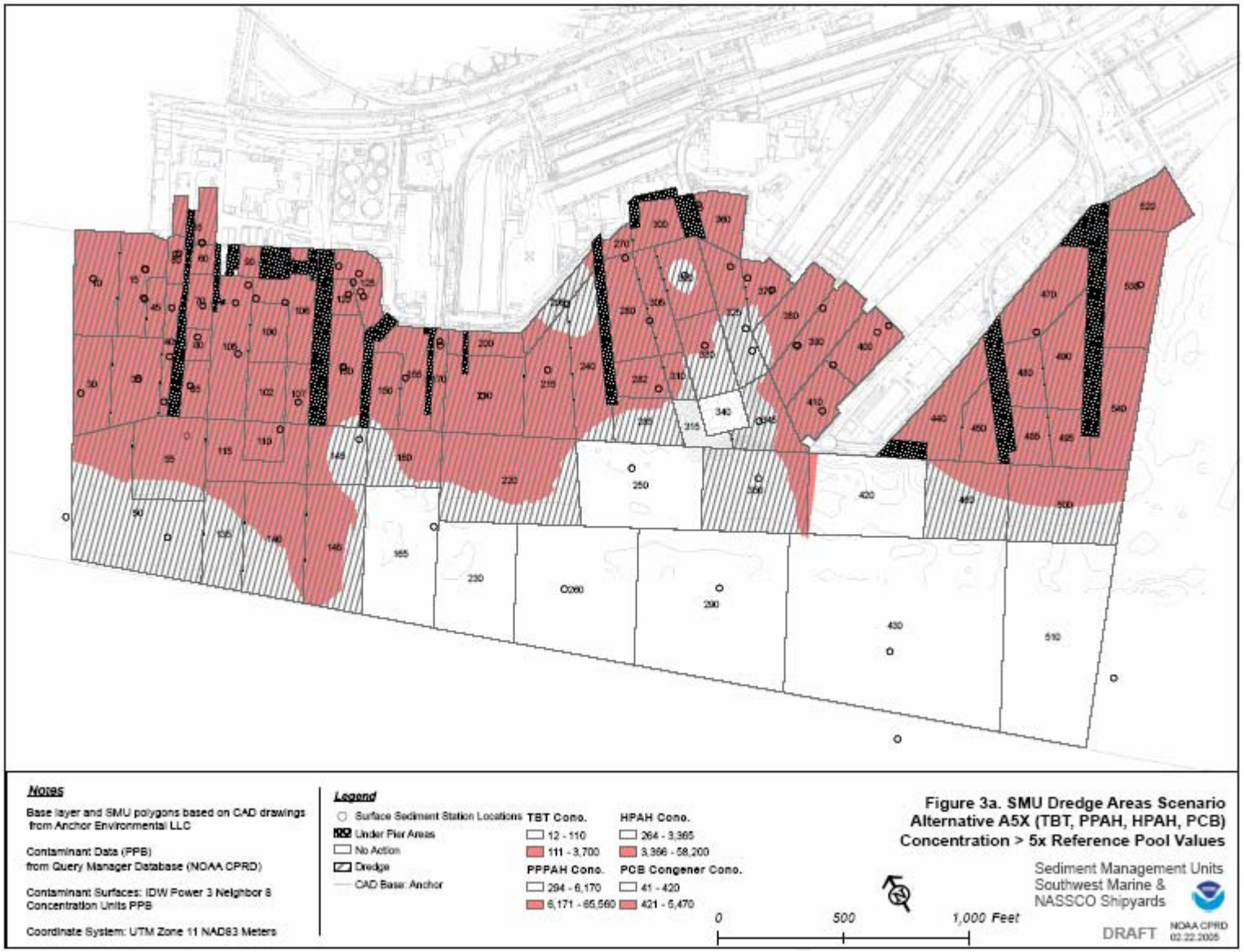


Figure 3a. SMU Dredge Areas Scenario Alternative A5X (TBT, PPAH, HPAH, PCB) Concentration > 5x Reference Pool Values

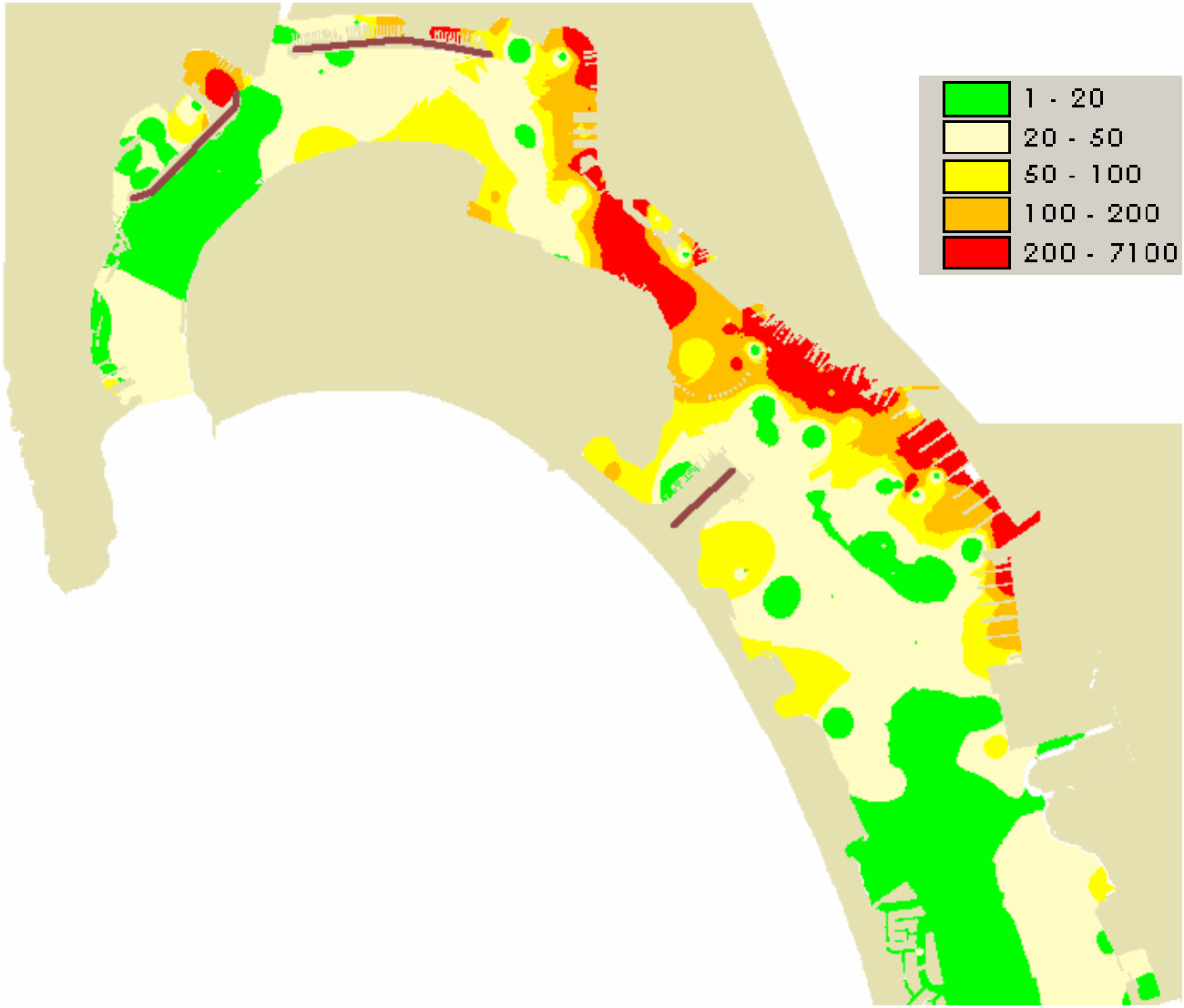
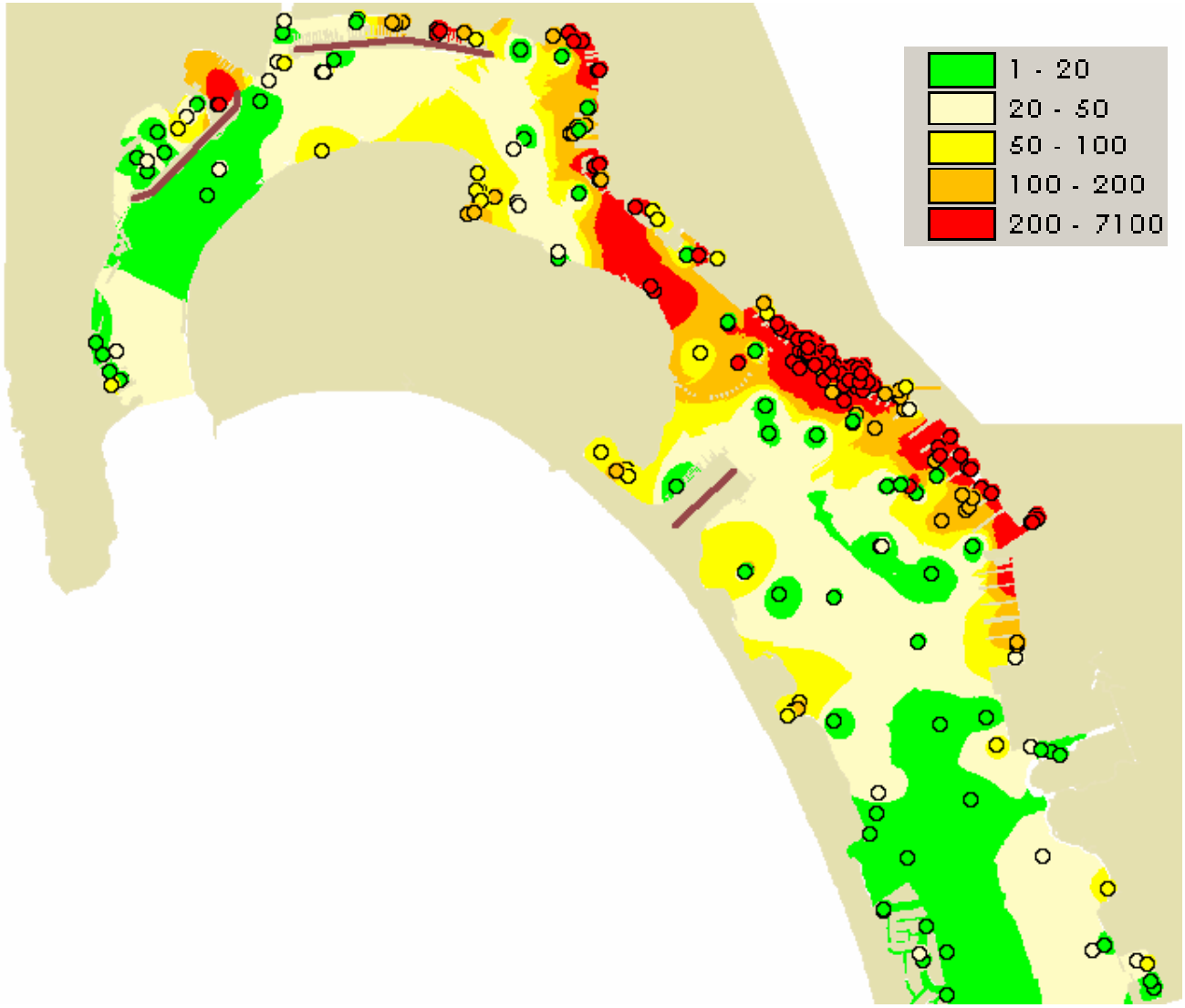
Estimated Dredge Volume for Various Scenarios.

Scenario	Dredged Volume Cu.Yd
Anchor LAET	75,850
Anchor Baseline	1,200,000
A5X	886,000
B5X	769,000
A10X	502,000
B10X	449,000
A15X	295,000
B15X	226,000
A20X	252,000
B20X	200,000

Caveats/Concerns with methodology

- Insufficient density of surface sampling especially outside the leaseholds.
- Insufficient density of sub-surface sampling (cores).
- Variable depth of cores.
- Concentration at bottom of cores often above criteria.
- Volume based on dredging entire SMUs which may not be necessary for all SMUs

Distribution of PCBs in San Diego Bay



Distribution of PCBs in San Diego Bay Datapoints