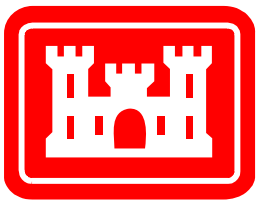
APPENDIX 2

EVALUATION of the POTENTIAL EFFECTS of the NEWARK BAY HARBOR DEEPENING PROJECT on CHEMICAL CONTAMINATION IN NEWARK BAY SEDIMENTS



U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT

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ACRONYMS

2,3,7,8-TCDD - 2,3,7,8-tetrachlorodibenzo-p-dioxin
AK-41/40 - Arthur Kill Channel 41/ 40 foot Federal Navigation Project
AOC - Administrative Order on Consent
BMP - Best Management Practice
CARP - Contaminant Assessment and Reduction Program
CERCLA - Comprehensive Environmental Response, Compensation and Liability Act
CFR – Code of Federal Regulations
CWA - Clean Water Act
EA - Environmental Assessment
EIS - Environmental Impact Statement
EPA – U.S. Environmental Protection Agency
HARS - Historic Area Remediation Site
HDP - NY and NJ Harbor Deepening Project 50' and the Arthur Kill 41/40' Project combined
HTRW - Hazardous, Toxic, and Radioactive Waste
KVK/NB-45 - Kill Van Kull and Newark Bay Channels 45 foot Federal Navigation Project
NEPA - National Environmental Policy Act
NBSA - Newark Bay Study Area
N.J.A.C. – New Jersey Administrative Code
NJDEP - New Jersey Department of Environmental Protection
NOAA - National Oceanic and Atmospheric Administration
NYD – New York District
NYSDEC - New York State Department of Environmental Conservation
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PCDD - polychlorinated dibenzo-p-dioxin
PCDF - polychlorinated dibenzofuran
PJ-41 - Port Jersey Channel 41 foot Federal Navigation Project
REMAP - Regional Environmental Monitoring and Assessment Program
RI/FS - Remedial Investigation and Feasibility Study
TEQ - Toxicity Equivalency Quotient
TSS - Total Suspended Solid
USACE - United States Army Corps of Engineers
USEPA – United States Environmental Protection Agency
U.S.C. – United States Code
WQC - Water Quality Certification

1 INTRODUCTION

1.1 Objectives

This appendix evaluates the effects of the Harbor Deepening Project (HDP) on measurements of sediment contamination to be performed as part of the Remedial Investigation and Feasibility Study for the Newark Bay Study Area (NBSA RI/FS). The results of the MIKE 3 PA model, described in Appendix 1, were used to estimate the resuspension, transport and deposition of dredged material. The analyses described in this Appendix estimate the effects of contaminants in this redeposited dredged material on contaminant concentrations in surface sediments in the NBSA. Predicted post-dredging concentrations in surface sediments are compared with current estimates of surface sediment contaminant concentrations.

1.2 Conceptual Model of Impacts of Dredging on RI/FS Samples

The Dredging Process

Dredging releases suspended sediments to the water. Much of this material will redeposit within the channel adjacent to the dredging operation, because deposition tends to be greater closer to a source, and because the channels are depositional environments (Suszkowski 1978; USACE 1999).

The channel bed is an environment that is disturbed on an ongoing basis, containing sediments that are physically mixed due to tides, storms, periodic dredging and ship traffic. The channels planned for deepening have been dredged previously to depths below the layer deposited during the industrial period. Thus, much of the silt in the channel has been deposited since the last dredging event; the HDP will remove these silts as well as underlying pre-industrial sediments. Following the HDP, the residual sediments in the channel will be a mixture of these materials as well as newly deposited silt that will quickly cover the bottom. These processes will lead to post-HDP contaminant levels that are similar to current conditions.

The term transitional zone is applied to the area that extends from the bottom of the channel to the shallow water flats (Tierra Solutions 2004). This includes the side slopes of the channel, which differ from both the adjacent channels and the shallow flats in their characteristics. The side slopes

include newly deposited material, sediments from the slumping of the adjacent flats, and historical sediments uncovered during previous dredging. They are disturbed on an ongoing basis by tides, wind waves and ship traffic.

Material from the transitional zone will be dredged during channel deepening because of the need to widen the channel prism, and because the HDP calls for widening navigational channels in some areas. Thus, the transitional slopes are a source of material that is resuspended, transported and redeposited may be the flats. Planned channel widening may also result in the exposure of material from the adjacent flats that has not been exposed in a long time. The effects of this resuspended material on surface sediment contaminant concentrations throughout the bay are evaluated in this appendix.

Some of the resuspended dredged material (DM) will disperse outside of the channels and redeposit on the surface of the sediment bed in the shallower flats and transitional zones. This DM is mixed into the top few inches of the sediment bed along with other newly deposited sediments that originate in the watershed, within the bay and within other parts of the harbor complex. The depth of this mixing (the "Biologically Active Zone" or BAZ) was estimated to be approximately six inches, based on work performed on behalf of USEPA as part of the NBSA RI/FS Phase I activities in Newark Bay (BBL 2006). This is consistent with the NBSA Phase I sampling, for which six-inch layers of surface sediments were collected and analyzed for contaminants.

The NBSA Remedial Investigation

The NBSA RI/FS includes sediment sampling to determine the distribution of chemical contamination in the bay, to support risk assessment, and to identify chemical sources (Tierra Solutions 2004). Phase I of this program has been completed. Sediment samples were collected in Fall, 2005 from 69 locations. The data were analyzed for geotechnical properties, radiochemistry activity, and contaminant levels. Additional sediment collections are anticipated; the next phase of sample collection is in the planning stage (Tierra Solutions 2006).

NBSA RI/FS Phase I sediment cores collected for chemical analysis included a surface layer six inches in depth, followed in general by one-foot-thick layers. The draft NBSA RI/FS Phase II plan

calls for a similar collection procedure (Tierra Solutions 2006). The conceptual model of the potential effects of navigational dredging on RI/FS sediment samples is illustrated in Figure 1.

Transported and redeposited DM may affect the RI/FS by changing the concentrations of contaminants within the surface layer of sediments. This appendix provides estimates of potential changes in surface sediment contaminant concentrations outside of the channel and slopes that will result from the redeposition of material resuspended during dredging. In some cases, contaminant concentrations may be higher in DM than in the existing surface sediments, and in some cases, lower. Both of these situations are addressed here, since in both cases, future contaminant concentrations may differ from those that would be observed without the HDP. In either case, future NBSA RI/FS sampling may be affected by the HDP.

The portions of the flats that lie adjacent to the slopes are a focus of this investigation. First, the dredging of sediments that have not been previously dredged or have not been dredged in some time may expose Areas with Elevated Concentrations of chemical contaminants (AECs) adjacent to the channel that have not been previously discovered and might be resuspended during dredging. The EA includes an explicit evaluation of this possibility (Figure 1).[1]

In addition, the areas of the flats that lie adjacent to the channel and that are not disturbed by the dredging are likely to experience more redeposition of DM than other areas of the flats, due to their proximity to the source of the material. The evaluation presented in this appendix includes estimates of redeposition and the consequent changes in chemical concentrations in these areas.

[1] There is no chemical level that defines an AEC; the importance of such an area depends on its location, its size, the extent of dispersal within the bay due to local hydrodynamic conditions, as well as nearby surface sediment concentrations. All of these factors are incorporated into the analysis of the effects of AECs.

2 APPROACH

2.1 General Approach

To evaluate the potential effect of the HDP on RI/FS sampling, we computed the expected contaminant concentrations in a six inch surface layer that might be measured following the HDP, and compared these with existing conditions in the top six inches of the sediment bed. Results were computed assuming the entire HDP was completed. This is conservative, since much of the RI/FS sampling may be performed prior to completion of the HDP. A cumulative analysis was performed in the same manner, incorporating O&M and other dredging anticipated in Newark Bay.

The approach relied on integrating the hydrodynamic and sediment transport model results (Appendix 1) with chemical data collected by USEPA, USACE, and others. Based on the conceptual model presented above, the evaluation quantified each step of the process by which the dredged material (DM) and its associated contaminants may be transported from the dredging site and redeposited. The first step used the results of the MIKE3 hydrodynamic/particle tracking model that predicted the mass of DM deposited per unit area (kg/m2) in each cell of a 75 m grid in Newark Bay. This involved the following components (the numbers below refer to Figure 1b):

(1) the mass of dredged material (kg) to be resuspended during dredging. The amount of DM was estimated based upon the contract data provided by USACE.

(2) the transport of dredged material throughout the bay. Transport was computed using a state-of-the-art hydrodynamic model (NY/NJ Harbor Partnership 1999).

(3) the subsequent deposition of the dredged material. This was computed by the particle tracking component of the hydrodynamic model (Appendix 1).

Next, levels of chemical contaminants in the redeposited material were used to characterize effects on the RI/FS sediment samples. The post-dredging concentrations of contaminants in the top six inches, resulting from mixing the original sample and the newly deposited material, were calculated. These values were compared with the existing concentrations in the top six inches. Differences

between the new and the existing concentrations represent the effects of the HDP. The analysis required estimates of the following:

(4) concentrations of contaminants in the dredged material. This was based upon the latest NBSA RI/FS Phase I data (Tierra Solutions 2006), the USACE data collected as part of the dredging project, as well as historical data collected throughout Newark Bay.

(5) concentrations of contaminants on surface sediments under current conditions. This was based upon the NBSA RI/FS Phase I data as well as historical data.

2.2 Estimation of the Change in Concentration in Surface Sediments Resulting from Dredging Resuspension

The concentration of each contaminant anticipated in a post-dredging core (Cpost) was calculated using the following formula:

$$C_{post} = \frac{1}{D_{core}}\left[D_{DM}C_{DM} + (D_{core} - D_{DM})C_{SS}\right] \quad (1)$$

where:

C_{SS} = the contaminant concentration in the surface sediments prior to deposition of the dredged material (mg/kg)
C_{DM} = the concentration of contaminant in the dredged material (mg/kg)
D_{core} = depth of the core (mm)
D_{DM} = depth of dredged material deposited on the sediment surface (mm)

The depth of deposition (D_{DM}) was calculated using the mass of sediment deposited on the sediment bed at each location within the bay (M_{DM}, in units of kg/m2, computed by the model) along with the dry bulk density value (BD, kg/m3) estimated from the NBSA RI/FS Phase I surface sediment data (Tierra Solutions 2006):

$$D_{DM} = \frac{M_{DM}}{BD}$$

D_{core}, the depth of the simulated core, was six inches (150 mm). This is the depth of the biologically active zone identified in Phase I data (BBL 2006) and the depth of the surface layer collected during the NBSA RI/FS Phase I sampling program (Tierra Solutions 2006).

Chemical data collected in Newark Bay were used to estimate concentrations in DM (C_{DM}) and in surface sediments (C_{SS}). The chemical data included historical measurements performed by a variety of agencies (most of which was reported in the USEPA Remedial Investigation Work Plan for the Newark Bay Study Area); sediment cores collected by USACE to evaluate disposal options for the DM; and cores collected in October-December , 2005 by Tierra Solutions as part of the Phase I sampling in the Newark Bay Study Area.

In each core lying with the region to be dredged, C_{DM} was estimated by computing the depth-integrated concentration of each contaminant:

$$C_{depth-weighted} = \sum_{i=1}^{n} L_i C_i$$

where:

$C_{depth\text{-}integrated}$ = depth-integrated concentration in the core

L_i = length of core layer *i*

C_i = contaminant concentration in core layer *i*

Cores collected by the USACE were not segmented and were thus included directly in the estimation of C_{DM}.

All calculations were performed based upon the 75m X 75m model grid. Depth-integrated chemical concentrations in each sediment grid cell were calculated by interpolating between the cores using Thiessen polygons drawn around each sample location[2]. Chemical concentrations in each model cell within each polygon were set equal to the concentration measured at the polygon's data point.

[2] Thiessen polygons are a set of adjacent polygons that cover the entire area, one polygon for each data point. All locations within a given polygon are closer to the data point within the polygon than to any other data point.

The particle tracking model simulated resuspension from 11 HDP "dredge areas" (Figure 2; and Appendix 1). For each dredge area, the contaminant concentrations on the resuspended material were set equal to the average of the interpolated concentrations in all model cells lying within it.

Surface sediment contaminant concentrations (C_{SS}) were estimated for each model sediment grid cell lying outside of the 11 dredge areas were estimated in a similar fashion, using Thiessen polygons created around the surface sediment sampling locations.

The analysis was performed for 2,3,7,8-TCDD, total PCBs, total DDT (pp-DDT, pp-DDE, and pp-DDD), benzo(a)pyrene, mercury, and chromium. To represent dioxins and furans, the analyses presented here focused on the concentration of 2,3,7,8-TCDD. One congener was chosen, because not all databases include multiple congeners. Benzo(a)pyrene (BAP) was used to represent polynuclear aromatic hydrocarbons (PAHs), because the list of PAH compounds is not consistent across databases.

2.3 Effects of Uncovering Areas of Elevated Concentrations

An analysis was performed to evaluate the effect of dredging potential but presently unidentified AECs in the side slopes and adjacent areas. The analysis estimated changes in the surface sediment concentrations throughout the bay that might be attributable to resuspension from such areas.

The first step in this analysis involved determining whether there is evidence of higher contaminant concentrations on side slopes compared with the channel. Based upon the NBSA Phase I data, overall, there were no significant differences in depth-integrated concentrations (Table 1). Thus, contaminant concentrations are not in general elevated on the slopes, indicating that AECs, if they exist, are local. Furthermore, the available slope data cannot be used to represent AECs.

In the absence of data adjacent to the channels that could be used to represent AECs, and acknowledging the limitations of the available data, the "elevated concentration" was set equal to the 90th percentile of all data collected south of the northern tip of the HDP[3] (Table 2). This analysis is

[3] The 90th percentile is the concentration value that is greater than 90% of the data.

designed to be conservative, as the data used to compute the 90th percentile included all NBSA Phase I data as well as all historical data collected within approximately half of Newark Bay and at any depth, including previously dredged core locations.

The transitional zones comprise approximately 15% of the volume of dredged material, based upon estimates available for dredge contract area S-NB-1 (total sediment volume = 580,000 cy; slopes = 90,000 cy). To estimate the effect on the overall concentration of contaminant in the dredged material, it was assumed that one entire edge of the dredge area (approximately equal to ½ of the total slope volume, or 7.5% of the DM) was contaminated at the elevated concentration.

The contaminant concentration used for the AEC analysis was thus set equal to:

$$C'_{Dm} = SC_{90} + (1 - S)C_{DM}$$

where:

C'_{DM} = contaminant concentration in the dredged material used for the AEC analysis

S = proportion of sediment volume that consists of slopes along one side of the dredge area = 0.075

C_{90} = 90th percentile concentration of data collected within the vicinity of the dredge area

Values used in the calculation for each dredge area are presented in Table 2. For example, for dredge area S-AK-1, the concentration of TCDD in DM is estimated to be 6.8 ng/kg, based on the Thiessen polygon analysis. The 90th percentile was 340 ng/kg. S = 0.075, 1 – S = 0.925, CDM = 6.8, C90 = 340. The calculated concentration (C'_{DM}) = 32 ng/kg = 0.075(340.) + 0.925(6.8).

3 CHEMICAL DATA

3.1 Data Sources

The analyses rely in part on the data collected in October- December 2005 as part of Phase I of the Newark Bay RI/FS (Tierra Solutions 2006). In addition, all relevant sediment studies described in Volume 1 of the Newark Bay Study Area Remedial Investigation Work Plan (Tierra Solutions 2005) were incorporated. These studies include those provided in the NOAA Query Manager database put together for Newark Bay by NOAA's Office of Response and Restoration/Coastal Protection and Restoration Division (NOAA 2005), as well as USEPA's Regional Environmental Monitoring and Assessment Program (REMAP; USEPA 2005) and the Contaminant Assessment and Reduction Program datasets (CARP 2004). The studies included were conducted from 1991 to 2001, and the data have been used in numerous other environmental assessments and studies. These data were used, in addition to the NBSA Phase I data, to define contaminant concentrations in surface sediments and dredged material.

Table 3-49 of the RIWP Volume 1 indicates that 7 of the 11 studies included in the analyses presented here were subjected to quantitative QA/QC procedures or USEPA Region 2 data validation. Moreover, the individual studies for which quantitative QA/QC is indicated as being "not specified" do include standard measures of quality assurance and quality control, such as duplicates, spike recoveries, and method blanks. These include the NOAA NS&T Hudson-Raritan Study, the REMAP studies, and the Newark Bay Reach B,C,D data collection conducted by the USACE for the Confined Disposal Facility FEIS. It is reasonable to combine these data for the purposes of this study because QA/QC information was incorporated in all of the studies.

In addition, USACE has collected cores from Newark Bay, Arthur Kill and Kill van Kull contract areas, as well as Port Elizabeth, for the purpose of evaluating the dredged material for placement options. For the surficial silty sediment strata targeted for upland beneficial use, core depths ranged from 2 feet to 25 feet and were chosen to characterize the material down to where it meets underlying consolidated Pleistocene, HARS suitable till and clay materials, or to the project depth of the HDP. The bulk sediment chemistry test results of the composites made from these cores were incorporated into the estimate of the concentrations of contaminants in the DM.

Together, these data include all relevant sediment data for Newark Bay and adjacent tidal straights, and thus are considered sufficient for the purposes of assessing the potential impacts on the NBSA RI/FS by the HDP. These data include multiple sampling locations within each geomorphic area and geographical region within the Bay (Tierra Solutions 2004 and 2006). Further, data are available from the sediment surface and at depth, in each of these areas. Thus, concentrations of chemicals within each dredge area and potential impact area are characterized by representative distributions. To the extent that there are areas with concentrations of chemicals in sediments that fall outside of the distributions characterized by the existing data, these areas would be limited in spatial extent (between existing data points).

3.2 NBSA RI/FS Phase I Data

Tierra Solutions, Inc collected 69 cores in Newark Bay for contaminant analysis as part of Phase I of the NBSA RI/FS (Tierra Solutions 2006). Details regarding the sampling are available in the NBSA RI/FS Work Plan (Tierra Solutions, 2004). The data are available at www.ourpassaic.org. Duplicate results were averaged and samples that were below detection were included as one-half the detection limit. Cores were sectioned from 0 – 0.5 ft and then generally at 1 ft intervals down to 5 to 6.5 ft, with two samples going down to 8 ft. The top 0.5 ft are included in surface analyses presented below. In the channels, the result for each core is presented as a depth-integrated concentration. The contaminant data used here are provided in Attachment 1. A map showing sample locations is provided in Attachment 3.

3.3 Historical Data

The data collected prior to the Phase I sampling are referred to as "historical". These data were collected from 1991 to 2001 and included surface and core samples collected during various monitoring and permit compliance programs. Many of these cores included a surface layer of up to six inches in thickness, which was used here to represent surface contamination. These cores also included a series of subsurface layers that were used to characterize the dredged material.

In the channels, contaminant concentrations either represent whole core composites (USACE cores collected for the purpose of characterizing dredged material) or depth-integrated concentrations.

Data from a total of 125 core and grab samples were included. (207 samples were collected in total, although chemical concentrations were not available for all samples.) Concentrations of the contaminants evaluated in this study are provided in Attachment 2, in which duplicates have been averaged and non-detects set at one-half the detection limit. Also provided in Attachment 2 is the geomorphic area determined for each sample location.

Some of these areas have been dredged since sample collection; the dredging status was determined by comparing the sampling location with available information concerning past dredge locations and contract dates and is indicated on the data table. Samples collected after the last dredging event are termed "active". Only active historical data were included in the analysis.

3.4 Data Usage and Compatibility

The type of analysis for which each sample was used is indicated by a "use" designation. These are provided for the NBSA RI/FS and Historical data in Attachments 1 and 2, respectively. A use designation of "S" indicates the sample was used to estimate surface sediment concentrations in the impact areas. A use of "DW" indicates the sample was used to estimate the depth-integrated concentrations of dredged material. Samples designated "DW&S" were located within the navigational channel but will not be dredged as part of the HDP, so they were used in estimating dredged material concentrations for other non-HDP dredging, including maintenance, as well as surface sediment concentrations for assessing the effects of the HDP. A designation of "NA" indicates the sample was not analyzed for this contaminant. A designation of "S, NA" indicates the sample was not used in the analyses presented here because it was collected at depth in an impact area, where only surface sediments impacts are evaluated. A designation of "EXCL" means the sample was excluded due to its location being outside the NBSA.

Contaminant concentrations measured in the NBSA RI/FS Phase I data and in the "active" historical data were found to be generally similar. Concentrations measured in the channels and out of the channels were compared for all six chemicals using a Student's t-test. Only one of the twelve statistical comparisons resulted in a P-value less than 0.05 (Table 3).

4 APPLICATION TO NEWARK BAY

4.1 Estimation of Chemical Concentrations

4.1.1 Chemical Concentrations in Dredged Material

The depth-integrated concentrations are presented in the left-hand panels of Figures 3a through 3f. In these figures, the concentration data are presented in five groups, differentiated by color intensity. Cutoffs were set so as to provide a reasonable number of values in each color group, using round values approximately equal to the 25th, 50th, 75th and 90th percentiles of the entire data set. (For each chemical, the same cutoff concentrations were used in all figures.) The groupings are for presentation purposes only; they do not represent statistical significance.

The estimated contaminant concentrations in DM for each dredge area (Table 2) was applied to the volume of silt to be dredged as part of the HDP. The total volume of all materials (silt, sand and gravel, rock) are listed in Table 4.

The analysis presented here is conservative, insofar as the contaminant data were collected almost exclusively in black silt, but were used to represent a mixture of black and red-brown silt. Black silt is relatively recently deposited material and has contaminant levels that are relatively high, generally sufficient to require upland disposal. The dredge volumes used here include black silt as well as red-brown silt. Red-brown silt, also termed Pleistocene silt and clay, was deposited long before the industrial period; this material has been tested and shown to have relatively low contaminant levels, suitable for placement at the Historic Area Remediation Site (HARS).

4.1.2 Chemical Concentrations in Surface Sediments

Surface sediments include all core layers lying completely within the top six inches of the sediment bed. This includes all surface layers of the NBSA RI/FS Phase I data, as well as historical data. Thiessen polygons of the surface sediment concentrations in all areas not to be dredged are presented in the right-hand panels of Figures 3a through 3f. Color coding is the same as for the dredge areas.

4.2 Model Parameters

As discussed in Appendix 1, 3% of the dredged material was assumed to resuspend into the water column.

The analysis was based upon a surface layer thickness of six inches. It is possible that future sediment sampling may include high-resolution cores with more than one layer within the top six inches. This EA provides an indication of what areas are expected to experience relatively elevated deposition due to the HDP; this information will be useful to USEPA in choosing locations for the collection of any such cores.

A dry bulk density of 1,500 kg/m3 was used to calculate the mass of sediments resuspended during the HDP. This value was calculated based upon sediment cores collected by USACE throughout Newark Bay for the purpose of geotechnical characterization. A value of 800 kg/m3 was used for other dredging, including maintenance, based upon NBSA Phase I data collected in the channels and on the side slopes. The dry bulk density of the material redeposited on the impact areas was set equal to 750 kg/m3, calculated based upon surface sediment percent moisture data reported in the NBSA Phase I database. The field data and bulk density calculations are presented in Attachment 4 to this appendix.

5 RESULTS

5.1 Presentation and Analysis

The estimated total deposition due to the entire HDP (all dredge areas, for the entire duration of the project) is presented in Figure 4. Each circle represents the results for a model sediment grid cell. These results represent the direct output from the MIKE 3 model (Appendix 1). The left-hand panel is a copy of Figure 35 from Appendix 1, showing interpolated model results. The right-hand panel presents the same results individually for each model sediment grid cell. This panel presents the information used in all subsequent calculations in this Appendix, which are preformed individually for each model grid cell. Results are not presented for the channel, because contaminant concentrations in the residual material are expected in general to be similar to pre-dredging concentrations.

Predicted post-HDP contaminant concentrations in the surface sediments of the NBSA are summarized in Figures 6 through 11. Results are presented in two ways.

Semi-Quantitative Comparisons

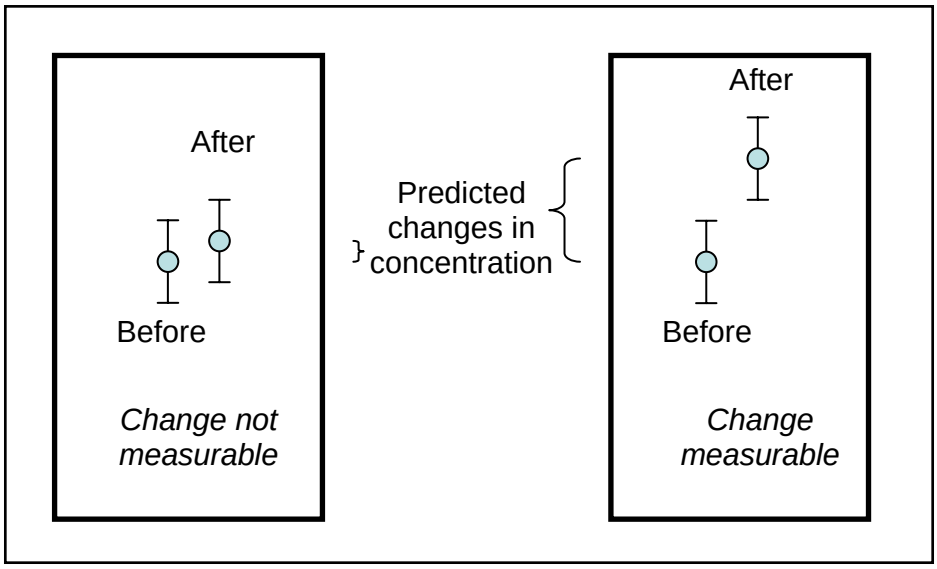
First, predicted changes in concentration are presented semi-quantitatively on maps, with the goal of showing where within the bay increases and decreases in concentration are expected, and roughly how much they are expected to change. Figures 6a, 7a, 8a, 9a, 10a, 11a present current concentrations in surface sediments (left-hand panel) and predicted post-dredging concentrations (right-hand panel) for each model sediment grid cell. The pre-dredging values in the left-hand panels are the same as those in Figure 3, except that in Figures 6 through 11, values are presented on the model grid. Values are grouped together in the same color coded groups used in Figures 3a through 3f.

In Figures 6b, 7b, 8b, 9b, 10b, and 11b, the difference between post- and pre-dredging concentration is presented for each model grid cell (pre-dredging minus post-dredging; thus, a positive value indicates a higher post-dredging concentration). Values are grouped, and groups are indicated by color: purple represents an increase in concentration, and brown represents a decrease. Differences in color intensity indicate the extent of change expected; for each chemical, the groups are

approximately equal to one-half and one-tenth of the 25th percentile of the entire data set. The same concentration ranges were used in all figures for each chemical. Note that the groups were selected for presentation only; they are not based upon risk and are not intended to imply significance.

Quantitative Comparisons

The second presentation of the results is quantitative and is based upon a comparison of predicted change with data uncertainty. Because changes that cannot be measured cannot affect the RI/FS, comparison of predicted changes with data uncertainty puts the predicted changes in context. For example, in the diagram below, pairs of points representing average concentrations measured before and after dredging are presented, along with error bars representing data uncertainty. In the panel on the left, the predicted change in concentration is less than the precision of the data; a comparison of pre- and post-dredging data would not be different. In the figure on the right, the difference would be noticeable.



The NBSA RI/FS Phase I dataset included the results of a number of field duplicates. These were used to estimate the uncertainty associated with the measurements. Tierra Solutions prepared field duplicates of selected sediment samples by mixing a double portion and placing equal aliquots of the homogenate in two sets of glassware (Tierra Solutions 2004). To compare the precision of the measurements in the Phase I data with the computed changes in concentration, the relative percent

difference (RPD) was calculated for both[4]. For the field duplicates collected during the NBSA RI/FS Phase I program, the percent difference between the duplicates was calculated as follows:

$$RPD_{dups} = \frac{dup1 - dup2}{average(dup1, dup2)} X100$$

where:

dup1 = chemical concentration in one of the duplicate samples

dup2 = chemical concentration in the other of the duplicate sample

The RPD_{dup} was calculated for each pair of duplicates for each chemical.

These values were then compared with a relative percent difference calculated from the pre- and post-HDP model results for each model grid cell:

$$RPD_{model} = \frac{post - pre}{pre} X100$$

where:

pre = chemical concentration prior to dredging (i.e., current conditions)

post = chemical concentration after the HDP is complete

These RPD values were used to evaluate which predicted HDP-induced changes in concentration were greater than the precision of the Phase I data, that is, lay outside the range of data uncertainty. Uncertainty was quantified using the upper 95th percentile of the mean of the RPD_{dup} values: changes smaller than this are expected to be indistinguishable from data uncertainty[5]. This value is termed here the "uncertainty threshold" (UT) and was calculated using Land's method for lognormal populations (Gilbert 1987, Land 1975). Each model grid cell with an RPD_{model} value greater than

[4] The RPD is a common measure of precision, discussed, for example, in the NBSA Phase I data program (Tierra Solutions 2004, Section 5.2.2.1).

[5] Most of the time, on average, sets of paired measurements are expected to differ less than this value. This means that a predicted change less than this amount would most likely not be noticeable.

the UT was identified and mapped; these cells were characterized in the discussion presented below as having potentially noticeable predicted changes, that is, changes greater than the uncertainty in the data.

Twenty pairs of duplicate samples were collected by Tierra Solutions. Duplicate pairs in which both samples were non-detect were not included in the analysis. Duplicate pairs in which one sample was below the limit of detection were included, and the non-detect value was set equal to one-half the detection limit. After eliminating pairs of non-detects, between 13 and 20 pairs of duplicates remained in the analysis for the six chemicals, depending upon the chemical species. The data for the duplicates are presented in Table 5. The distributions of the RPD values are presented graphically in Figure 5. The RPD statistics and resulting UT values are presented in Table 6.

In Figures 6c, 7c, 8c, 9c, 10c, 11c, the left-hand panel presents the quantitative relationship between pre- and post-dredging concentrations on a grid cell-by-grid cell basis in the form of a crossplot. The pre-dredging (current) concentration of each contaminant for each model sediment grid cell is plotted on the horizontal axis and the predicted post-HDP concentration for the same grid cell is plotted on the vertical axis. The 1:1 line is presented; symbols below this line represent a decrease in concentration following the HDP, and symbols above this line represent an increase. The dashed lines represent the UT. Symbols that lie outside of the bounds of the dashed lines represent model grid cells which are predicted to change in concentration more than the UT; these are indicated with a different color. The middle panel presents the same information with a magnified scale to aid in comparing the lower values. The right-hand panel provides a map of Newark Bay in which the model grid cells exhibiting changes greater than the UT are indicated with a different color.

5.2 Effects of the HDP

Figures 6a and 6b provide both an indication of where changes are expected to occur, and roughly how strong those changes are expected to be. It should be noted that this presentation is qualitative[6].

[6] For example, a small predicted change in concentration may move a cell from roughly the 49th percentile to the 51st percentile, resulting in a color change. A larger change, from say the 30th percentile to the 49th would not be visible on these figures. Thus, a change in color group does not imply significance; it is simply a qualitative means of describing relative changes in concentration following the HDP.

Concentrations of TCDD showed relatively little change throughout the bay (Figures 6a and 6b). Only two cells out of a total of 2380 model cells[7] changed color groups (Figure 6a). Most of the changes in concentration are visible in the northern portion of the navigational channel, and in southern Newark Bay alongside the channel, areas where the greatest deposition occurred (Figure 6b). All visible changes in concentration in Figure 6b were decreases, because in these locations, the channels showed somewhat lower TCDD concentrations than nearby surface sediments.

In the quantitative evaluation, only 10 cells out of 2380 (0.4%) had predicted changes that were greater than the uncertainty in the data (Figure 6c and Table 7). All but one of these cells were located at the northern end of the HDP; these were in one polygon which contained a sample with a very low TCDD concentration. All of the predicted changes that were greater than the uncertainty in the data were increases in concentration (Figure 6c, left and middle panels). Even after the HDP, these concentrations were predicted to remain below 5 ng/kg after the HDP is complete, considerably less than the overall median TCDD concentration in the bay, which was approximately 50 ng/kg. Thus, nearly all of the predicted differences throughout Newark Bay were within the precision of the data, and changes greater than the precision of the data were small absolute changes at low concentrations.

Concentrations of total PCBs throughout the bay showed relatively little change, similar to TCDD (Figures 7a and 7b). Only 42 cells changed color groups (Figure 7a). Most of the visible changes occurred in the navigational channel, both towards the north and in the KVK, as well as alongside the channel; these were areas where the greatest deposition occurred. Twelve cells had predicted changes that were greater than the uncertainty in the data (0.5%; Figure 7c, Table 7). Similar to TCDD, these were all located at the northern tip of the HDP in an area with very low current PCB concentrations (Figure 7c, left and middle panels). Also similar to TCDD, all of these potentially noticeable changes were increases in concentration. None were predicted to exceed approximately 0.011 mg/kg after the HDP is complete. This is much less than the overall median PCB concentration in the bay, approximately 0.5 mg/kg.

[7] 2,380 model sediment cells lie within the surface sediment polygons presented in Figure 3, right hand panels.

Concentrations of DDT throughout the bay showed more changes than TCDD and PCBs (Figures 8a and 8b). Eight cells changed color groups (Figure 8a). The spatial pattern differed from TCDD and PCBs. Most of the visible changes occurred along the northern edge of the HDP, along the south Elizabeth Channel, and along the Arthur Kill channel. Along the Arthur Kill, concentrations were predicted to increase following the HDP, while in the other areas, concentrations decreased. Twenty-five model grid cells had predicted changes that were greater than the uncertainty in the data (1.1%; Figure 8c and Table 7); all of these cells were located along the Arthur Kill. All of these potentially noticeable changes were increases in concentration, occurring in areas with relatively low current DDT concentrations (Figure 8c, left and middle panels). None of these concentrations were predicted to exceed 0.08 mg/kg after the HDP is complete. For comparison, the overall median DDT concentration in the bay was approximately 0.05 mg/kg and the 75th percentile was about 0.10 mg/kg.

Concentrations of BAP throughout the bay showed less change than TCDD, PCBs and DDT (Figures 9a and 9b). Four cells changed color groups (Figure 9a). All of the visible changes that appear on Figure 9b were decreases, and most of these were located at the northern edge of the HDP. Thirty-six model grid cells had predicted changes that were greater than the uncertainty in the data (1.5%; Figure 9c and Table 7). All of these cells were located in the Kill van Kull, lay within one Thiessen polygon with a very low current BAP concentration (Figure 9c, left and middle panels), and showed increases in concentration. Post-HDP concentrations in this area were not predicted to exceed 0.007 mg/kg after the HDP is complete, considerably less than the overall median BAP concentration in the bay, approximately 0.7 mg/kg. Thus, the predicted differences throughout Newark Bay were nearly all within the precision of the data, and changes greater than the precision of the data were small absolute changes at low concentrations.

Concentrations of mercury throughout the bay showed relatively little change (Figures 10a and 10b). Two model grid cells changed color groups (Figure 10a). Visible changes in Figure 10b were scattered along the edges of the dredge channels; all changes visible in Figure 10b were decreases. Ten model grid cells had predicted changes that were greater than the uncertainty in the data (0.4%; Figure 10c and Table 7). All of these cells were located at the southern edge of the NBSA within the Arthur Kill. All of the potentially noticeable changes were increases in concentration, and all occur

in areas with very low current mercury concentrations (Figure 10c, left and middle panels): concentrations in this area were not predicted to exceed 0.04 mg/kg after the HDP is complete, considerably less than the overall median mercury concentration in the bay, approximately 2 mg/kg. (Note that the cells that showed decreases in Figure 10b were not the same cells that showed changes greater than the precision of the data in Figure 10c; the latter figure provides a more quantitative assessment than the former).

Concentrations of chromium throughout the bay showed relatively little change, similar to BAP and mercury (Figures 11a and 11b). Seventeen cells changed color groups (Figure 10a). All changes that were great enough to appear in Figure 11b were decreases, and most were located at the northern tip of the HDP and by the south Elizabeth Channel. Three model grid cells had predicted changes that were greater than the uncertainty in the data (0.1%; Figure 11c and Table 7). These were decreases in concentration of at most approximately 20% (Figure 11c).

In summary, few predicted changes in concentration were greater than the uncertainty threshold. These tended to be found within or adjacent to the navigational channel at the northern tip of the HDP (TCDD and PCBs) and along the Arthur Kill (DDT, Hg). For BAP, the changes that were greater than the precision of the data were all associated with one data value in the Kill van Kull. For TCDD, PCBs, BAP and mercury, changes greater than the precision of the data occurred only in locations where the data indicated very low surface sediment concentrations, and the predicted changes in concentration were relatively small. A few model cells with intermediate DDT and chromium concentrations changed to an extent greater than the precision of the data. Thus, for nearly all of Newark Bay, predicted changes in concentration lay within the precision of the data. This lack of dramatic, widespread effects was due to the fact that contaminant levels in the channels were generally similar to levels in the surface sediments. This similarity also explains the observation that changes greater than the precision of the data were generally increases and generally occurred in areas with relatively low surface sediment concentrations. Consequently, chemical concentrations in samples collected after the HDP are, with a few exceptions, likely to be indistinguishable from concentrations in samples collected prior. It is improbable that deposition due to the HDP will affect USEPA's ability to interpret sediment samples in Newark Bay

5.3 Effects of Uncovering Areas of Elevated Concentration

This analysis was designed to evaluate the effects of encountering previously unknown AECs in the transitional zone as the channel is widened (Figure 1a). Results are presented in Figures 12 through 17, which are structured the same as Figures 6 through 11.

For TCDD, effects on surface concentrations were similar to the HDP evaluation discussed above. Twenty-six model grid cells had predicted changes that were greater than the uncertainty in the data, compared with 10 cells in the HDP evaluation (Figure 12c, Table 7). As in the HDP evaluation, most of these were located at the northern tip of the HDP. Changes were observed in a small number of model grid cells in the Kill van Kull. As in the HDP-only case, all of the changes that were greater than the uncertainty in the data were increases in concentration, and occurred in areas with low current TCDD concentrations (Figure 12c, left and middle panels). Furthermore, in all areas showing potentially noticeable increases in concentration, concentrations were predicted to remain below 10 ng/kg after the HDP is complete.

For PCBs, some cells showed increases in concentration (Figure 13b), in contrast to the HDP evaluation (Figure 7b). Twenty-seven model grid cells had predicted changes that were greater than the uncertainty in the data, compared with 12 cells in the HDP evaluation (Figure 13c, Table 7). All but one of these model grid cells were located at the northern tip of the HDP. One cell was located in northern Newark Bay. Similar to HDP evaluation, all of these potentially noticeable changes were increases in concentration, and occurred in an area with low current PCB concentrations (Figure 13c, left and middle panels). Concentrations in this area were not predicted to exceed 0.07 mg/kg after the HDP is complete.

For DDT, more increases were observed in the AEC analysis (Figure 14b) than in the HDP evaluation (Figure 8b). Thirty-three model grid cells had predicted changes greater than the uncertainty in the data, compared with twenty-five cells in the HDP evaluation. These were largely located along the Arthur Kill (Figure 15c), similar to the HDP evaluation. A few cells were located north of the HDP. As in the HDP evaluation, all of the potentially noticeable changes were increases in concentration. They occurred in areas with relatively low current DDT concentrations (Figure

14c, left and middle panels). As in the HDP evaluation, concentrations were not predicted to exceed 0.08 mg/kg after the HDP is complete.

For BAP, results for the AEC analysis (Figure 15b) and the HDP evaluation were similar (Figure 9b). Thirty-eight model grid cells had predicted changes that were greater than the uncertainty in the data, compared with 36 cells in the HDP evaluation. These were largely located in Kill van Kull (Figure 15c), similar to the HDP evaluation (Figure 9c). Two cells were located in Newark Bay (Figure 15c). All of the potentially noticeable changes in Kill van Kull were increases in concentration. Post-HDP concentrations in this area were not predicted to exceed 0.007 mg/kg after the HDP is complete. Two locations in Newark Bay showed increased in concentration slightly more than the uncertainty in the data (Figure 15c), although they remained around the median (0.7 mg/kg).

For mercury, the AEC analysis (Figure 16b) produced fewer visible changes than the HDP evaluation results, based upon the color scheme used in Figure 10b. The number of model grid cells that changed more than the precision of the data were similar: 12 in the AEC analysis, compared with ten in the HDP evaluation. All but two of these were located along the Arthur in Kill (Figure 16c). Two model cells in northern Newark Bay also had predicted changes that were greater than the uncertainty in the data (Figure 16c). All of these potentially noticeable changes were increases in concentration. All of the changes in the Arthur Kill occurred in areas with very low current mercury concentrations (Figure 16c, left and middle panels): concentrations in this area were not predicted to exceed 0.05 mg/kg after the HDP is complete. In northern Newark Bay, a change from approximately 0.3 mg/kg to approximately 0.4 mg/kg was predicted in one model grid cell; these values are small relative to the bulk of the concentrations observed in the surface sediments of Newark Bay (median about 2 mg/kg; Figure 16c, Figure 3e).

For chromium, both the AEC analysis (Figure 17b) and the HDP evaluation produced very few changes (Figure 11b). Two model grid cells had predicted changes greater than the uncertainty in the data (Figure 17c), compared with 3 cells in the HDP evaluation (Figure 11c). Both increases were only slightly greater than the uncertainty in the data.

Results are summarized in Table 7. Few predicted changes in concentration were greater than the uncertainty threshold, similar to the HDP evaluation. The spatial distribution was generally similar to the HDP evaluation, although more increases in concentration were observed than in the HDP evaluation, as was expected. Thus, chemical concentrations in samples collected after the HDP are likely to be indistinguishable from concentrations in samples collected prior. It is improbable that deposition due to the HDP will affect USEPA's ability interpret sediment samples in Newark Bay.

5.4 Effects At Proposed NBSA Phase II Locations

Tierra Solutions has developed a draft Phase II sampling program that is currently under review by USEPA (Tierra Solutions 2006). A total of 18 coring locations were proposed for Phase II sampling by Tierra Solutions. Eleven of these were previously sampled during Phase I activities; the Phase II cores will be collected within 50 feet of their associated Phase I locations (Table 6-1 from Tierra Solutions 2006). Two additional cores represent new sampling locations within select Industrial Waterfront Areas; one within the NBSA (082) and one in the adjacent tidal straight, the Kill Van Kull (081). The proposed location 081 was included in the analysis, despite its location outside of the NBSA, because it was within the study area (the model domain). Five Phase II cores are proposed to be collected from outside the NBSA and the study area (one in Arthur Kill and four from tributaries to the Arthur Kill) were not considered in the analysis. Additionally, USACE proposed the collection of samples from 15 other locations within the NBSA. Using the results of the analysis discussed above, current and model-predicted post-HDP chemical concentrations at these 28 proposed Phase II sampling locations were compared.

For the HDP evaluation, the changes computed to occur within each of the model grid cells representing the Phase II sampling locations are listed in Table 8. Out of 168 comparisons (6 chemicals X 28 sites), two values were computed to change from existing concentrations by more than the precision of the Phase II data; one value for mercury and one for DDT. The changes for both chemicals were predicted to occur at USACEP2-14. These were the result of low existing concentrations, as measured in closest core, 39_PRP-99-01. The mercury concentration changed from 0.016 to 0.026 mg/kg; both of these values are considerably lower than the median concentration in surface sediments (approximately 2.0 mg/kg). The DDT concentration changed

from 0.001 to 0.003 mg/kg; both of these values are considerably lower than the median concentration in surface sediments (0.05 mg/kg). Thus, the concentrations change by a relatively small amount in absolute terms, but because the estimated existing concentrations are low, the change exceeds the precision of the data. Thus, overall, predicted changes in surface sediment chemical concentrations are anticipated to be minimal. This analysis can be repeated for future revised sampling plans for the NBSA to help USEPA locate sampling sites.

Results for the AEC analysis are provided in Table 9. As for the HDP evaluation, out of 168 comparisons (6 chemicals at 28 sites), two values were computed to change from existing concentrations by more than the precision of the data. These were the same chemicals and the same location as or the HDP evaluation and thus, the significant changes were also the result of low existing chemical concentrations, relative to the overall distribution. Thus, overall, predicted changes in surface sediment chemical concentrations are anticipated to be minimal.

6 CUMULATIVE ASSESSMENT

While the HDP is underway, additional dredging is expected to occur in Newark Bay for other projects including channel and berth operations and maintenance (O&M). Anticipated volumes of dredged material are discussed in the EA and are summarized in Table 10. To simulate the impact of this additional dredging, the total volumes likely to be dredged while the HDP is under construction were distributed among the HDP dredge areas as well as additional areas in Port Newark Channel. The MIKE3 model was used to estimate the deposition due to the combination of the HDP and other dredging anticipated in Newark Bay during construction of the HDP.

Predicted deposition is more widespread in the cumulative assessment than in the HDP-only case, as expected (Figure 18)[8]. This is especially evident in the Port Newark Channel, where no HDP dredging is to take place, but where additional dredging is planned.

Thiessen polygons representing dredged material concentrations including the Port Newark O&M areas are presented in Figures 18a through 18f. Contaminant results are presented in Figures 19 through 24, which are structured the same as Figures 6 through 11. The predicted changes in surface sediment chemical concentrations are compared with the precision of the NBSA RI/FS Phase I data in Table 7.

Qualitative results for TCDD are shown in Figure 19b. Thirteen model grid cells had predicted changes that were greater than the uncertainty in the data, compared with 10 cells in the HDP evaluation. As in the HDP evaluation, most of these were located at the northern tip of the HDP (Figure 19c). Three cells were located in southern Newark Bay and in Kill van Kull. All but one of these potentially noticeable changes were increases in concentration, and all of the increases occurred in areas with very low current TCDD concentrations (Figure 19c, left and middle panels). The concentrations that increased were predicted to remain below 10 ng/kg after the HDP is complete. One cell was predicted to decrease slightly more than the precision of the data (Figure 19c).

Qualitative results for PCBs are shown in Figure 20b. Seventeen model grid cells had predicted changes that were greater than the uncertainty in the data, compared with 12 cells in the HDP evaluation (Figure 20c). Similar to the HDP evaluation, these were located at the northern tip of the HDP. Also similar to HDP evaluation, all of these potentially noticeable changes were increases in concentration, and all occurred in areas with low current PCB concentrations (Figure 20c, left and middle panels). These concentrations were not predicted to exceed 0.012 mg/kg after the HDP is complete.

Qualitative results for DDT are shown in Figure 21b. Twenty nine model grid cells had predicted changes that were greater than the uncertainty in the data, compared with 25 cells in the HDP evaluation. Concentrations increased along the Arthur Kill (Figure 21b), similar to the HDP evaluation (Figure 8b). Similar to the HDP evaluation, these potentially noticeable changes were increases in concentration, and none of these concentrations were predicted to exceed 0.10 mg/kg after the HDP is complete.

Qualitatively, results for BAP produced some visible changes in the Port Newark Channel (Figure 22b), in contrast to the HDP evaluation results (Figure 9b). However, only 37 model grid cells had predicted changes that were greater than the uncertainty in the data, compared with 36 cells in the HDP evaluation (Figure 22c). All but one of these cells were located in the Kill van Kull, the same location is in the HDP evaluation (Figure 22c, right panel). These changes were due to one data value, as in the HDP evaluation (Figure 9c). One grid cell in South Elizabeth Channel showed a change slightly greater than the precision of the data (Figure 22c).

Qualitatively, cumulative assessment results for mercury (Figure 23b) produced more visible changes than the HDP evaluation (Figure 10b). Nonetheless, the number of changes that exceeded the uncertainty in the data was similar: 11 model grid cells, compared with ten cells in the HDP evaluation. These were located in the Arthur in Kill (Figure 23c), as in the HDP evaluation (Figure 10c). All of these potentially noticeable changes were increases in concentration. All of the changes

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[8] The left-hand panel of Figure 18 is a copy of Figure 38 from Appendix 1, showing interpolated model results. The righ-hand panel presents the same results individually for each model sediment grid cell.

in the Arthur Kill occurred in areas with relatively low current mercury concentrations (Figure 23c, left and middle panels): concentrations in this area were not predicted to exceed 0.16 mg/kg after the HDP is complete. This value is relatively small compared with the overall level of contamination within the bay, for which the median is approximately 2 mg/kg.

For chromium, the cumulative assessment (Figure 24b) showed slightly more visible changes than the HDP evaluation (Figure 11b). These occurred along Port Elizabeth and south Elizabeth Channels (Figure 24c) and were due to decreases in concentrations. Six model grid cells had predicted changes that were greater than the uncertainty in the data (Figure 24.1), compared with three cells in the HDP evaluation (Figure 24c). Four were located along the south Elizabeth channel and two along the Port Elizabeth channel.

Results are summarized in Table 7. While more changes were predicted in the cumulative assessment than in the HDP evaluation, the proportion of Newark Bay that showed changes greater than the precision of the data was low. As in the HDP evaluation, changes greater than the precision of the data occurred at the northern tip of the HDP, in the Arthur Kill, and, for BAP, in Kill van Kull. In the cumulative assessment, changes were also observed in or adjacent to the port channels, in or adjacent to the transitional zones. Also, more decreases in concentration were predicted than in the HDP evaluation. Overall, though, throughout the bay, those few changes that were greater than the uncertainty in the data were often only slightly greater. Furthermore, it should be noted that the analysis is conservative, insofar as a portion of the additional dredging is to be performed irrespective of the HDP, and thus predicted changes in contaminant levels in surface sediments represent, in part, the continuation of an ongoing process. In conclusion, for nearly all of Newark Bay, predicted changes in concentration were generally less than or similar to the precision of the data. Consequently, chemical concentrations in samples collected after the HDP are likely to be indistinguishable, in general, from chemical concentrations in samples collected prior. Deposition due to the HDP and other dredging is unlikely to affect USEPA's ability to interpret chemical concentrations in sediment samples from the flats.

The results of the analysis presented here for proposed Phase II sediment sampling locations are provided in Table 11. As for the HDP and AEC analyses, out of 168 comparisons (6 chemicals X 28

sites), two values were computed to change from existing concentrations by more than the precision of the data. These were the same chemicals and the same location as for the HDP and AEC evaluation. Concentrations changed to a greater degree than in the HDP-only and AEC evaluations (for mercury from 0.016 to 0.058 mg/kg, and for DDT from 0.001 to 0.01 mg/kg. For comparison, all values remained considerably less than the overall medians of the data (approximately 2.0 mg/kg Hg and 0.05 mg/kg DDT). Thus, the predicted concentration increases are still relatively minor. Overall, predicted changes in surface sediment chemical concentrations are anticipated to be minimal.

7 SUMMARY

Overall, few predicted changes in concentration were greater than the uncertainty threshold. This was true of the HDP evaluation, the AEC evaluation, and the cumulative analysis.

Flats. In the HDP evaluation and in the AEC analysis, very few cells lying in the flats exhibited changes greater than the precision of the data, for all chemicals. This is due to limited deposition and to the general similarity between contaminant concentrations in dredged material and in surface sediments on the flats.

Channels. Changes in contaminant concentrations in surface sediments were assessed in the channels that lie outside of the HDP; these extend from the Bergen Point area into Kill Van Kull and in the channels in northern Newark Bay, including Port Newark Channel. Predicted changes in concentration that were greater than the precision of the data were found within the navigational channel at the northern tip of the HDP (TCDD and PCBs). For BAP, the changes that were greater than the precision of the data were all associated with one data value in the Kill Van Kull.

Results were generally similar for the AEC analysis, with the following exceptions. For TCDD, changes that were greater than the precision of the data were also found in the Kill van Kull. For DDT, a few cells in the channel in northern Newark Bay exceeded the precision of the data.

Transitional zones. The transitional zones were represented by the model cells lying adjacent to the channel. Predicted changes in concentration due to the HDP that were greater than the precision of the data tended to be found adjacent to the navigational channel at the northern tip of the HDP (TCDD and PCBs) and along the Arthur Kill (DDT, Hg). The few cells that showed changes in chromium levels greater than the precision of the data were located along the Port Elizabeth Channel.

Results were generally similar in the AEC analysis.

In the cumulative assessment, the locations of cells showing changes greater than the precision of the data were generally similar to the HDP and AEC evaluations.

In conclusion, the analysis presented here shows that chemical concentrations projected to be present after the HDP is completed are, with a few exceptions, indistinguishable from current sediment concentrations. Furthermore, in general, those few changes that were greater than the uncertainty in the data were often only slightly greater. Therefore, it is improbable that deposition due to the HDP will affect USEPA's ability to interpret sediment samples in Newark Bay.

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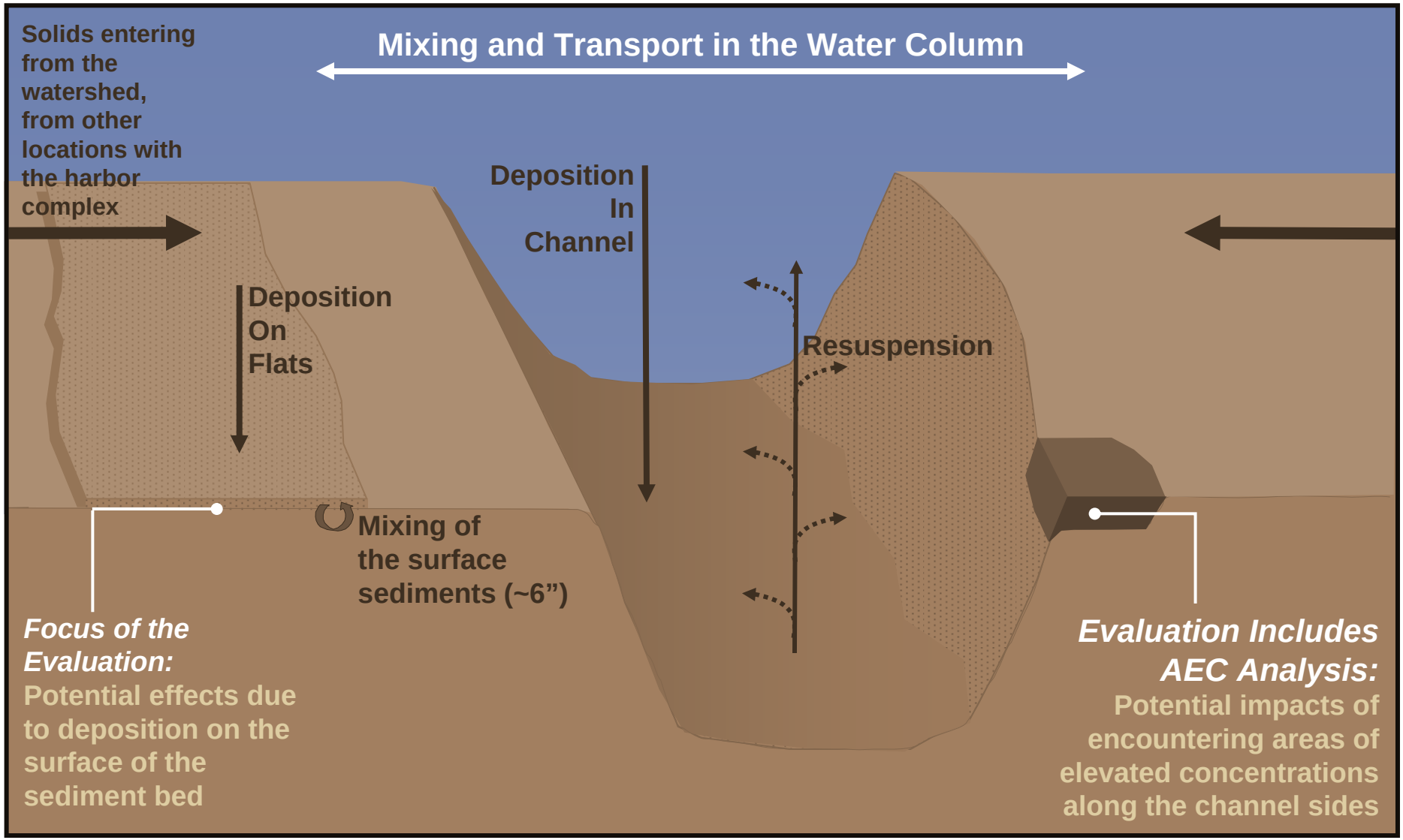
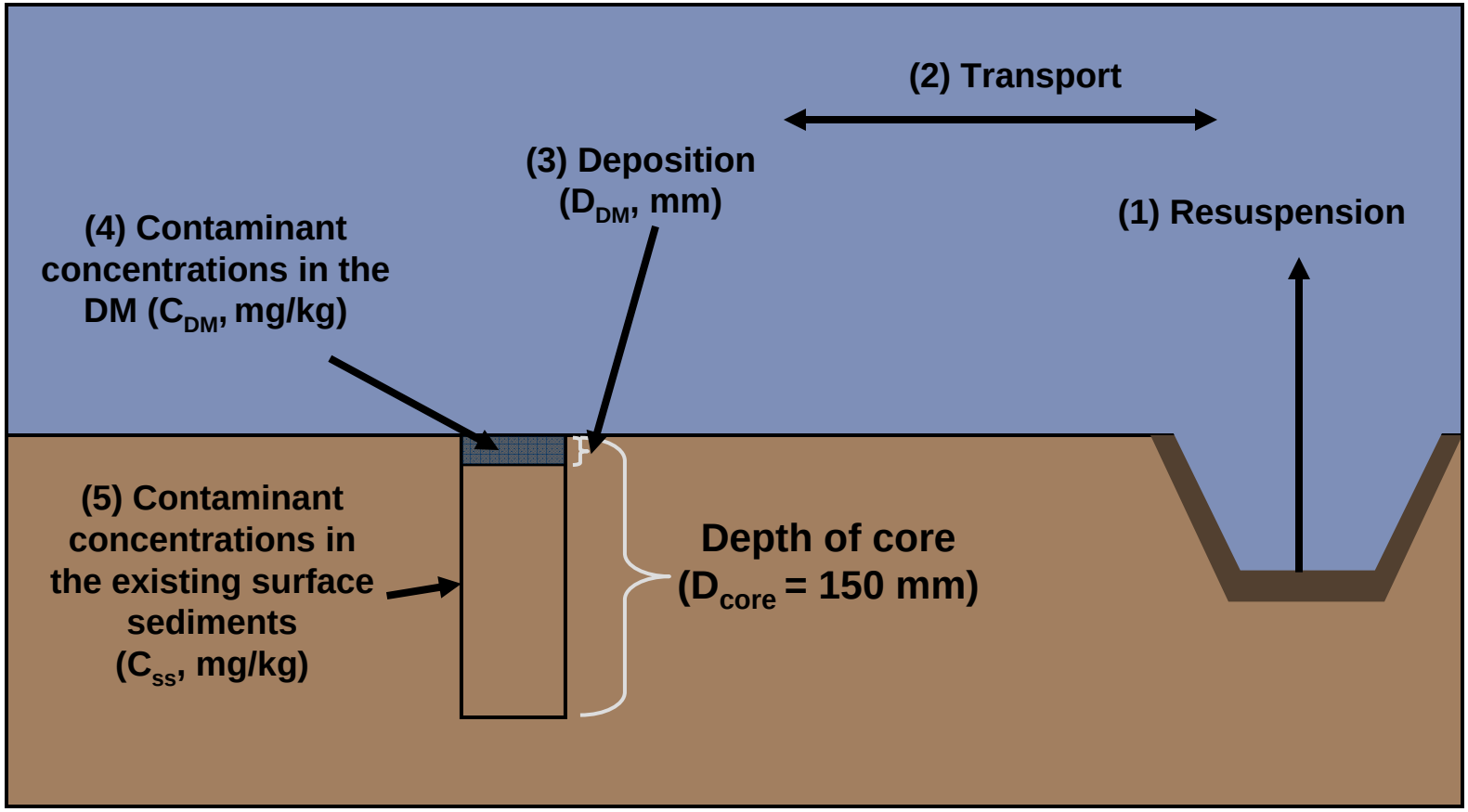


Figure 1a. Conceptual model of potential effects of dredging on the RIFS.



$$D_{core} = D_{DM} + D_{SS}$$

$$C_{post-dredging} = \frac{1}{D_{core}}\left[D_{DM}C_{DM} + (D_{core} - D_{DM})C_{SS}\right]$$

Figure 1b. Schematic of the analysis of effects.

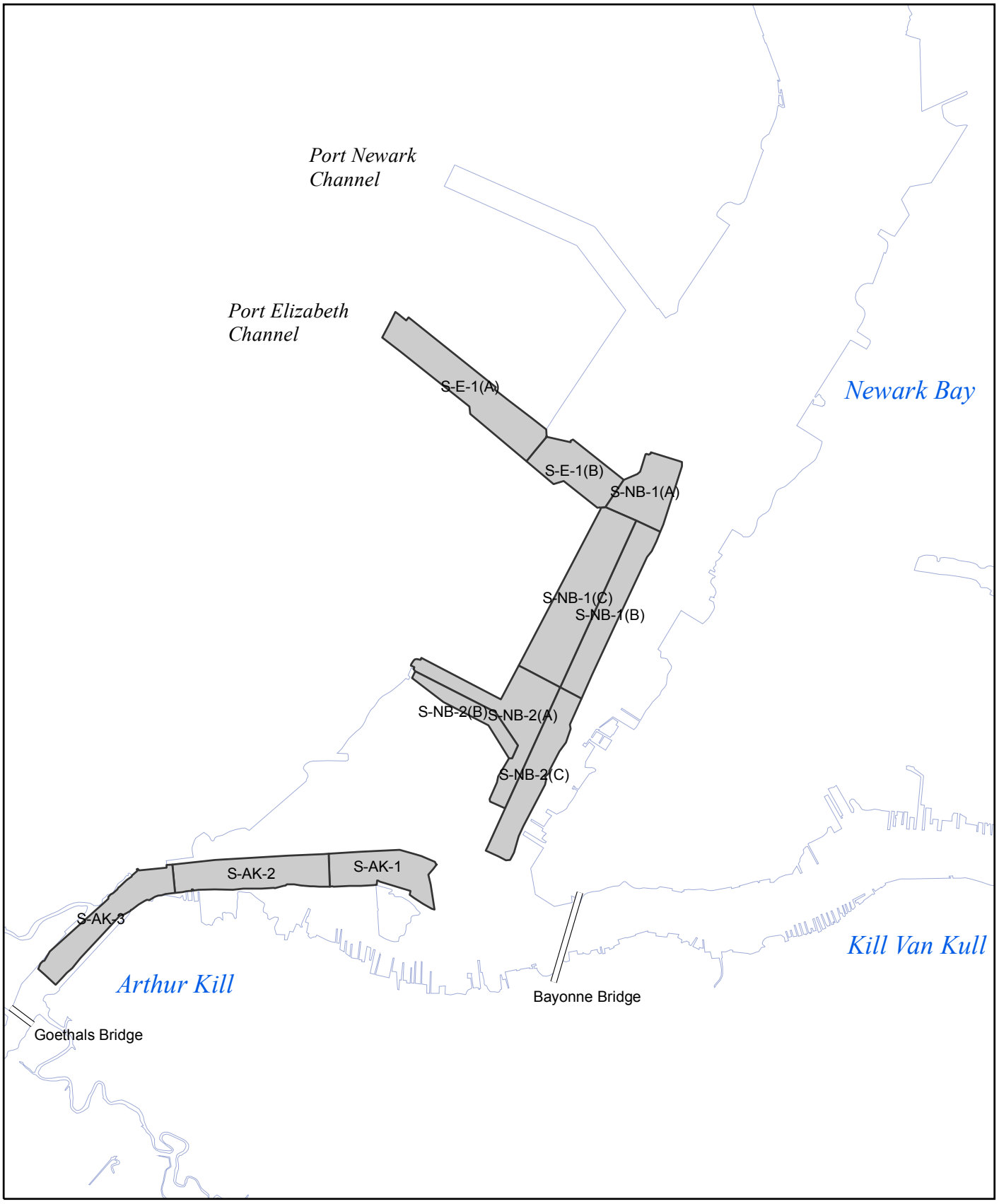


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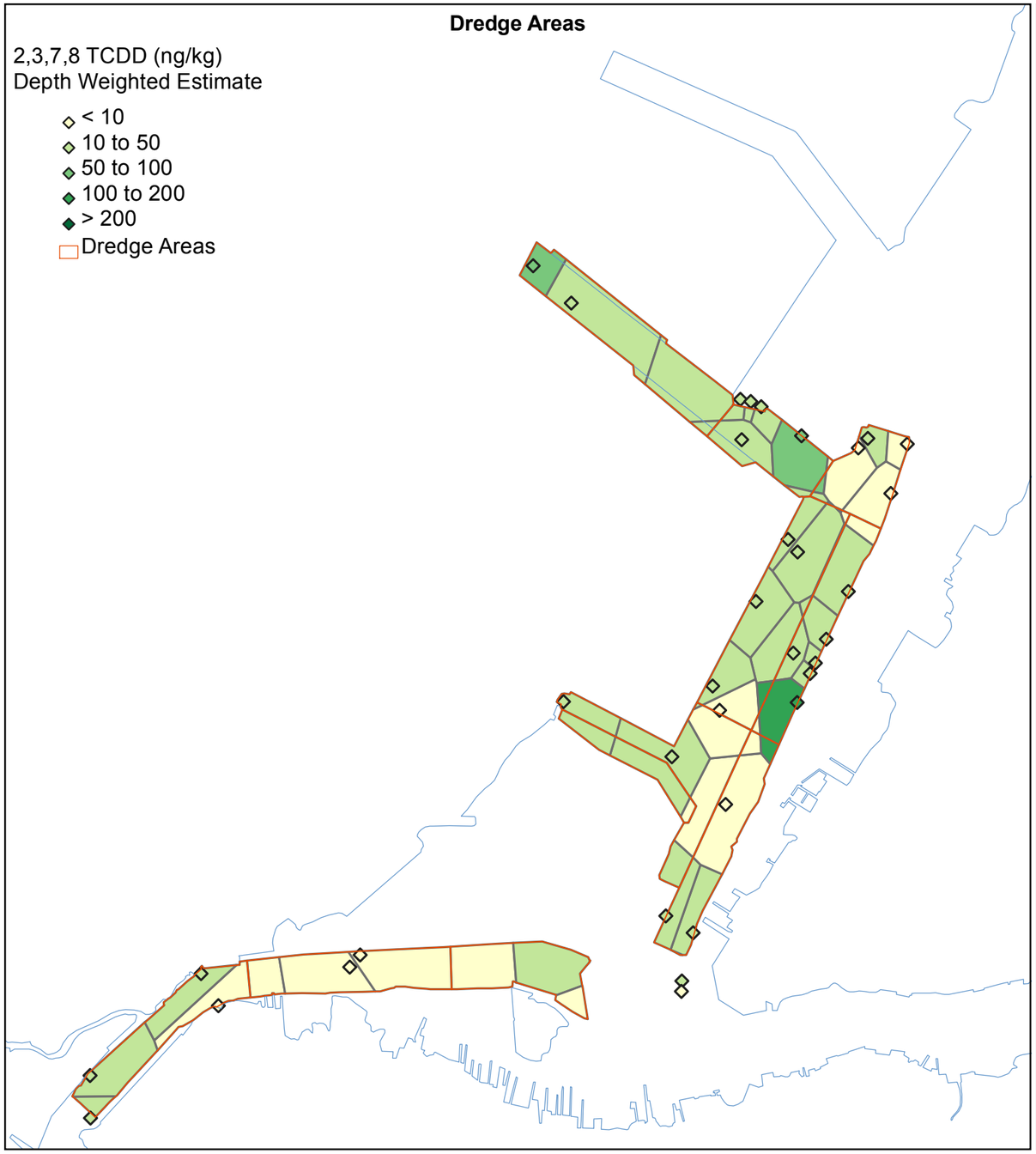
Figure 2
Dredge areas used in the model

Dredge Areas

2,3,7,8 TCDD (ng/kg)
Depth Weighted Estimate

- < 10
- 10 to 50
- 50 to 100
- 100 to 200
- > 200
- Dredge Areas



Impact Areas

2,3,7,8 TCDD (ng/kg)
Surface Sediments

- < 10
- 10 to 50
- 50 to 100
- 100 to 200
- > 200
- Dredge Areas

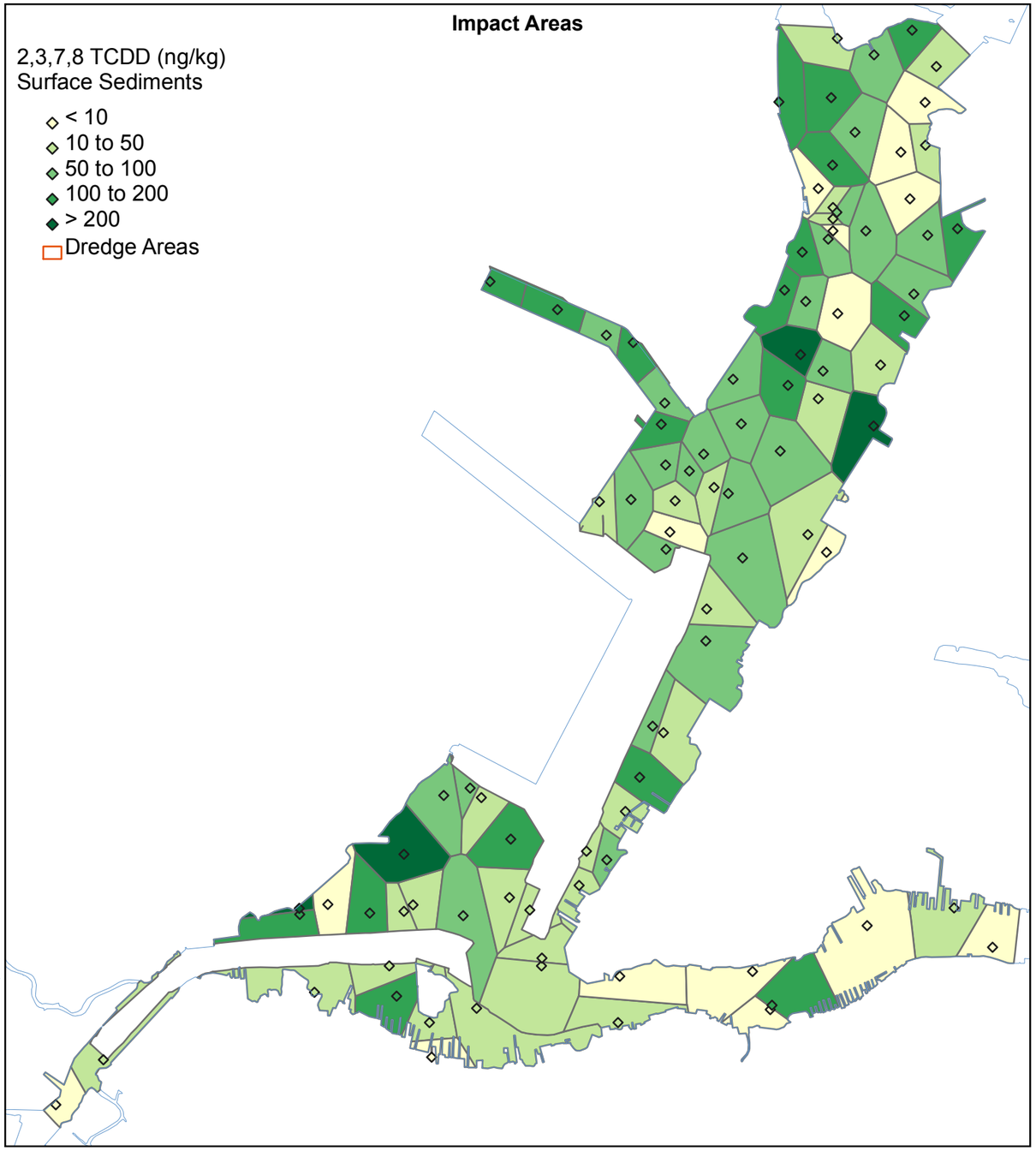


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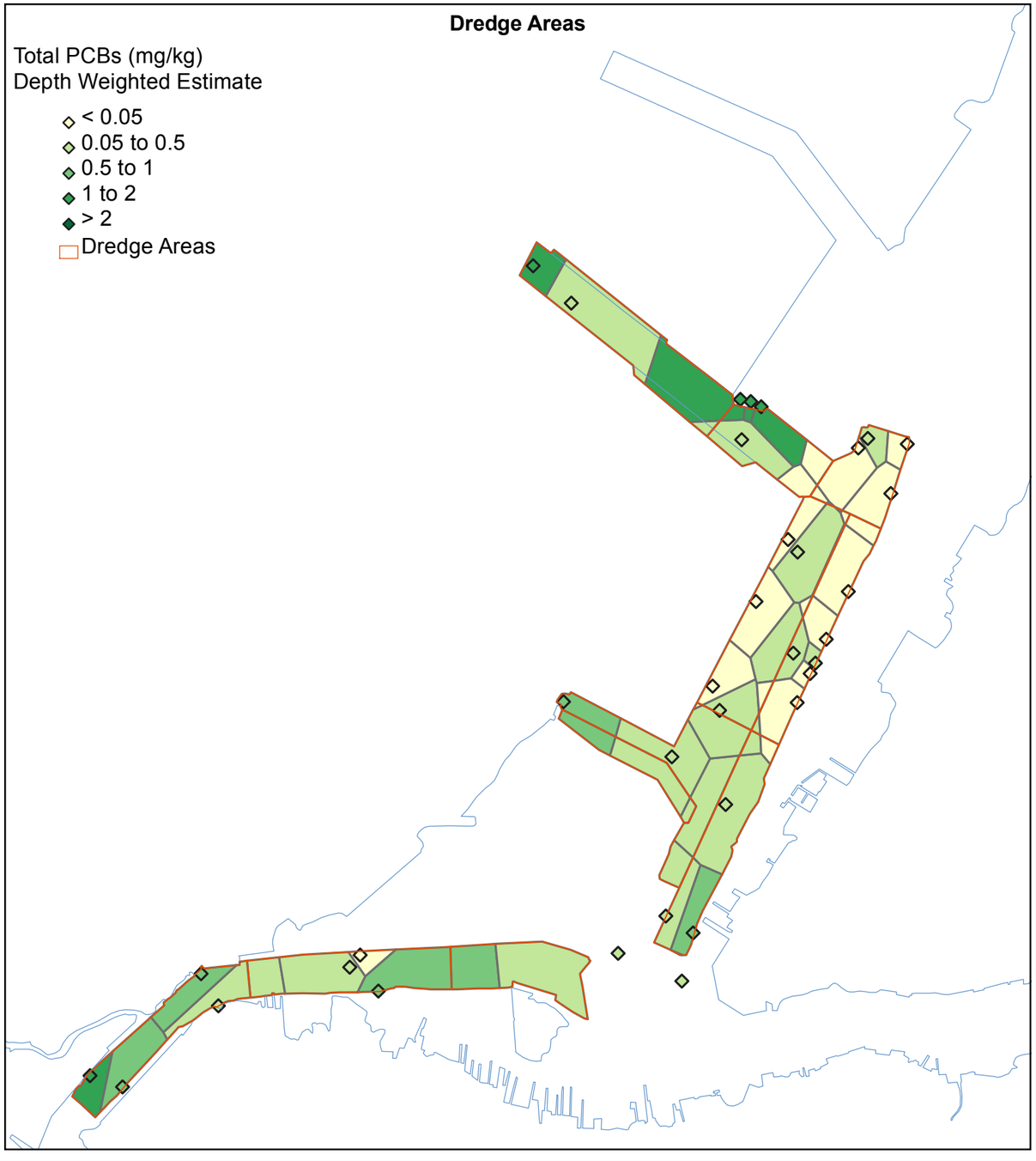
Figure 3a

2,3,7,8 TCDD in the sediments of Newark Bay under current conditions: Thiessen polygons

Dredge Areas

Total PCBs (mg/kg)
Depth Weighted Estimate

- < 0.05
- 0.05 to 0.5
- 0.5 to 1
- 1 to 2
- > 2
- Dredge Areas



Impact Areas

Total PCBs (mg/kg)
Surface Sediments

- < 0.05
- 0.05 to 0.5
- 0.5 to 1
- 1 to 2
- > 2
- Dredge Areas

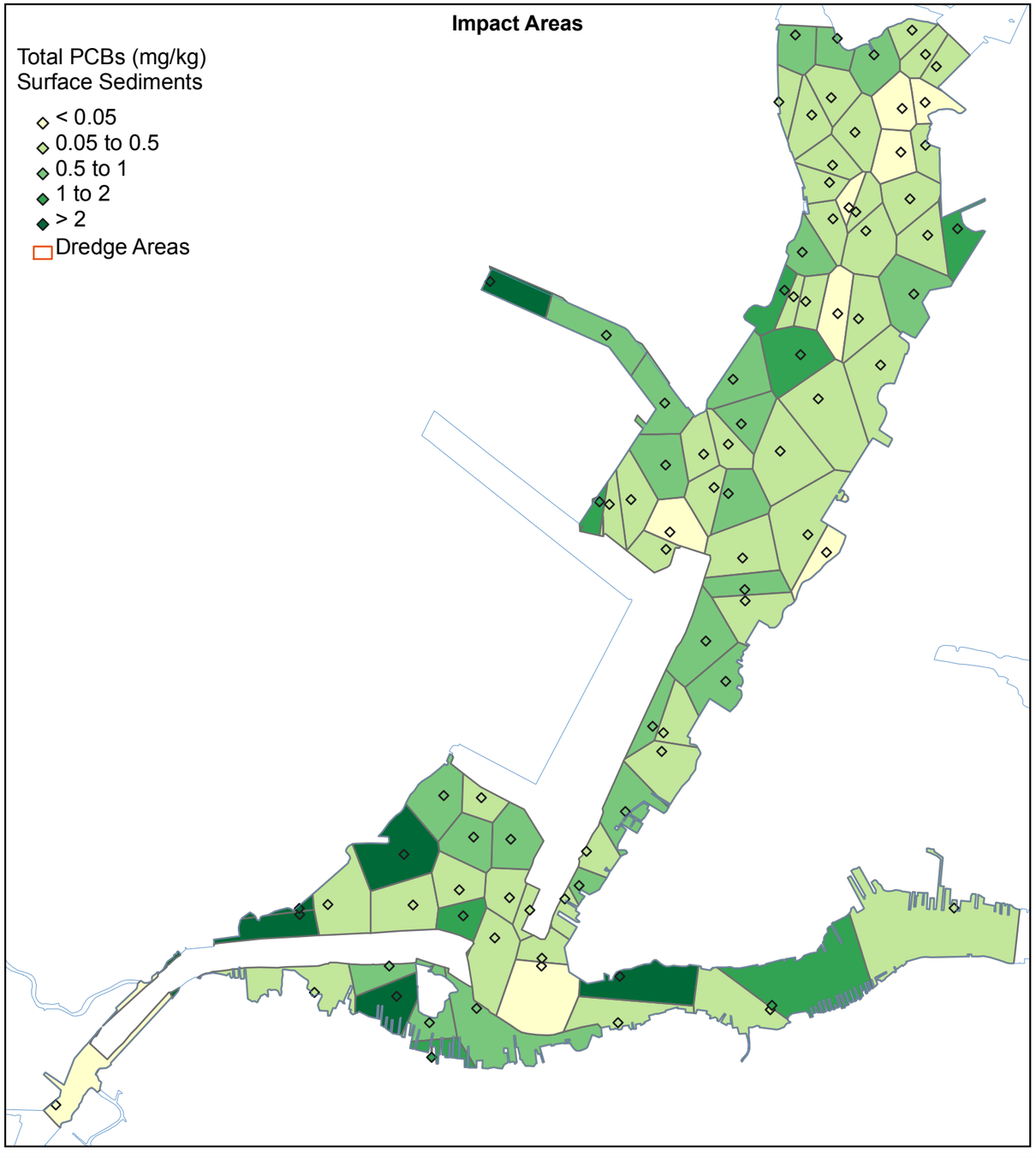


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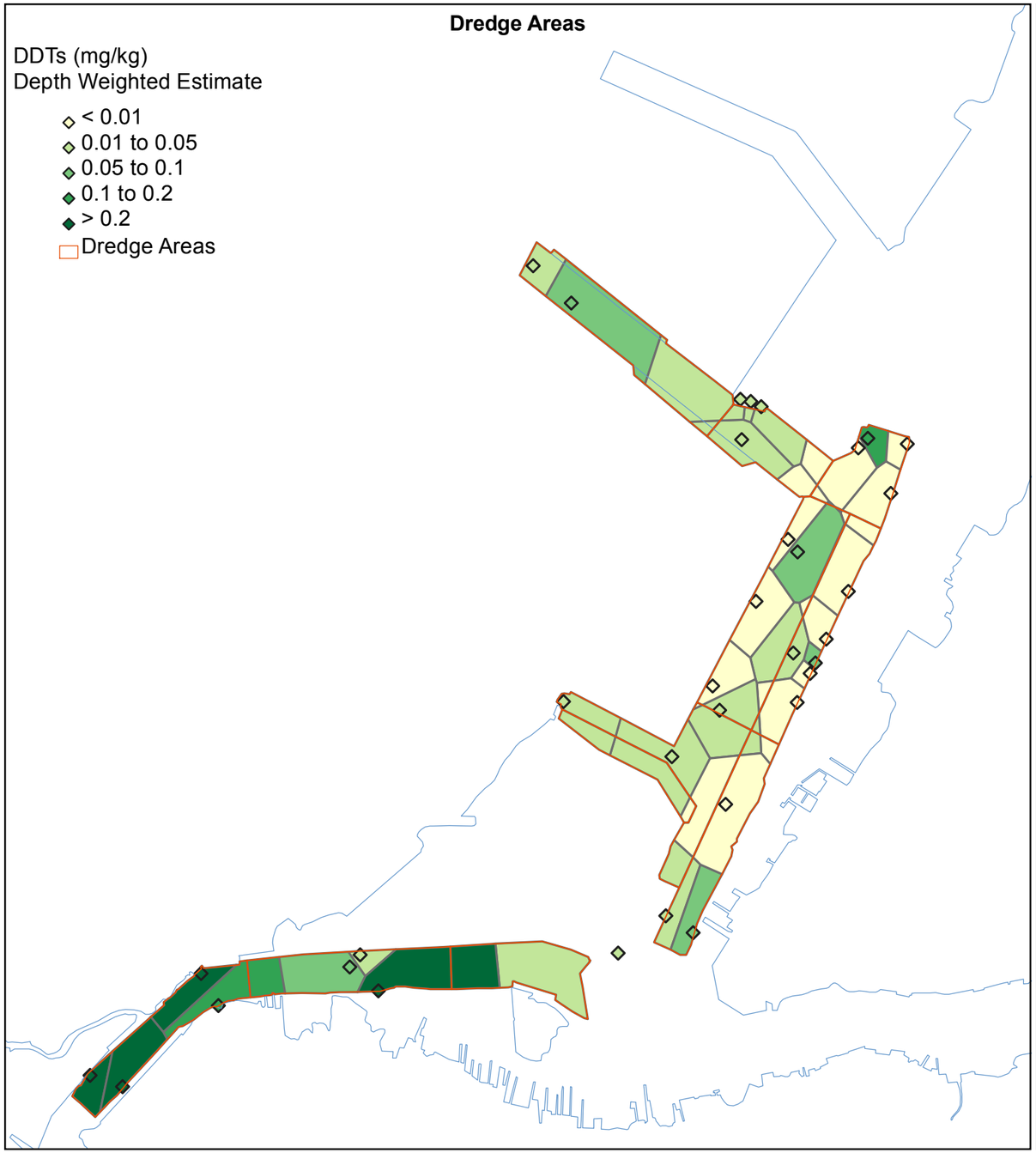
Figure 3b

Total PCBs in the sediments of Newark Bay under current conditions: Thiessen polygons

Dredge Areas

DDTs (mg/kg)
Depth Weighted Estimate

- < 0.01
- 0.01 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- > 0.2
- Dredge Areas



Impact Areas

DDTs (mg/kg)
Surface Sediments

- < 0.01
- 0.01 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- > 0.2
- Dredge Areas

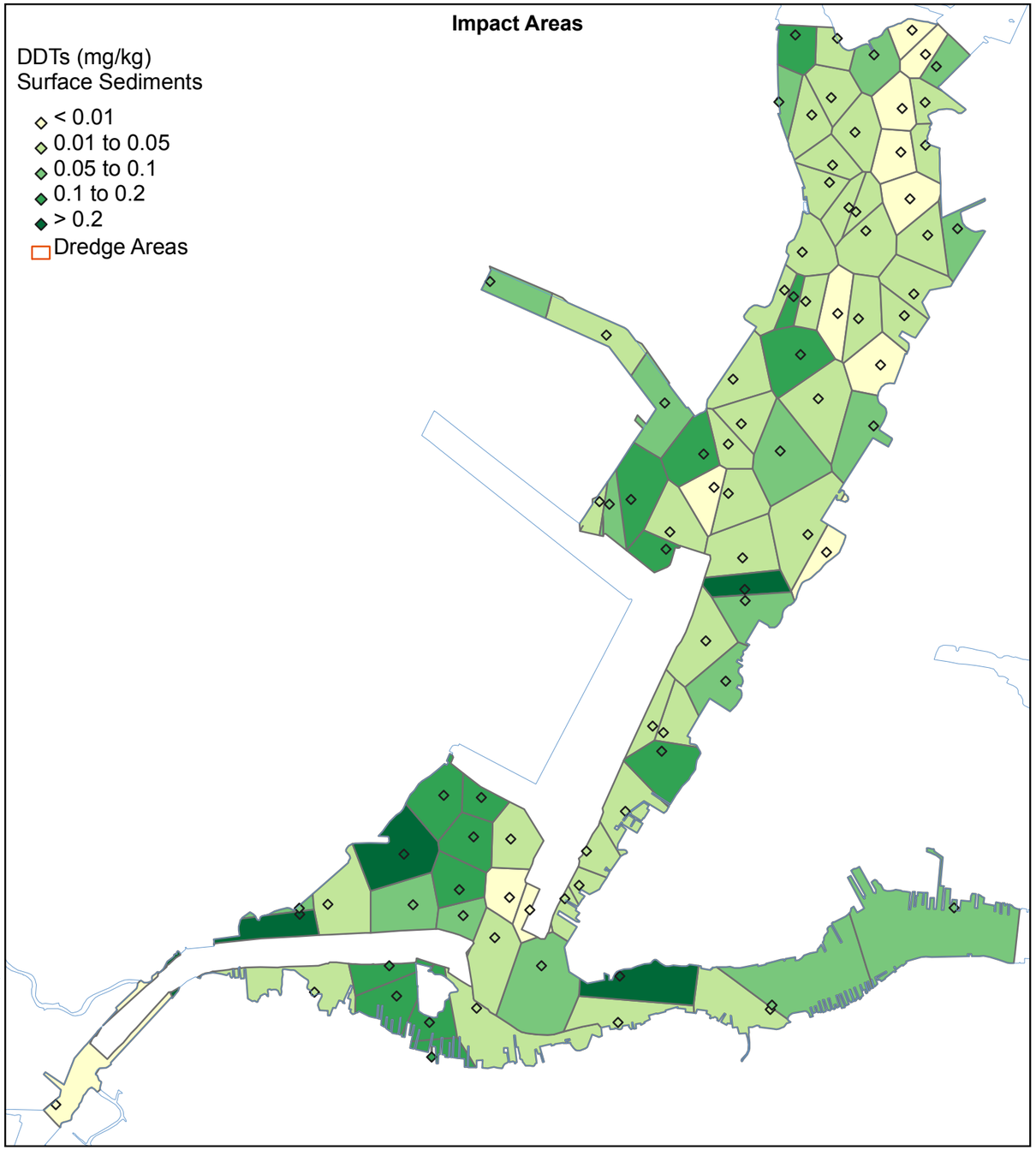


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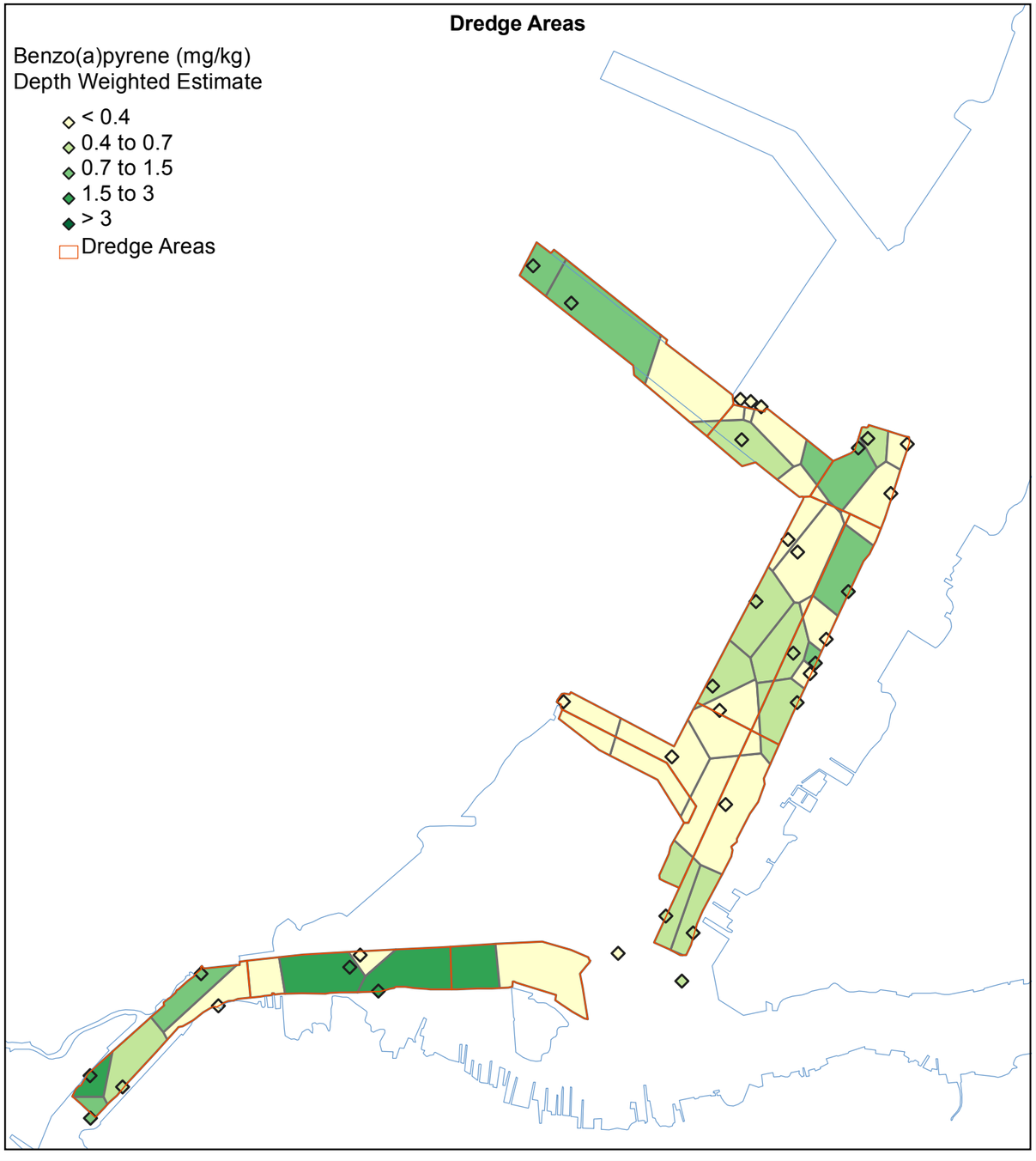
Figure 3c

DDTs in the sediments of Newark Bay under current conditions: Thiessen polygons

Dredge Areas

Benzo(a)pyrene (mg/kg)
Depth Weighted Estimate

- < 0.4
- 0.4 to 0.7
- 0.7 to 1.5
- 1.5 to 3
- > 3
- Dredge Areas



Impact Areas

Benzo(a)pyrene (mg/kg)
Surface Sediments

- < 0.4
- 0.4 to 0.7
- 0.7 to 1.5
- 1.5 to 3
- > 3
- Dredge Areas

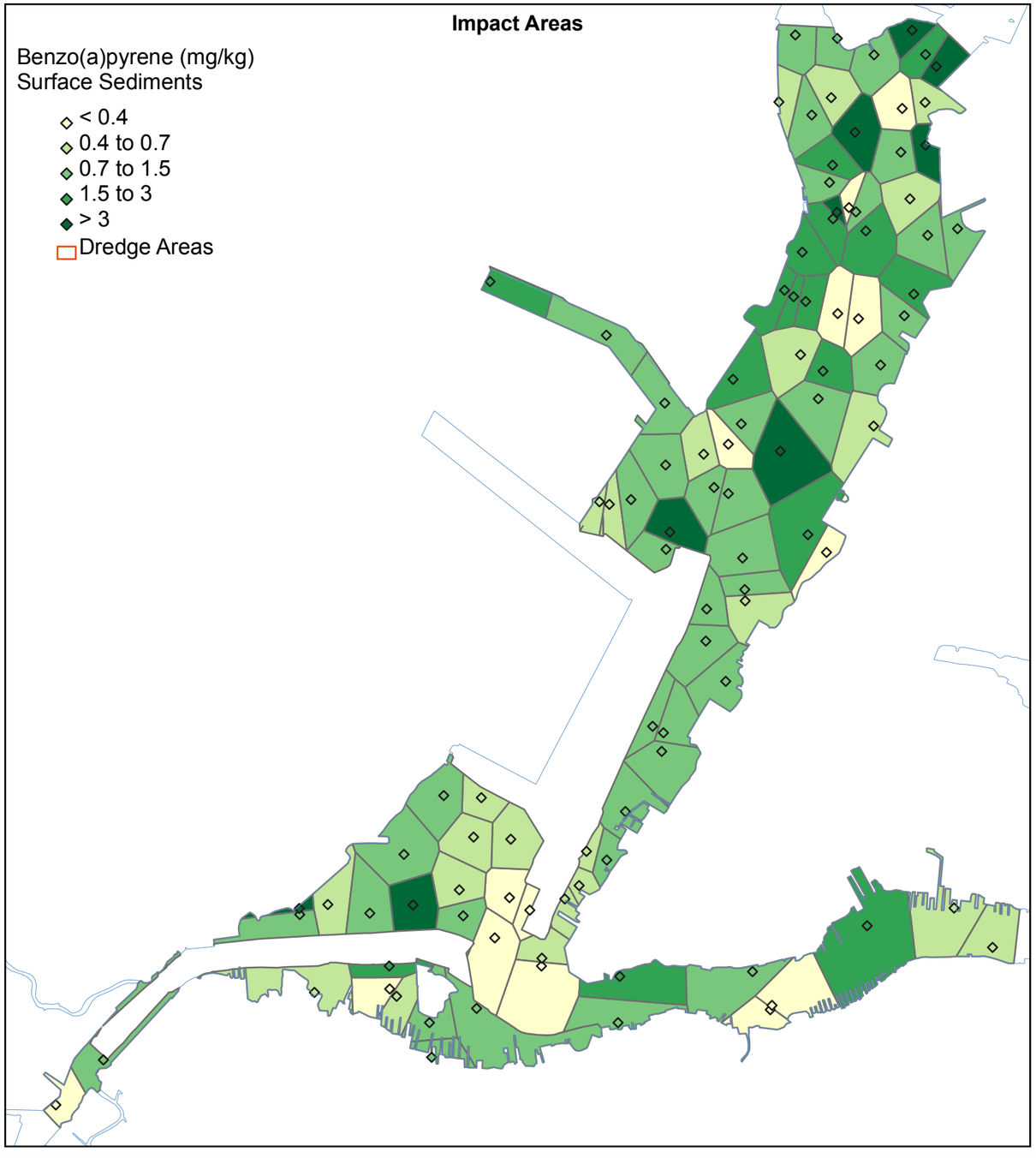


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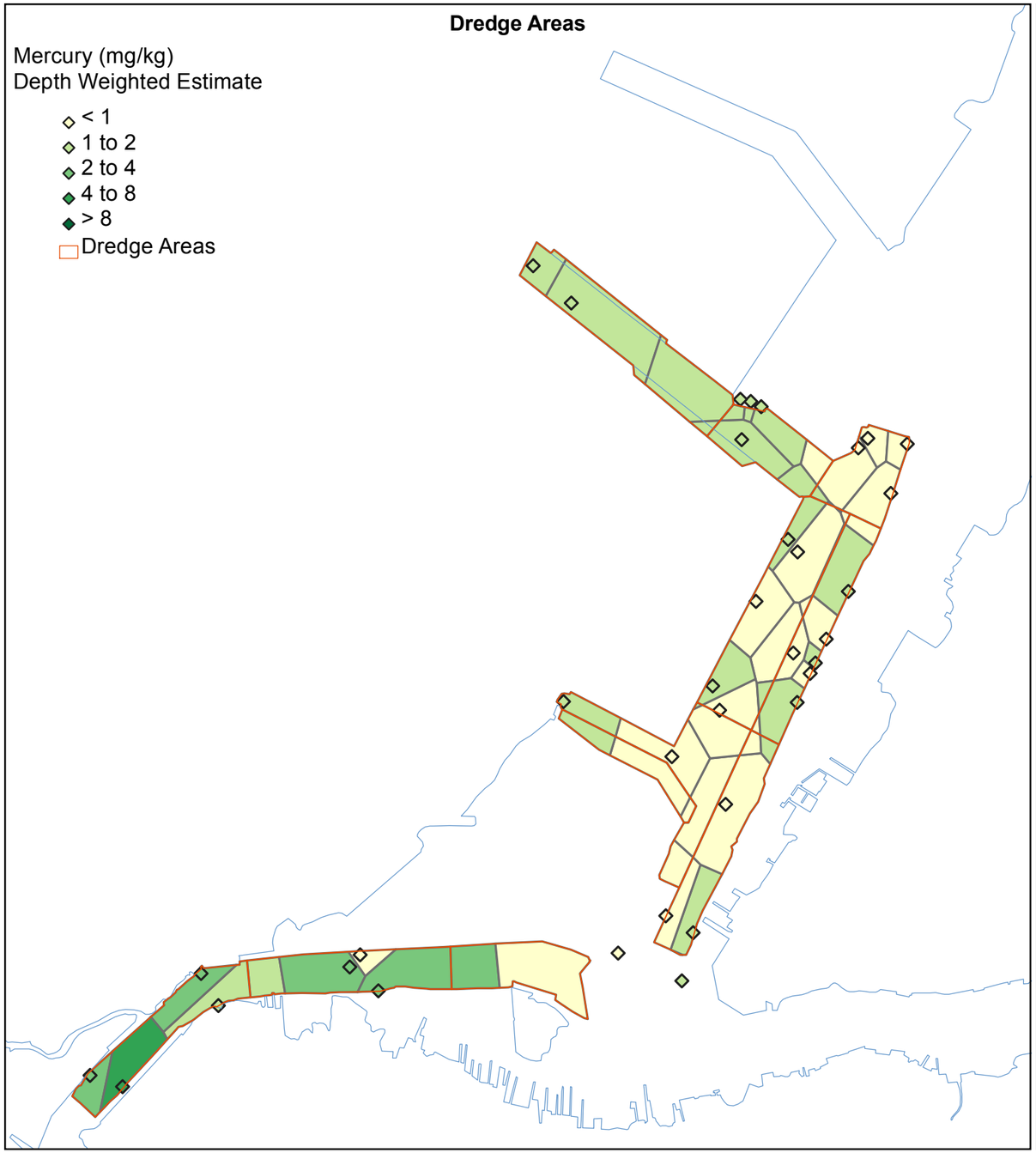
Figure 3d

Benzo(a)pyrene in the sediments of Newark Bay under current conditions: Thiessen polygons

Dredge Areas

Mercury (mg/kg)
Depth Weighted Estimate

- < 1
- 1 to 2
- 2 to 4
- 4 to 8
- > 8
- Dredge Areas



Impact Areas

Mercury (mg/kg)
Surface Sediments

- < 1
- 1 to 2
- 2 to 4
- 4 to 8
- > 8
- Dredge Areas

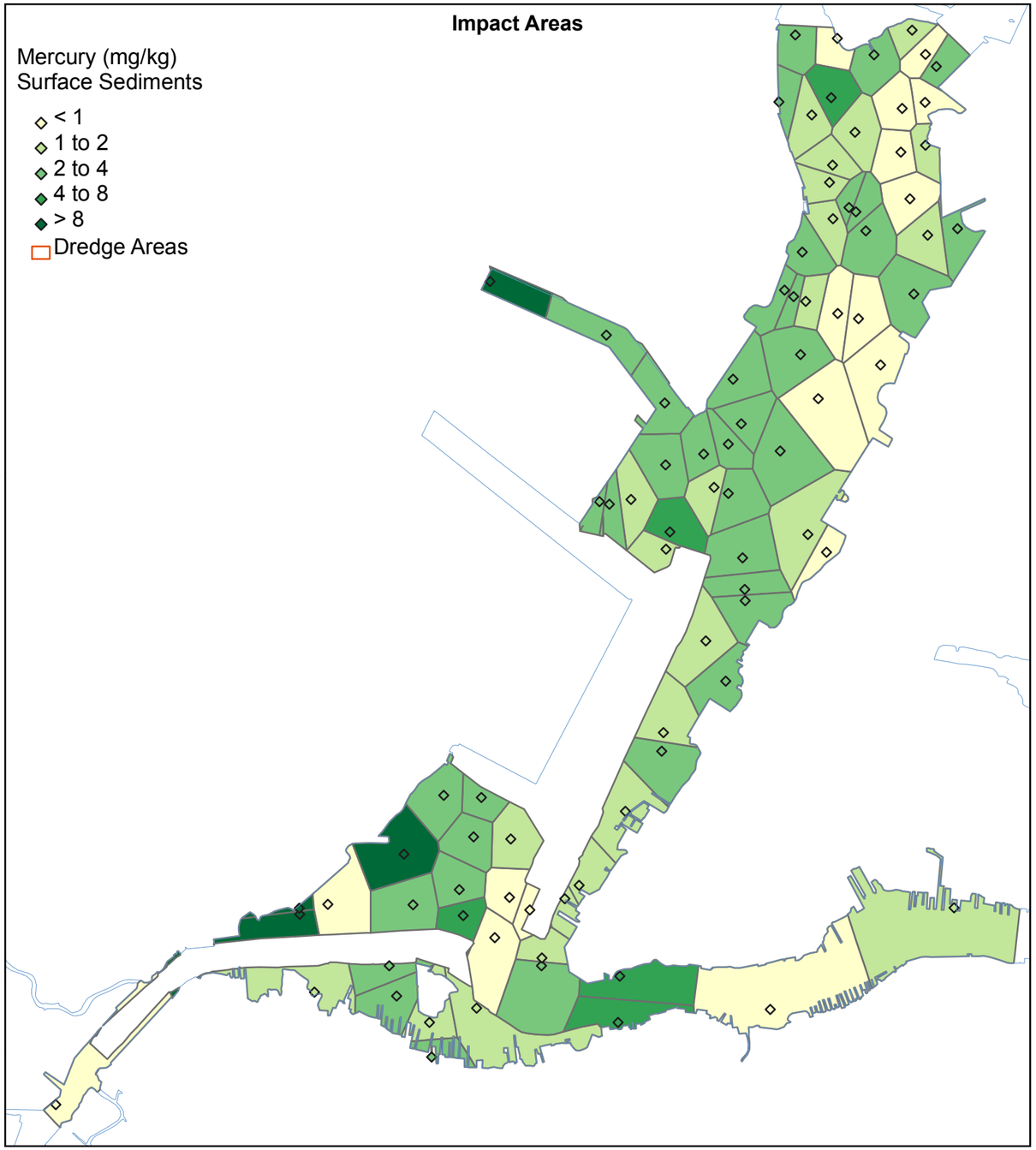


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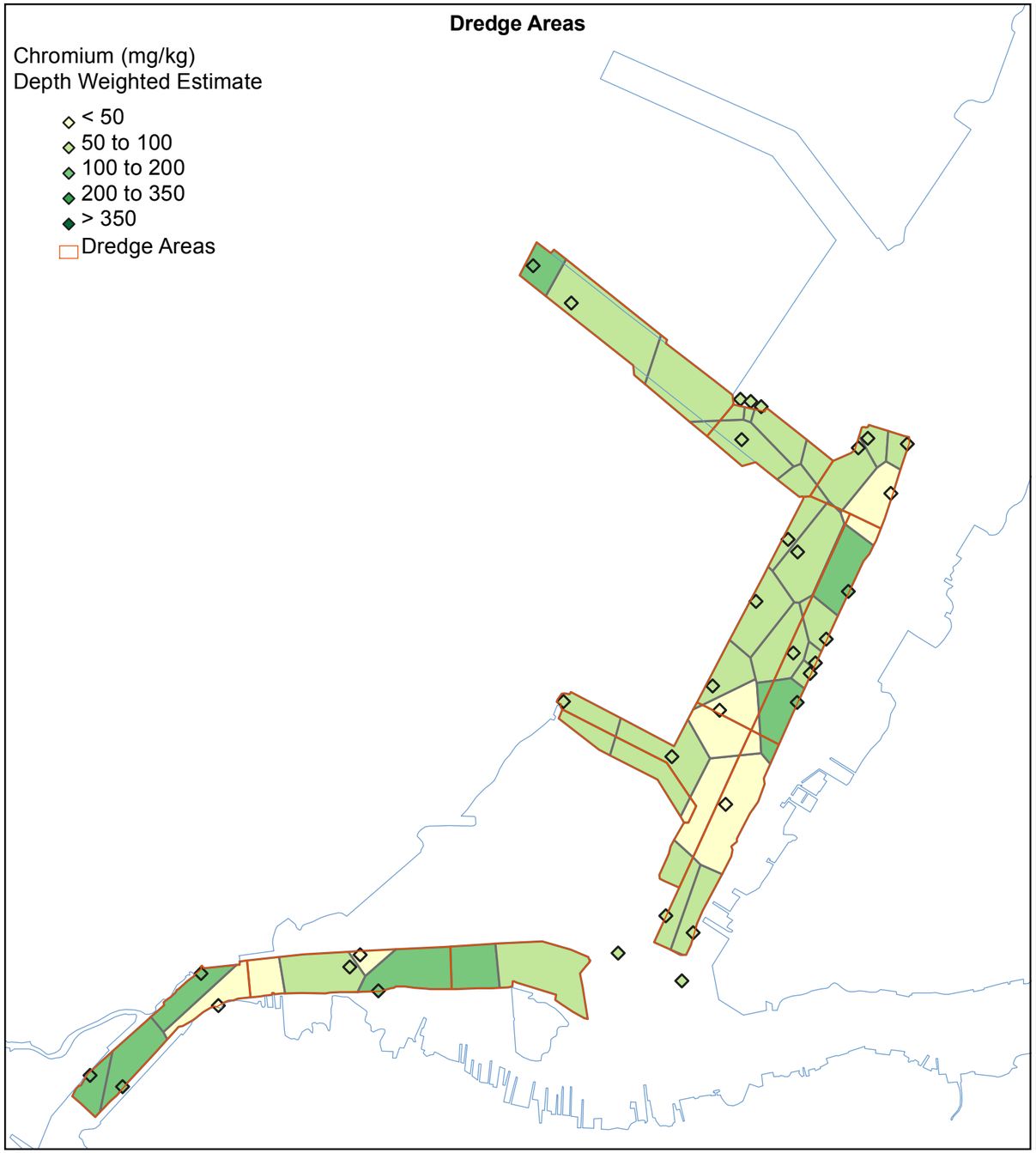
Figure 3e

Mercury in the sediments of Newark Bay under current conditions: Thiessen polygons

Dredge Areas

Chromium (mg/kg)
Depth Weighted Estimate

- < 50
- 50 to 100
- 100 to 200
- 200 to 350
- > 350
- Dredge Areas



Impact Areas

Chromium (mg/kg)
Surface Sediments

- < 50
- 50 to 100
- 100 to 200
- 200 to 350
- > 350
- Dredge Areas

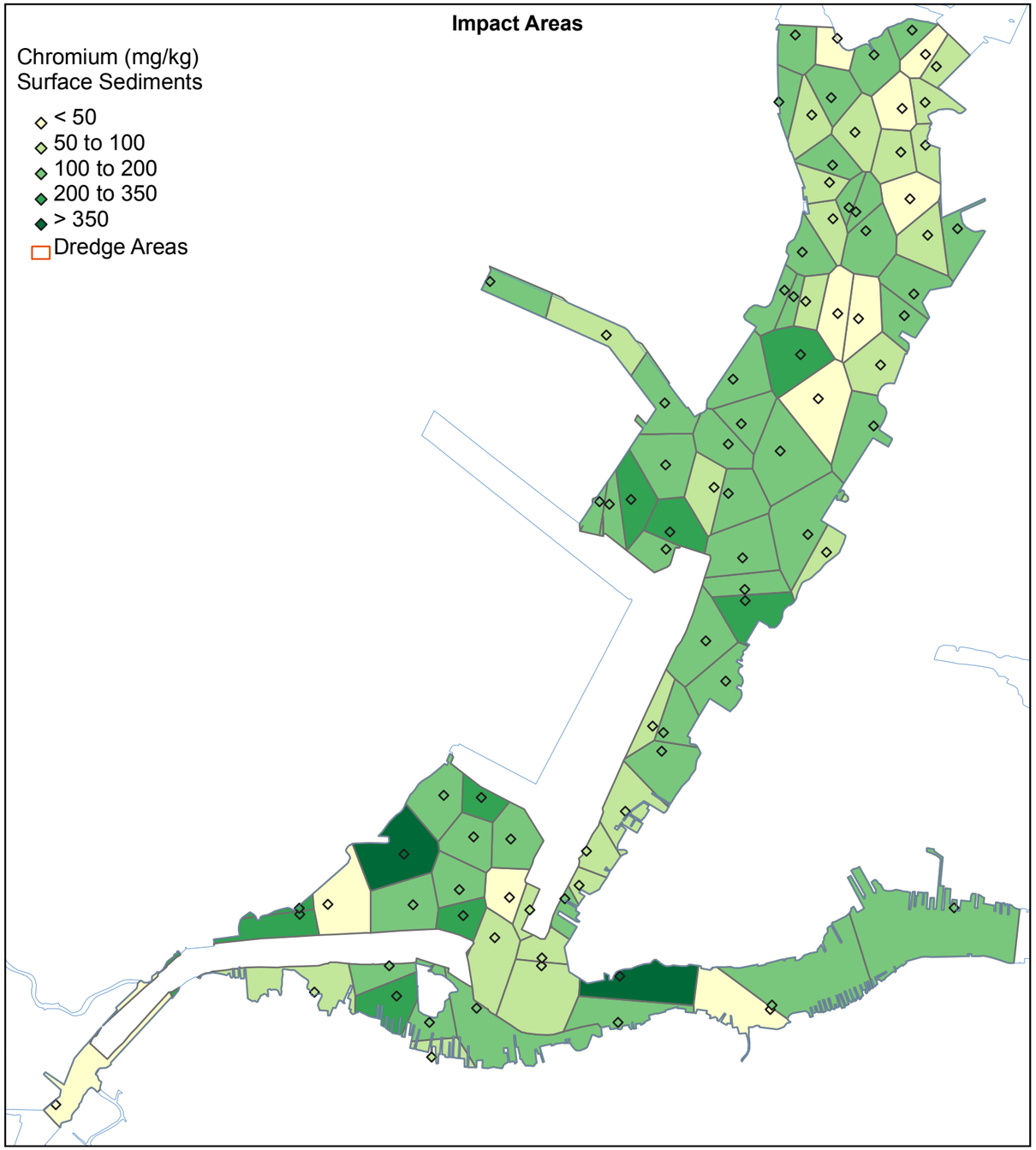


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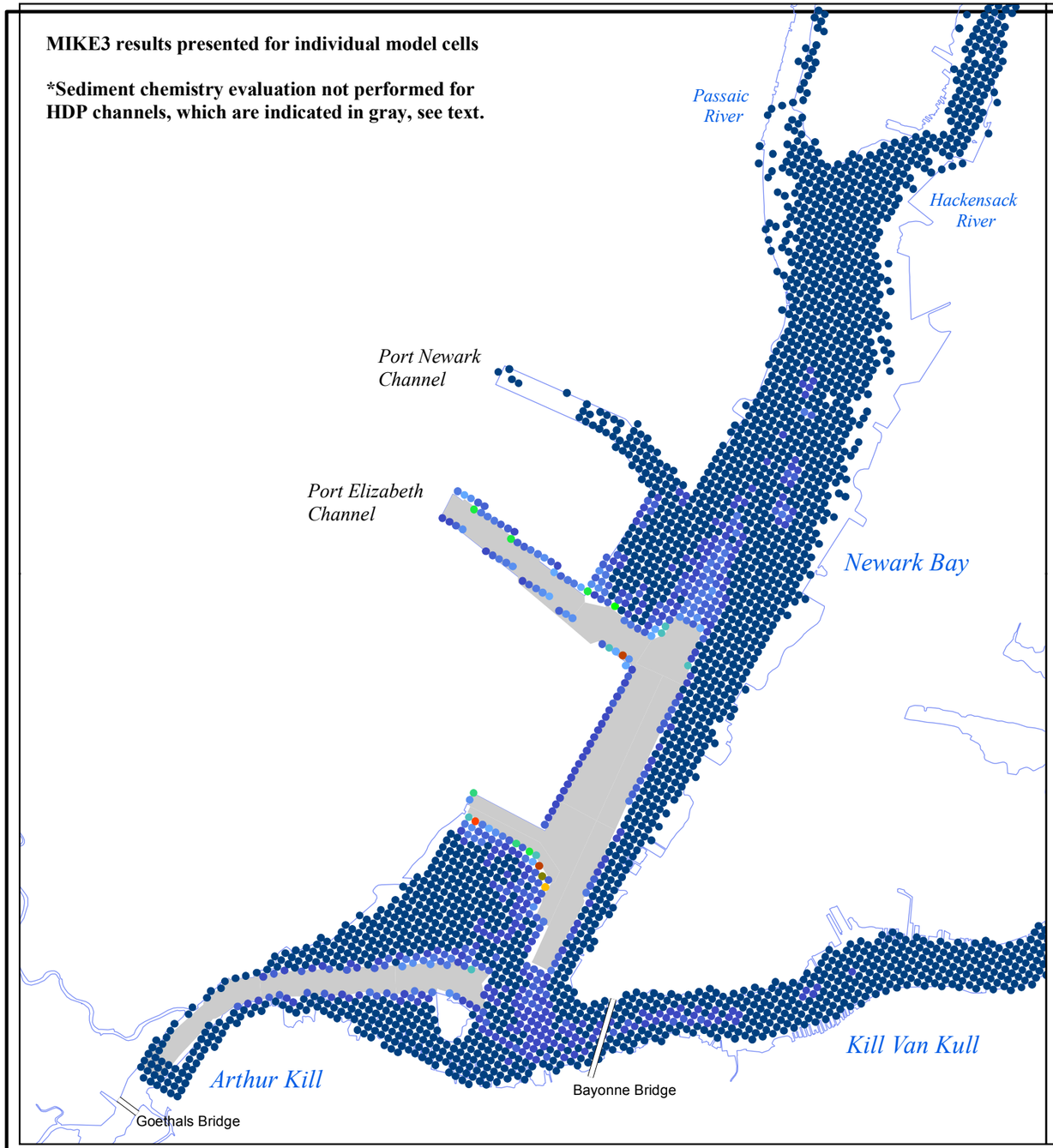
Figure 3f

Chromium in the sediments of Newark Bay under current conditions: Thiessen polygons

MIKE3 results presented for individual model cells

***Sediment chemistry evaluation not performed for HDP channels, which are indicated in gray, see text.**



Interpolated MIKE3 Model Results

Source: Appendix 1, Figure 35

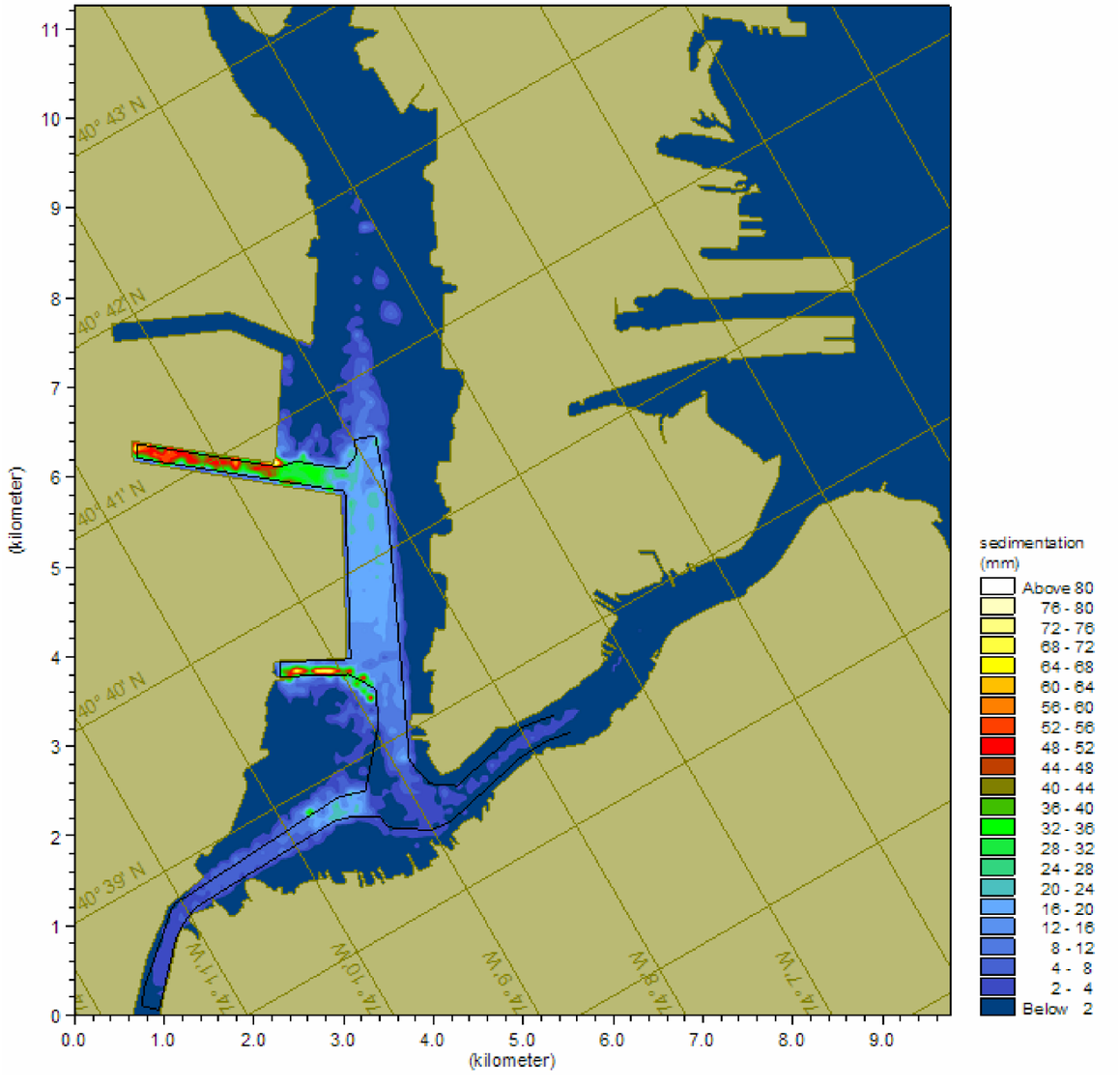


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Figure 4.

5-year Sedimentation Due to Resuspension Caused by the HDP

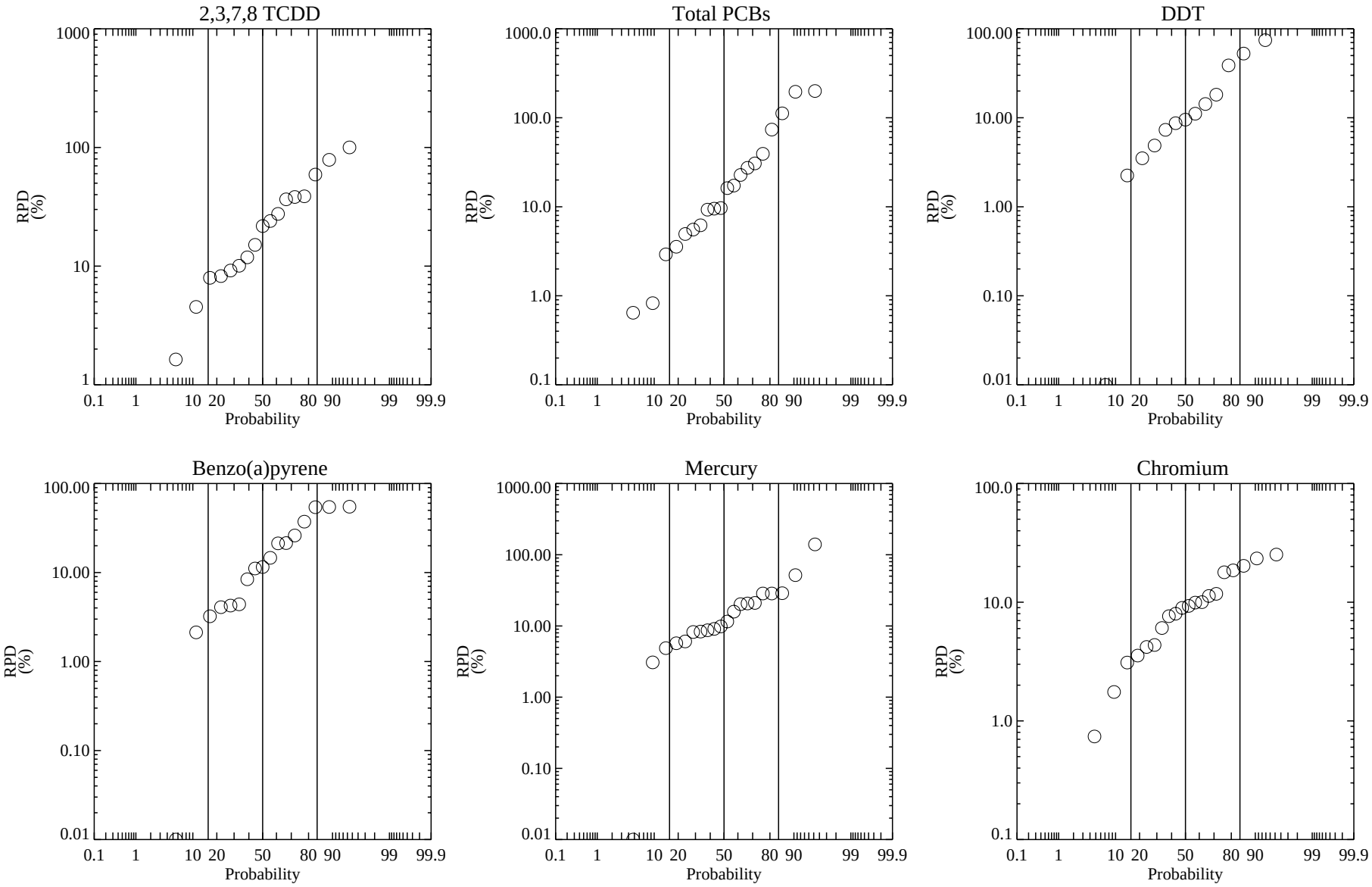
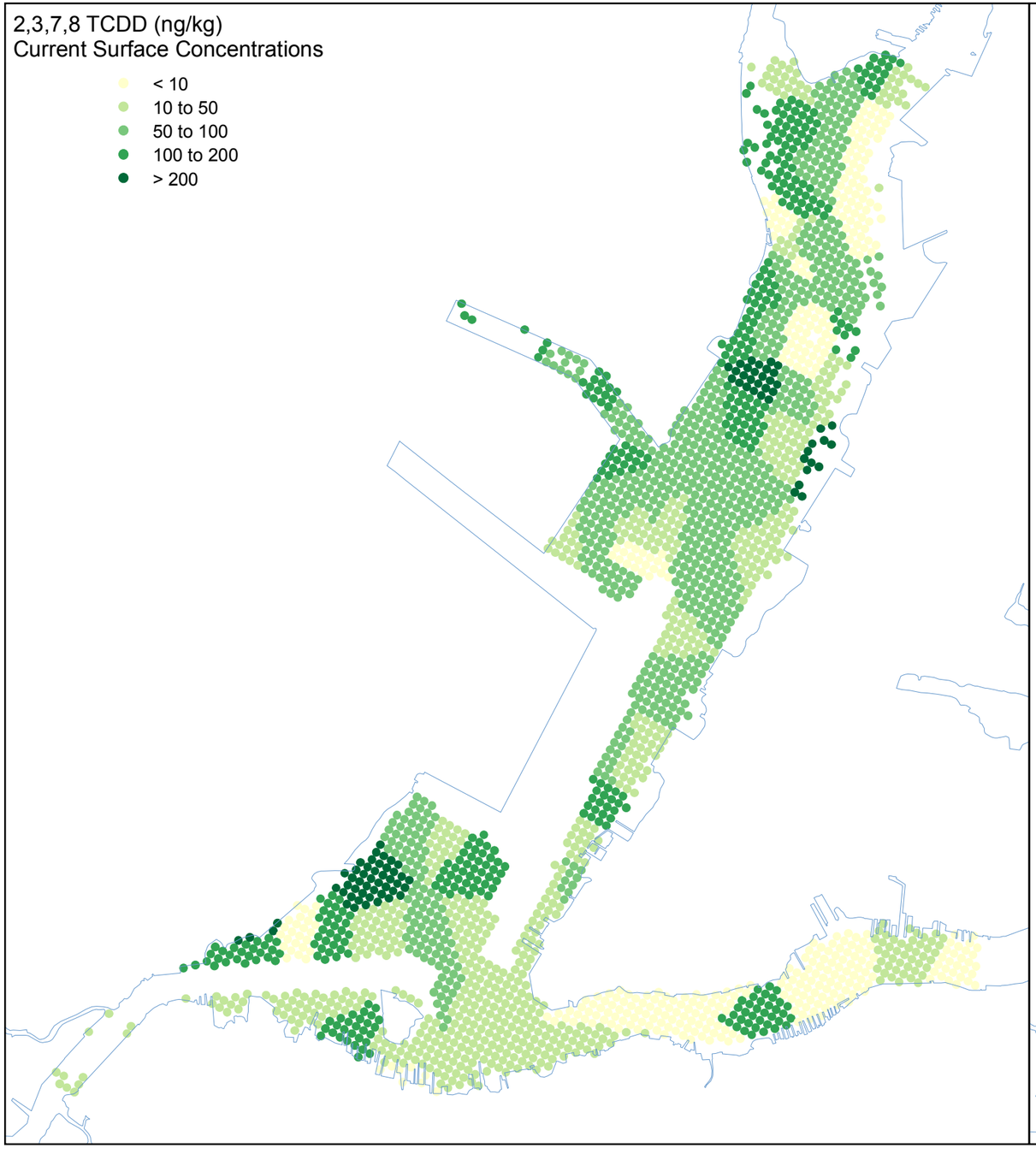


Figure 5. Field duplicates in the NBSA RI/FS Phase 1 Data Set: Relative Percent Differences



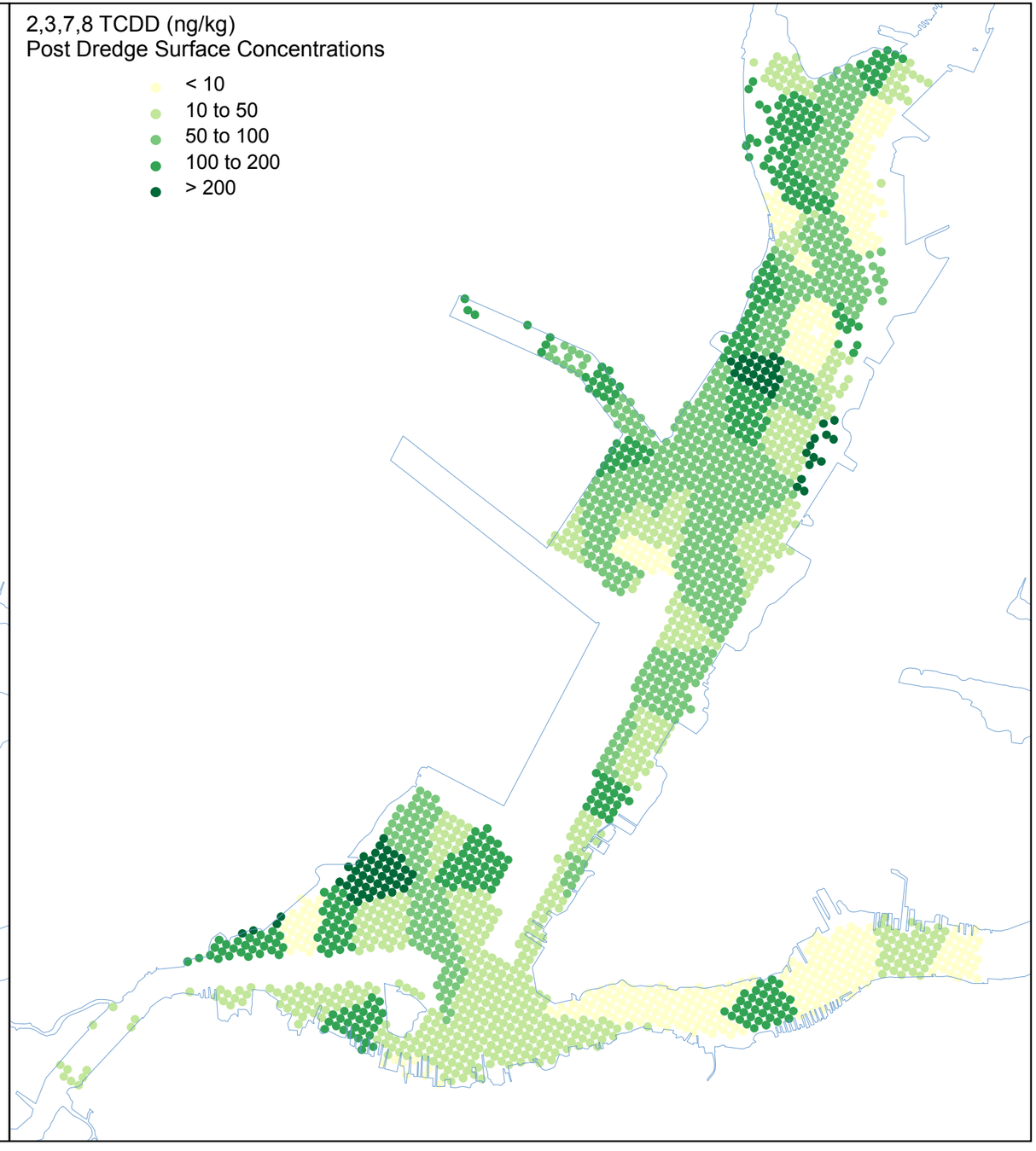


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Figure 6a

2,3,7,8 TCDD: comparison of existing surface sediment concentrations with post HDP concentrations predicted by the model

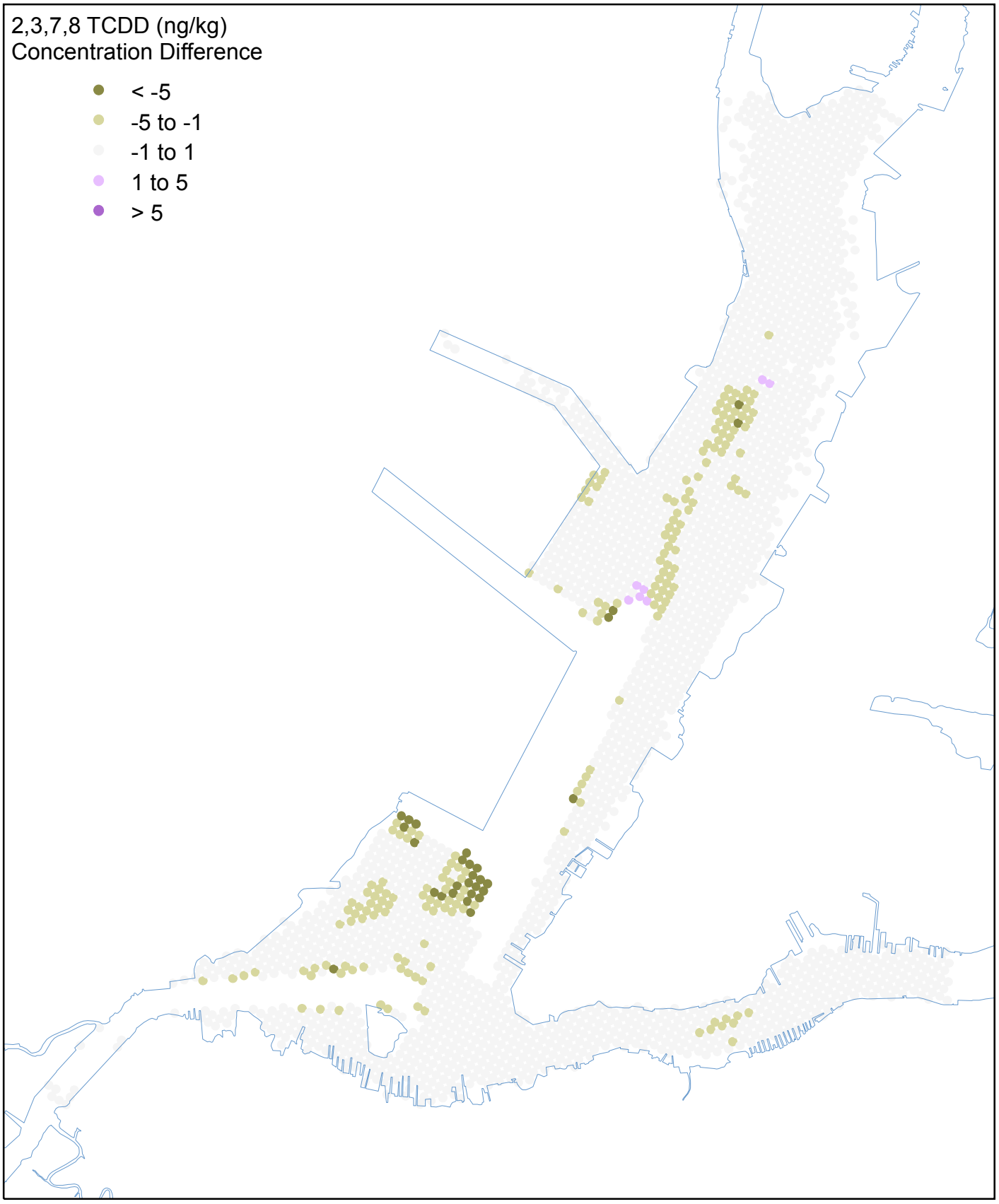

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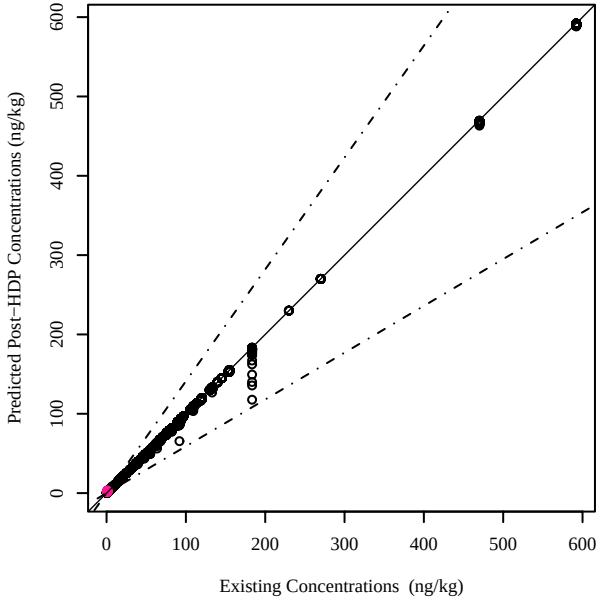
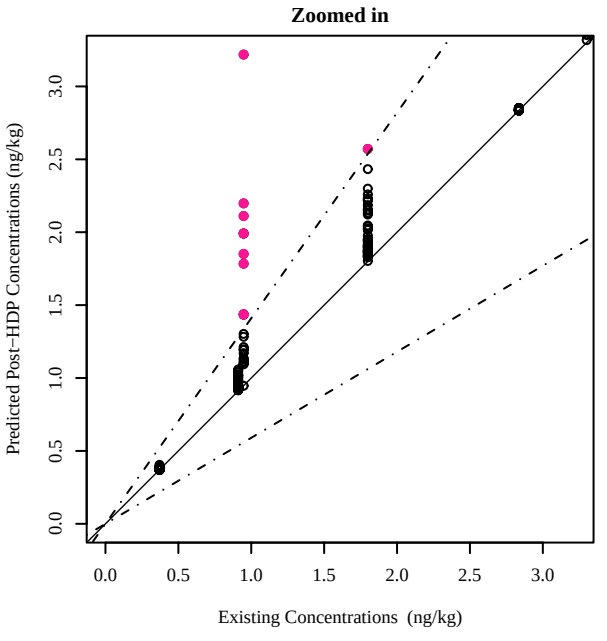
Figure 6b.
2,3,7,8 TCDD: change in surface sediment concentrations due to dredging as predicted by the model





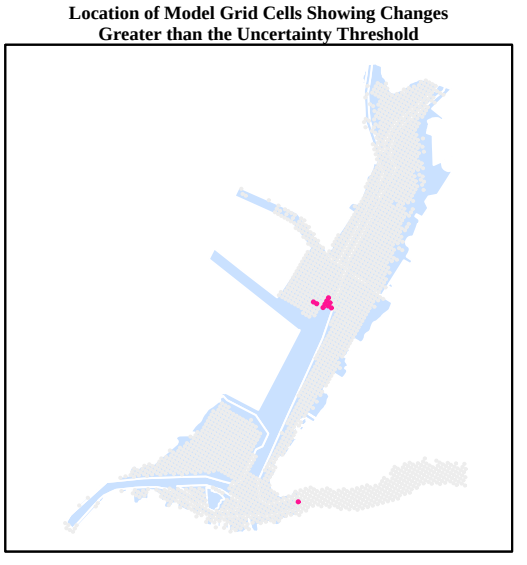
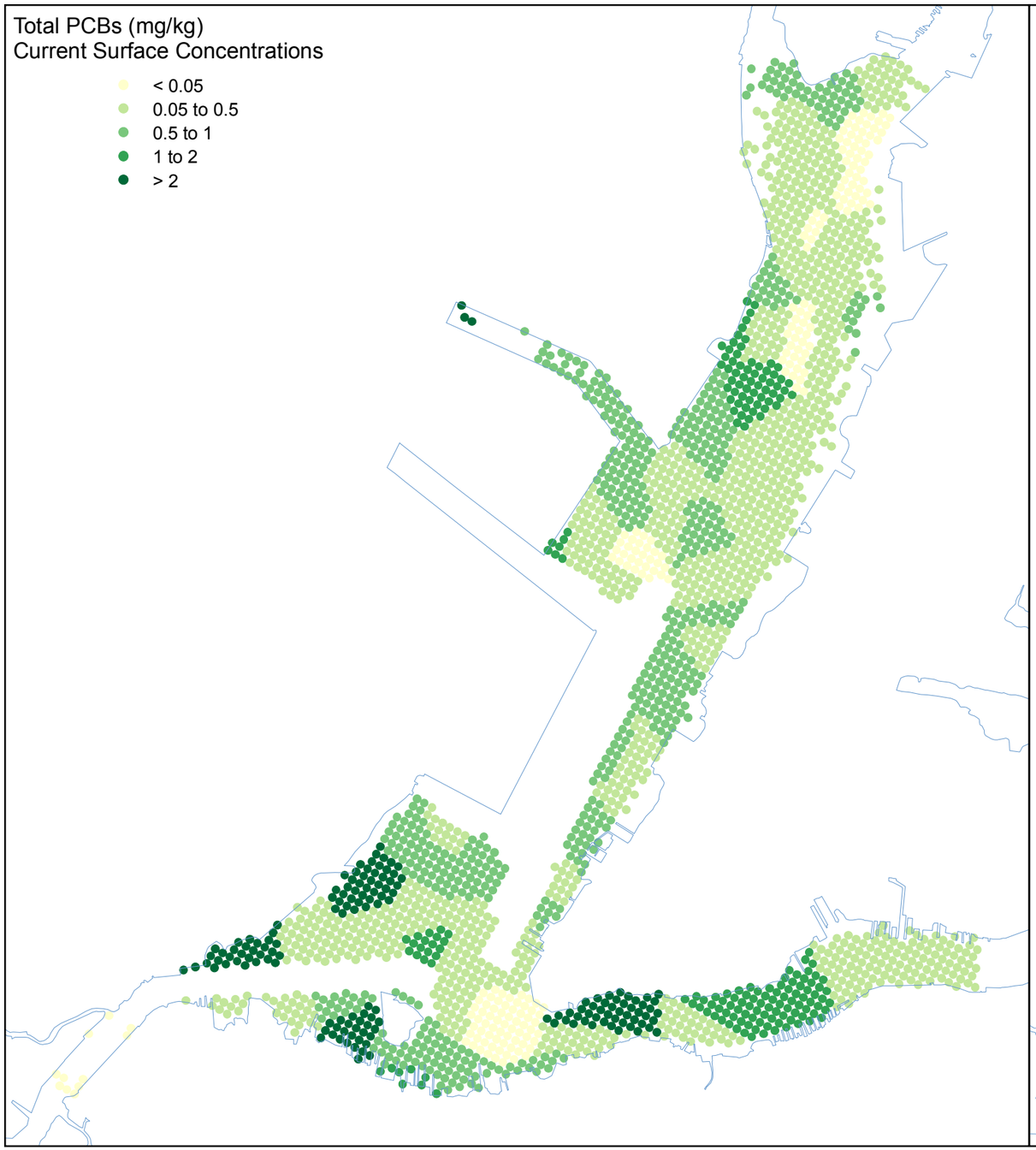


Figure 6c. 2,3,7,8 TCDD : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.



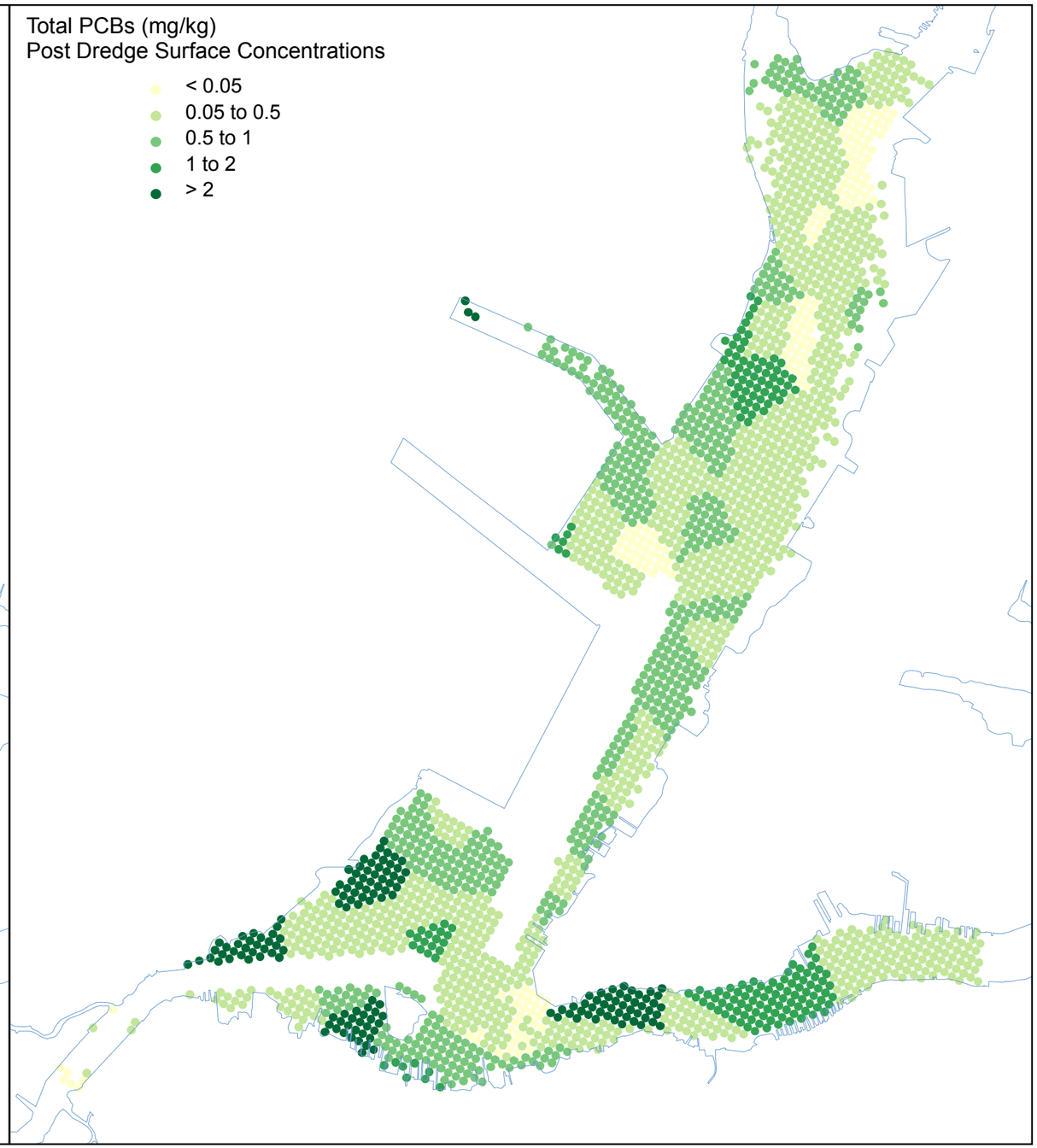


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Figure 7a

Total PCBs: comparison of existing surface sediment concentrations with post HDP concentrations predicted by the model

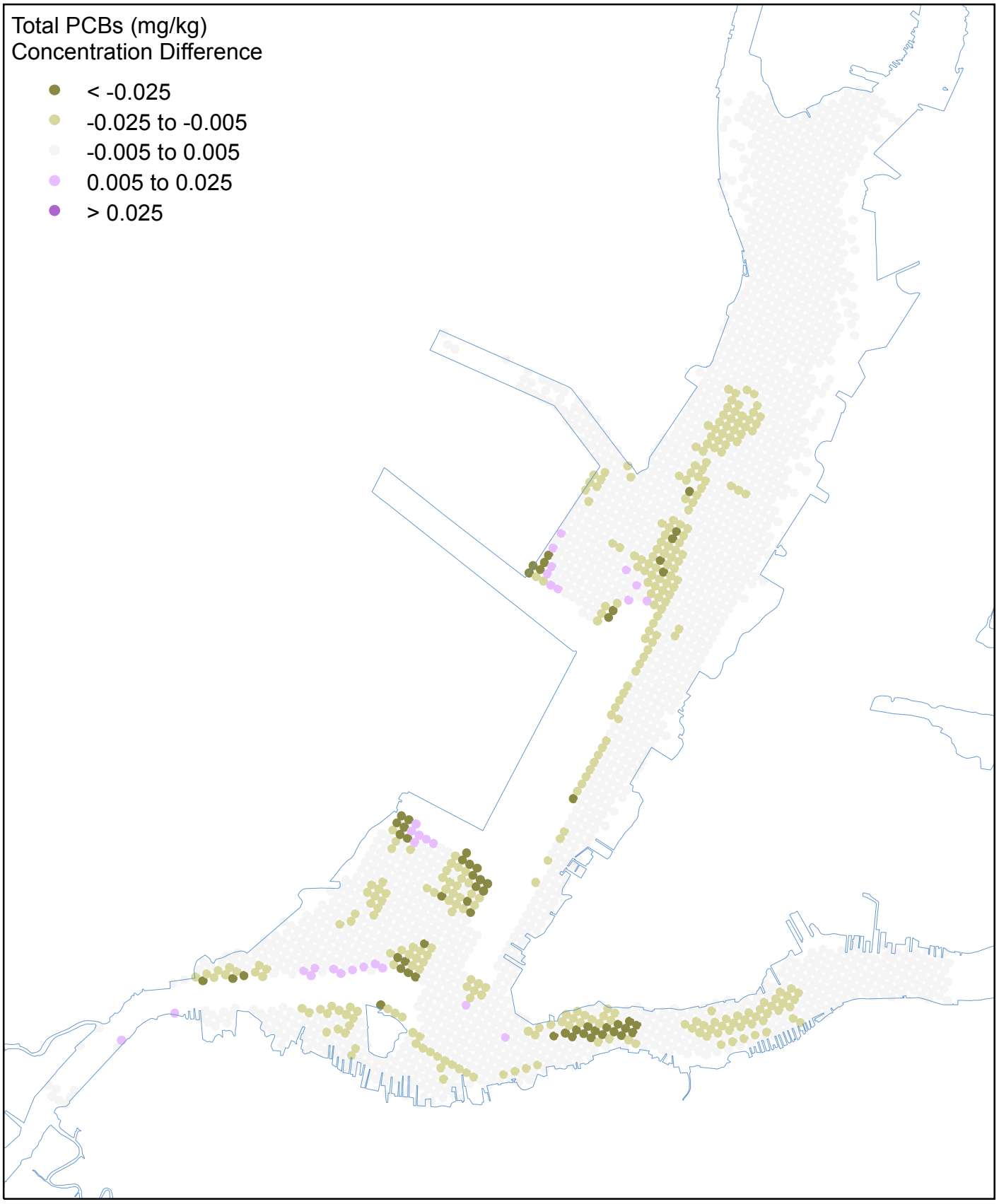

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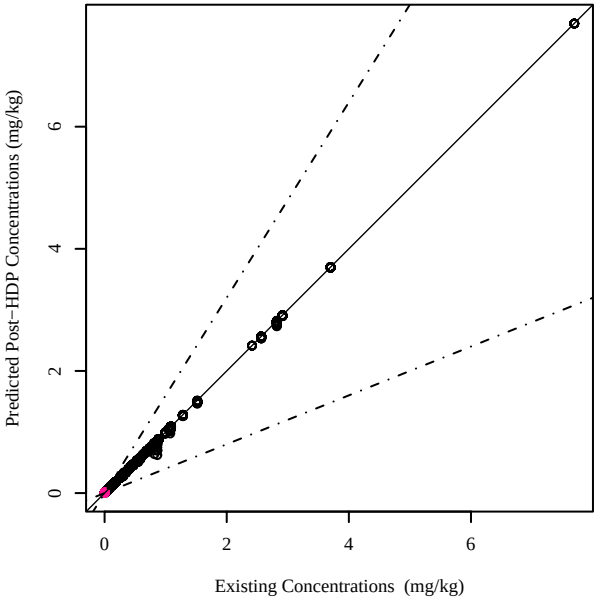
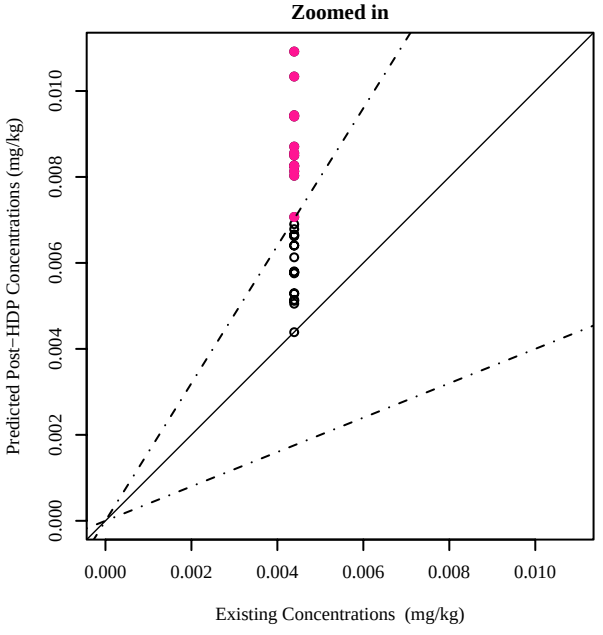
Figure 7b.
Total PCBs: change in surface sediment concentrations due to dredging as predicted by the model





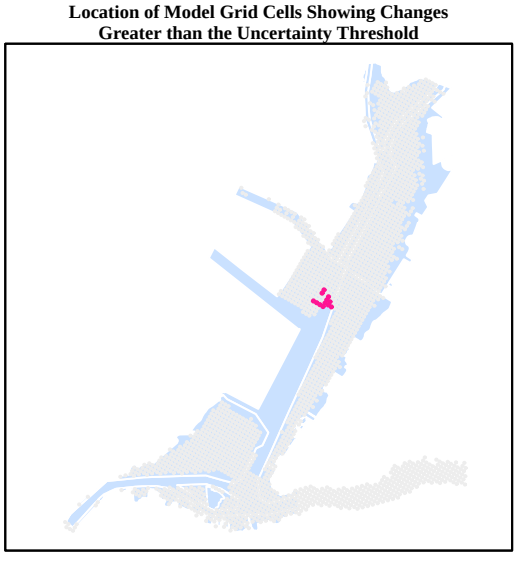


Figure 7c. Total PCBs : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

DDTs (mg/kg)
Current Surface Concentrations

- < 0.01
- 0.01 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- > 0.2

DDTs (mg/kg)
Post Dredge Surface Concentrations

- < 0.01
- 0.01 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- > 0.2

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Figure 8a

DDTs: comparison of existing surface sediment concentrations with post HDP concentrations predicted by the model

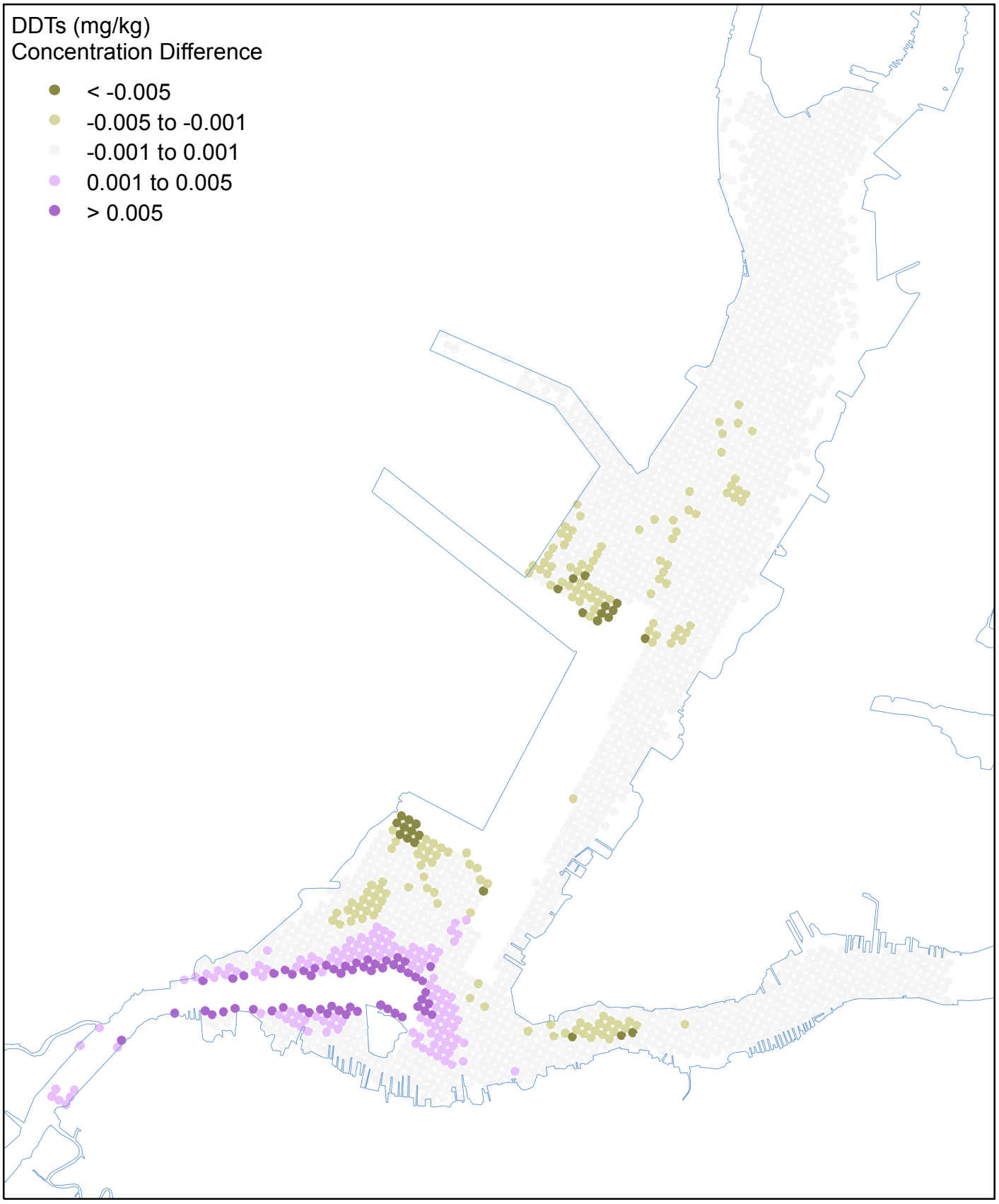

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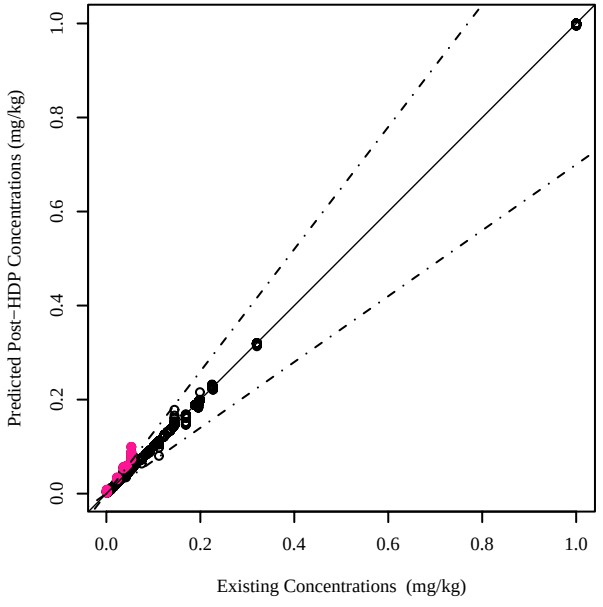
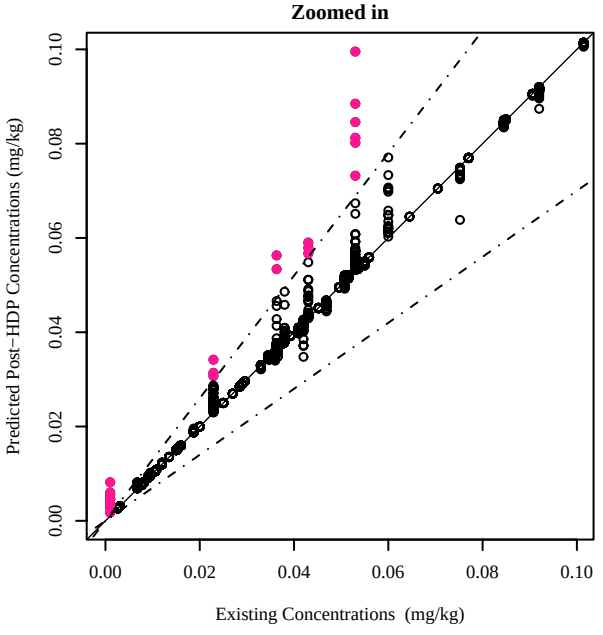
Figure 8b.
DDTs: change in surface sediment concentrations due to dredging as predicted by the model





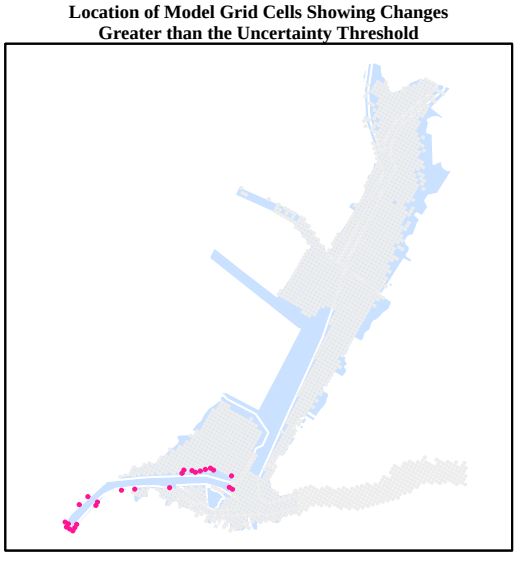


Figure 8c. DDT : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

Benzo(a)pyrene (mg/kg)
Current Surface Concentrations

- < 0.4
- 0.4 to 0.7
- 0.7 to 1.5
- 1.5 to 3
- > 3

Benzo(a)pyrene (mg/kg)
Post Dredge Surface Concentrations

- < 0.4
- 0.4 to 0.7
- 0.7 to 1.5
- 1.5 to 3
- > 3

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Figure 9a

Benzo(a)pyrene: comparison of existing surface sediment concentrations with post HDP concentrations predicted by the model

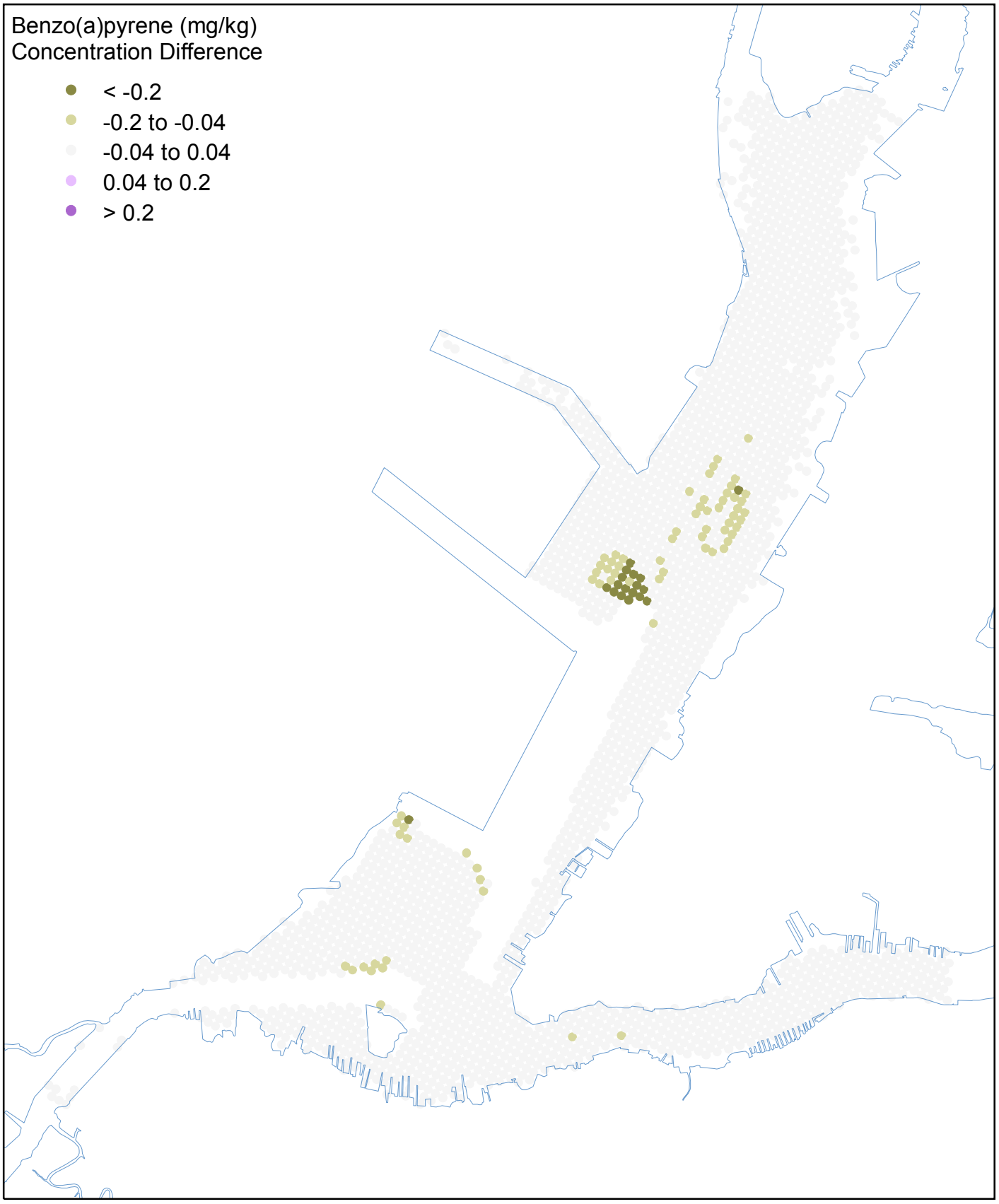

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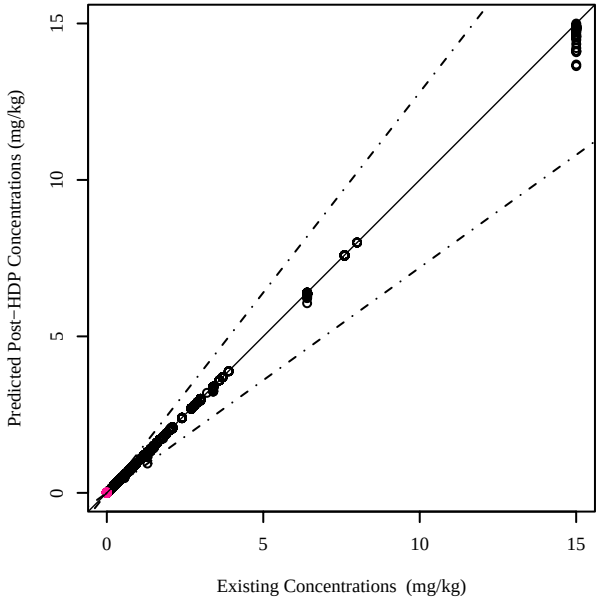
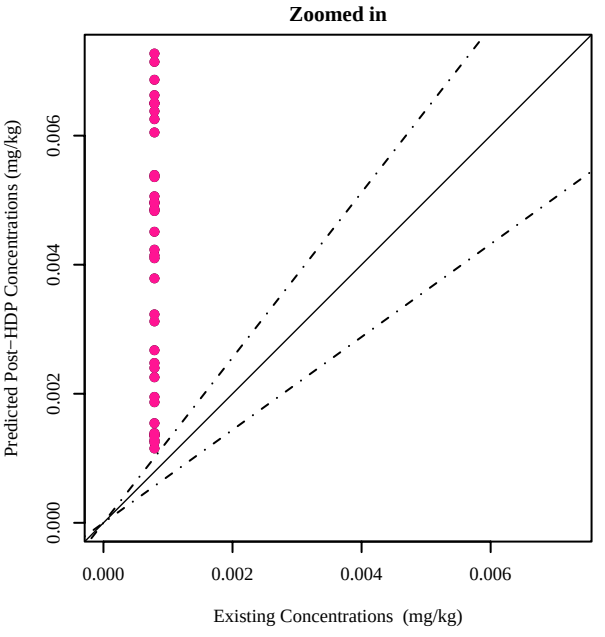
Figure 9b
Benzo(a)pyrene: change in surface sediment concentrations due to dredging as predicted by the model





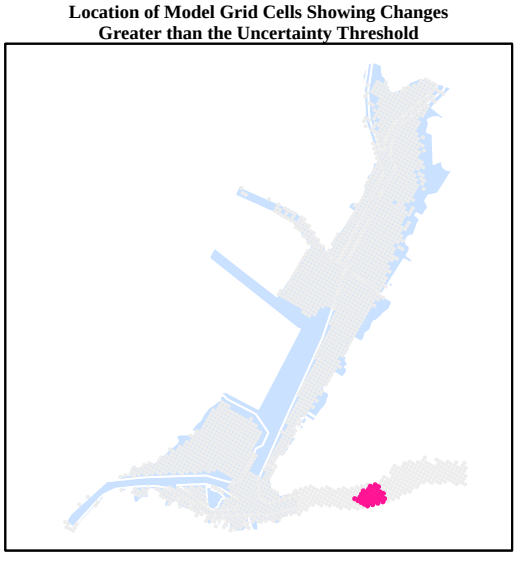
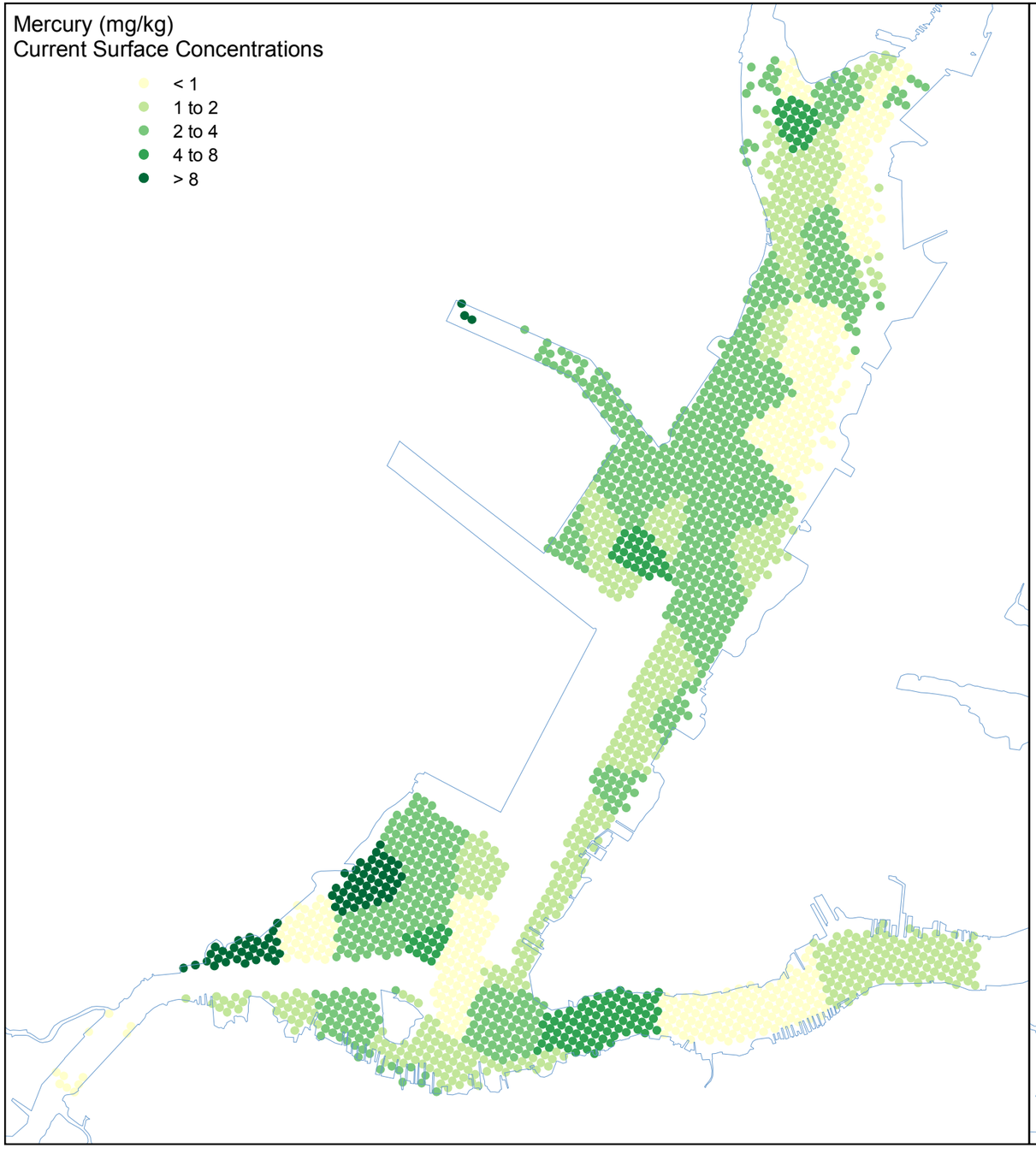


Figure 9c. Benzo(a)pyrene : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.



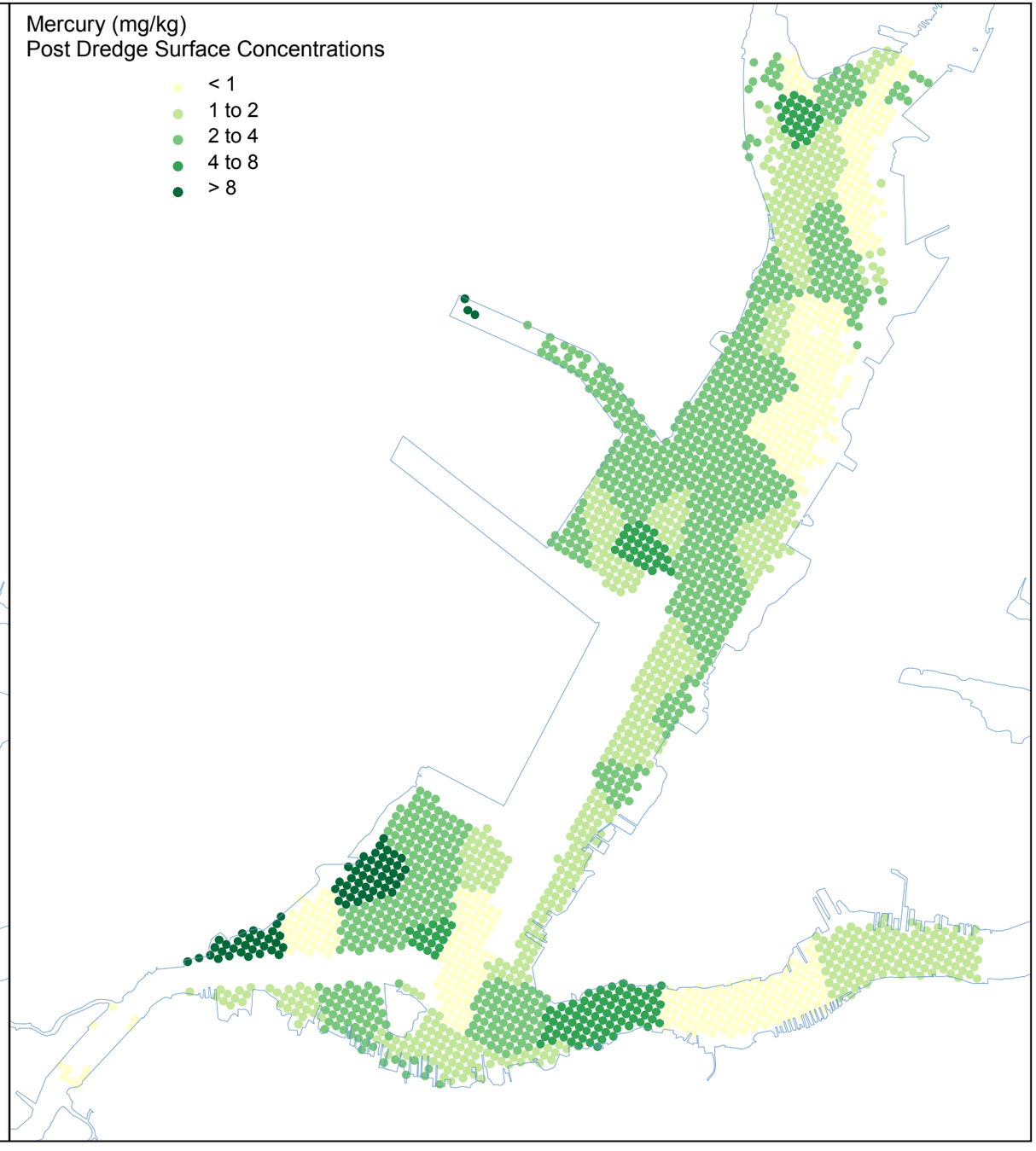


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Figure 10a

Mercury: comparison of existing surface sediment concentrations with post HDP concentrations predicted by the model

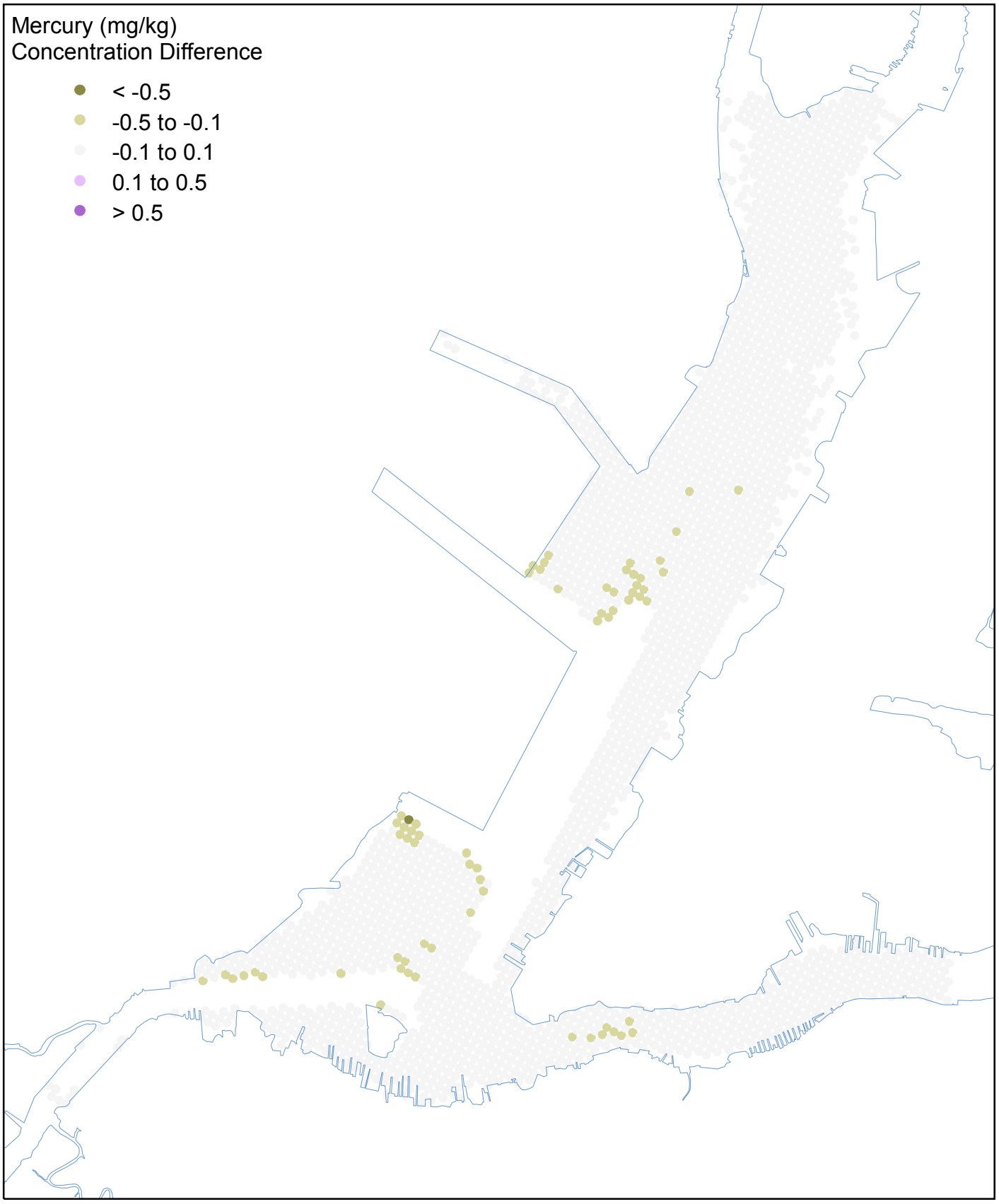

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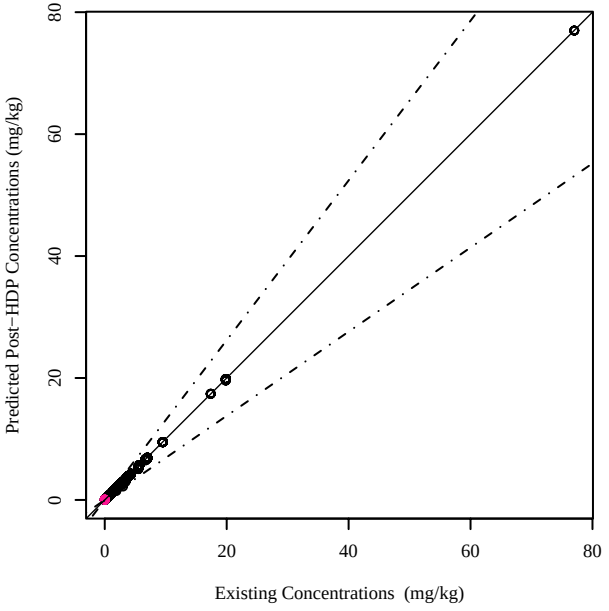
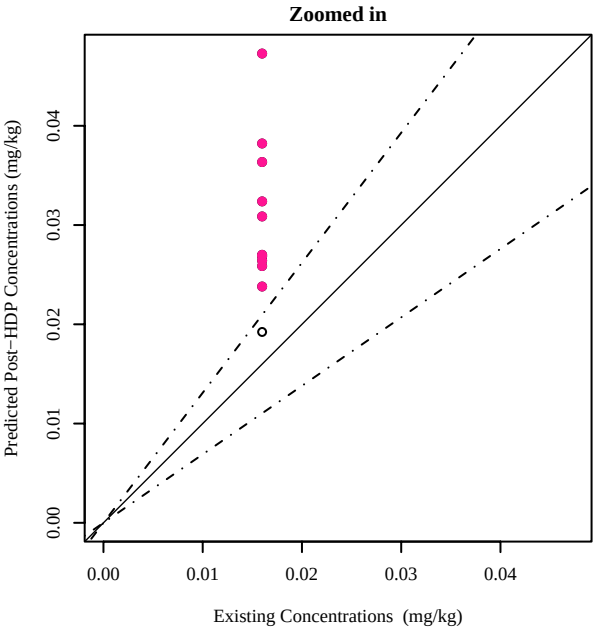
Figure 10b
Mercury: change in surface sediment concentrations due to dredging as predicted by the model





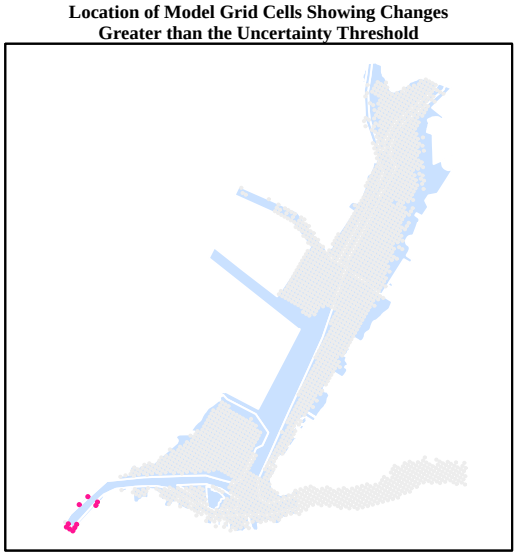


Figure 10c. Mercury : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

Chromium (mg/kg)
Current Surface Concentrations

- < 50
- 50 to 100
- 100 to 200
- 200 to 350
- > 350

Chromium (mg/kg)
Post Dredge Surface Concentrations

- < 50
- 50 to 100
- 100 to 200
- 200 to 350
- > 350

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Figure 11a

Chromium: comparison of existing surface sediment concentrations with post HDP concentrations predicted by the model

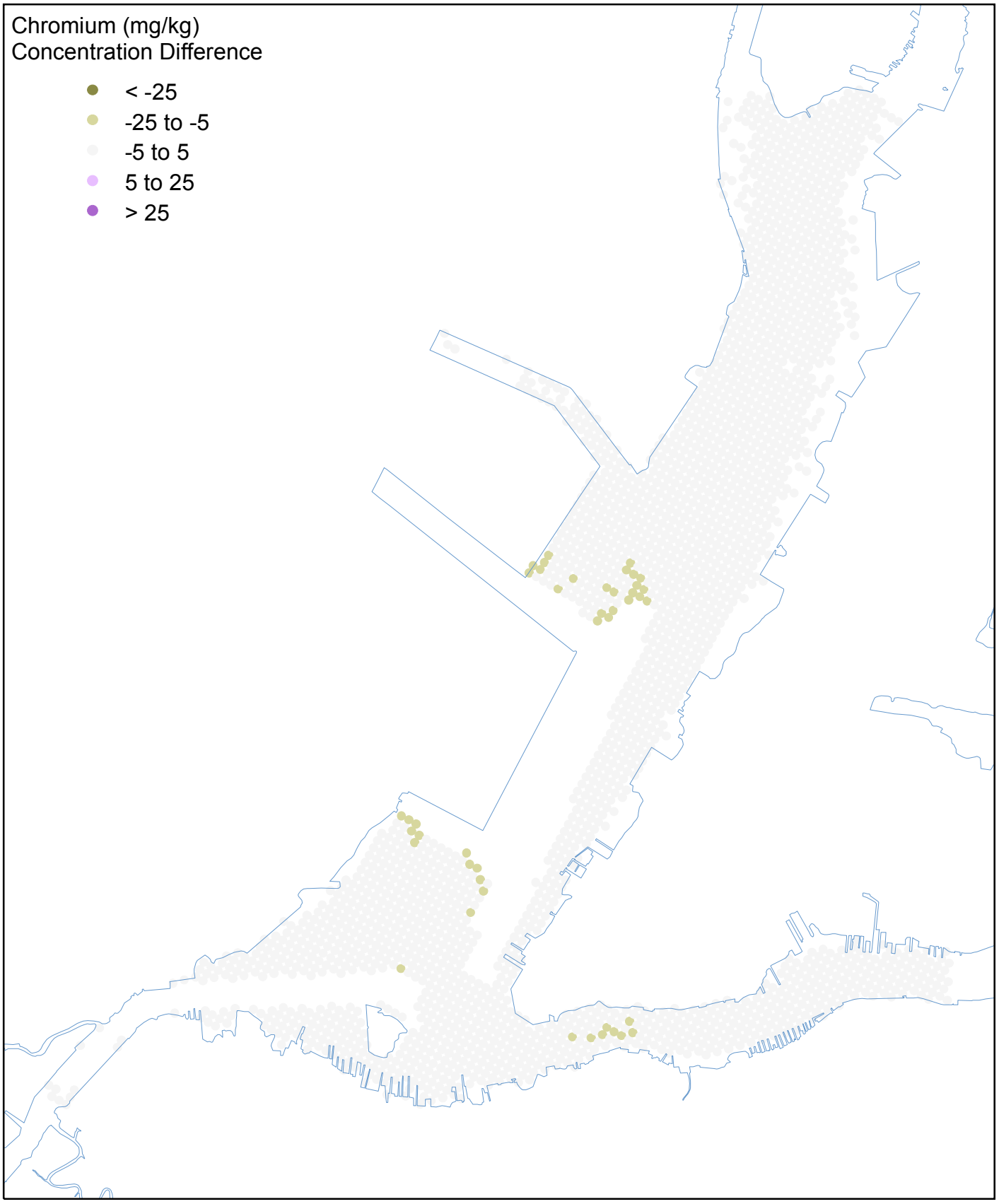

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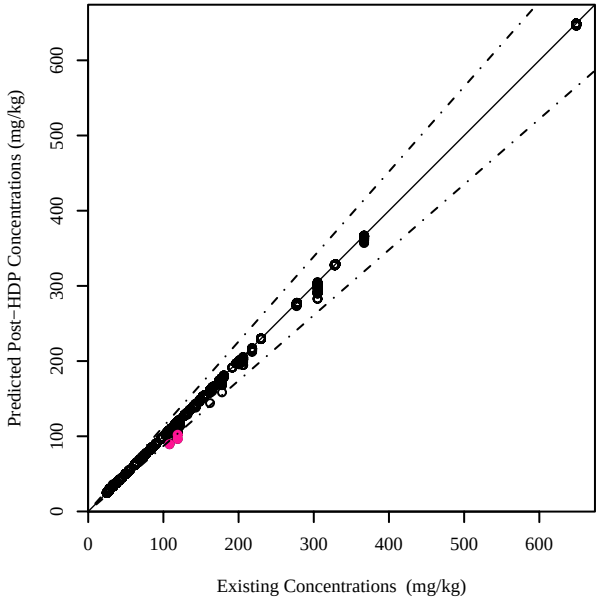
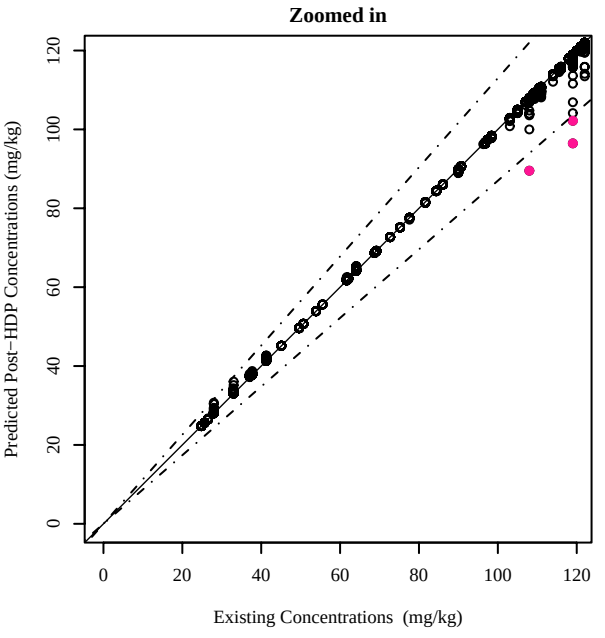
Figure 11b
Chromium: change in surface sediment concentrations due to dredging as predicted by the model





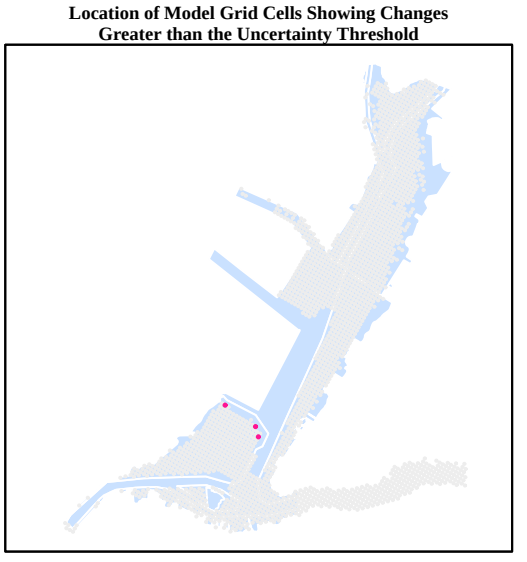
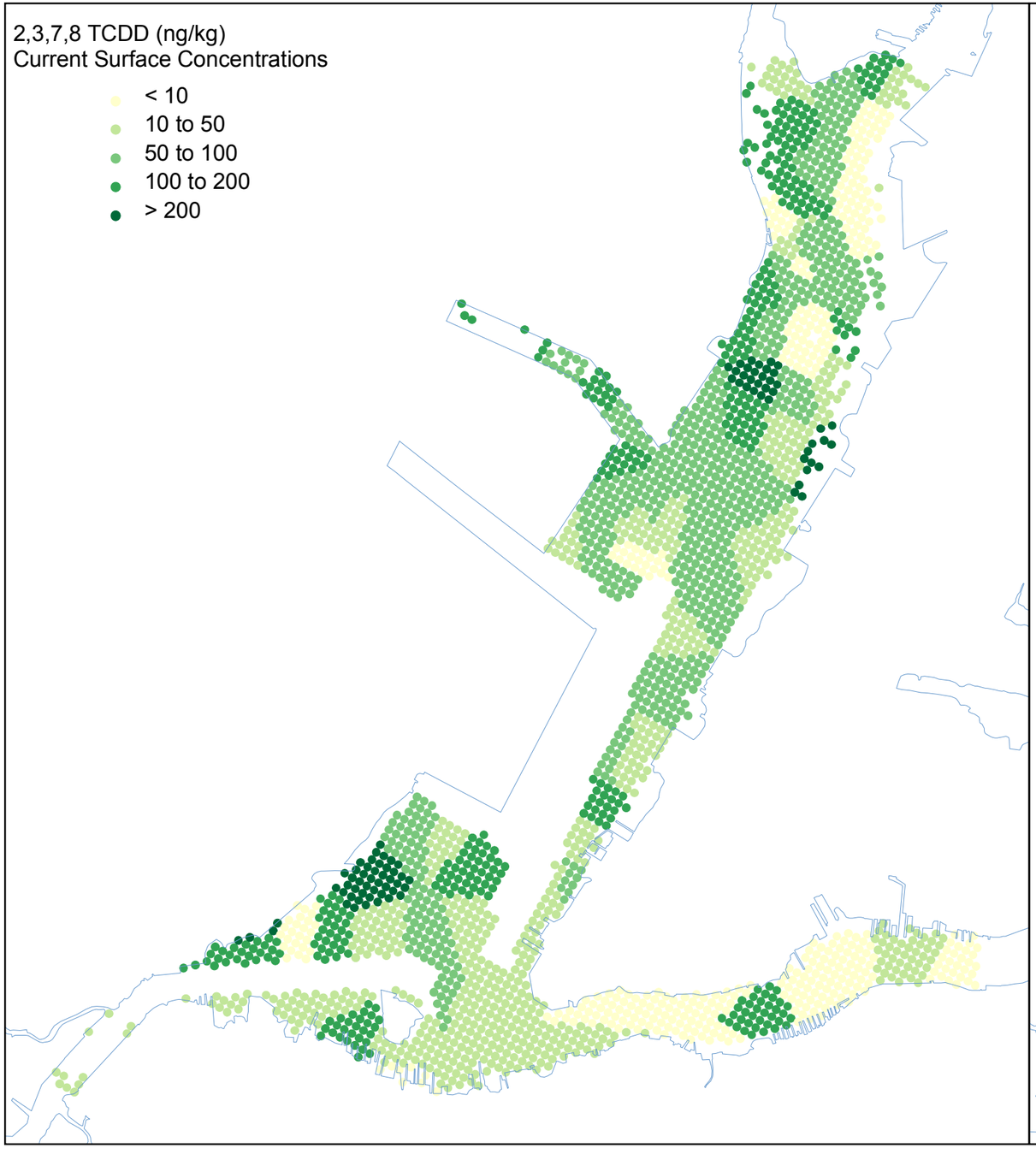


Figure 11c. Chromium : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.



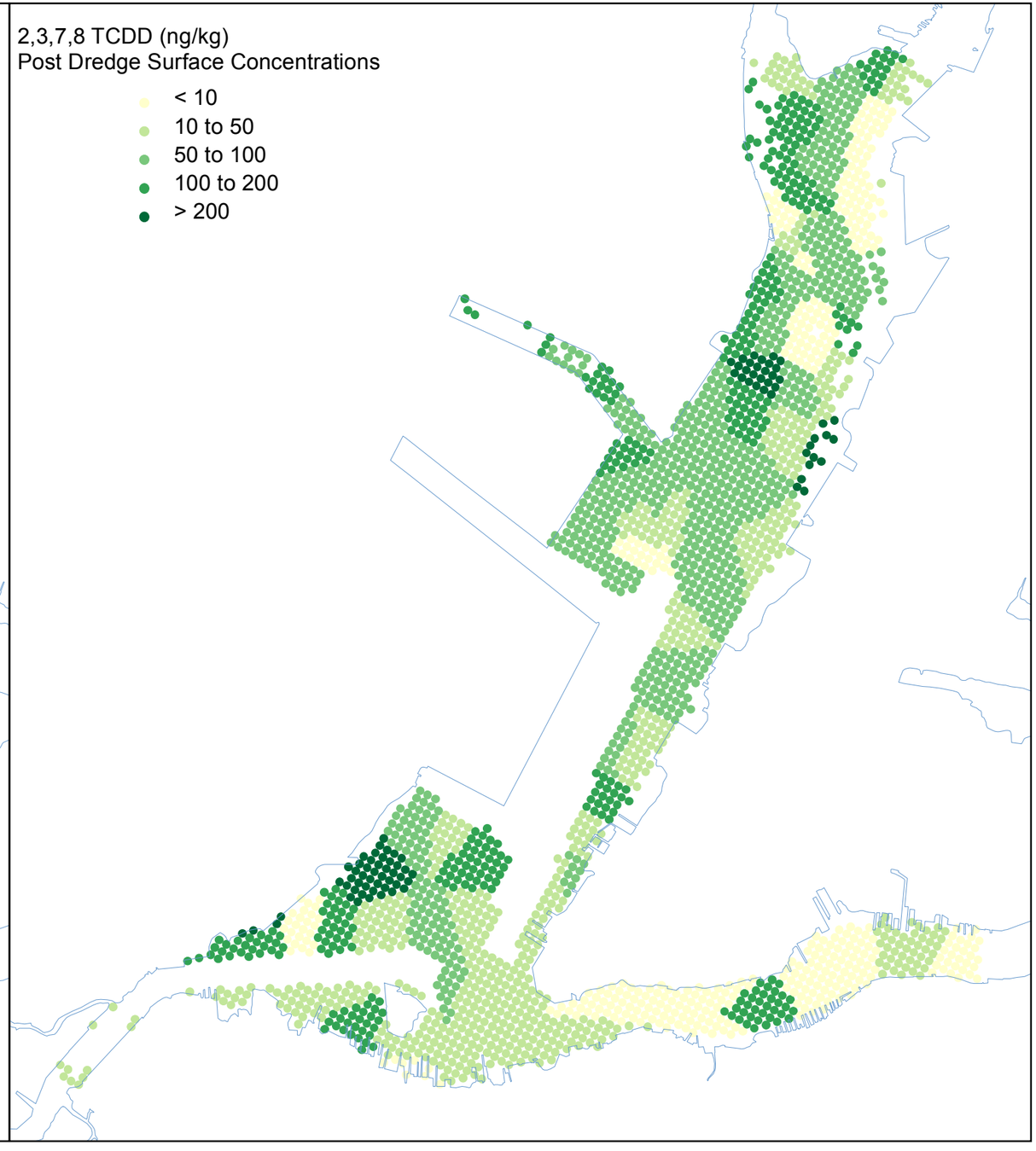


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Figure 12a

2,3,7,8 TCDD: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, AEC analysis

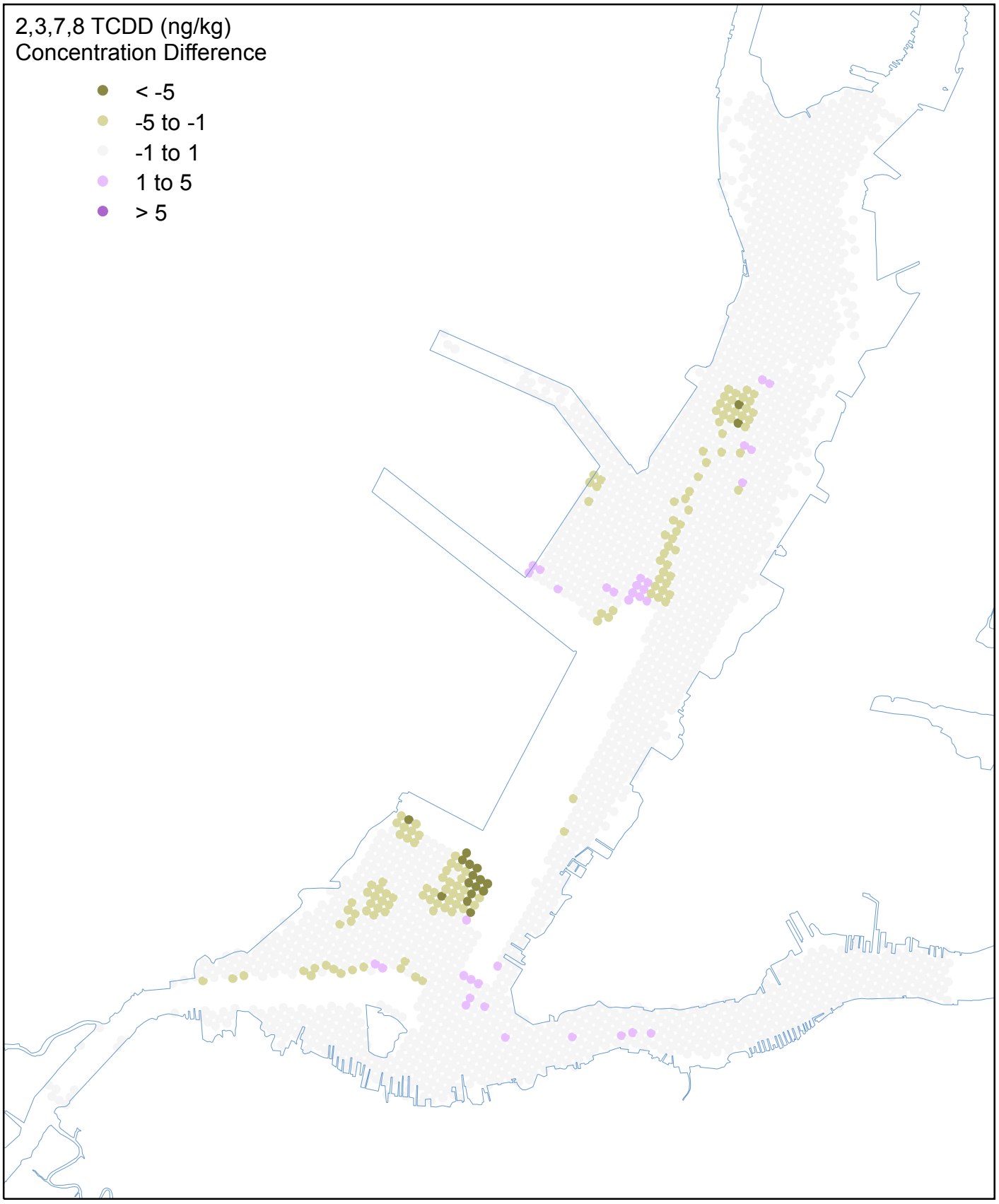

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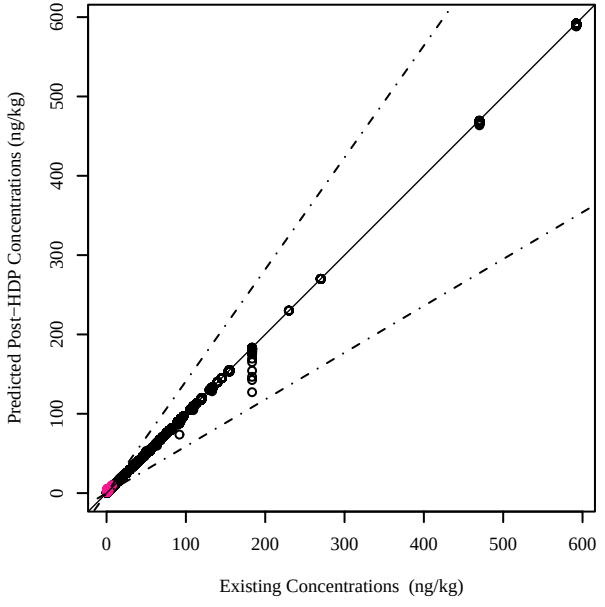
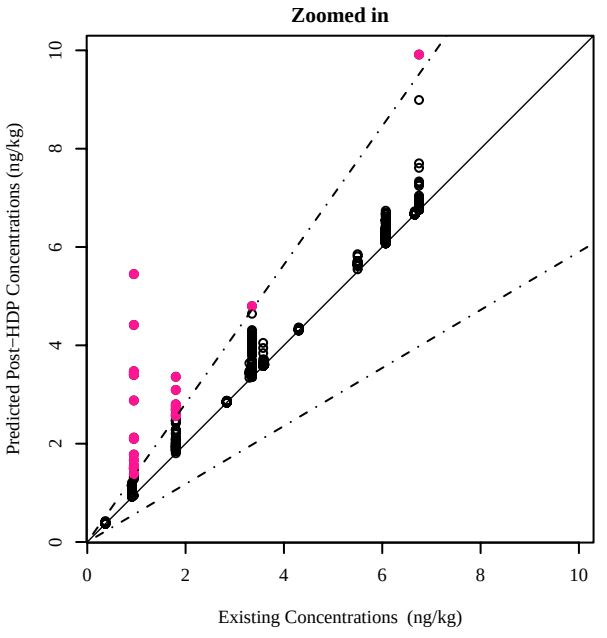
Figure 12b
2,3,7,8 TCDD: change in surface sediment concentrations due to dredging as predicted by the model, AEC analysis





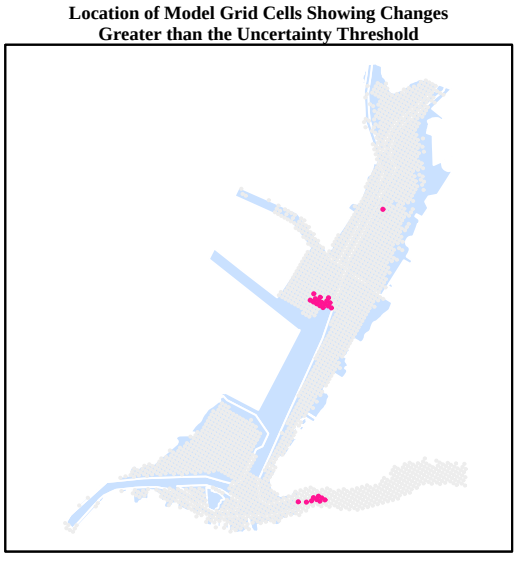


Figure 12c. 2,3,7,8 TCDD : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold, AEC analysis

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

D:/jobs/ACEnew/Analysis/Post_Dredge_Concentrations/Active_Cores_Sensitivity/ThiessenActiveCores.mdb.R
D:/jobs/ACEnew/Analysis/Post_Dredge_Concentrations/Post_Processing/output_plots/fig12c_plots_RPD_comp_tz.ps
Thu Feb 01 12:25:15 2007

Total PCBs (mg/kg)
Current Surface Concentrations

- < 0.05
- 0.05 to 0.5
- 0.5 to 1
- 1 to 2
- > 2

Total PCBs (mg/kg)
Post Dredge Surface Concentrations

- < 0.05
- 0.05 to 0.5
- 0.5 to 1
- 1 to 2
- > 2

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Figure 13a

Total PCBs: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, AEC analysis

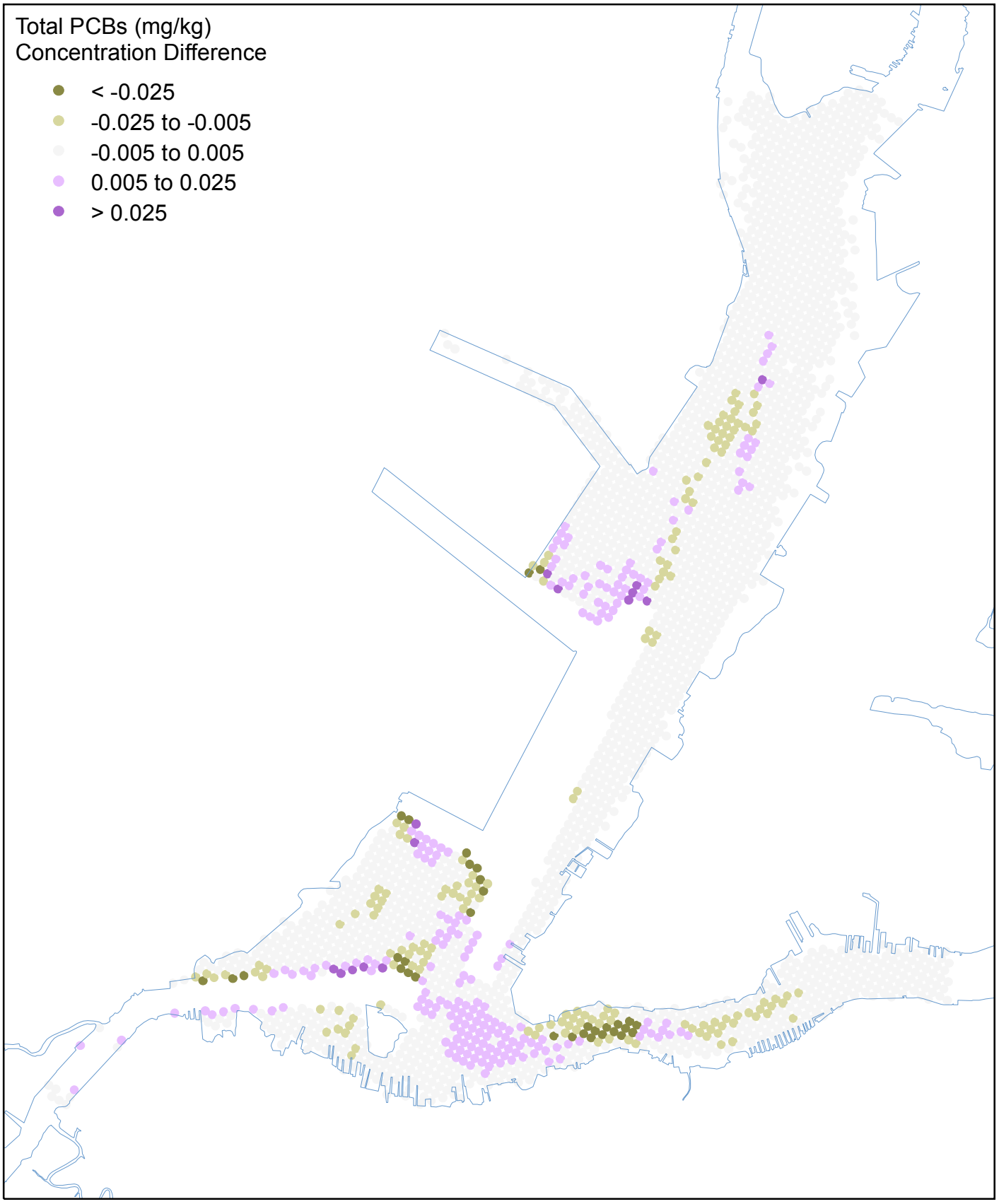

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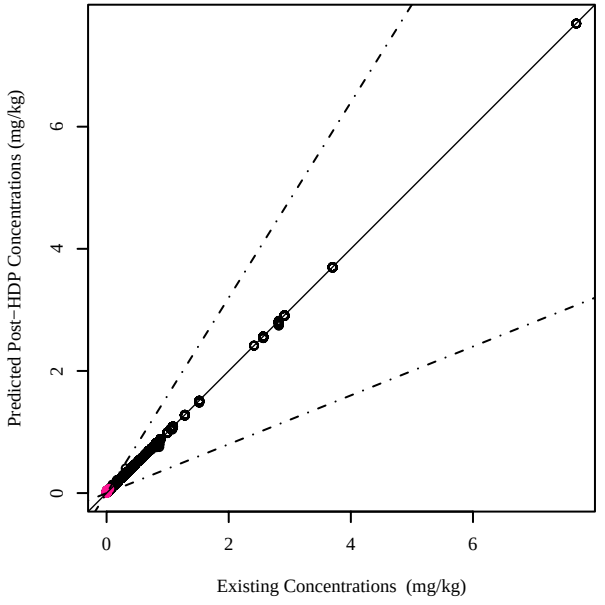
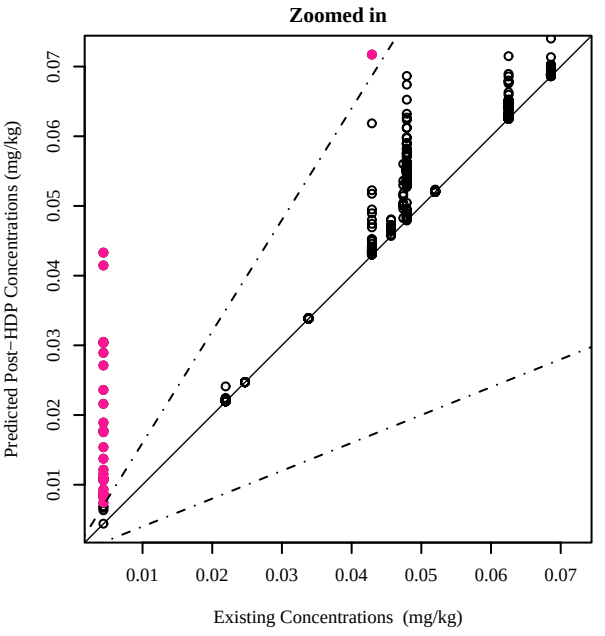
Figure 13b
Total PCBs: change in surface sediment concentrations due to dredging as predicted by the model, AEC analysis





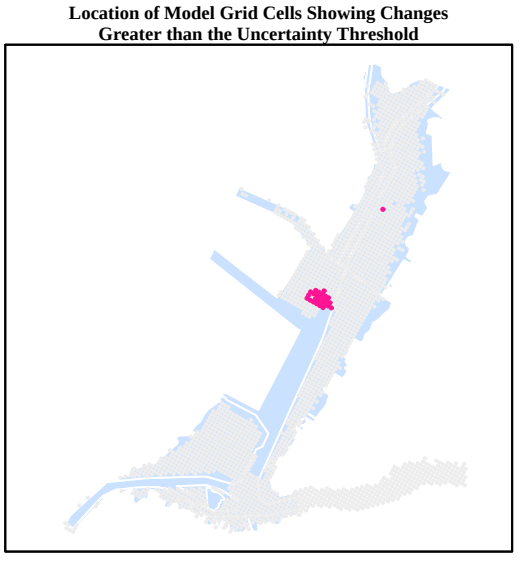


Figure 13c. Total PCBs : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold, AEC analysis

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

DDTs (mg/kg)
Current Surface Concentrations

- < 0.01
- 0.01 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- > 0.2

DDTs (mg/kg)
Post Dredge Surface Concentrations

- < 0.01
- 0.01 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- > 0.2

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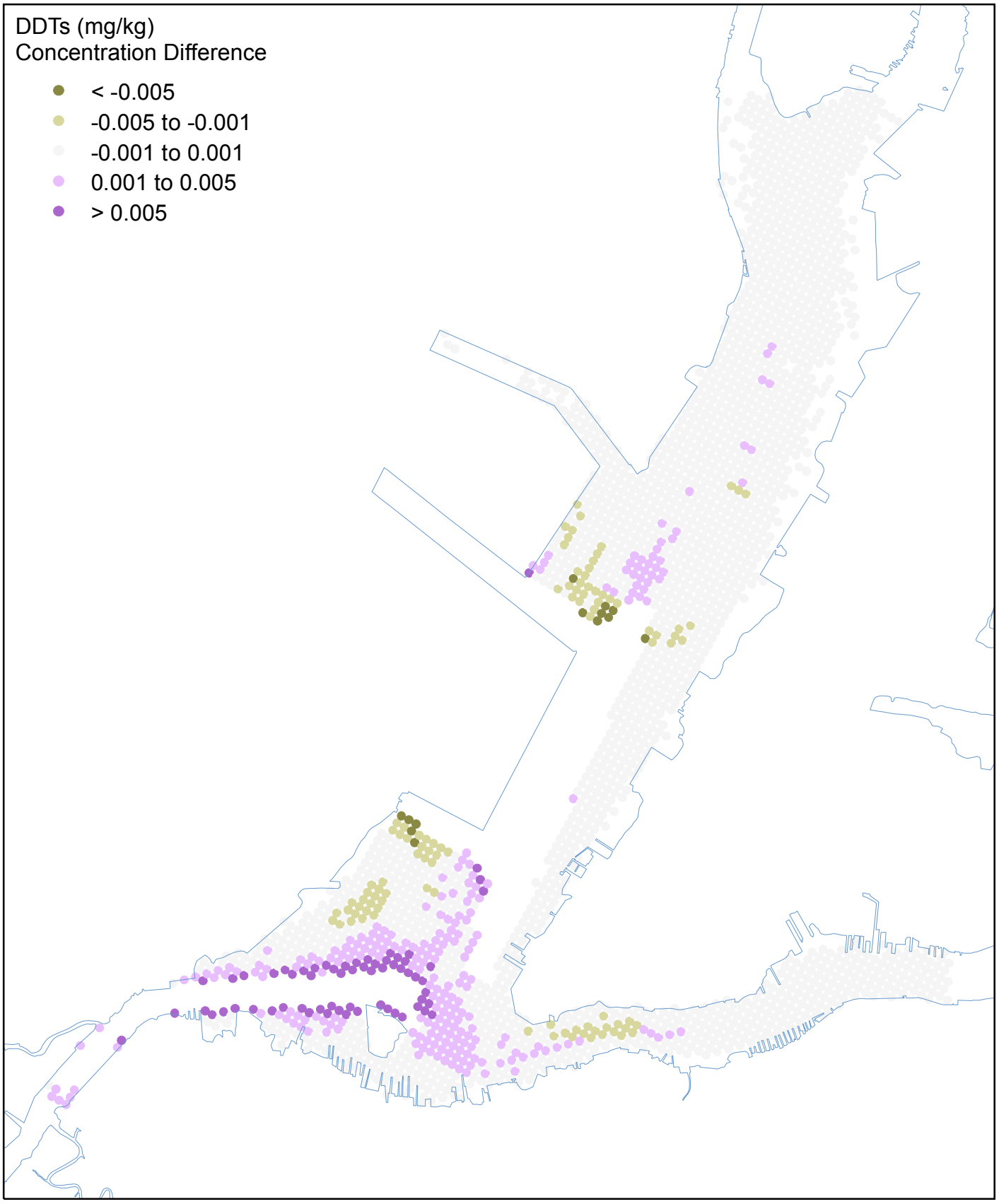
New York District

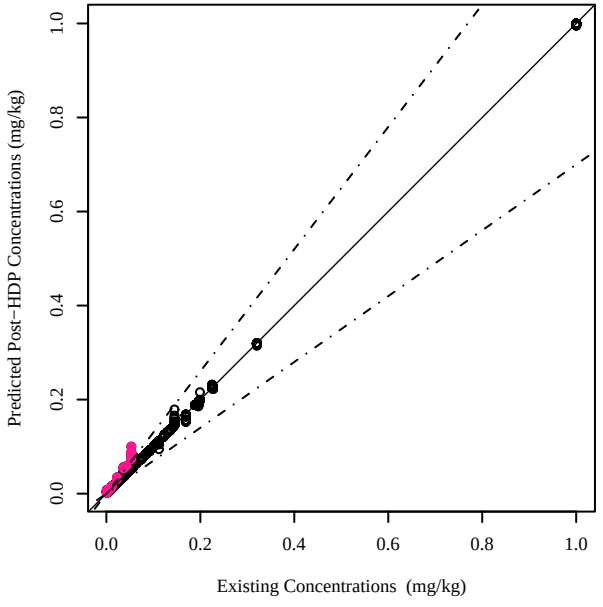
Figure 14a

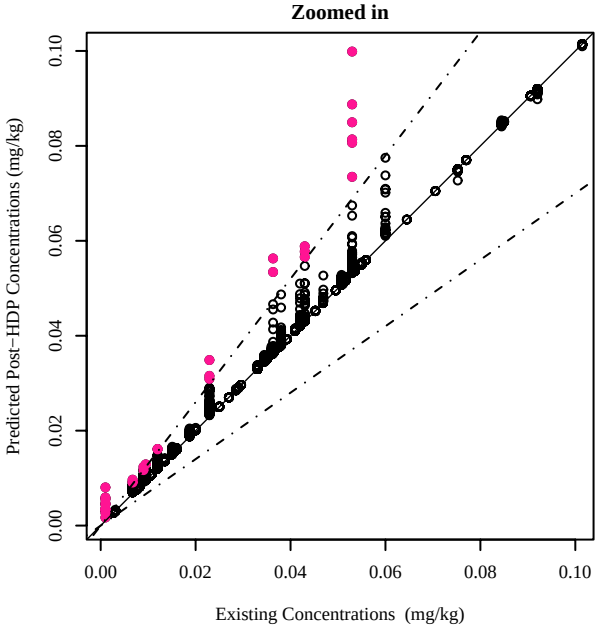
DDTs: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, AEC analysis



US Army Corps of Engineers
New York District

Figure 14b
DDTs: change in surface sediment concentrations due to dredging as predicted by the model, AEC analysis





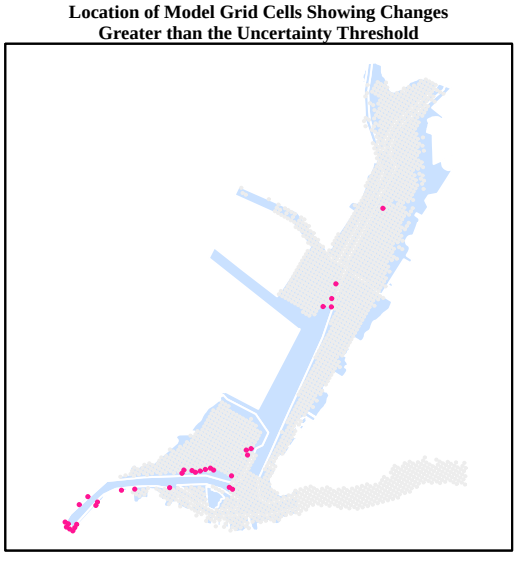


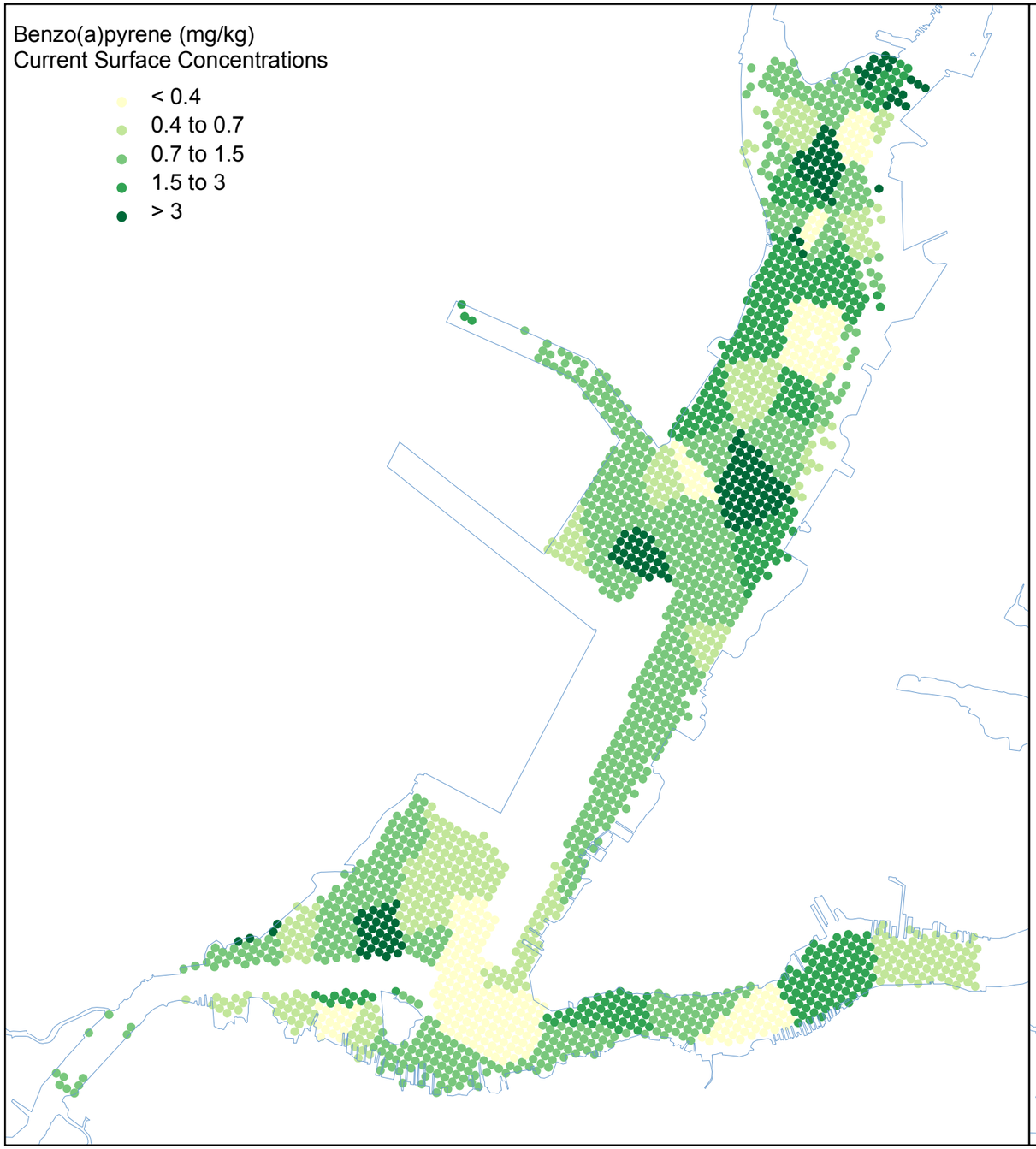
Figure 14c. DDT : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold, AEC analysis

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

D:/jobs/ACEnew/Analysis/Post_Dredge_Concentrations/Active_Cores_Sensitivity/ThiessenActiveCores.mdb.R
D:/jobs/ACEnew/Analysis/Post_Dredge_Concentrations/Post_Processing/output_plots/fig14c_plots_RPD_comp_tz.ps
Thu Feb 01 12:25:16 2007

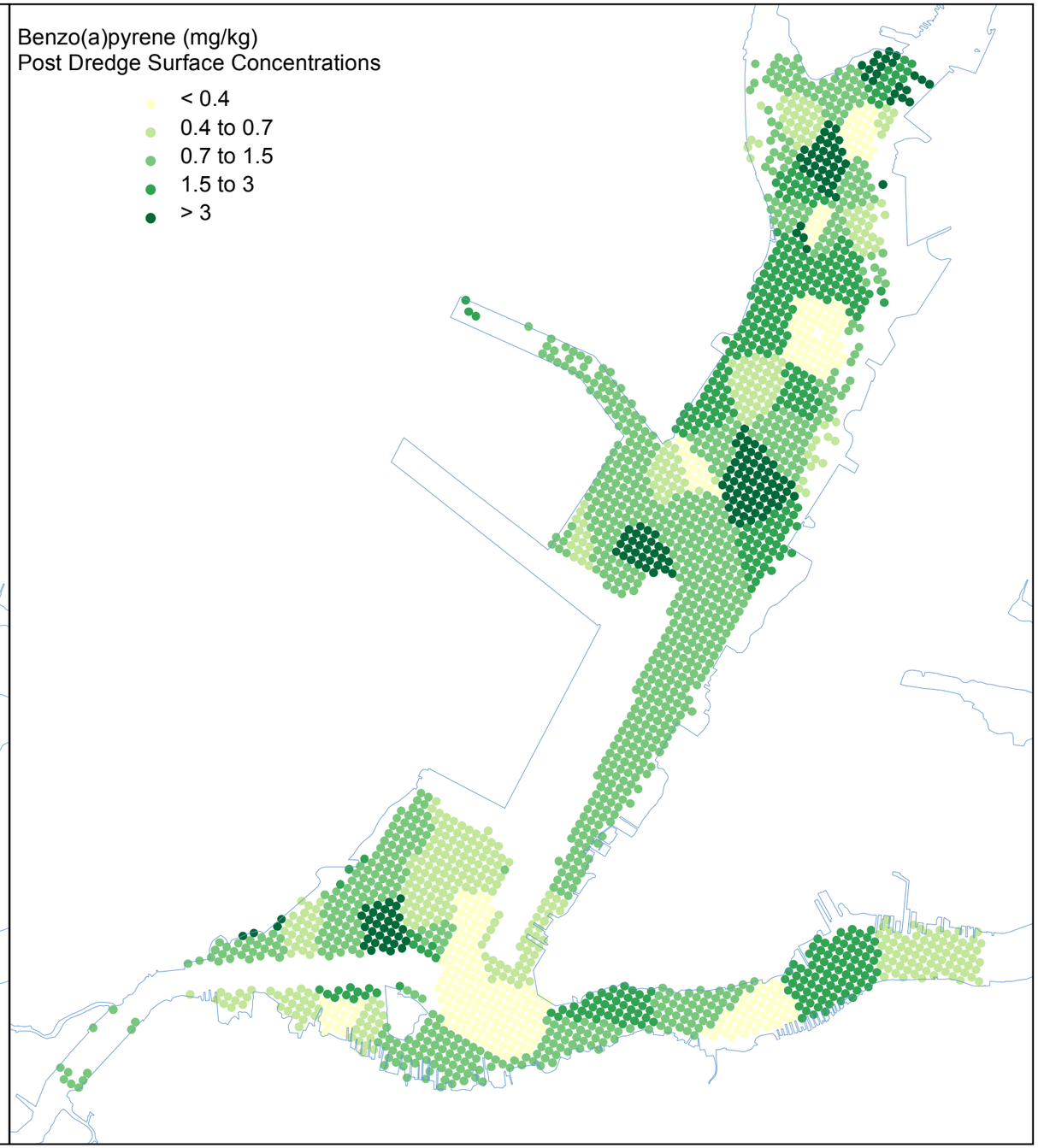
Benzo(a)pyrene (mg/kg)
Current Surface Concentrations

- < 0.4
- 0.4 to 0.7
- 0.7 to 1.5
- 1.5 to 3
- > 3



Benzo(a)pyrene (mg/kg)
Post Dredge Surface Concentrations

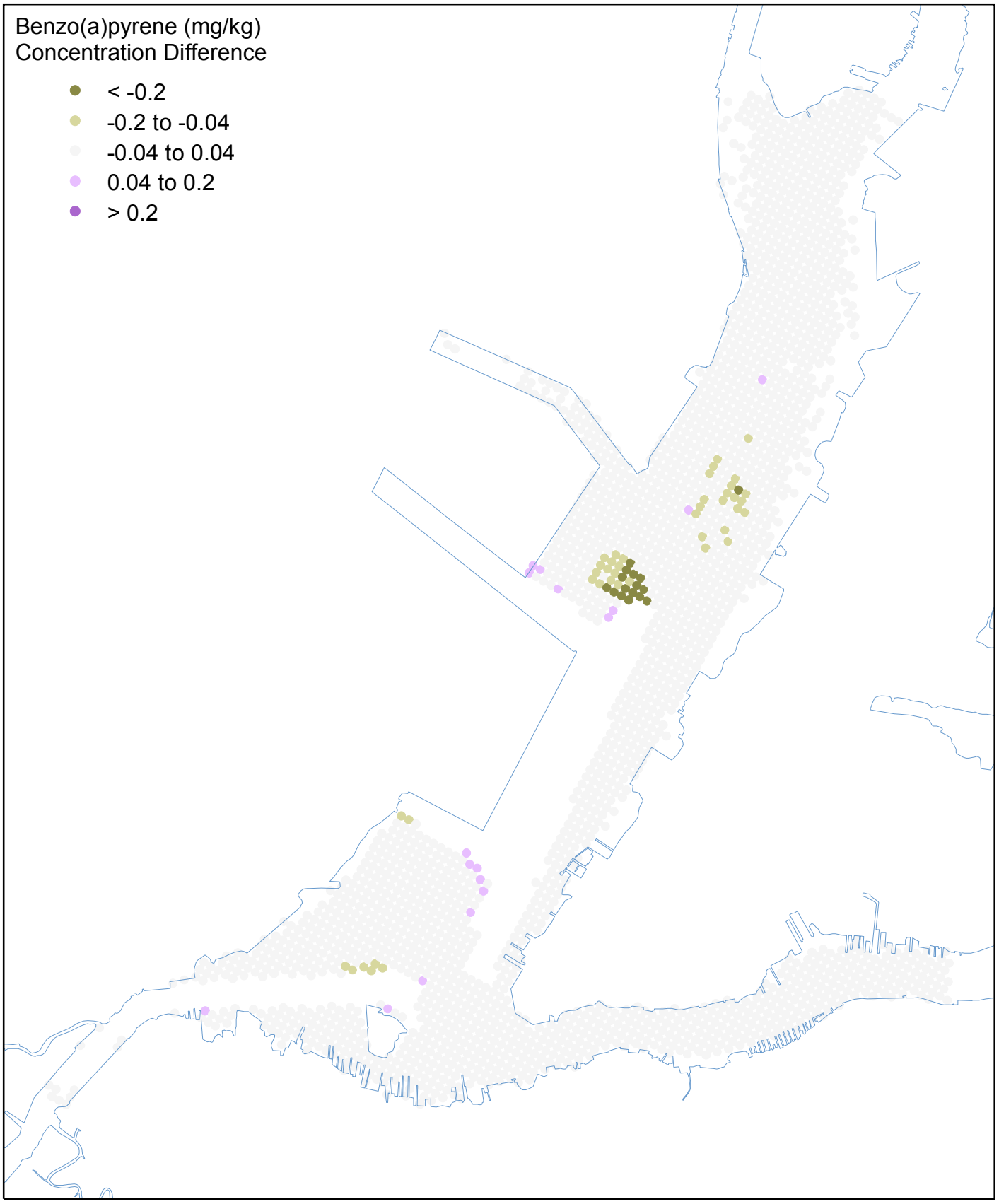
- < 0.4
- 0.4 to 0.7
- 0.7 to 1.5
- 1.5 to 3
- > 3



US Army Corps of Engineers
New York District

Figure 15a

Benzo(a)pyrene: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, AEC analysis



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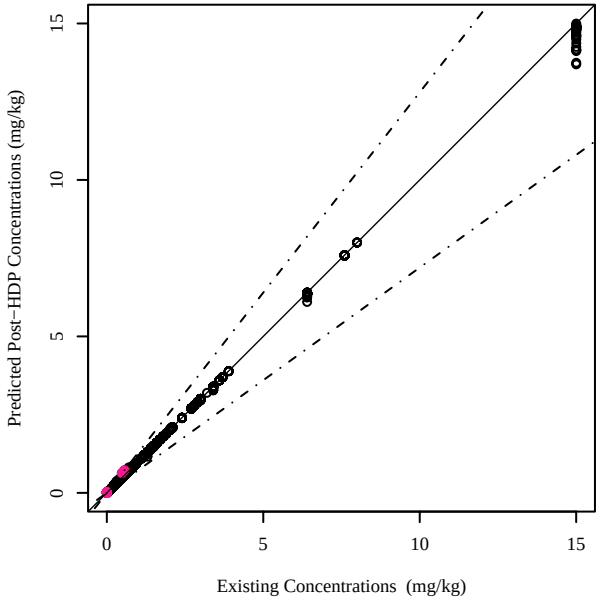
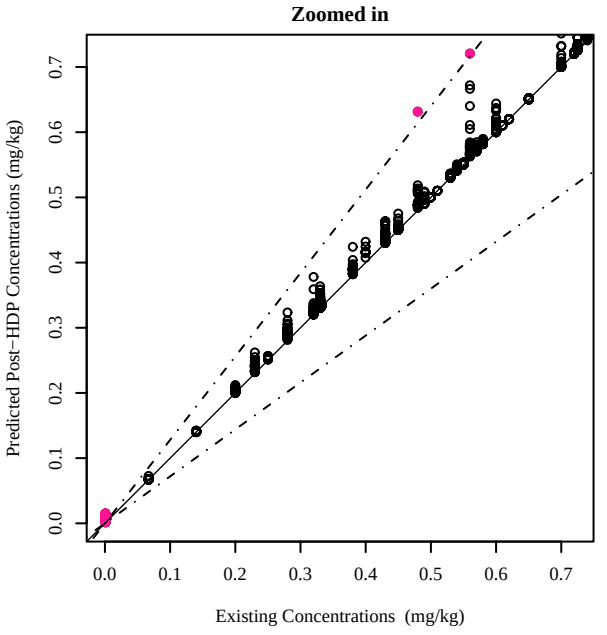
New York District

Figure 15b
Benzo(a)pyrene: change in surface sediment concentrations due to dredging as predicted by the model, AEC analysis





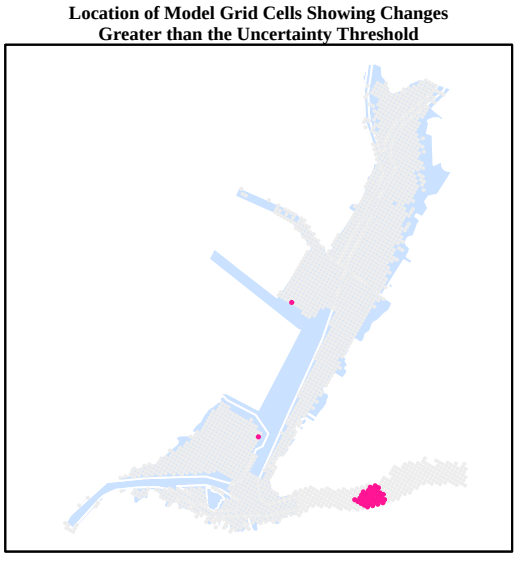


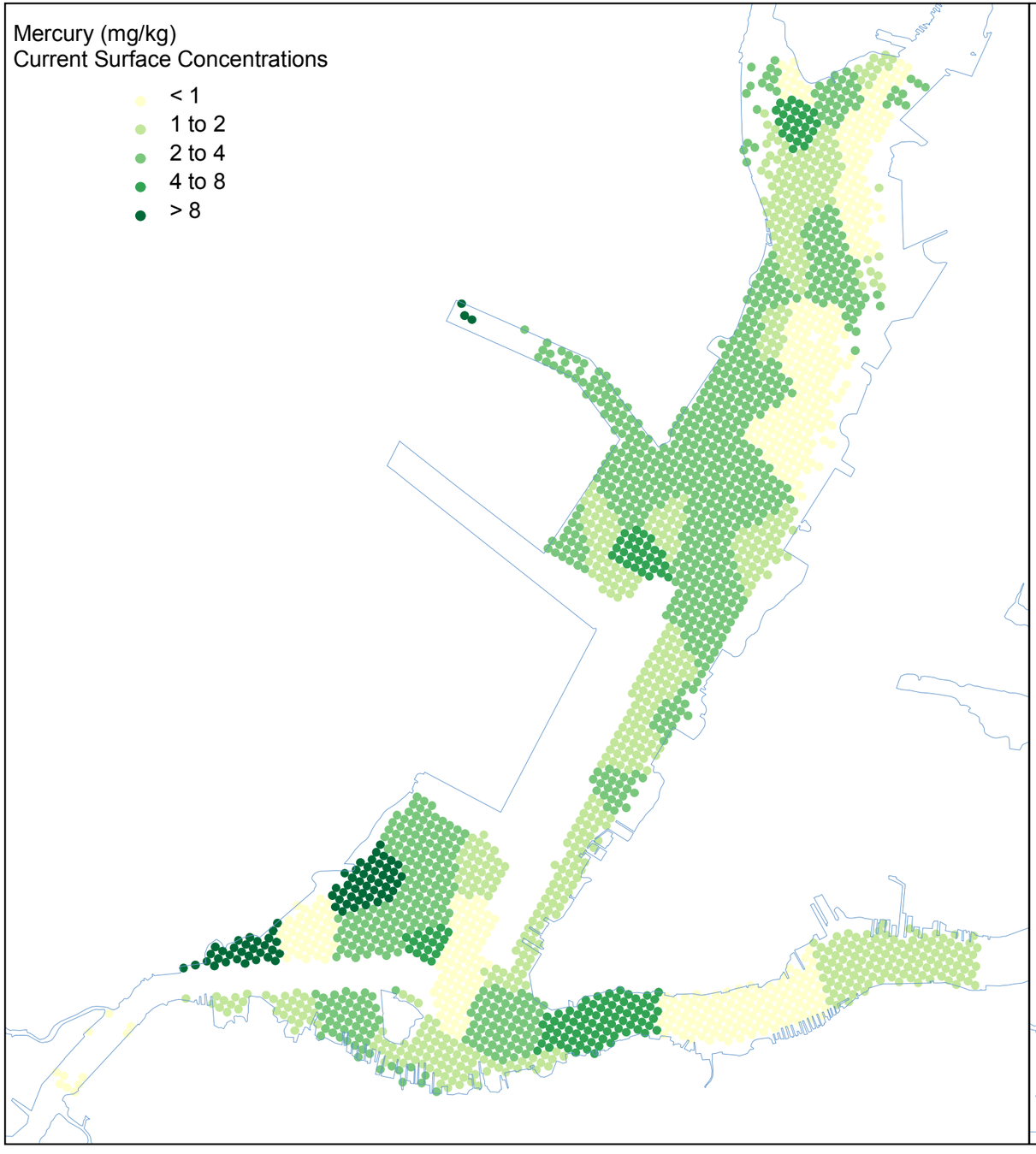
Figure 15c. Benzo(a)pyrene : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold, AEC analysis

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

D:/jobs/ACEnew/Analysis/Post_Dredge_Concentrations/Active_Cores_Sensitivity/ThiessenActiveCores.mdb.R
D:/jobs/ACEnew/Analysis/Post_Dredge_Concentrations/Post_Processing/output_plots/fig15c_plots_RPD_comp_tz.ps
Thu Feb 01 12:25:16 2007

Mercury (mg/kg)
Current Surface Concentrations

- < 1
- 1 to 2
- 2 to 4
- 4 to 8
- > 8



Mercury (mg/kg)
Post Dredge Surface Concentrations

- < 1
- 1 to 2
- 2 to 4
- 4 to 8
- > 8

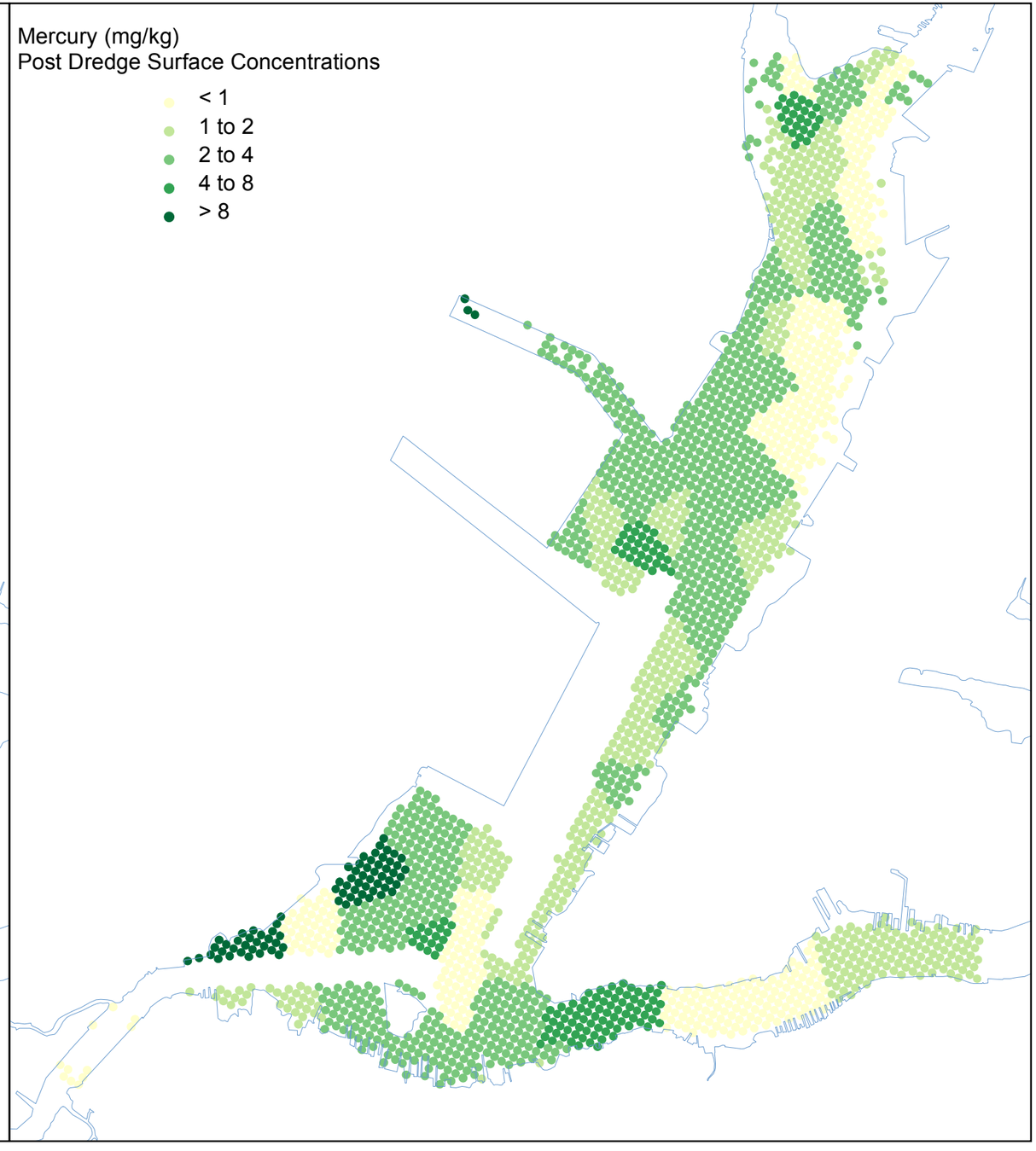


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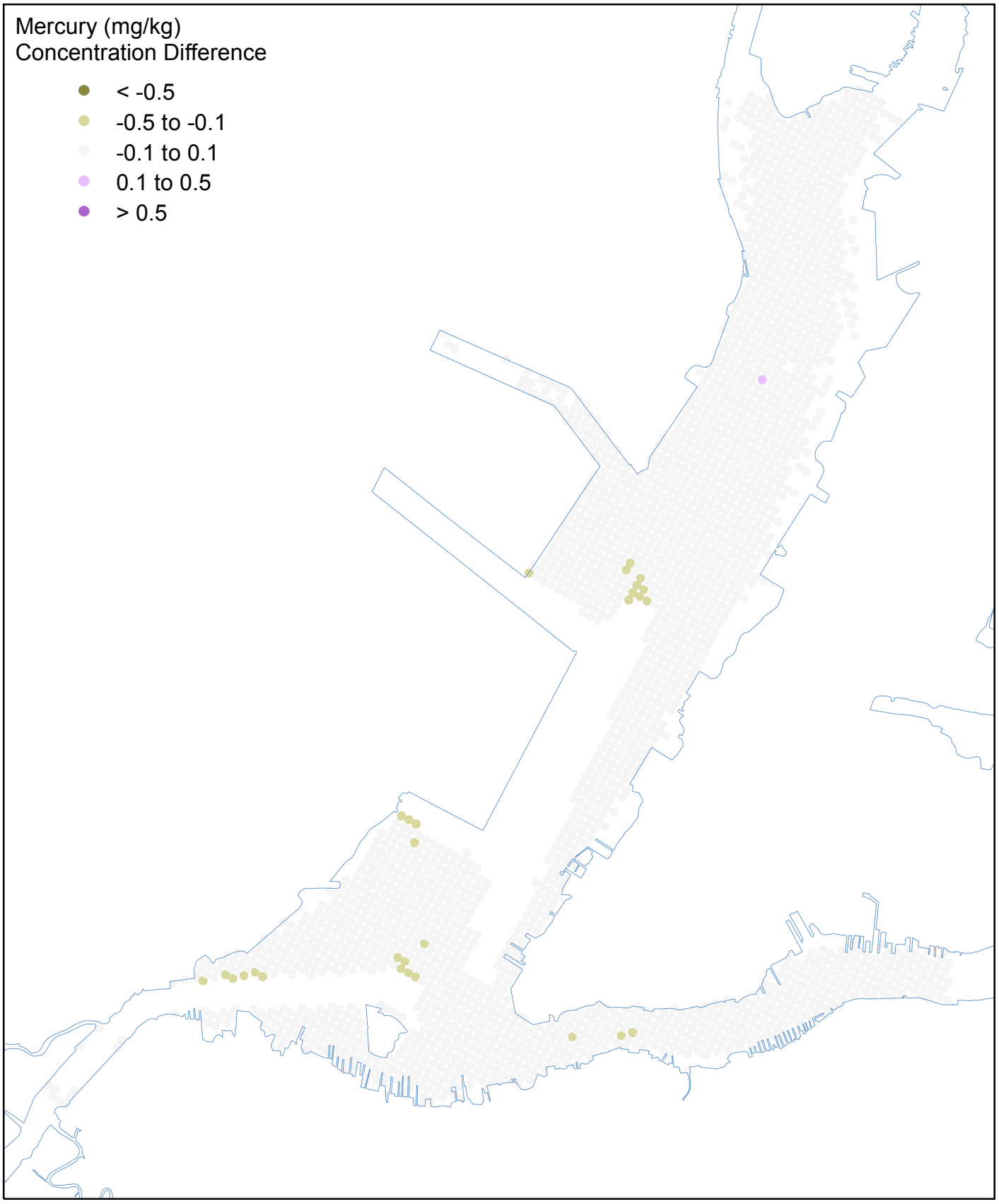
Figure 16a

Mercury: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, AEC analysis



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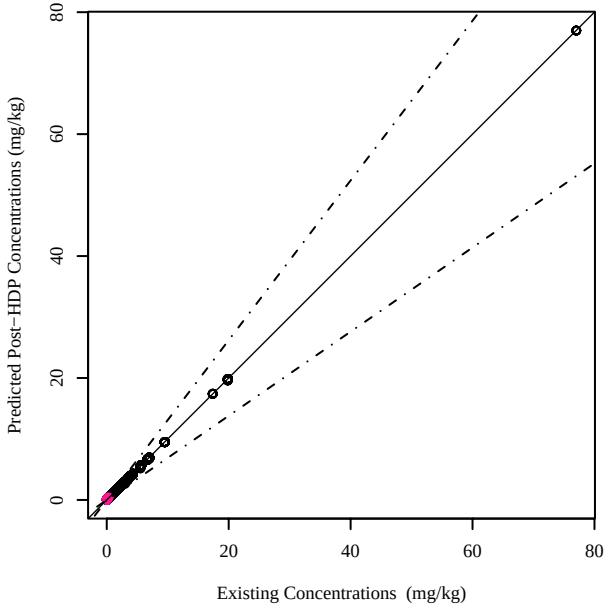
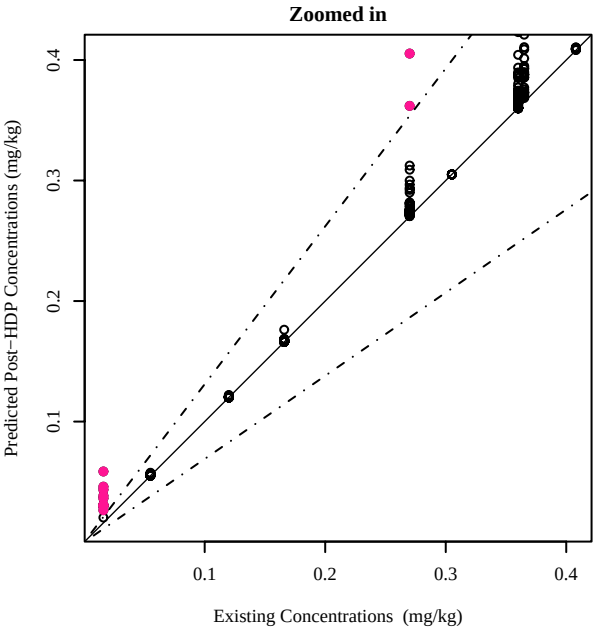
New York District

Figure 16b
Mercury: change in surface sediment concentrations due to dredging as predicted by the model, AEC analysis





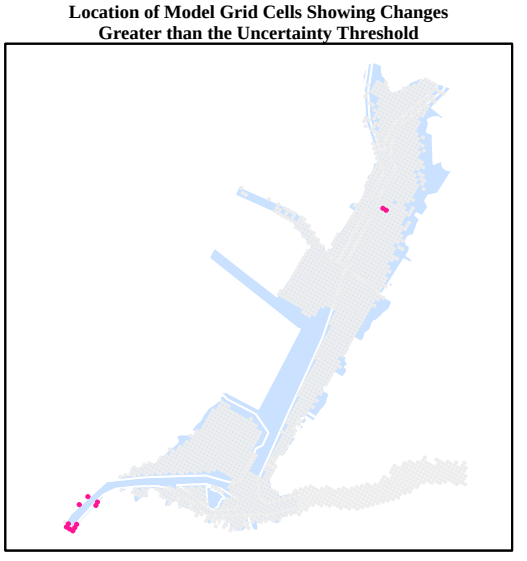


Figure 16c. Mercury : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold, AEC analysis

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

Chromium (mg/kg)
Current Surface Concentrations

- < 50
- 50 to 100
- 100 to 200
- 200 to 350
- > 350

Chromium (mg/kg)
Post Dredge Surface Concentrations

- < 50
- 50 to 100
- 100 to 200
- 200 to 350
- > 350

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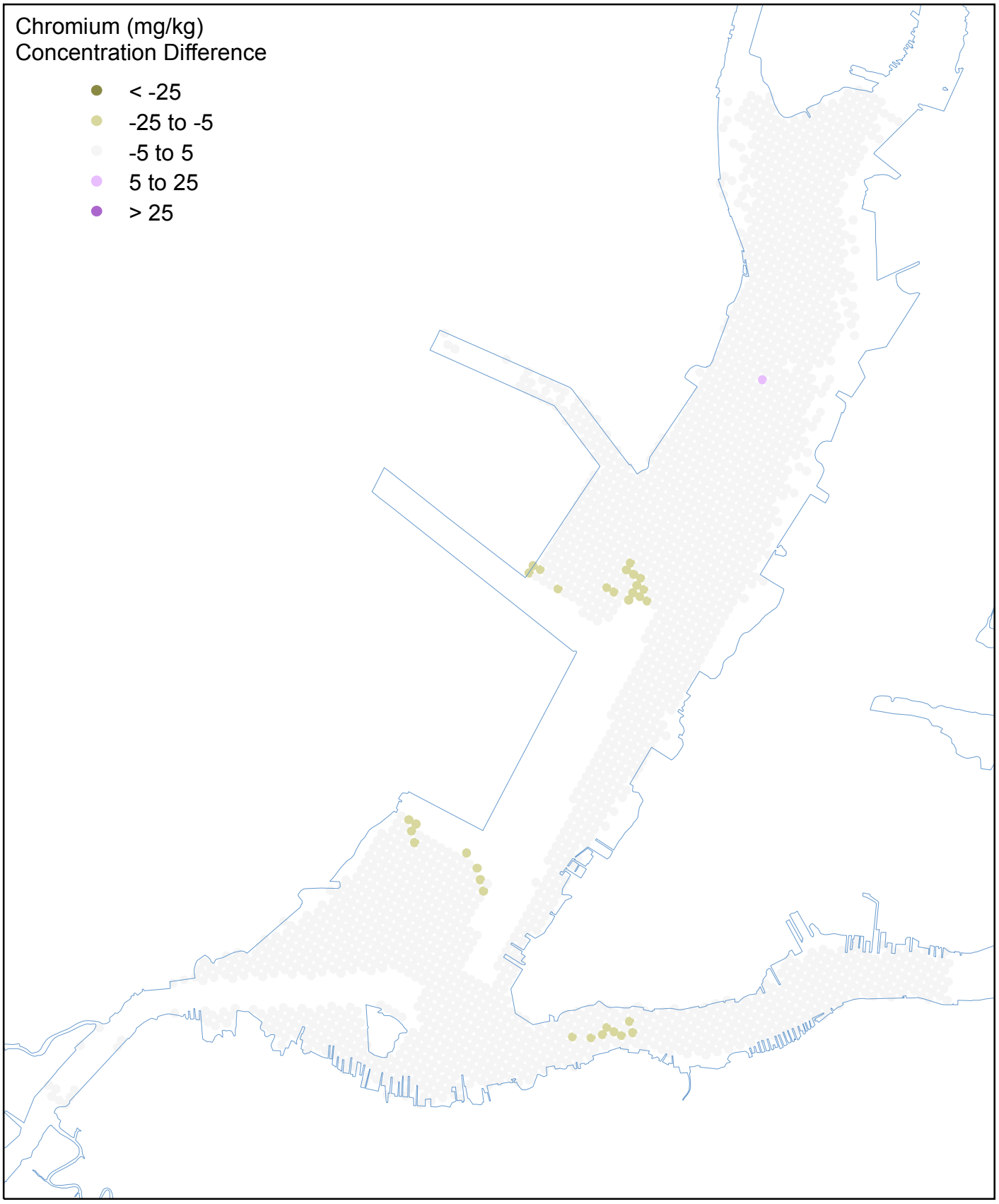
Figure 17a

Chromium: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, AEC analysis



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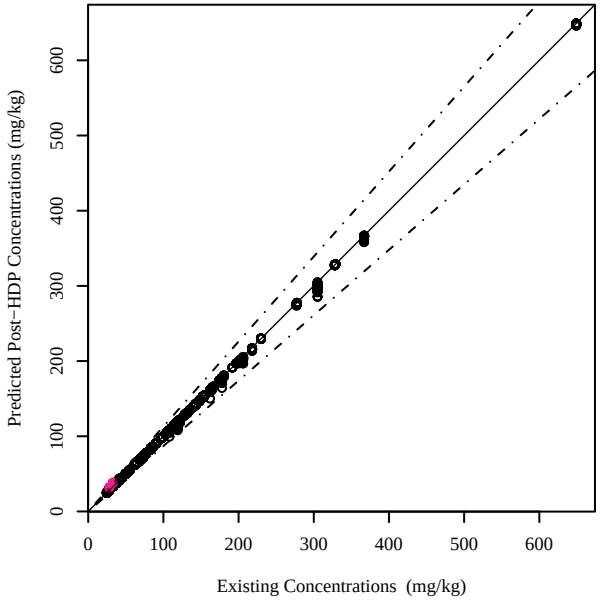
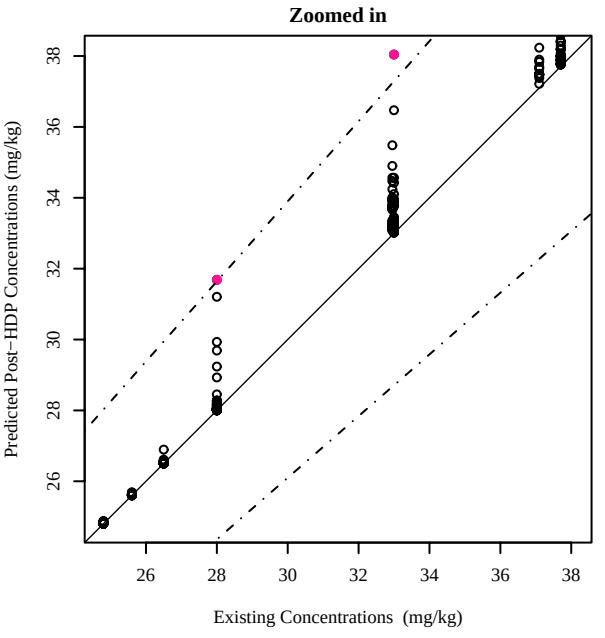
New York District

Figure 17b
Chromium: change in surface sediment concentrations due to dredging as predicted by the model, AEC analysis





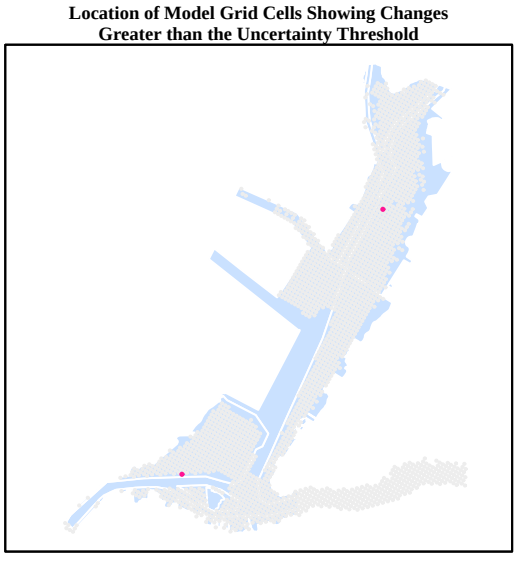
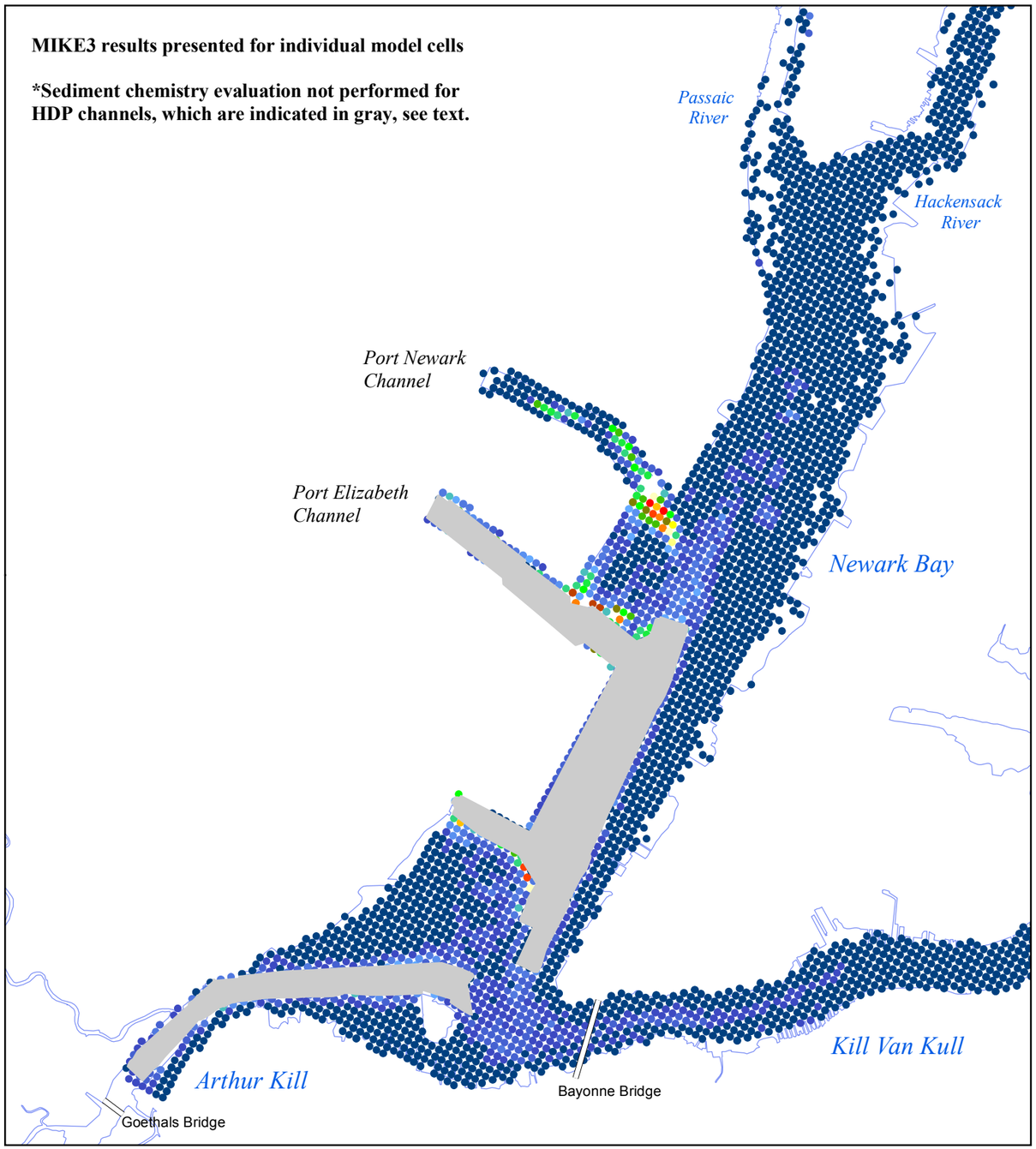


Figure 17c. Chromium : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold, AEC analysis

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

MIKE3 results presented for individual model cells

***Sediment chemistry evaluation not performed for HDP channels, which are indicated in gray, see text.**



Interpolated MIKE3 Model Results

Source: Appendix 1, Figure 38

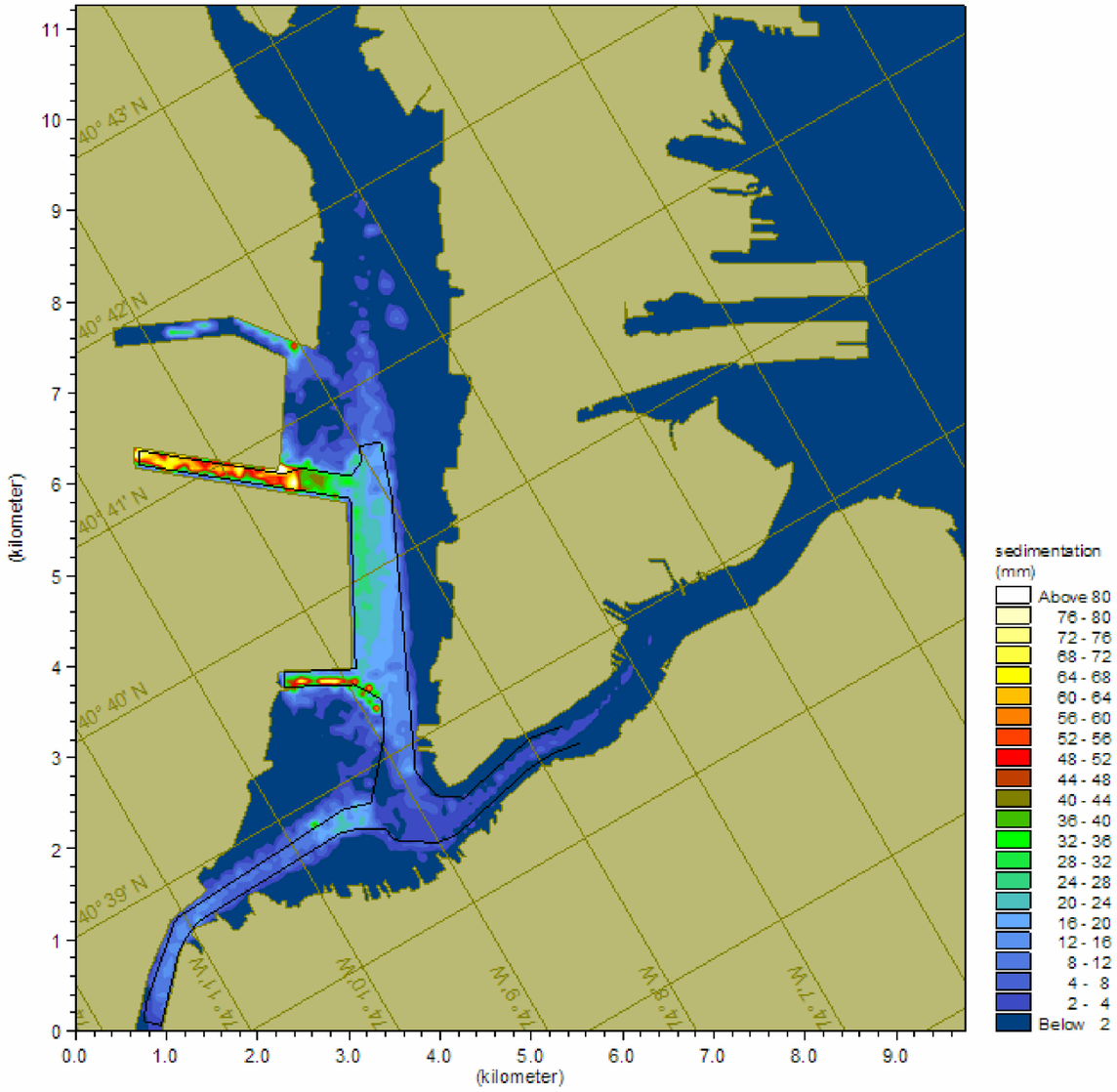


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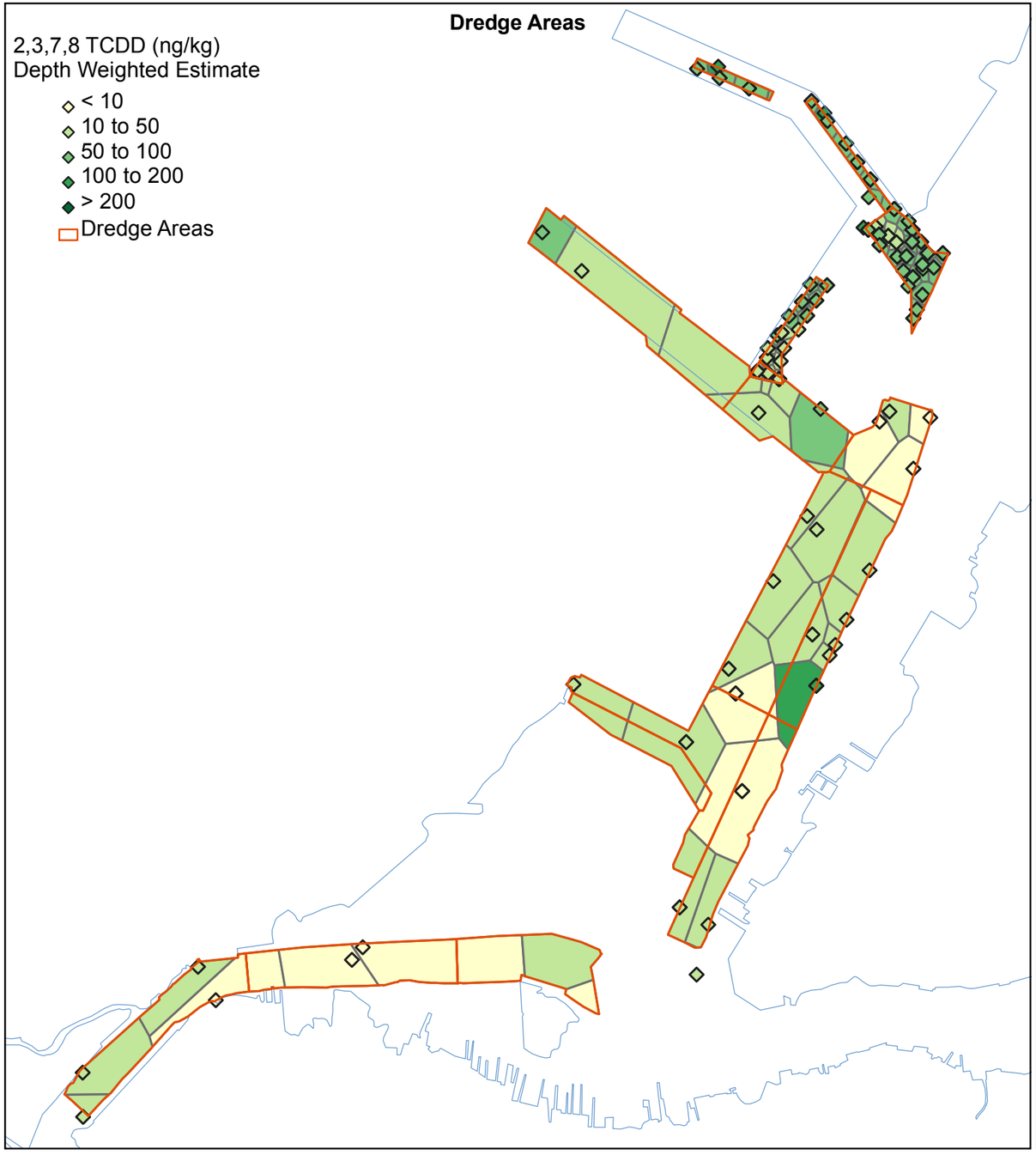
Figure 18.

Cumulative 5-year Sedimentation Due to Resuspension Caused by the HDP and Other Dredging

Dredge Areas

2,3,7,8 TCDD (ng/kg)
Depth Weighted Estimate

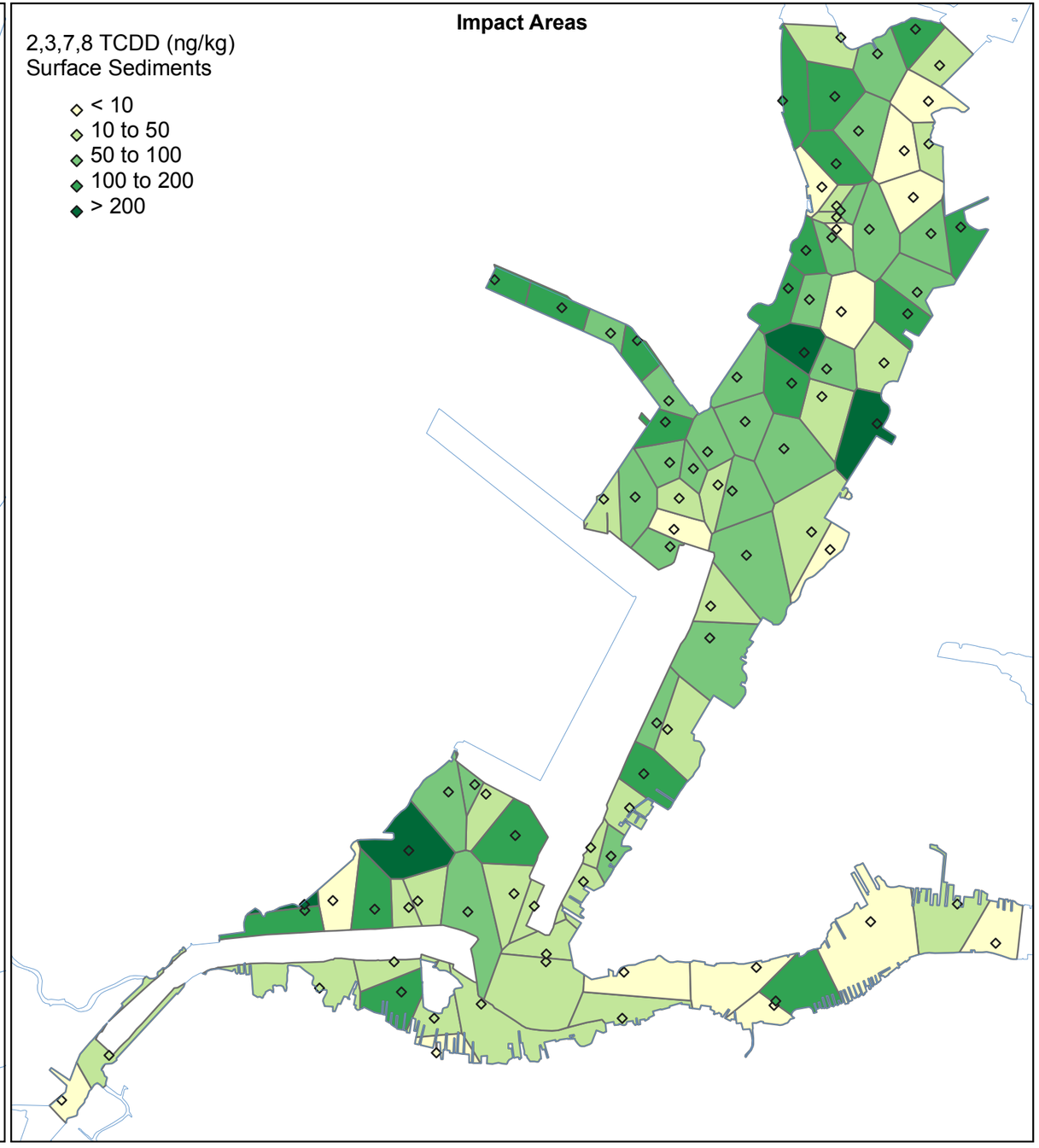
- < 10
- 10 to 50
- 50 to 100
- 100 to 200
- > 200
- Dredge Areas



Impact Areas

2,3,7,8 TCDD (ng/kg)
Surface Sediments

- < 10
- 10 to 50
- 50 to 100
- 100 to 200
- > 200



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New York District

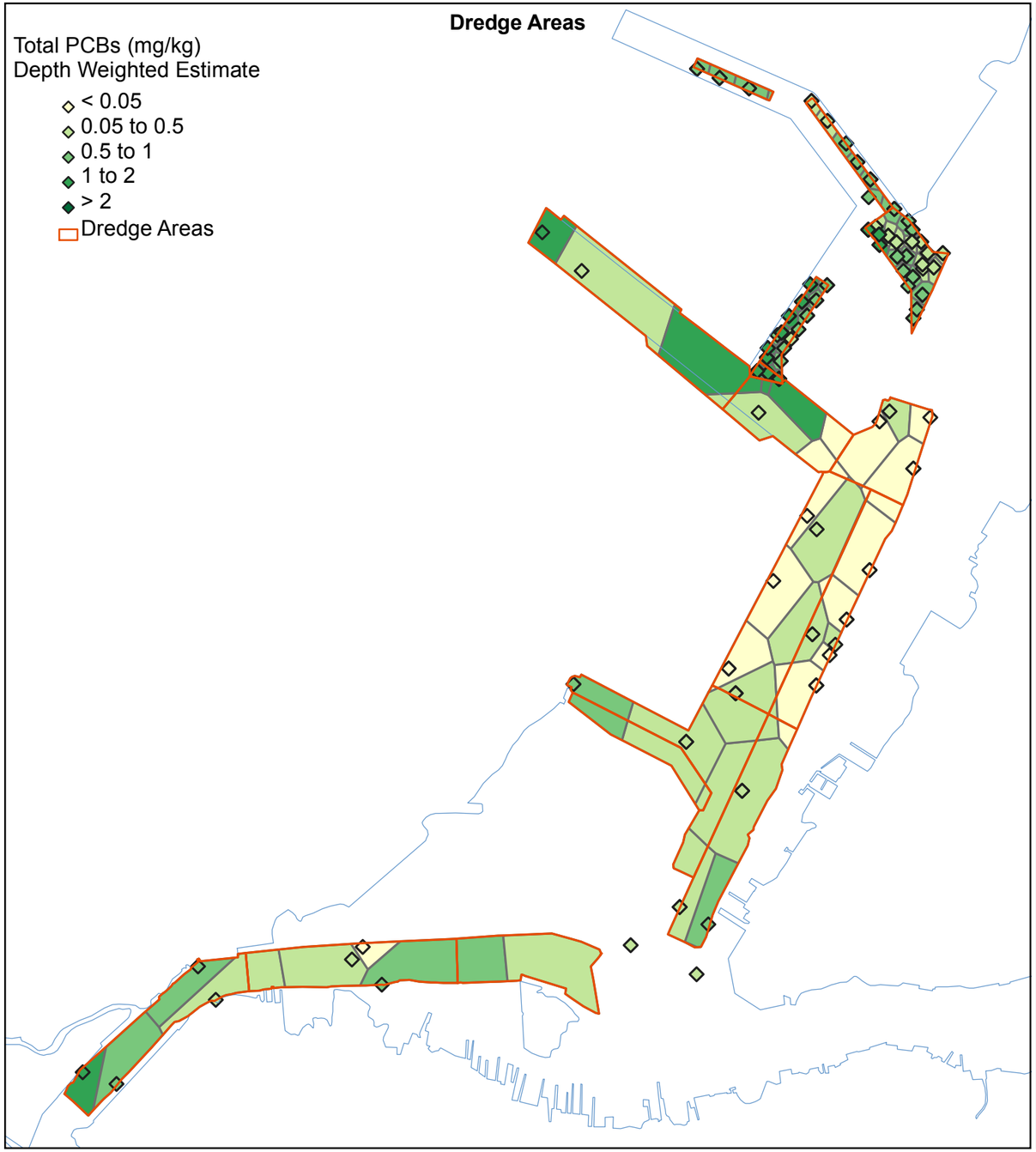
Figure 18a

2,3,7,8 TCDD in the sediments of Newark Bay under current conditions: Thiessen polygons, cumulative assessment

Dredge Areas

Total PCBs (mg/kg)
Depth Weighted Estimate

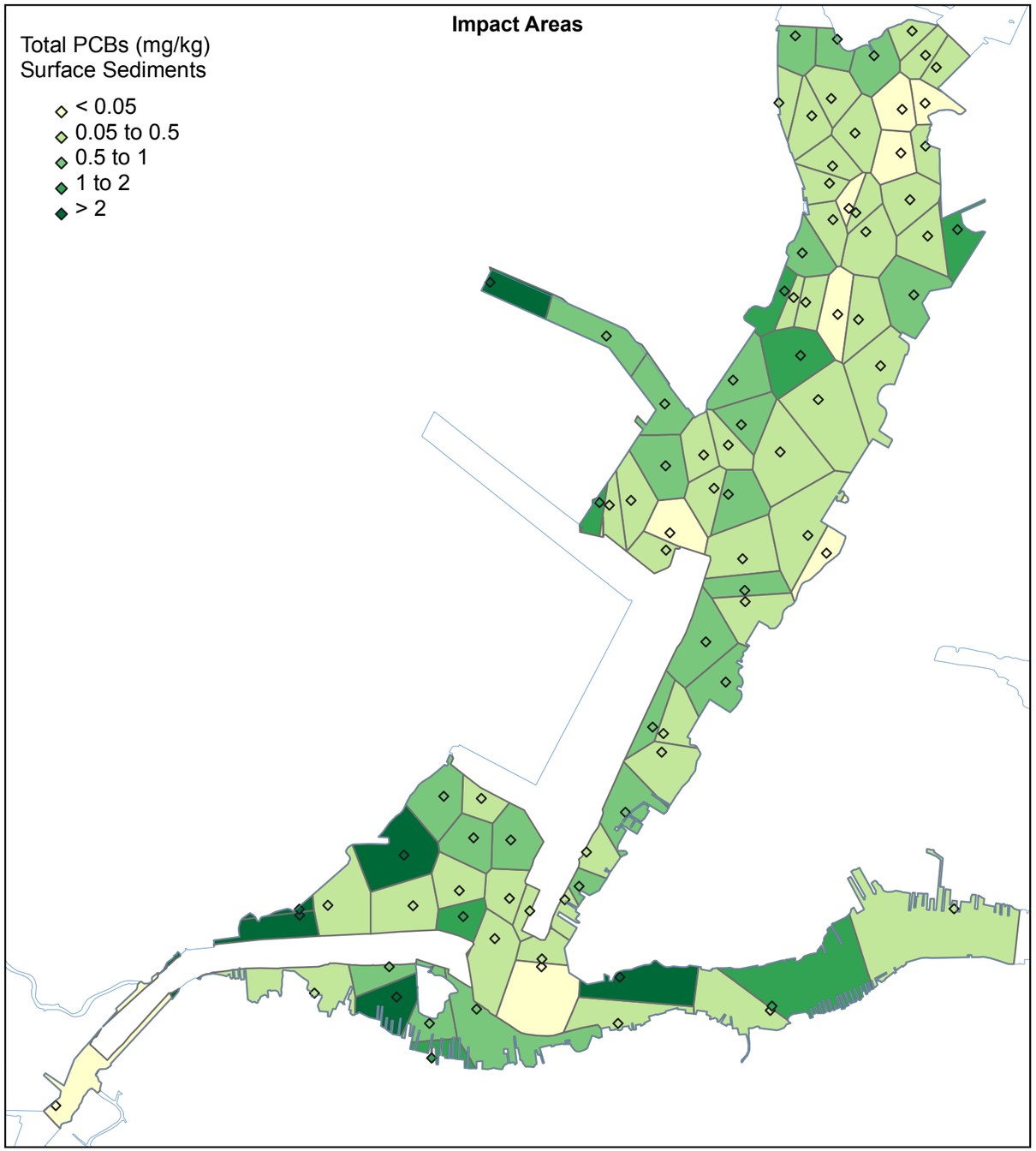
- < 0.05
- 0.05 to 0.5
- 0.5 to 1
- 1 to 2
- > 2
- Dredge Areas



Impact Areas

Total PCBs (mg/kg)
Surface Sediments

- < 0.05
- 0.05 to 0.5
- 0.5 to 1
- 1 to 2
- > 2



US Army Corps of Engineers
New York District

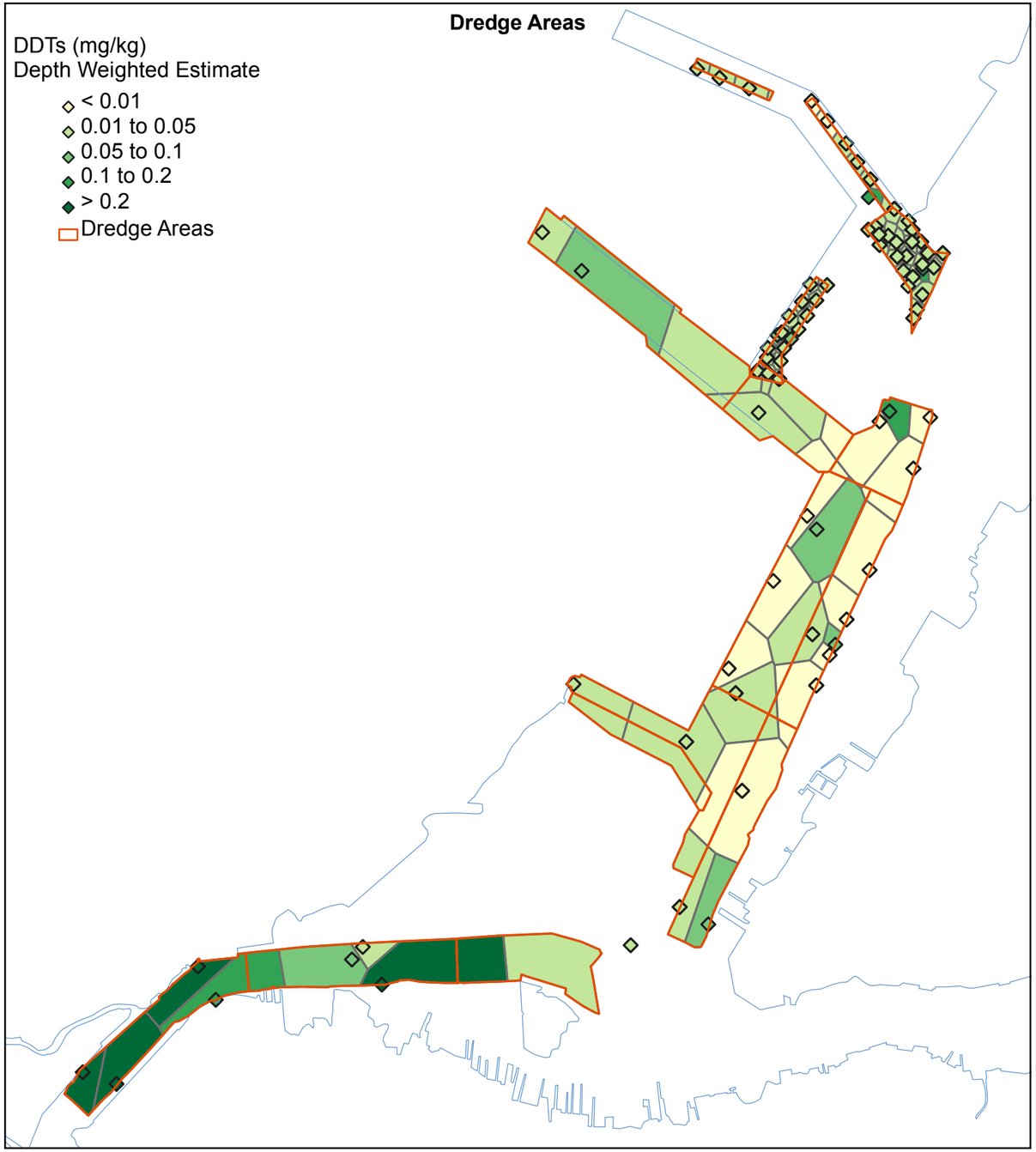
Figure 18b

Total PCBs in the sediments of Newark Bay under current conditions: Thiessen polygons, cumulative assessment

Dredge Areas

DDTs (mg/kg)
Depth Weighted Estimate

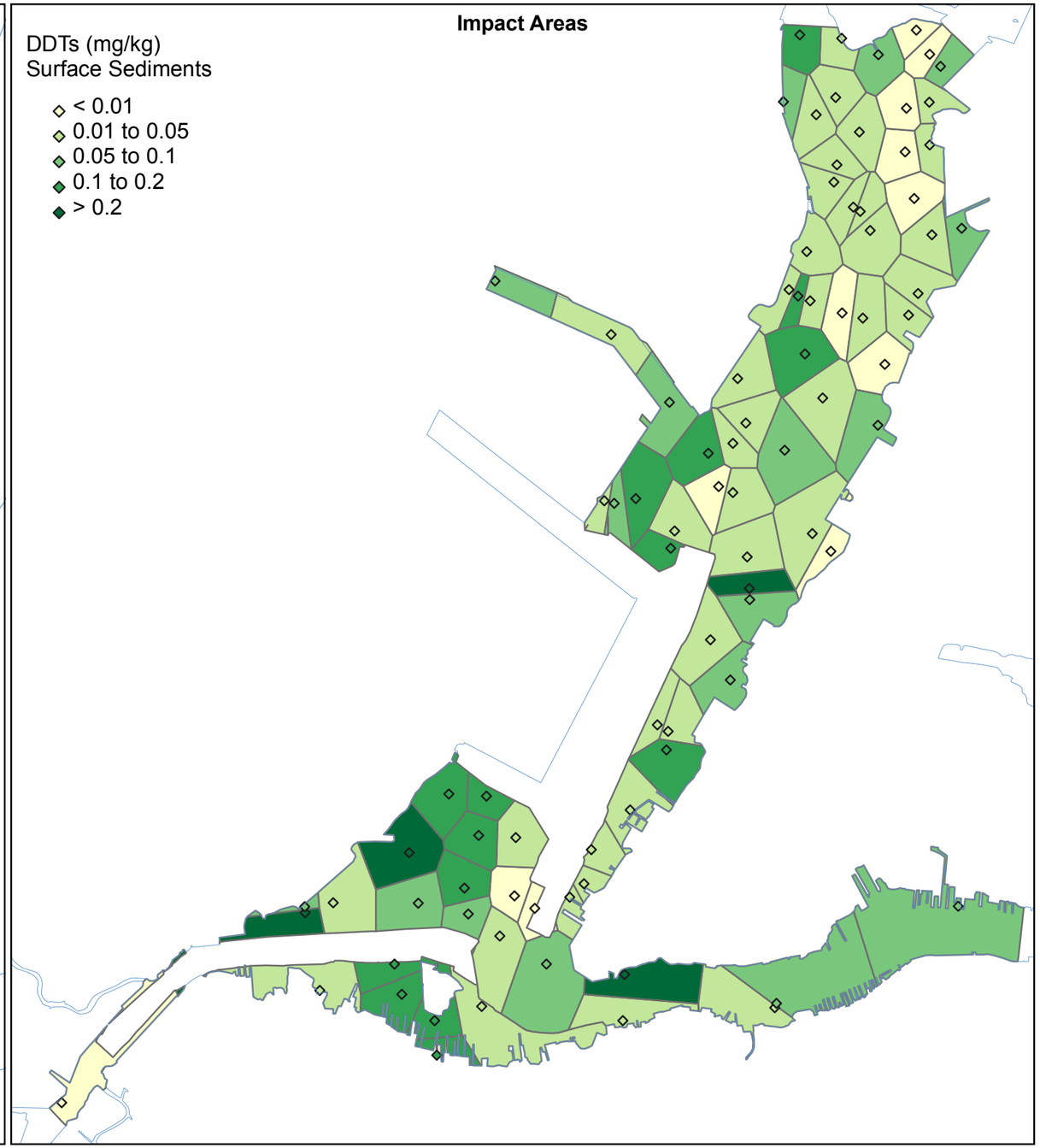
- < 0.01
- 0.01 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- > 0.2
- Dredge Areas



Impact Areas

DDTs (mg/kg)
Surface Sediments

- < 0.01
- 0.01 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- > 0.2



US Army Corps of Engineers
New York District

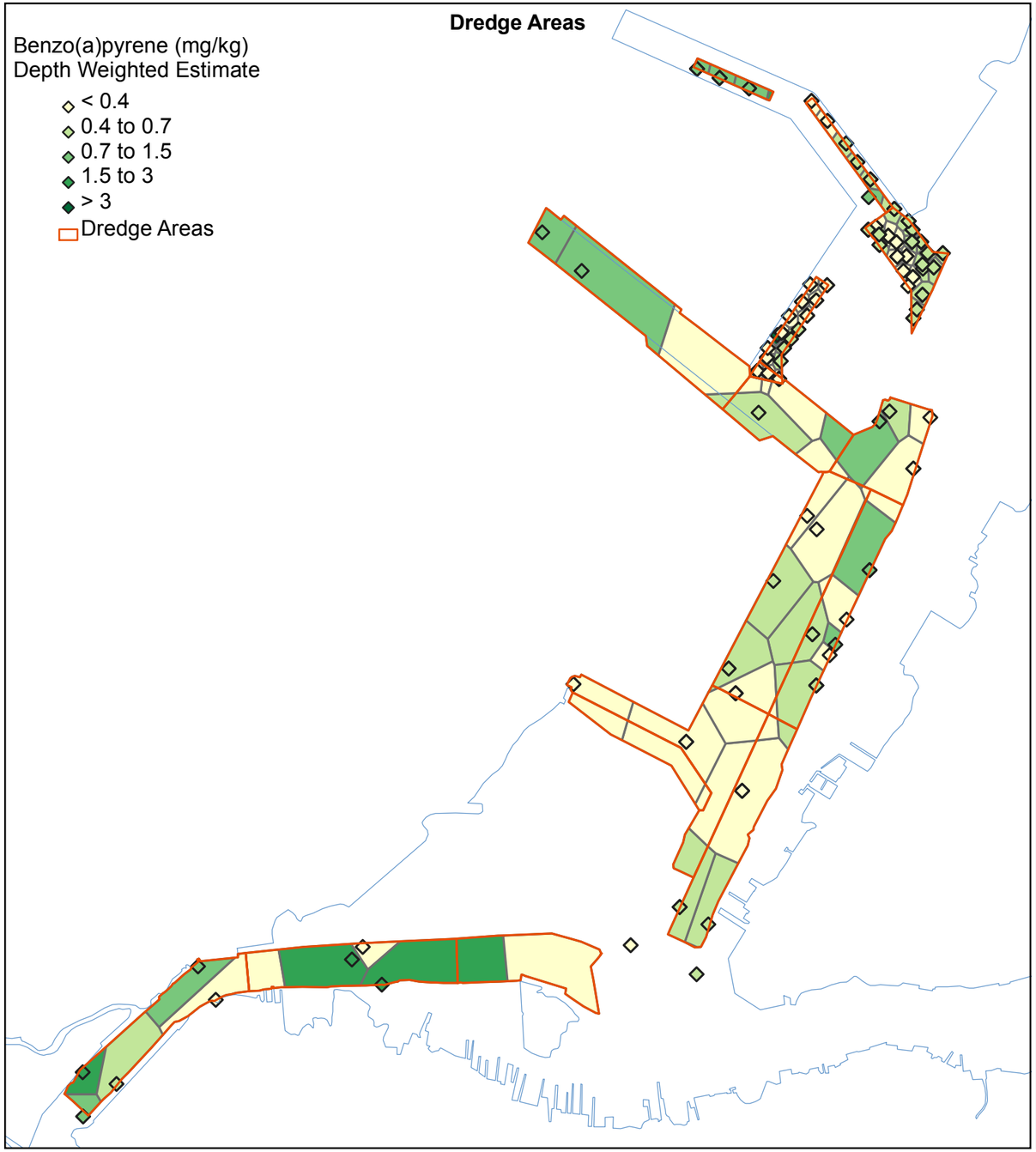
Figure 18c

DDTs in the sediments of Newark Bay under current conditions: Thiessen polygons, cumulative assessment

Dredge Areas

Benzo(a)pyrene (mg/kg)
Depth Weighted Estimate

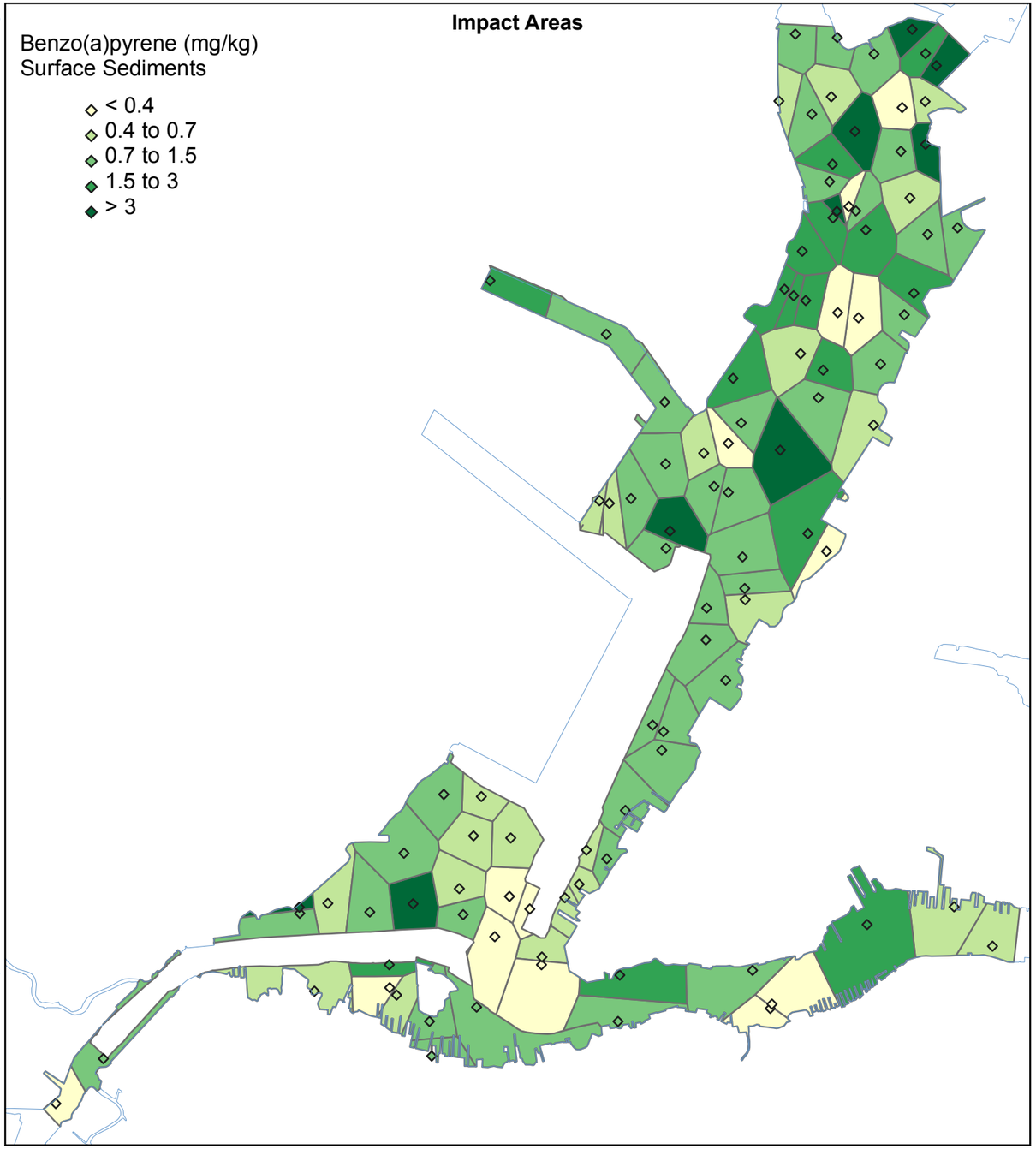
- < 0.4
- 0.4 to 0.7
- 0.7 to 1.5
- 1.5 to 3
- > 3
- Dredge Areas



Impact Areas

Benzo(a)pyrene (mg/kg)
Surface Sediments

- < 0.4
- 0.4 to 0.7
- 0.7 to 1.5
- 1.5 to 3
- > 3



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New York District

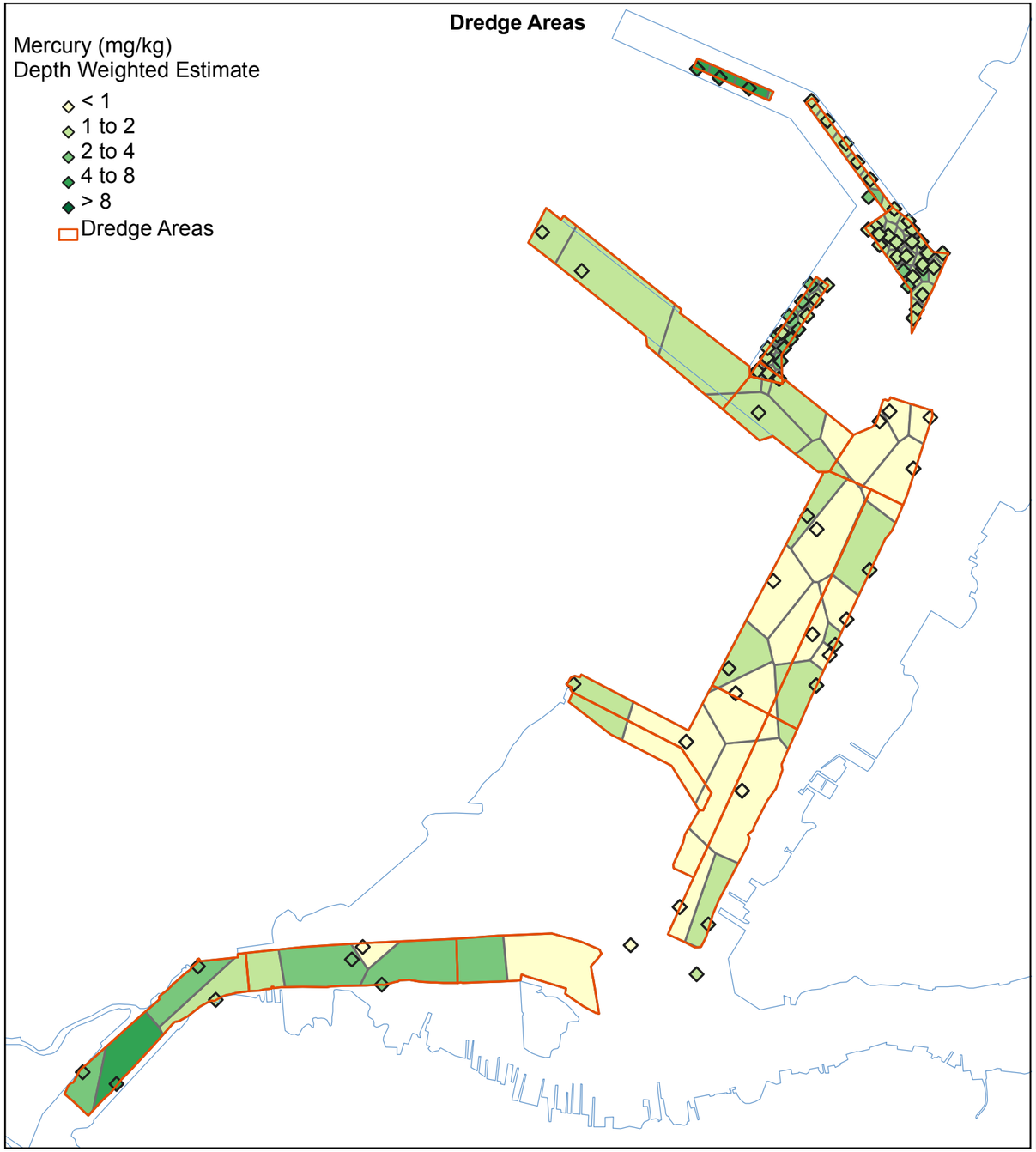
Figure 18d

Benzo(a)pyrene in the sediments of Newark Bay under current conditions: Thiessen polygons, cumulative assessment

Dredge Areas

Mercury (mg/kg)
Depth Weighted Estimate

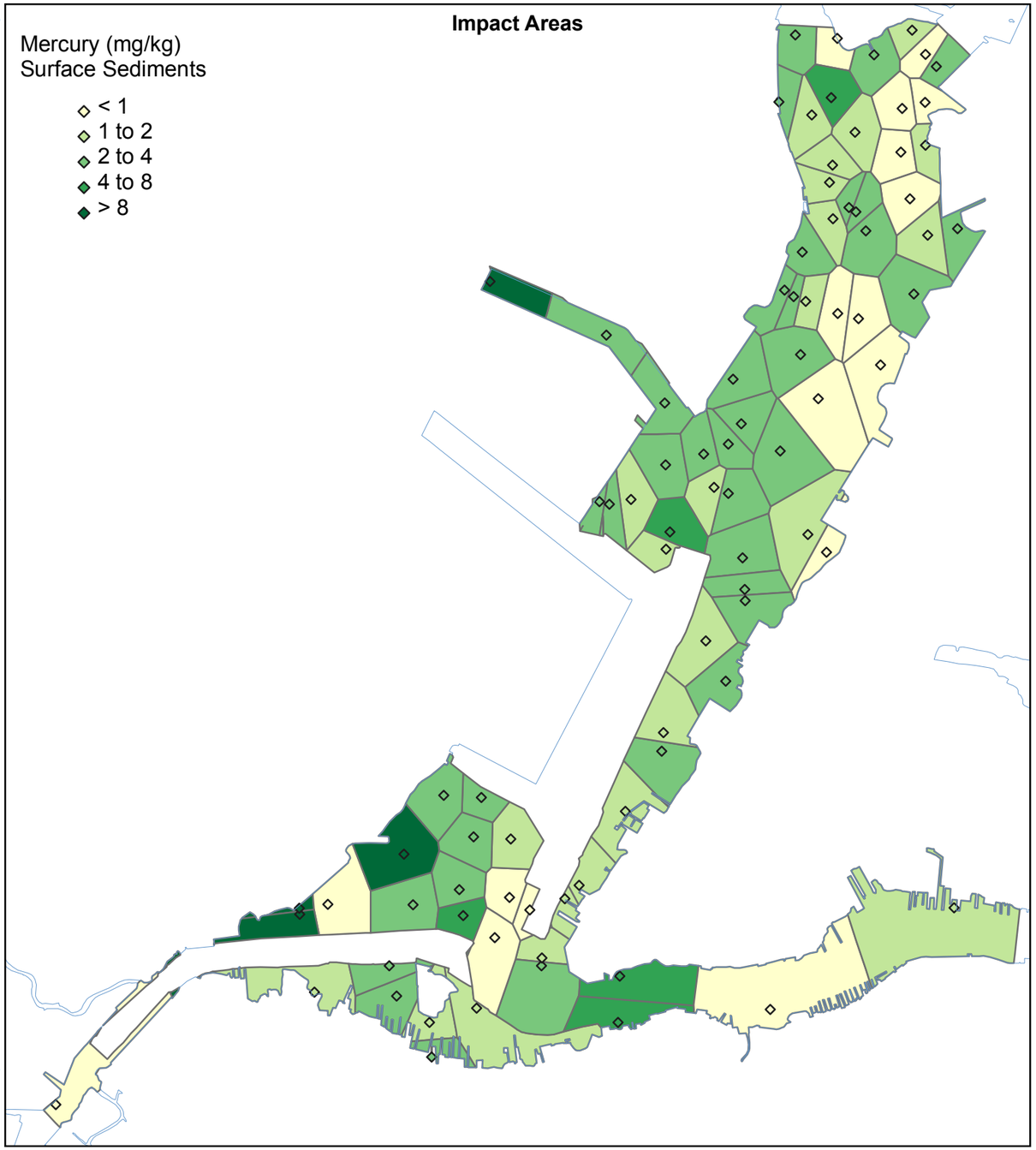
- < 1
- 1 to 2
- 2 to 4
- 4 to 8
- > 8
- Dredge Areas



Impact Areas

Mercury (mg/kg)
Surface Sediments

- < 1
- 1 to 2
- 2 to 4
- 4 to 8
- > 8



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New York District

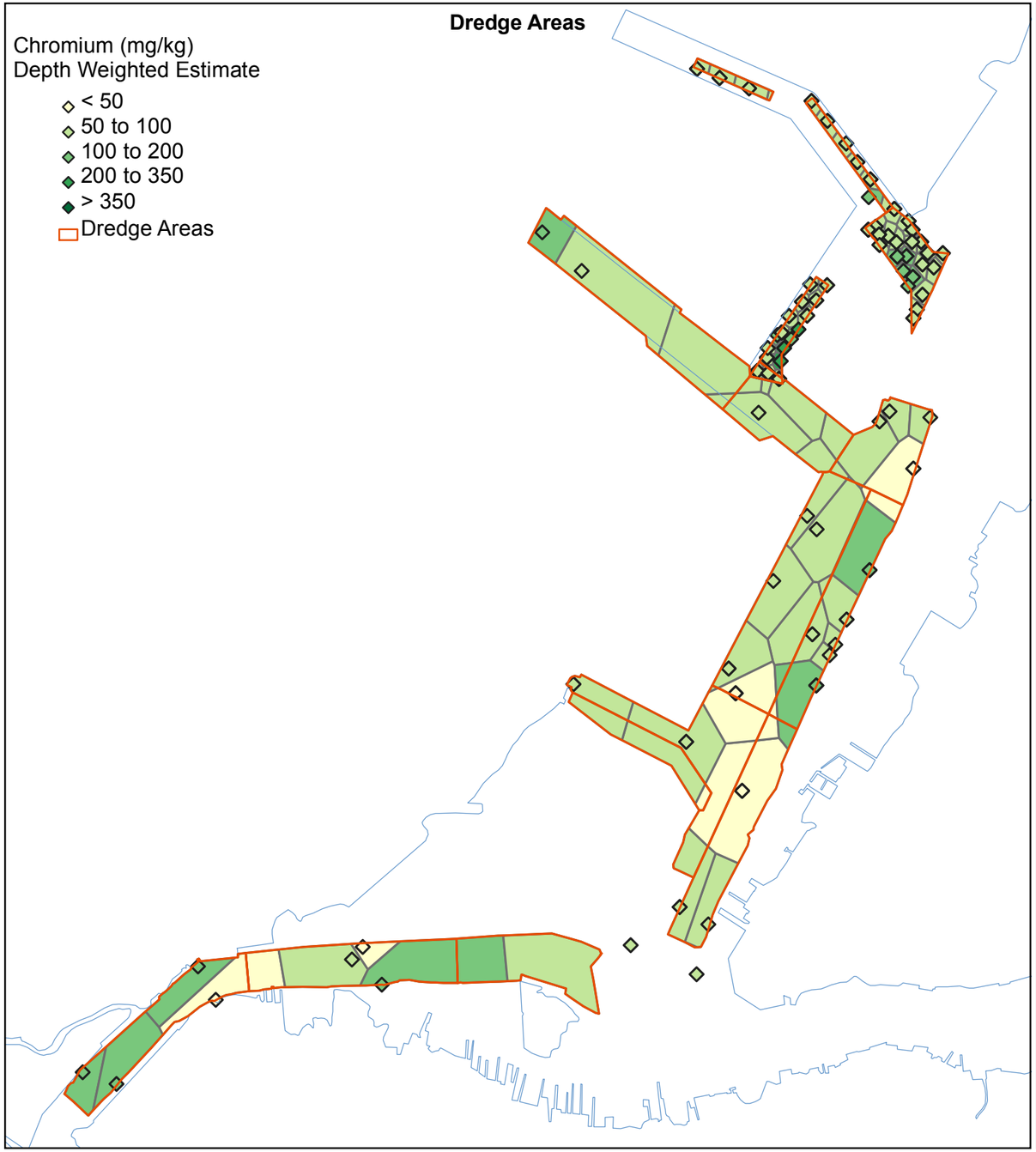
Figure 18e

Mercury in the sediments of Newark Bay under current conditions: Thiessen polygons, cumulative assessment

Dredge Areas

Chromium (mg/kg)
Depth Weighted Estimate

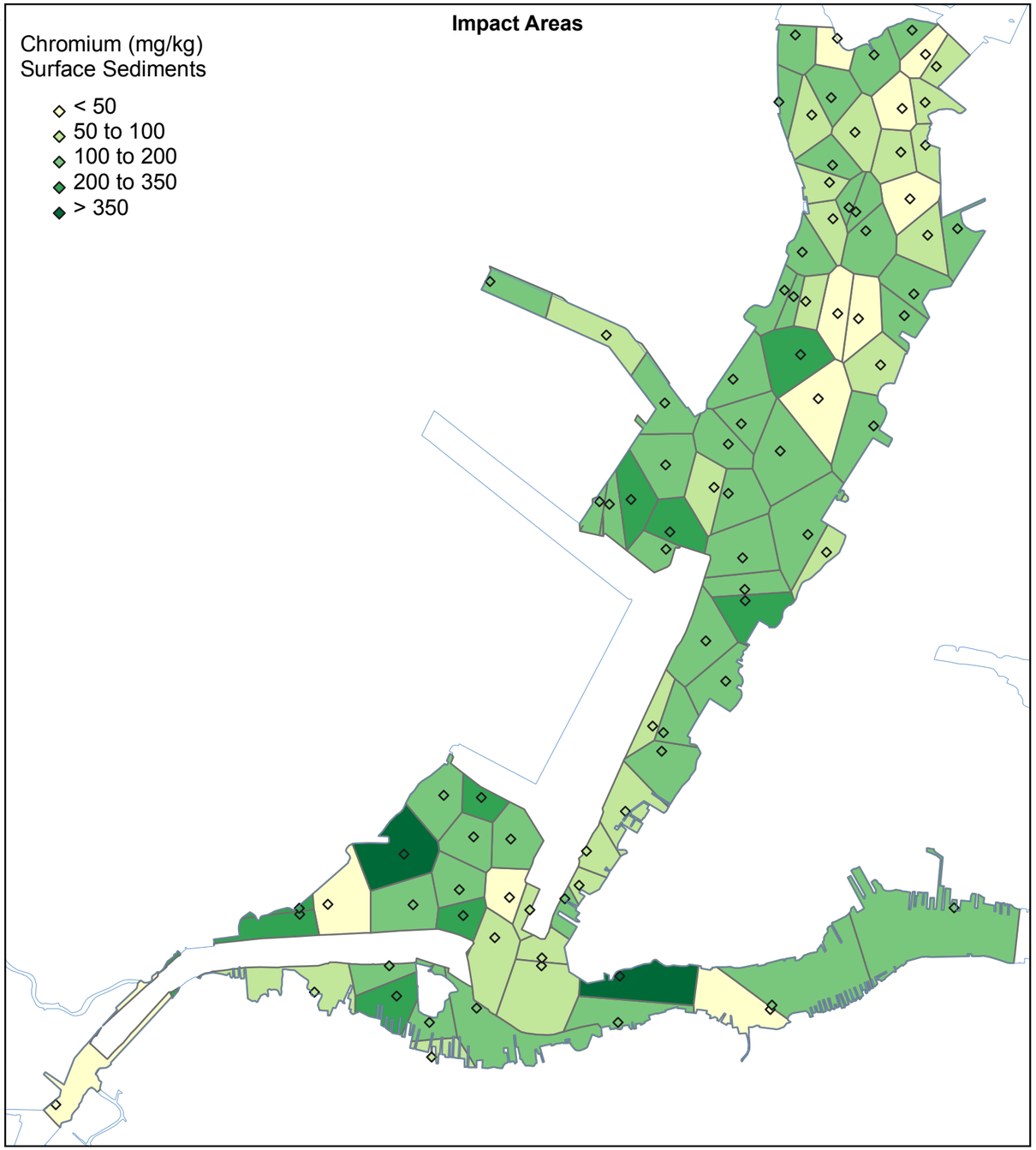
- < 50
- 50 to 100
- 100 to 200
- 200 to 350
- > 350
- Dredge Areas



Impact Areas

Chromium (mg/kg)
Surface Sediments

- < 50
- 50 to 100
- 100 to 200
- 200 to 350
- > 350



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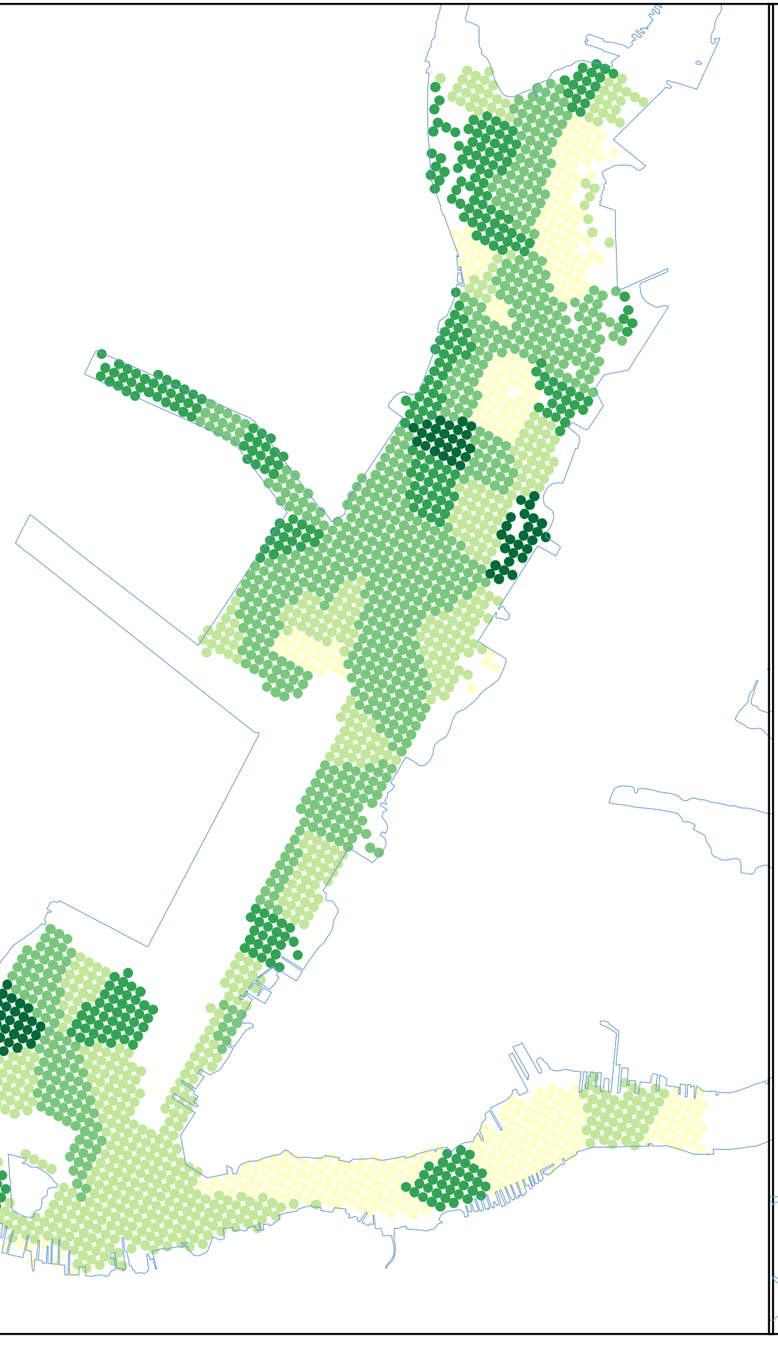
New York District

Figure 18f

Chromium in the sediments of Newark Bay under current conditions: Thiessen polygons, cumulative assessment

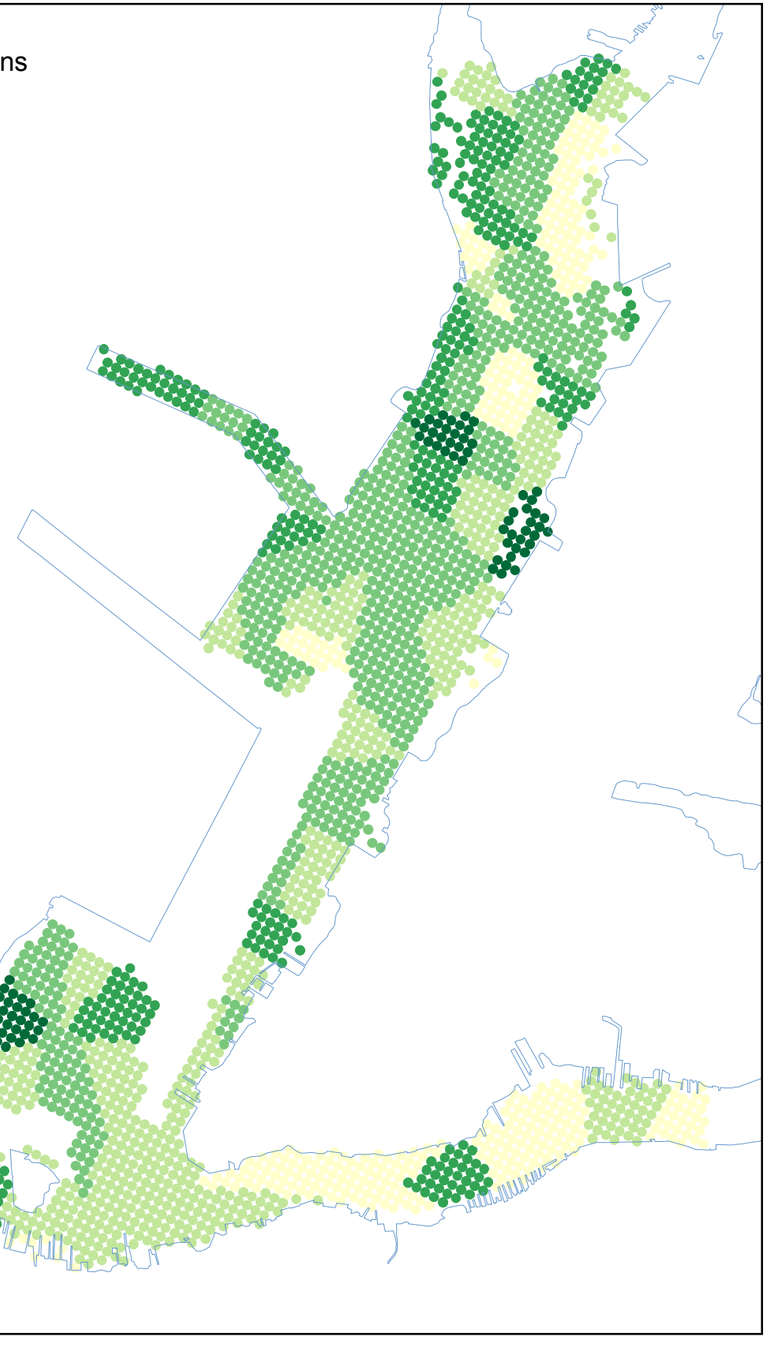
2,3,7,8 TCDD (ng/kg)
Current Surface Concentrations

- < 10
- 10 to 50
- 50 to 100
- 100 to 200
- > 200



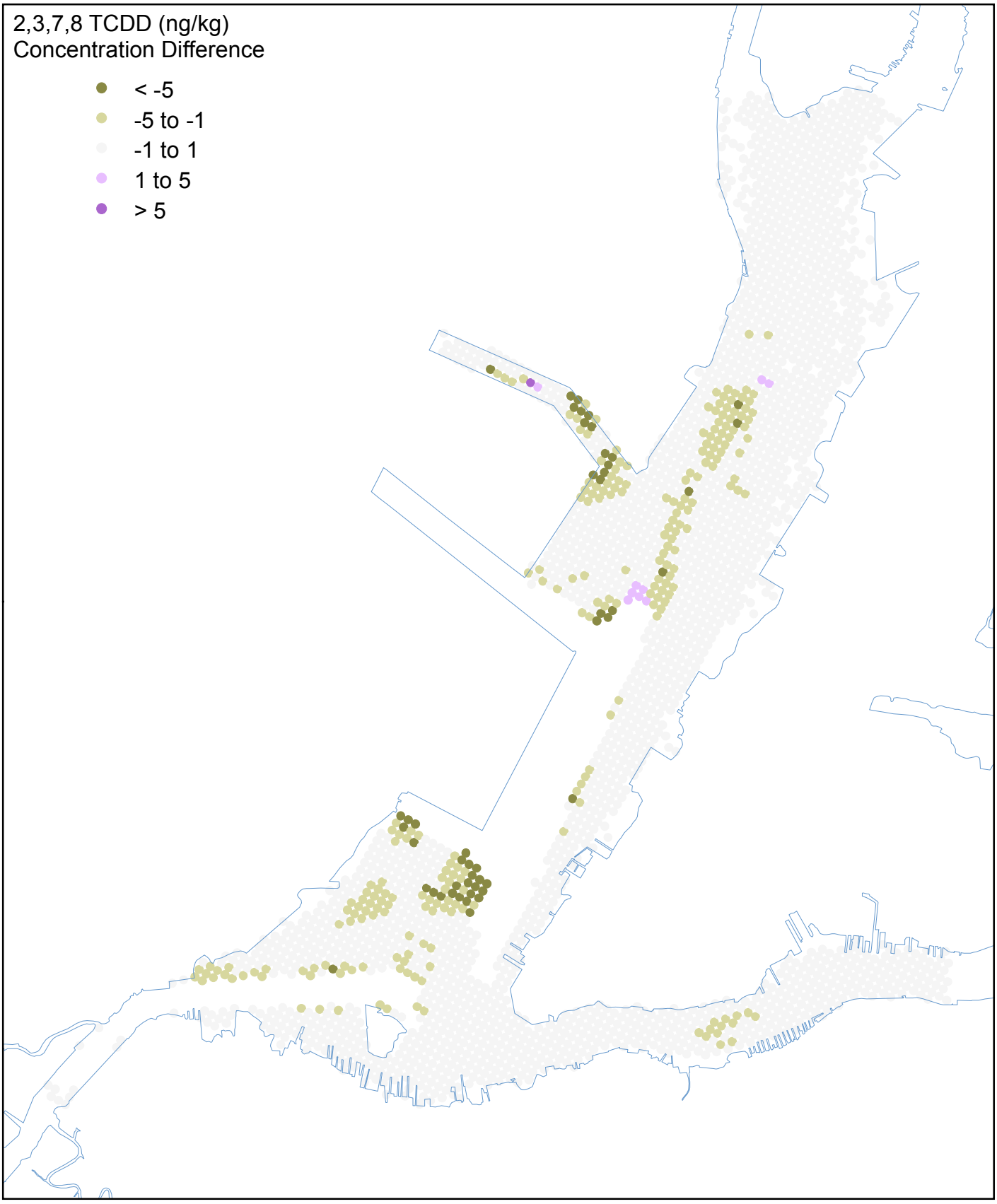
2,3,7,8 TCDD (ng/kg)
Post Dredge Surface Concentrations

- < 10
- 10 to 50
- 50 to 100
- 100 to 200
- > 200



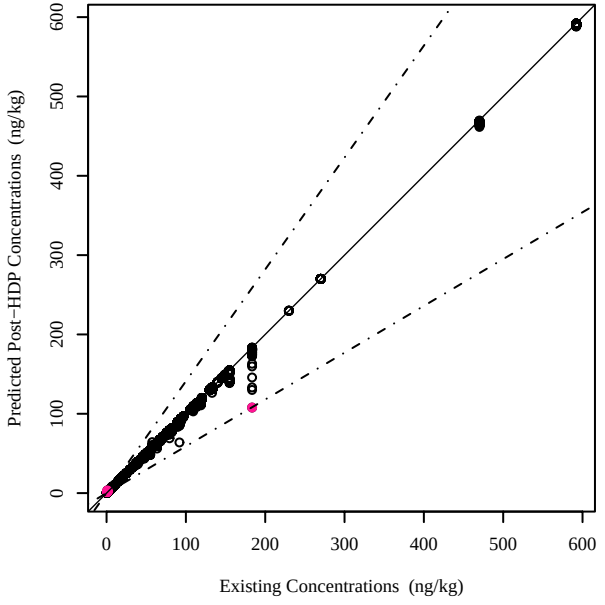
US Army Corps of Engineers
New York District

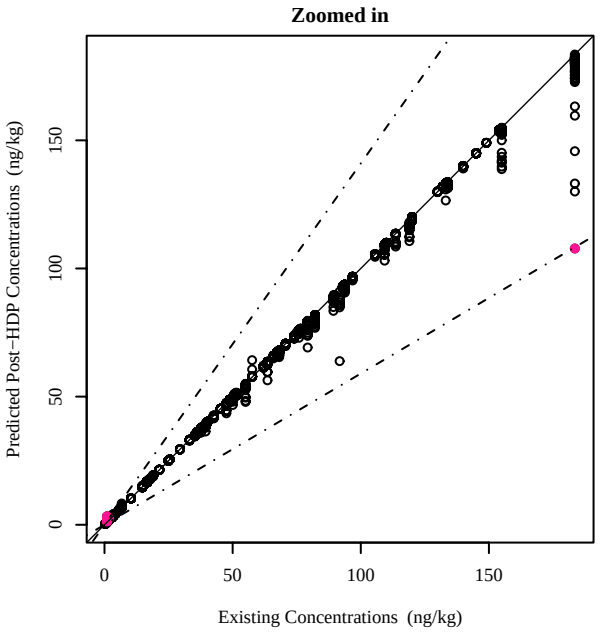
Figure 19a
2,3,7,8 TCDD: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, cumulative assessment



US Army Corps of Engineers
New York District

Figure 19b
2,3,7,8 TCDD: change in surface sediment concentrations due to dredging as predicted by the model, cumulative assessment





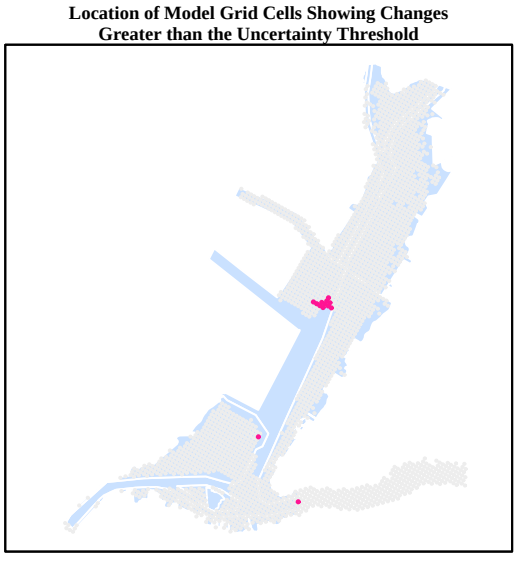


Figure 19c. 2,3,7,8 TCDD : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold cumulative assessment

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

Total PCBs (mg/kg)
Current Surface Concentrations

- < 0.05
- 0.05 to 0.5
- 0.5 to 1
- 1 to 2
- > 2

Total PCBs (mg/kg)
Post Dredge Surface Concentrations

- < 0.05
- 0.05 to 0.5
- 0.5 to 1
- 1 to 2
- > 2

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Figure 20a
Total PCBs: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, cumulative assessment

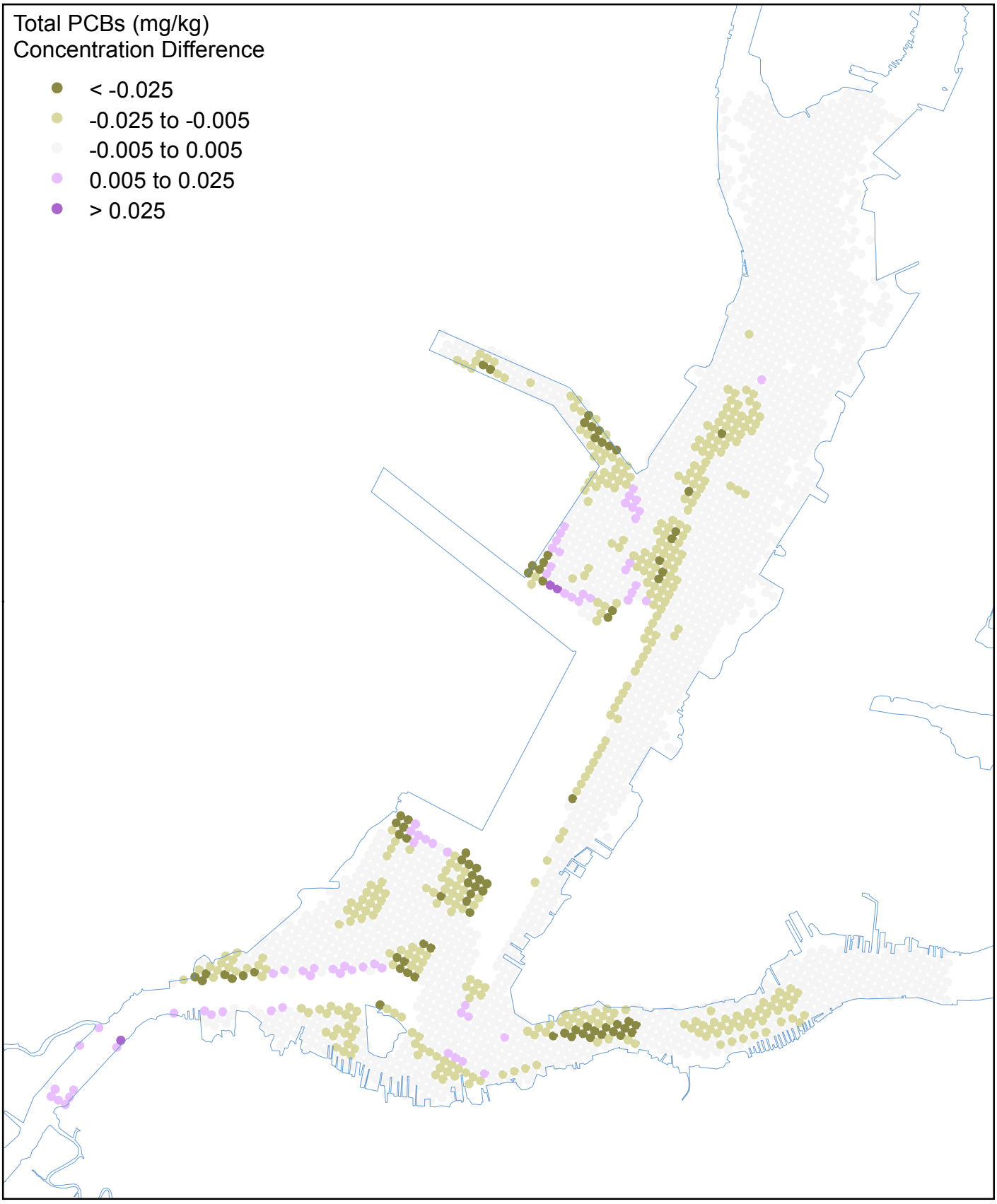

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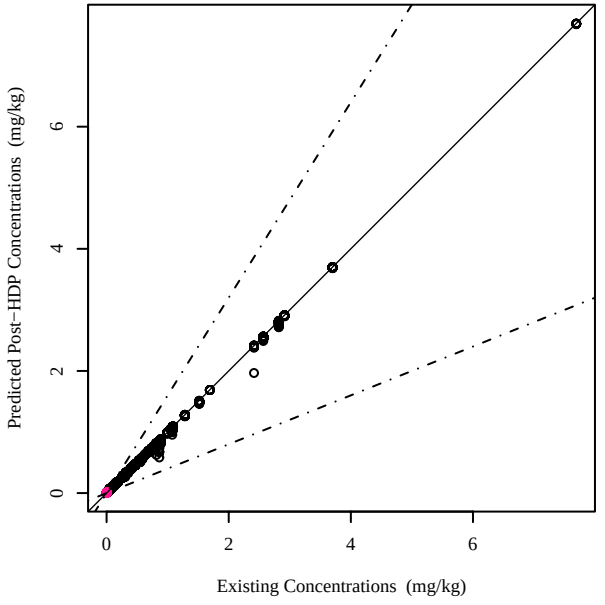
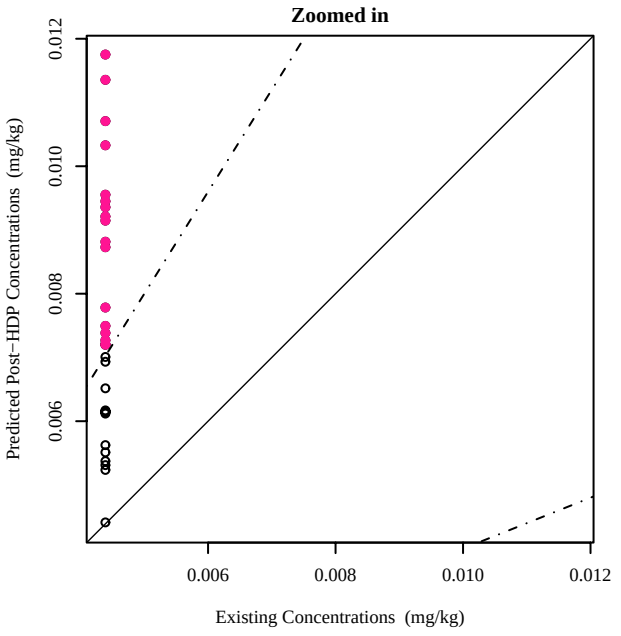
Figure 20b
Total PCBs: change in surface sediment concentrations due to dredging as predicted by the model, cumulative assessment





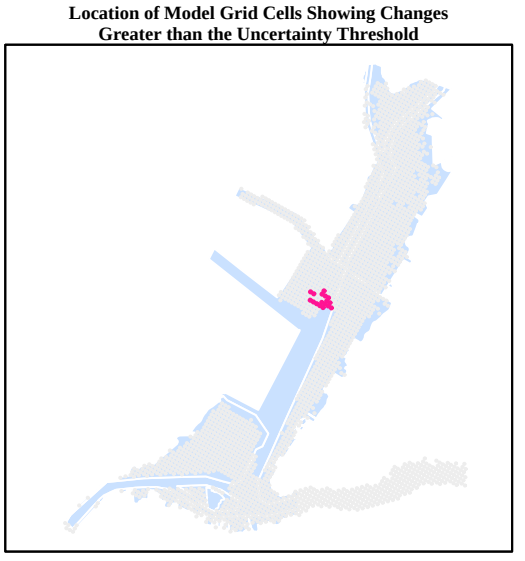


Figure 20c. Total PCBs : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold cumulative assessment

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

D:/jobs/ACEnew/Analysis/Post_Dredge_Concentrations/Active_Cores_Cumulative/ThiessenActiveCores.mdb.R
D:/jobs/ACEnew/Analysis/Post_Dredge_Concentrations/Post_Processing/output_plots/fig20c_plots_RPD_comp_cumul.ps
Fri Mar 16 08:51:42 2007

DDTs (mg/kg)
Current Surface Concentrations

- < 0.01
- 0.01 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- > 0.2

DDTs (mg/kg)
Post Dredge Surface Concentrations

- < 0.01
- 0.01 to 0.05
- 0.05 to 0.1
- 0.1 to 0.2
- > 0.2

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Figure 21a
DDTs: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, cumulative assessment

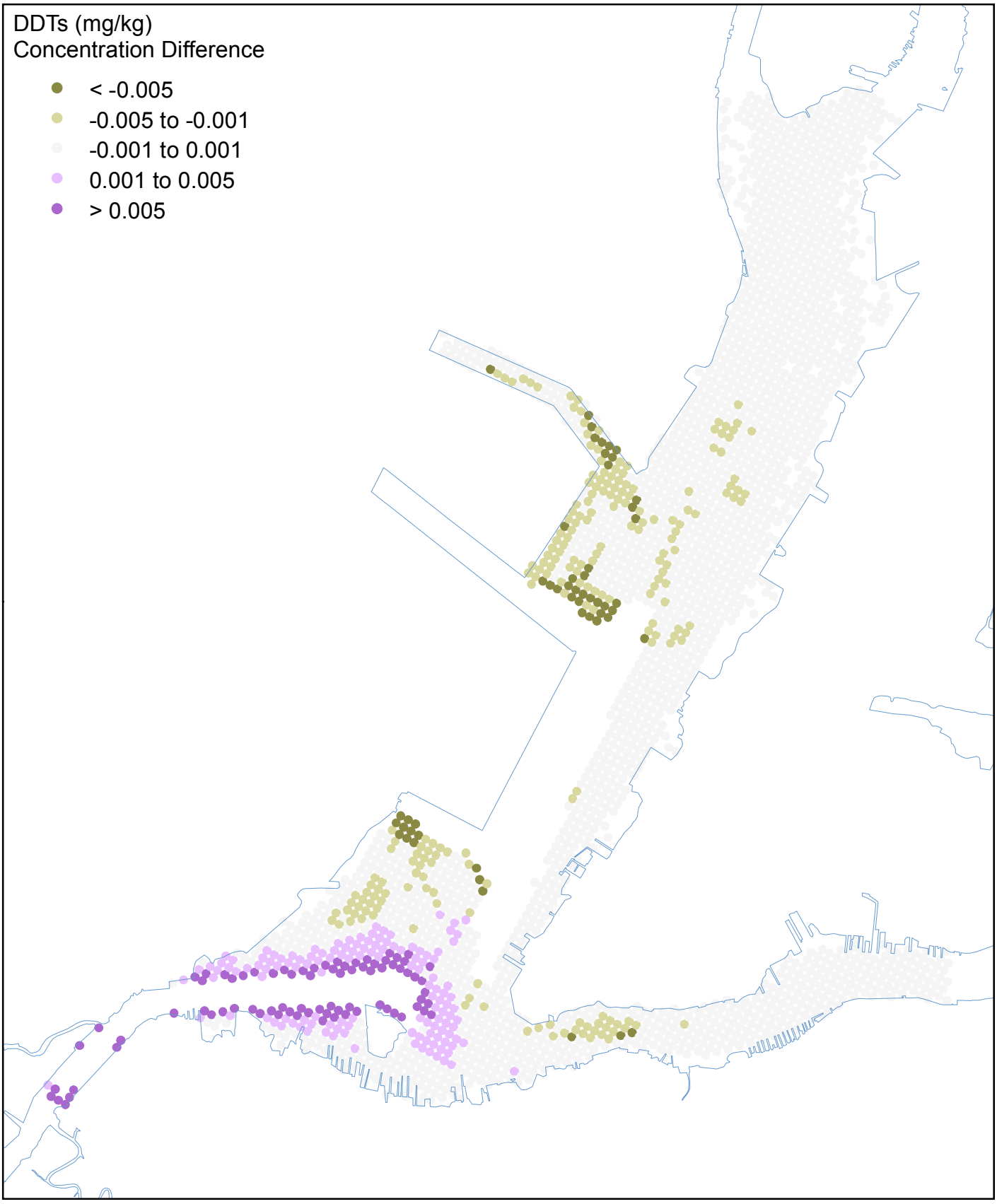

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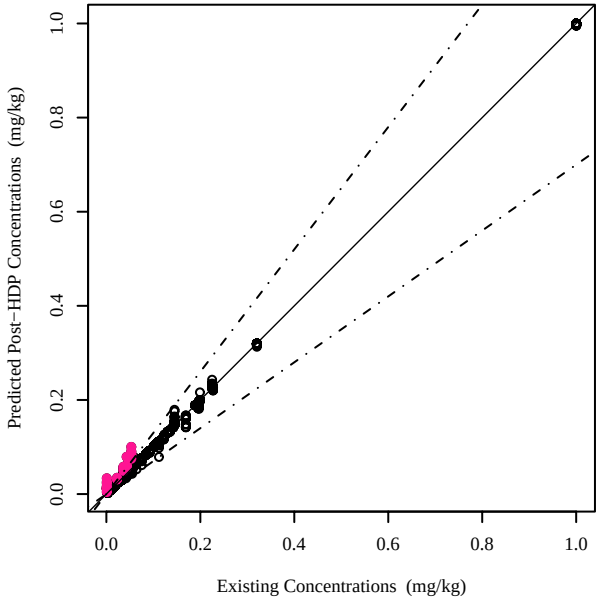
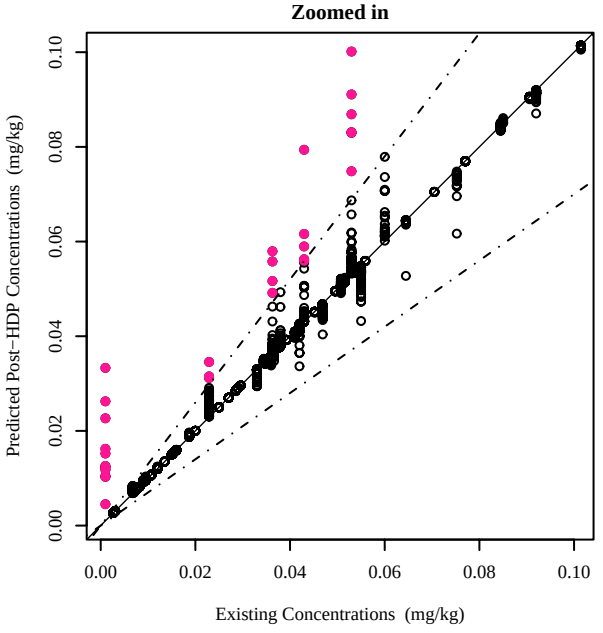
Figure 21b
DDTs: change in surface sediment concentrations due to dredging as predicted by the model, cumulative assessment





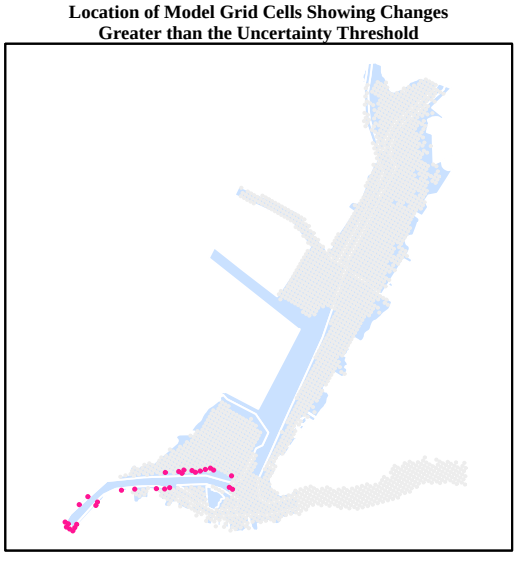


Figure 21c. DDT : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold cumulative assessment

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

Benzo(a)pyrene (mg/kg)
Current Surface Concentrations

- < 0.4
- 0.4 to 0.7
- 0.7 to 1.5
- 1.5 to 3
- > 3

Benzo(a)pyrene (mg/kg)
Post Dredge Surface Concentrations

- < 0.4
- 0.4 to 0.7
- 0.7 to 1.5
- 1.5 to 3
- > 3

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Figure 22a
Benzo(a)pyrene: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, cumulative assessment

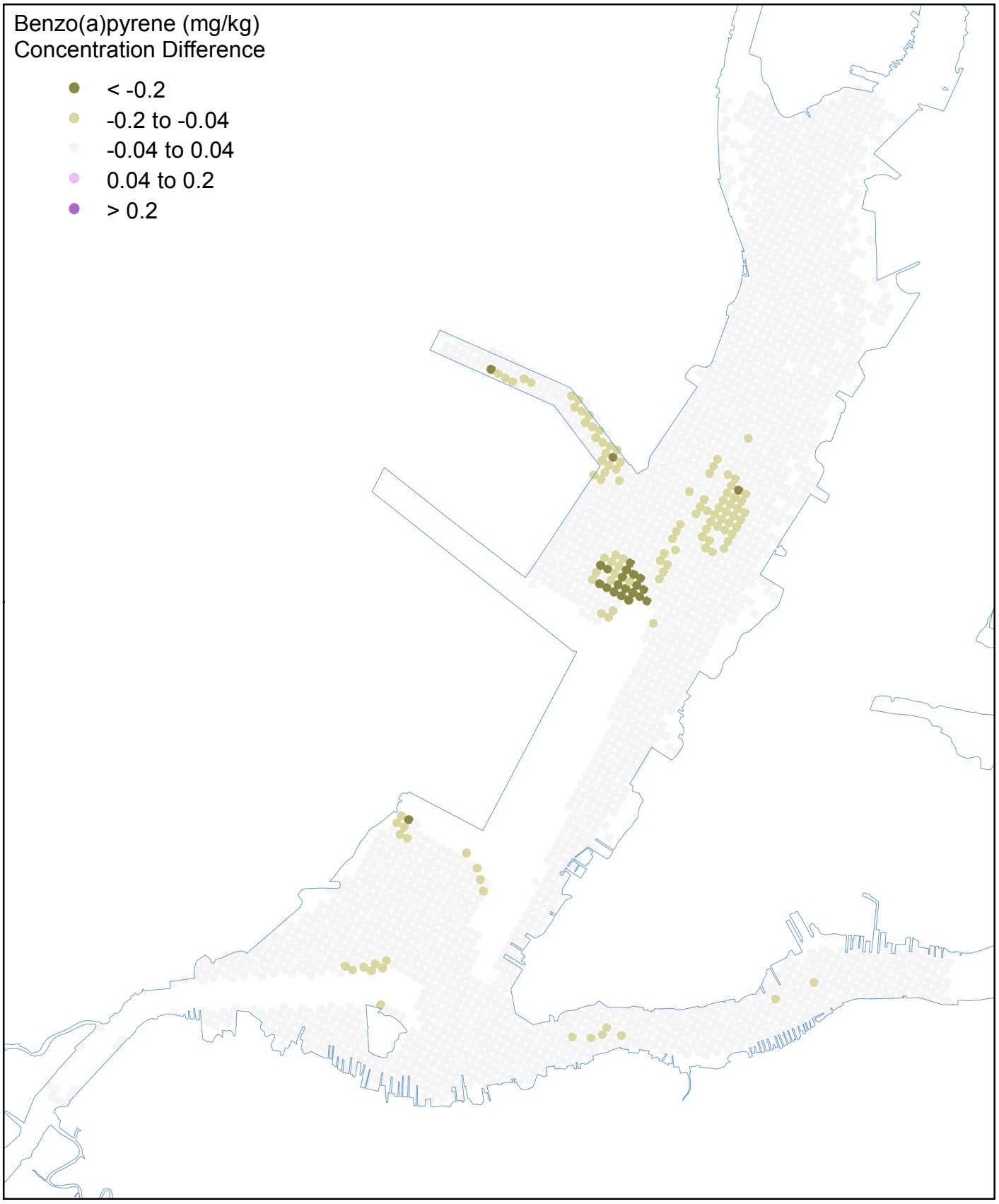

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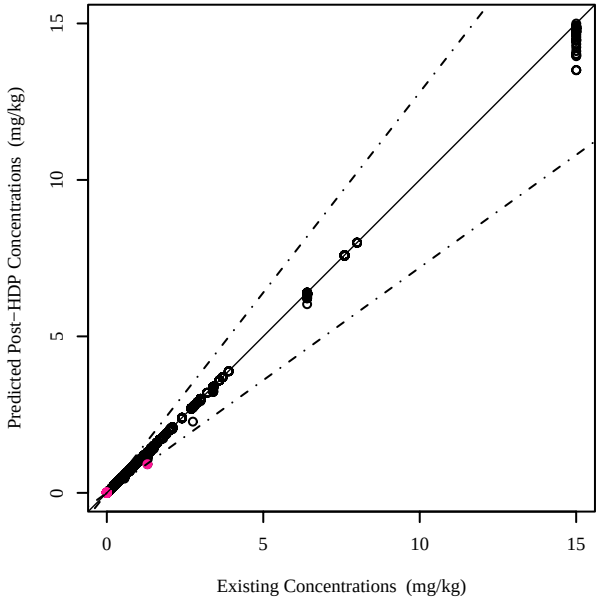
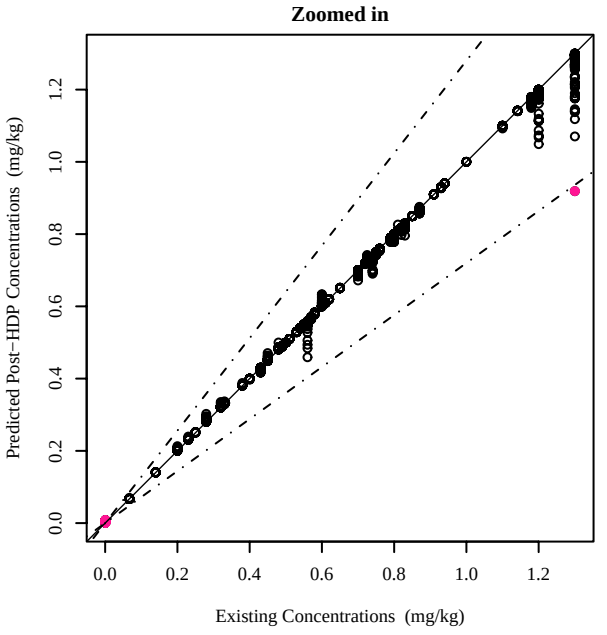
Figure 22b
Benzo(a)pyrene: change in surface sediment concentrations due to dredging as predicted by the model, cumulative assessment





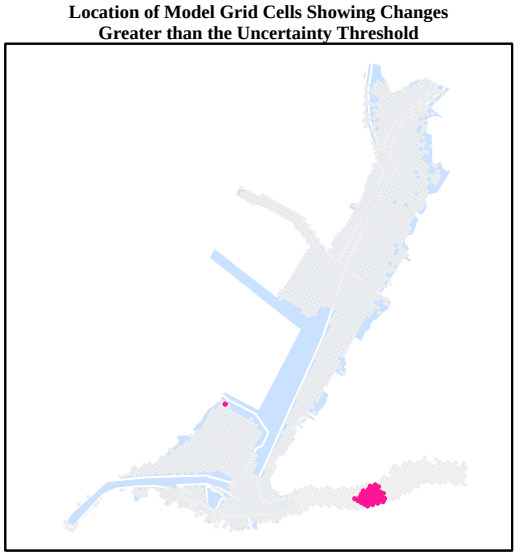
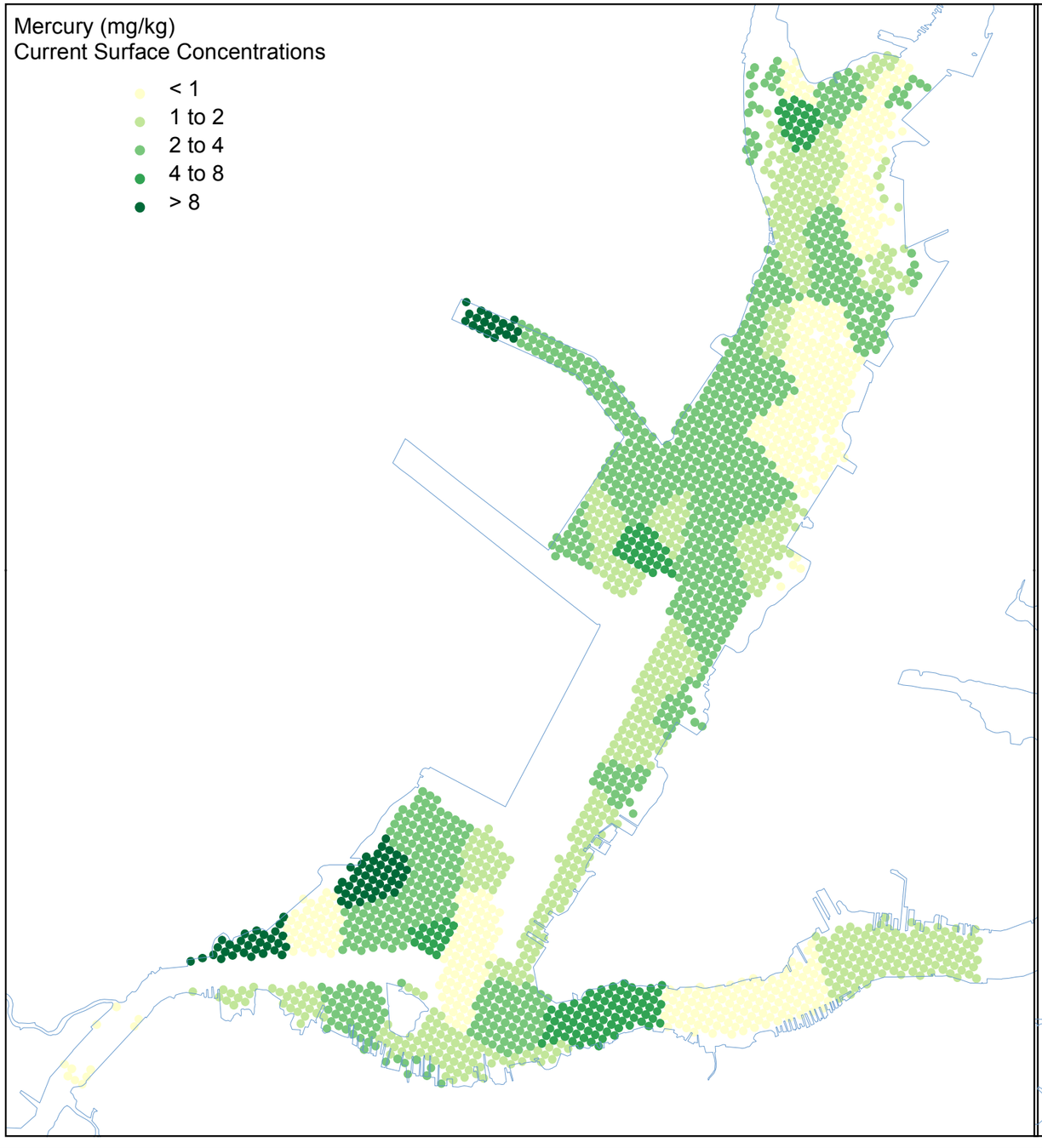


Figure 22c. Benzo(a)pyrene : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold cumulative assessment

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.



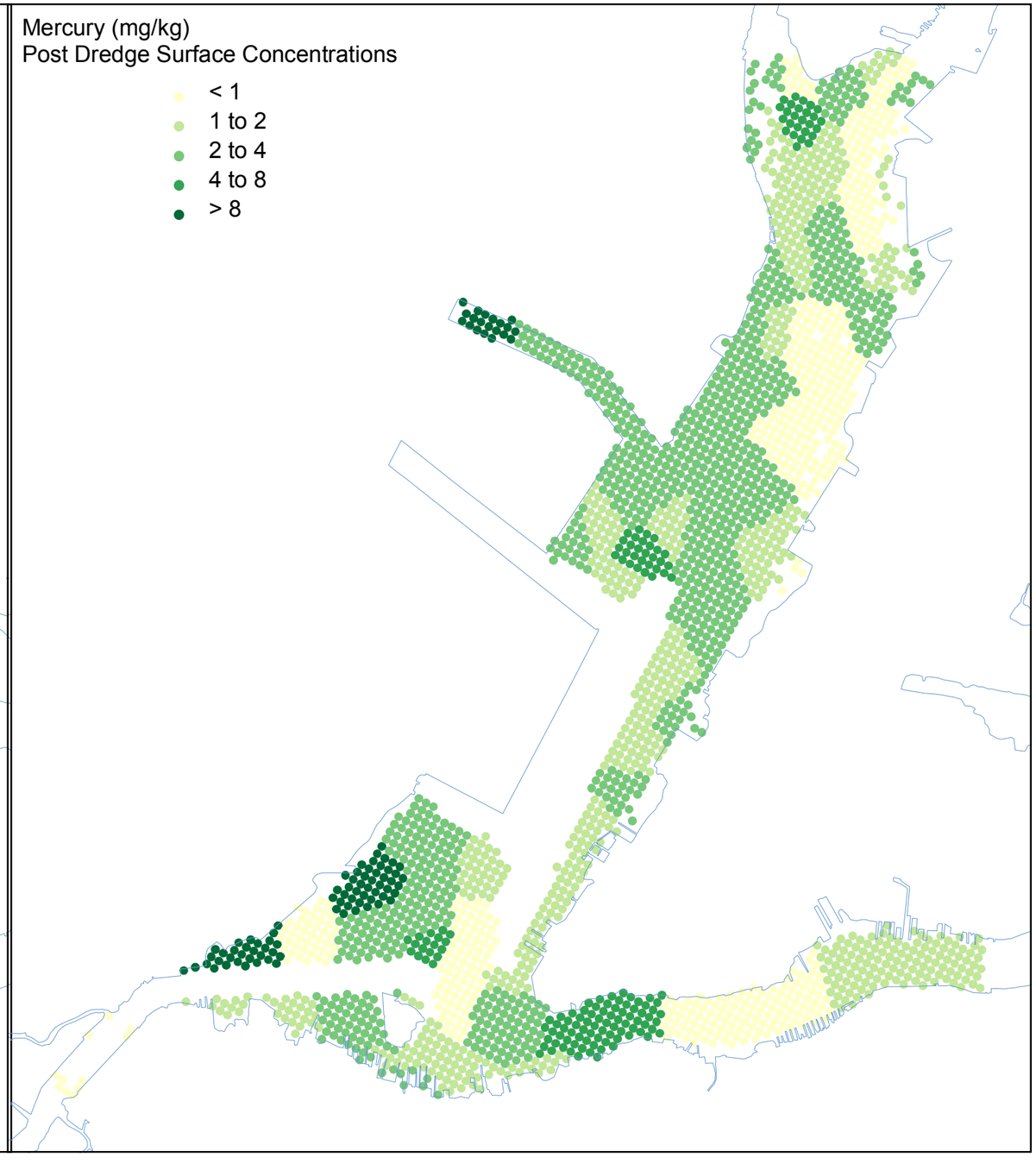


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Figure 23a
Mercury: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, cumulative assessment

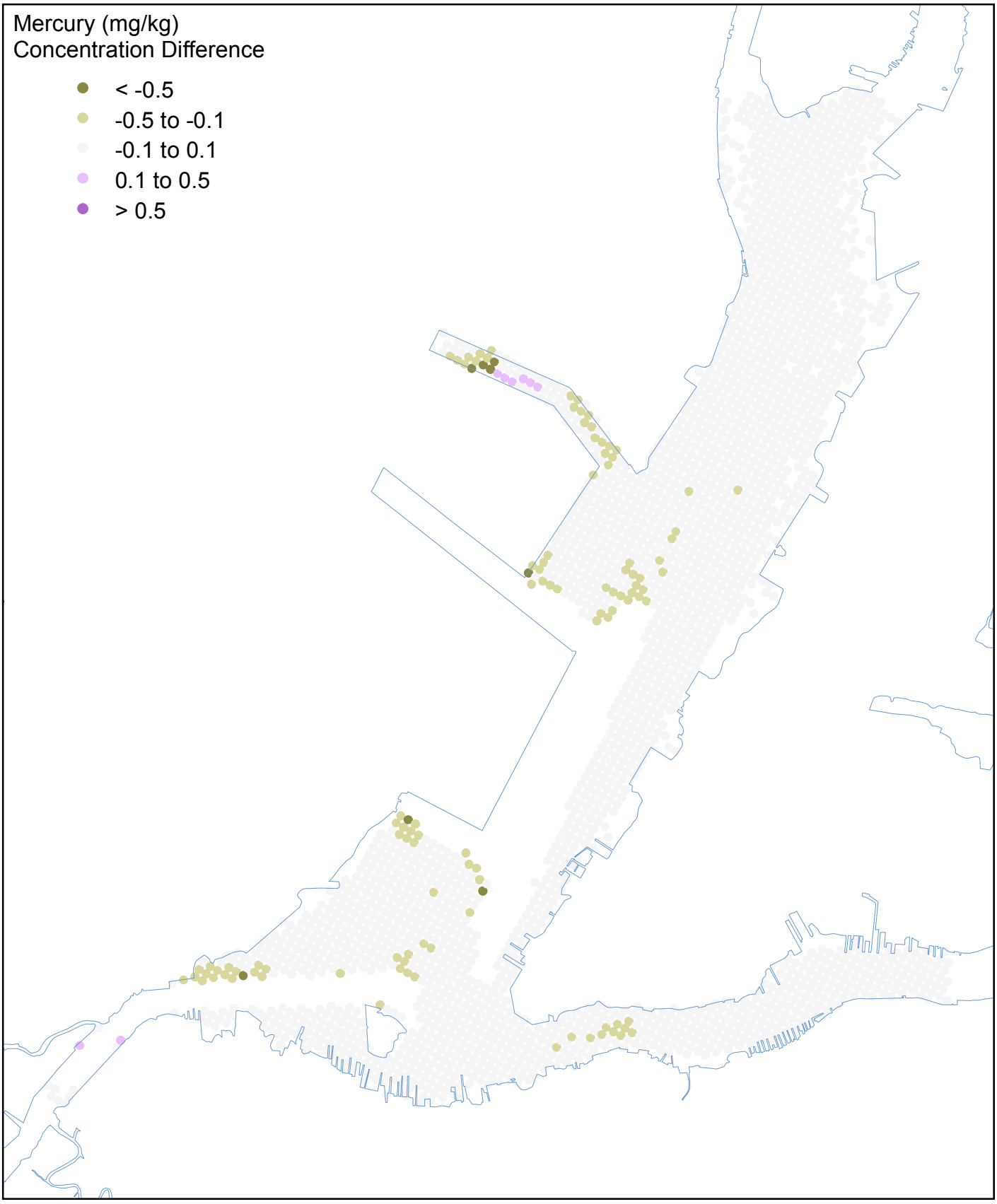

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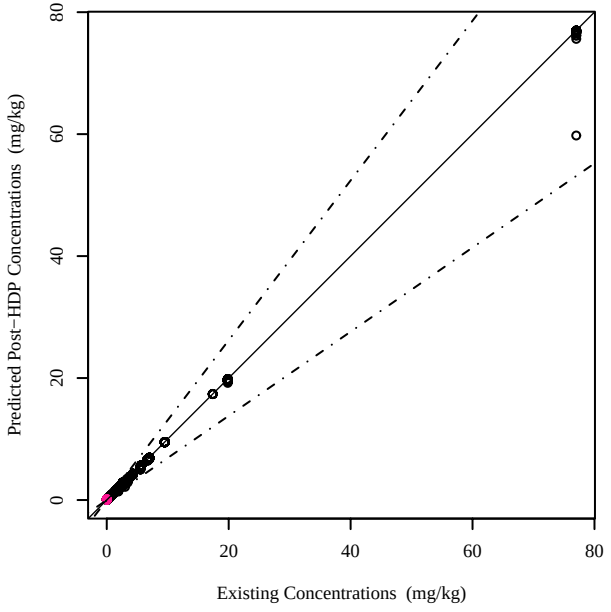
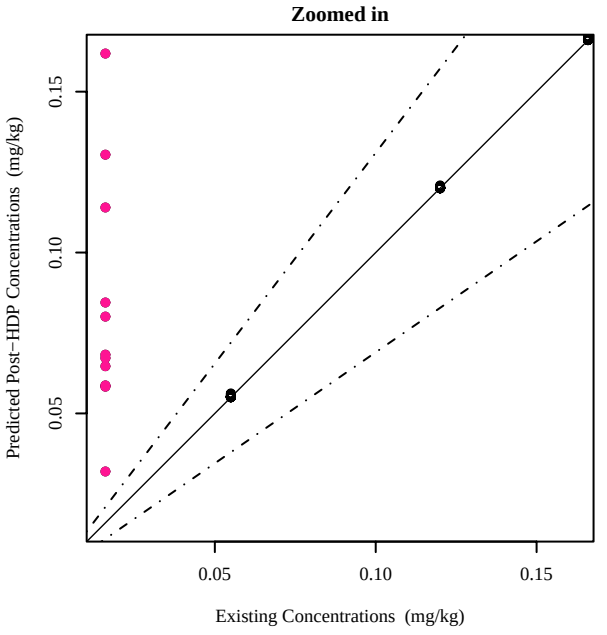
Figure 23b
Mercury: change in surface sediment concentrations due to dredging as predicted by the model, cumulative assessment





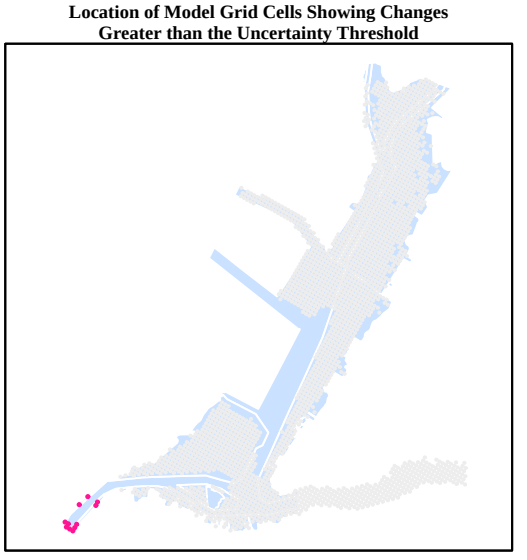
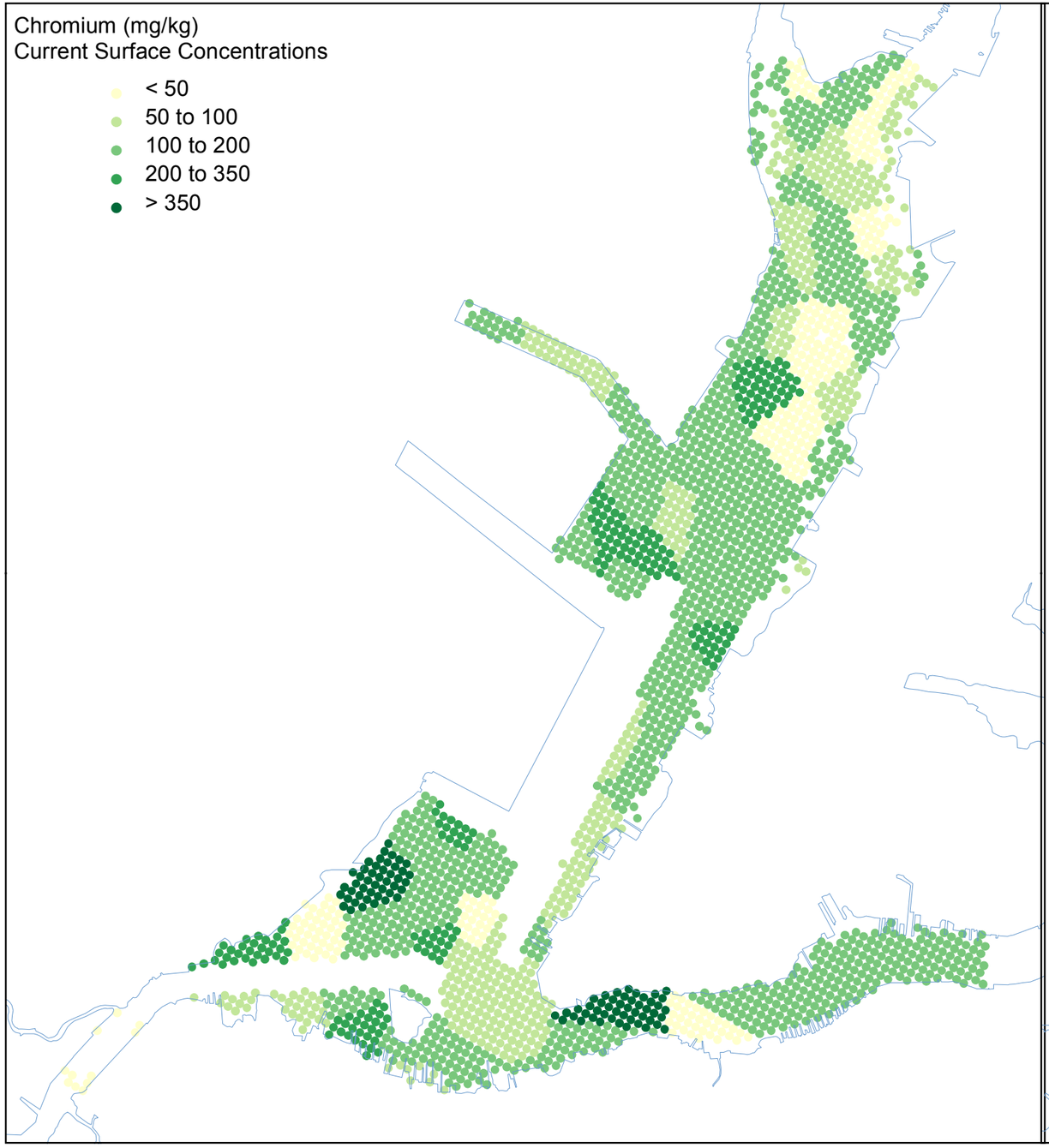


Figure 23c. Mercury : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold cumulative assessment

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

Chromium (mg/kg)
Current Surface Concentrations

- < 50
- 50 to 100
- 100 to 200
- 200 to 350
- > 350



Chromium (mg/kg)
Post Dredge Surface Concentrations

- < 50
- 50 to 100
- 100 to 200
- 200 to 350
- > 350

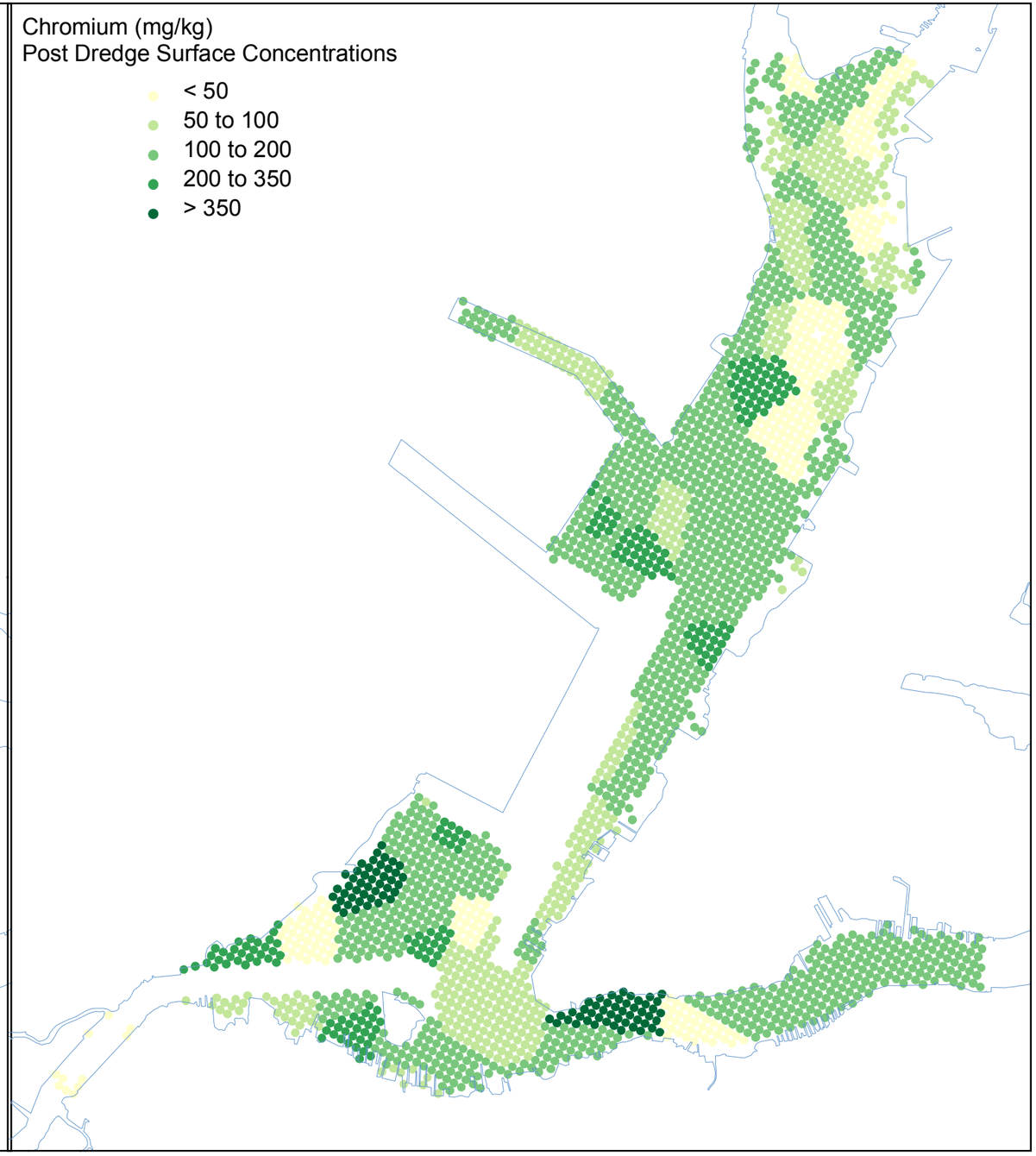


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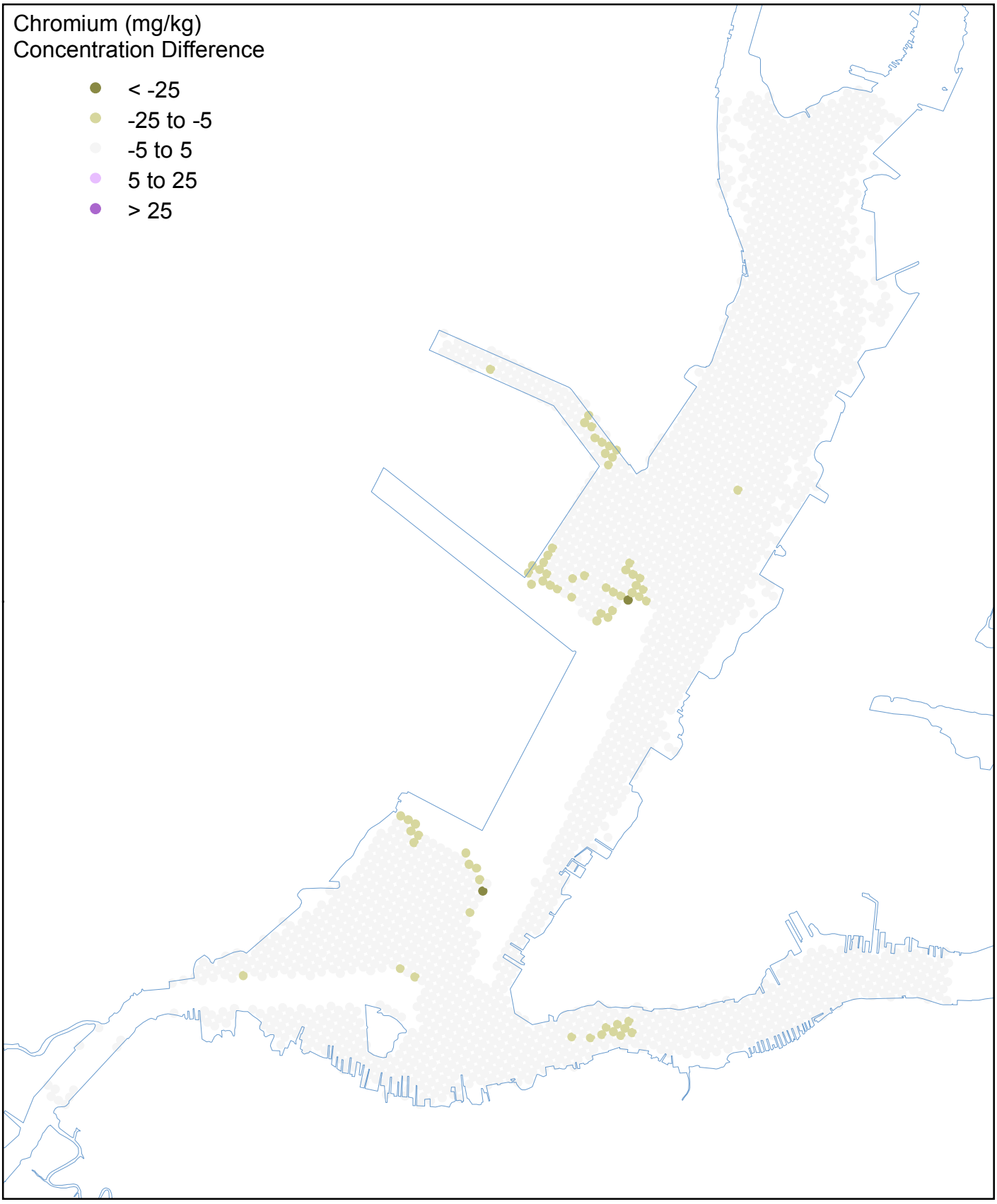
Figure 24a
Chromium: comparison of existing surface sediment concentrations with post dredging concentrations predicted by the model, cumulative assessment



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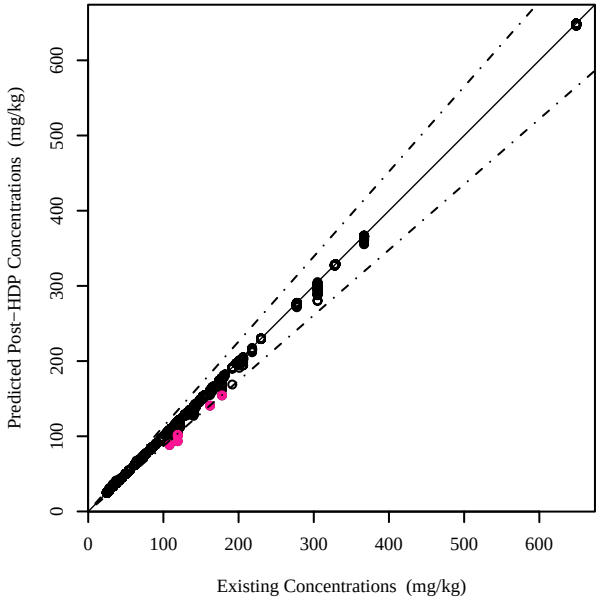
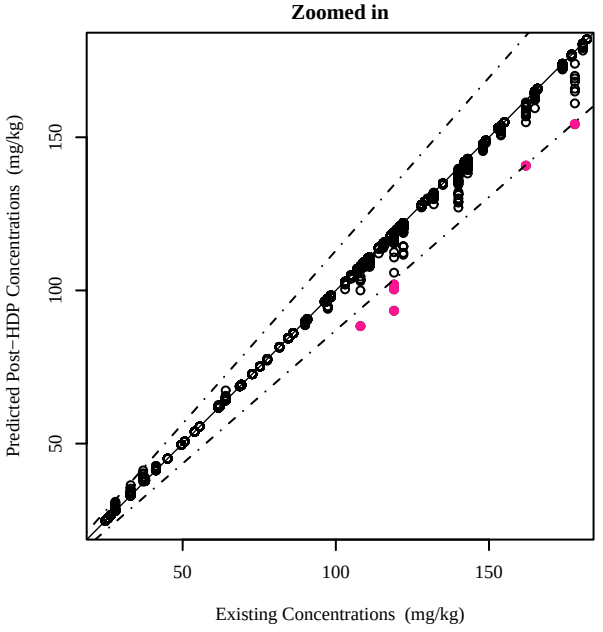
New York District

Figure 24b
Chromium: change in surface sediment concentrations due to dredging as predicted by the model, cumulative assessment





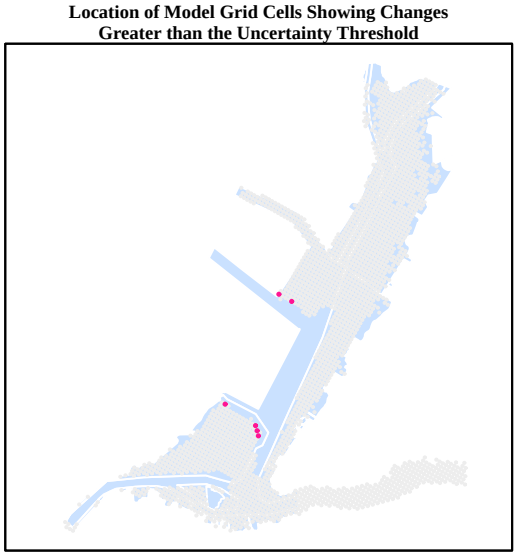


Figure 24c. Chromium : Predicted changes in surface sediment concentrations that are greater than the uncertainty threshold cumulative assessment

Predicted changes were greater than the uncertainty threshold in points colored pink. Dashed line represents the boundaries of the uncertainty threshold. See text for more details.

Table 1. Comparison of depth-integrated concentrations in the channels and slopes of Southern Newark Bay, NBSA RI/FS Phase I Data only.

Chemical	Geomorphology	Count	Minimum	Maximum	Mean	Std Dev	Median	T-Test
Benzo(a)pyrene	In Channel	19	0.15	3.00	0.91	0.70	0.76	0.86
(mg/kg)	Slope **	5	0.24	2.01	1.05	0.66	1.14	
Chromium	In Channel	19	29.42	455.50	116.26	97.70	90.47	0.08
(mg/kg)	Slope	5	18.99	90.88	65.26	31.32	82.24	
Total DDT	In Channel	19	0.01	0.63	0.10	0.14	0.05	0.13
(mg/kg)	Slope	5	0.00	0.07	0.04	0.03	0.05	
Mercruy	In Channel	19	0.30	220.48	13.64	50.16	1.29	0.30
(mg/kg)	Slope	5	0.19	1.56	0.97	0.58	1.17	
Total PCB	In Channel	19	0.08	5.01	0.89	1.22	0.45	0.09
(mg/kg)	Slope	5	0.02	0.59	0.31	0.26	0.43	
2,3,7,8 TCDD	In Channel	19	2.45	186.00	52.64	53.73	39.63	0.30
(ng/kg)	Slope	5	0.78	53.90	25.90	22.32	31.00	

* In channel cores are designated with a geomorphology of "navigation channel" in the NBSA RI/FS Phase I data
** Slope cores are designated with a geomorpolohy of "transitional slopes in the NBSA RI/FS Phase I data

Table 2. Calculated dredge material concentrations.

	Dredge Area	2,3,7,8 TCDD (ng/kg)	Total PCBs (mg/kg)	DDT (mg/kg)	Benzo(a)pyrene (mg/kg)	Mercury (mg/kg)	Chromium (mg/kg)
Current dredge material concentrations used in the evaluation of the impacts of the HDP (base case)	S-AK-1	6.75	0.30	0.52	1.12	1.68	94.24
	S-AK-2	2.76	0.32	0.67	1.83	2.73	111.53
	S-AK-3	33.53	0.69	0.71	0.95	3.26	129.00
	S-E-1(A)	43.33	0.73	0.05	0.68	1.32	85.88
	S-E-1(B)	45.02	0.52	0.02	0.61	1.33	84.39
	S-NB-1(A)	11.73	0.05	0.02	0.64	0.62	58.56
	S-NB-1(B)	54.58	0.06	0.01	0.57	1.34	105.90
	S-NB-1(C)	20.06	0.13	0.03	0.40	0.90	76.60
	S-NB-2(A)	10.81	0.21	0.02	0.25	0.55	47.78
	S-NB-2(B)	15.61	0.31	0.02	0.25	0.72	55.16
	S-NB-2(C)	17.39	0.22	0.02	0.38	0.68	53.76
90th percentile concentration (1)	Surrounding the HD	339.60	4.64	0.56	8.69	17.59	441.55
Upper bound concentrations used in AEC analysis	S-AK-1	31.71	0.63	0.52	1.69	2.87	120.29
	S-AK-2	28.03	0.65	0.66	2.34	3.84	136.28
	S-AK-3	56.48	0.99	0.70	1.53	4.33	152.44
	S-E-1(A)	65.55	1.02	0.09	1.28	2.54	112.55
	S-E-1(B)	67.12	0.82	0.06	1.22	2.55	111.18
	S-NB-1(A)	36.32	0.39	0.06	1.24	1.89	87.28
	S-NB-1(B)	75.96	0.40	0.05	1.18	2.56	131.07
	S-NB-1(C)	44.02	0.47	0.07	1.02	2.15	103.97
	S-NB-2(A)	35.47	0.55	0.06	0.88	1.83	77.32
	S-NB-2(B)	39.91	0.63	0.06	0.88	1.99	84.14
	S-NB-2(C)	41.56	0.56	0.06	1.01	1.95	82.84

(1) See text for calculation of 90th percentile concentration

Table 3. Comparison of Active Historic Data with NBSA RI/FS Phase I Data

Location	Data	Benzo(a)pyrene (mg/kg)		Chromium (mg/kg)		Total DDT (mg/kg)		Mercury (mg/kg)		Total PCBs (mg/kg)		2,3,7,8 TCDD (ng/kg)	
		NBSA RI/FS Phase I	Historic	NBSA RI/FS Phase I	Historic	NBSA RI/FS Phase I	Historic	NBSA RI/FS Phase I	Historic	NBSA RI/FS Phase I	Historic	NBSA RI/FS Phase I	Historic
In Channel *Navigation*	Count	24	14	24	11	22	11	24	12	24	12	24	17
In Channel	Mean	1.36	1.26	97.31	121.98	0.12	0.27	1.81	2.27	0.54	0.48	46.17	65.12
	Median	0.81	0.67	81.95	133.50	0.03	0.05	1.20	2.50	0.37	0.73	37.95	50.43
	Min	0.23	0.05	32.95	24.30	0.01	0.00	0.37	0.02	0.13	0.05	5.01	0.35
	Max	7.60	3.90	328.00	195.40	1.13	1.57	5.60	5.36	3.70	1.32	154.00	155.00
	Std Dev	1.56	1.18	61.04	56.42	0.25	0.50	1.27	1.47	0.70	0.38	36.68	51.04
	T-Test*	0.636		0.64		0.39		0.91		0.76		0.78	
Port	Count	8	0	8	0	7	0	8	0	8	0	8	0
Channels	Mean	1.27		141.40		0.04		11.50		1.31		65.14	
	Median	1.10		118.90		0.03		2.50		0.71		59.60	
	Min	0.39		77.60		0.02		1.00		0.31		19.60	
	Max	2.75		265.00		0.06		77.00		2.92		133.50	
	Std Dev	0.79		66.04		0.02		26.48		1.10		34.33	
Combined In	Count	32	14	32	11	29	11	32	12	32	12	32	17
Channel Total	Mean	1.34	1.26	108.33	121.98	0.10	0.27	4.24	2.27	0.73	0.48	50.91	65.12
	Median	0.91	0.67	88.05	133.50	0.03	0.05	1.30	2.50	0.43	0.73	42.30	50.43
	Min	0.23	0.05	32.95	24.30	0.01	0.00	0.37	0.02	0.13	0.05	5.01	0.35
	Max	7.60	3.90	328.00	195.40	1.13	1.57	77.00	5.36	3.70	1.32	154.00	155.00
	Std Dev	1.39	1.18	64.23	56.42	0.22	0.50	13.33	1.47	0.87	0.38	36.53	51.04
Not in Channel	Count	35	47	35	40	34	40	35	35	35	38	35	37
	Mean	1.95	1.06	135.13	125.48	0.10	0.16	2.71	2.86	0.76	0.51	75.54	69.65
	Median	0.94	0.73	118.00	122.00	0.04	0.05	1.90	2.20	0.46	0.30	48.80	47.60
	Min	0.24	0.00	28.00	24.80	0.00	0.00	0.27	0.06	0.00	0.02	0.95	0.37
	Max	15.00	5.90	649.00	367.00	1.00	3.09	17.40	19.85	7.69	2.82	592.00	470.00
	Std Dev	2.80	1.07	111.85	76.97	0.21	0.48	3.20	3.35	1.34	0.63	105.09	88.81
	T-Test*	0.01		0.71		0.09		0.93		0.58		0.61	

* Two-tailed t-tests following f-tests to determine variance equality/inequality. Statistics were conducted on log-transformed data.
The p-value represents the probability that the means are equivalent at the 95% confidence level.

Table 4. Gross dredging volumes for the HDP,

Contract area	Rock	Pleistocene Sand and Gravel	Silt to HARS disposal	Silt to upland disposal	Total Volume Modeled
S-AK-1	463,400	329,900	0	120,600	120,600
S-AK-2	388,800	441,700	0	59,100	59,100
S-AK-3	1,567,300	466,000	0	21,000	21,000
S-E-1	36,000	1,066,100	0	629,400	629,400
S-NB-1	97,200	1,549,000	0	577,300	577,300
S-NB-2	183,200	2,766,600	194,000	232,800	426,800
Total	2,735,900	6,619,300	194,000	1,640,200	1,834,200

Notes All volumes in cubic yards.
HARS: Historic Area Remediation Site
Total volume modeled includes silt to HARS and to upland

Table 5. Duplicates in the NBSA RI/FS Phase I Data.

Sample ID	2,3,7,8 TCDD (ng/kg)				Total PCBs (mg/kg)				DDT (mg/kg)			
HR01SED067B-04	0.1	U	0.1	U	0.00	B	0.00	B	0.0105	U	0.0105	U
NB01SED001B-02	36.5		33.0		0.91	D B	0.87	D B	1.2	J	0.7	J
NB01SED004B-02	65.2		57.9		1.32	D B	1.20	B D	0.09	J	0.088	J
NB01SED010I-02	0.4	G	0.3	EMPC	0.14	D B	0.12	D B	0.048	U	0.0435	U
NB01SED012A-06	466.0	J	322.0		3.83		3.22		1.4	J	0.64	J
NB01SED018D-01	16.8		13.2		0.20	B D	0.15	B D	0.007	U	0.0065	U
NB01SED019A-05	0.1	U	0.1	U	0.01	B	0.00	B	0.0021	U	0.00205	U
NB01SED020A-01	185.0		182.0		0.90	D B	0.82	D B	0.045	J	0.039	J
NB01SED028C-05	474.0	J	453.0		4.58	D B	4.42	D B	0.065	U	0.055	U
NB01SED029C-03	NA		NA		NA		NA		0.018	J	0.015	J
NB01SED029C-04	44.2		33.5		0.47	D B	0.46	D B	NA		NA	
NB01SED034AC-01	68.3		54.9		0.49	D	0.48	D	NA		NA	
NB01SED034AC-02	NA		NA		NA		NA		0.019	J	0.017	J
NB01SED037C-01	98.0		89.4		0.48	D B	0.46	D B	0.042		0.04	
NB01SED038A-04	0.1	U	0.1	U	0.00		0.00		0.006	U	0.006	U
NB01SED044A-01	79.6		73.5		0.77	D B	0.59	D B	0.024	J	0.022	J
NB01SED049C-01	139.0		128.0		2.69	D B	2.14	D B	0.077		0.052	J
NB01SED051D-04	1070.0		582.0		1.83	D	1.72	D	0.11		0.1	
NB01SED052B-01	126.0		85.1		0.56		0.54		0.029	J	0.028	J
NB01SED053B-01	17.8		15.3		0.15	B	0.10	B	0.0085	J	0.0079	
NB01SED059A-01	106.0	J	35.3	J	0.27	B	0.25	B D	0.012	J	0.012	J
NB01SED064B-01	4.0		1.7		0.03	B	0.02	B	0.013	U	0.011	U

Sample ID	Benzo(a)pyrene (mg/kg)				Mercury (mg/kg)				Chromium (mg/kg)			
HR01SED067B-04	0.18	U M	0.18	U M	0.032	B M	0.024	B M	37.5	M	35.9	M
NB01SED001B-02	2.6	G D M	2.1	J	3.2	* M	2.6	* M	130	* M	120	* M
NB01SED004B-02	1.1	G D M	0.98	G D M	3.8	M	3.5	M	177	M	164	M
NB01SED010I-02	1.9	G D	1.7	G D	4.4		3.3		128		107	
NB01SED012A-06	2.4	D M	2.3	D M	38.7	* M	22.8	* M	647	* M	528	* M
NB01SED018D-01	0.26	G D	0.2	G	0.62	N * J L	0.11	N * J L	34.6	E J	31.3	E J
NB01SED019A-05	0.11	U	0.105	U	0.017	B	0.016	B	17.2	E J	16.6	E J
NB01SED020A-01	0.62	G D	0.5	J	2.1		1.7		134		104	
NB01SED028C-05	1.6	J	1.6	J	7.5	* M	6.9	* M	403	N	396	N
NB01SED029C-03	0.63	G D	0.61	G D	0.98		0.8		70		64	
NB01SED029C-04	NA		NA		NA		NA		NA		NA	
NB01SED034AC-01	NA		NA		NA		NA		NA		NA	
NB01SED034AC-02	0.62	G D M	0.57	G D M	1.2	M	1.1	M	81.5	M	80.9	M
NB01SED037C-01	1.4	D M	0.96	G D M	2.3	N J L	2.1	N J L	146	M	140	M
NB01SED038A-04	0.315	U D	0.105	U	0.0034	B N J H	0.0029	U N J H	13.1		12.7	
NB01SED044A-01	1.5	D M	0.86	G D	2.2	*	2.2	* M	119	M	112	
NB01SED049C-01	3.5	D J	2	J	88.1	M	65.9	M	201	M	182	M
NB01SED051D-04	1	D M	0.96	D	3.6		3.4	M	262	M	234	
NB01SED052B-01	2.2	D	1.9	D	2.1		2		117	E J	104	E J
NB01SED053B-01	0.93		0.89		0.66		0.64		58.9		48.9	
NB01SED059A-01	0.95		0.93		1.1		0.98		78.7		71.7	
NB01SED064B-01	0.65	U M	0.37	G M	0.32	M	0.29	M	62.1	M	49.1	M

* NA indicates no duplicates for this sample

** Description of qualifier codes not available as of this writing; any sample with a qualifier code of "U" was assumed to be nondetec

*** Duplicates with both samples measuring at non-detect levels were excluded

Table 6. Calculation of the uncertainty threshold based upon the NBSA RI/FS Phase I duplicates.

	Count	Mean	Standard	Median	Maximum	UT
2,3,7,8 TCDD	17	29%	28%	22%	100%	41%
Total PCBs	20	39%	61%	13%	200%	60%
DDT	13	19%	23%	10%	75%	30%
Benzo(a)pyrene	17	20%	19%	12%	55%	28%
Mercury	20	22%	30%	11%	140%	31%
Chromium	20	10%	7%	9%	25%	13%

Notes

(1) Values used to calculate the UT using Land's method (Gilbert 1987, Land 1975)

Table 7. Comparison of concentration changes computed by the model with data precision as measured with the NBSA RI/FS Phase 1 field duplicates.

	2,3,7,8 TCDD	Total PCBs	DDTs	Benzo(a)pyrene	Mercury	Chromium
Uncertainty Threshold (1)	41%	60%	30%	28%	31%	13%
Percent of grid cells projected to change in concentration more than the uncertainty threshold						
Post HDP	0.42%	0.50%	1.05%	1.51%	0.42%	0.13%
AEC Analysis	1.09%	1.13%	1.39%	1.60%	0.50%	0.08%
Cumulative Assessment	0.52%	0.68%	1.15%	1.47%	0.44%	0.24%

Notes:

(1) Relative percent difference, unitless

Table 8. Estimated changes to contaminant concentrations at NBSA RI/FS Phase II sampling locations.

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
2,3,7,8 TCDD (ng/kg)					
NB02SED082	NB01SED013	3.580	3.581	0.00	0%
NB02SED070	NB01SED005	36.200	35.952	-0.25	-1%
NB02SED075	NB01SED049	133.500	133.493	-0.01	0%
NB02SED071	NB01SED007	33.200	33.048	-0.15	0%
NB02SED072	NB01SED022	40.200	40.174	-0.03	0%
NB02SED074	NB01SED044	76.550	76.453	-0.10	0%
NB02SED073	NB01SED032	67.300	67.267	-0.03	0%
NB02SED076	NB01SED051	89.600	89.492	-0.11	0%
NB02SED077	NB01SED056	145.000	144.999	0.00	0%
NB02SED078	NB01SED052	105.550	105.496	-0.05	0%
KK02SED081	NB207	6.070	6.082	0.01	0%
NB02SED080	NB01SED060	79.300	79.224	-0.08	0%
NB02SED079	NB01SED057	93.100	93.094	-0.01	0%
USACEP2-14	NB211	29.400	29.399	0.00	0%
USACEP2-01A	39_PRP-99-02	155.000	154.727	-0.27	0%
USACEP2-15	NB01SED003	14.700	14.645	-0.06	0%
USACEP2-16	NB01SED003	14.700	14.634	-0.07	0%
USACEP2-13	NB01SED023	63.600	56.353	-7.25	-11%
USACEP2-02A	NB01SED023	63.600	63.050	-0.55	-1%
USACEP2-17	17_42A	19.000	19.123	0.12	1%
USACEP2-05A	NB01SED041	51.400	51.336	-0.06	0%
USACEP2-03A	NB01SED028	48.800	48.796	0.00	0%
USACEP2-04A	NB01SED028	48.800	48.798	0.00	0%
USACEP2-12	NB226	40.050	40.038	-0.01	0%
USACEP2-11	NB01SED051	89.600	89.481	-0.12	0%
USACEP2-07	NB01SED060	79.300	79.218	-0.08	0%
USACEP2-06A	NB901	130.000	129.858	-0.14	0%
USACEP2-10	NB01SED066	40.200	40.192	-0.01	0%

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Benzo(a)pyrene (mg/kg)					
NB02SED082	NB01SED013	0.450	0.450	0.00	0%
NB02SED070	NB01SED005	0.870	0.868	0.00	0%
NB02SED075	NB01SED049	2.750	2.750	0.00	0%
NB02SED071	NB01SED007	0.530	0.528	0.00	0%
NB02SED072	NB01SED022	0.760	0.759	0.00	0%
NB02SED074	NB01SED044	1.180	1.179	0.00	0%
NB02SED073	NB01SED032	0.790	0.790	0.00	0%
NB02SED076	NB01SED051	1.600	1.598	0.00	0%
NB02SED077	NB01SED056	1.700	1.700	0.00	0%
NB02SED078	NB01SED052	2.050	2.049	0.00	0%
KK02SED081	NB207	3.000	2.999	0.00	0%
NB02SED080	NB01SED060	2.900	2.897	0.00	0%
NB02SED079	NB01SED057	1.700	1.700	0.00	0%
USACEP2-14	NB211	1.100	1.100	0.00	0%
USACEP2-01A	39_PRP-99-02	0.725	0.726	0.00	0%
USACEP2-15	NB01SED003	0.600	0.609	0.01	2%
USACEP2-16	NB01SED003	0.600	0.608	0.01	1%
USACEP2-13	NB01SED023	1.300	1.142	-0.16	-12%
USACEP2-02A	26_NB044	0.570	0.567	0.00	0%
USACEP2-17	17_42A	0.330	0.334	0.00	1%
USACEP2-05A	NB01SED041	0.830	0.829	0.00	0%
USACEP2-03A	27_NB103	0.720	0.720	0.00	0%
USACEP2-04A	NB01SED028	0.750	0.750	0.00	0%
USACEP2-12	NB226	1.500	1.498	0.00	0%
USACEP2-11	NB01SED051	1.600	1.598	0.00	0%
USACEP2-07	NB01SED060	2.900	2.896	0.00	0%
USACEP2-06A	27_NB110	0.140	0.141	0.00	0%
USACEP2-10	26_NB065	2.000	1.999	0.00	0%

* Values in yellow are greater than the UT, see text.
** Stations indicated as "USACEP2" are NBSA RI/FS Phase II sampling locations proposed by USACE to USEPA
*** Closest core: NBSA RI/FS Phase I or active historic core

Table 8. Estimated changes to contaminant concentrations at NBSA RI/FS Phase II sampling locations.

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Total PCBs (mg/kg)					
NB02SED082	NB01SED013	0.069	0.069	0.00	0%
NB02SED070	NB01SED005	0.693	0.687	-0.01	-1%
NB02SED075	NB01SED049	2.415	2.415	0.00	0%
NB02SED071	NB01SED007	0.537	0.533	0.00	-1%
NB02SED072	NB01SED022	0.538	0.537	0.00	0%
NB02SED074	NB01SED044	0.679	0.678	0.00	0%
NB02SED073	NB01SED032	0.521	0.521	0.00	0%
NB02SED076	NB01SED051	0.642	0.642	0.00	0%
NB02SED077	NB01SED056	1.090	1.090	0.00	0%
NB02SED078	NB01SED052	0.548	0.548	0.00	0%
KK02SED081	27_NB115	0.298	0.297	0.00	0%
NB02SED080	NB01SED060	0.450	0.449	0.00	0%
NB02SED079	NB01SED057	0.573	0.573	0.00	0%
USACEP2-14	39_PRP-99-01	0.047	0.049	0.00	3%
USACEP2-01A	39_PRP-99-02	2.565	2.561	0.00	0%
USACEP2-15	NB01SED003	0.146	0.148	0.00	2%
USACEP2-16	NB01SED003	0.146	0.148	0.00	1%
USACEP2-13	NB01SED023	0.818	0.741	-0.08	-9%
USACEP2-02A	26_NB044	0.517	0.514	0.00	-1%
USACEP2-17	17_42A	0.048	0.052	0.00	9%
USACEP2-05A	NB01SED041	0.391	0.391	0.00	0%
USACEP2-03A	27_NB103	0.381	0.381	0.00	0%
USACEP2-04A	NB01SED028	0.461	0.461	0.00	0%
USACEP2-12	NB01SED032	0.521	0.520	0.00	0%
USACEP2-11	NB01SED051	0.642	0.642	0.00	0%
USACEP2-07	NB01SED060	0.450	0.449	0.00	0%
USACEP2-06A	27_NB110	0.083	0.083	0.00	0%
USACEP2-10	26_NB065	0.163	0.163	0.00	0%

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Mercury (mg/kg)					
NB02SED082	NB01SED013	0.830	0.830	0.00	0%
NB02SED070	NB01SED005	2.000	1.990	-0.01	-1%
NB02SED075	NB01SED049	77.000	76.994	-0.01	0%
NB02SED071	NB01SED007	1.100	1.096	0.00	0%
NB02SED072	NB01SED022	1.400	1.399	0.00	0%
NB02SED074	NB01SED044	2.200	2.198	0.00	0%
NB02SED073	NB01SED032	1.500	1.499	0.00	0%
NB02SED076	NB01SED051	2.500	2.497	0.00	0%
NB02SED077	NB01SED056	3.100	3.100	0.00	0%
NB02SED078	NB01SED052	2.050	2.049	0.00	0%
KK02SED081	27_NB115	1.730	1.730	0.00	0%
NB02SED080	NB01SED060	2.200	2.198	0.00	0%
NB02SED079	NB01SED057	2.400	2.400	0.00	0%
USACEP2-14	39_PRP-99-01	0.016	0.024	0.01	49%
USACEP2-01A	39_PRP-99-02	19.850	19.814	-0.04	0%
USACEP2-15	NB01SED003	1.500	1.511	0.01	1%
USACEP2-16	NB01SED003	1.500	1.509	0.01	1%
USACEP2-13	NB01SED023	3.000	2.656	-0.34	-11%
USACEP2-02A	26_NB044	3.796	3.760	-0.04	-1%
USACEP2-17	17_42A	2.200	2.162	-0.04	-2%
USACEP2-05A	NB01SED041	1.800	1.798	0.00	0%
USACEP2-03A	27_NB103	2.350	2.350	0.00	0%
USACEP2-04A	NB01SED028	1.400	1.400	0.00	0%
USACEP2-12	NB01SED032	1.500	1.499	0.00	0%
USACEP2-11	NB01SED051	2.500	2.497	0.00	0%
USACEP2-07	NB01SED060	2.200	2.198	0.00	0%
USACEP2-06A	27_NB110	0.517	0.518	0.00	0%
USACEP2-10	26_NB065	0.408	0.408	0.00	0%

* Values in yellow are greater than the UT, see text.
** Stations indicated as "USACEP2" are NBSA RI/FS Phase II sampling locations proposed by USACE to USEPA
*** Closest core: NBSA RI/FS Phase I or active historic core

Table 8. Estimated changes to contaminant concentrations at NBSA RI/FS Phase II sampling locations.

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
DDTs (mg/kg)					
NB02SED082	NB01SED013	0.036	0.036	0.00	0%
NB02SED070	NB01SED005	0.038	0.040	0.00	6%
NB02SED075	NB01SED049	0.065	0.064	0.00	0%
NB02SED071	NB01SED007	0.014	0.014	0.00	1%
NB02SED072	NB01SED022	0.016	0.016	0.00	0%
NB02SED074	15_31	0.122	0.122	0.00	0%
NB02SED073	NB01SED032	0.033	0.033	0.00	0%
NB02SED076	NB01SED051	0.035	0.035	0.00	0%
NB02SED077	NB01SED056	0.035	0.035	0.00	0%
NB02SED078	NB01SED052	0.029	0.028	0.00	0%
KK02SED081	27_NB115	0.052	0.052	0.00	0%
NB02SED080	NB01SED060	0.015	0.015	0.00	0%
NB02SED079	NB01SED057	0.027	0.027	0.00	0%
USACEP2-14	39_PRP-99-01	0.001	0.003	0.00	173%
USACEP2-01A	39_PRP-99-02	0.225	0.226	0.00	0%
USACEP2-15	NB01SED003	0.043	0.049	0.01	13%
USACEP2-16	NB01SED003	0.043	0.048	0.00	11%
USACEP2-13	NB01SED023	0.112	0.098	-0.01	-12%
USACEP2-02A	26_NB044	0.135	0.134	0.00	-1%
USACEP2-17	17_42A	0.051	0.051	0.00	0%
USACEP2-05A	NB01SED041	0.197	0.197	0.00	0%
USACEP2-03A	27_NB103	0.101	0.101	0.00	0%
USACEP2-04A	NB01SED028	0.025	0.025	0.00	0%
USACEP2-12	NB01SED032	0.033	0.033	0.00	0%
USACEP2-11	NB01SED051	0.035	0.035	0.00	0%
USACEP2-07	NB01SED060	0.015	0.015	0.00	0%
USACEP2-06A	27_NB110	0.011	0.011	0.00	0%
USACEP2-10	26_NB065	0.008	0.008	0.00	0%

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Chromium (mg/kg)					
NB02SED082	NB01SED013	28.000	28.002	0.00	0%
NB02SED070	NB01SED005	105.000	104.660	-0.34	0%
NB02SED075	NB01SED049	191.500	191.492	-0.01	0%
NB02SED071	NB01SED007	81.600	81.327	-0.27	0%
NB02SED072	NB01SED022	98.400	98.347	-0.05	0%
NB02SED074	NB01SED044	115.500	115.421	-0.08	0%
NB02SED073	NB01SED032	121.000	120.957	-0.04	0%
NB02SED076	NB01SED051	119.000	118.917	-0.08	0%
NB02SED077	NB01SED056	153.000	152.999	0.00	0%
NB02SED078	NB01SED052	110.500	110.477	-0.02	0%
KK02SED081	27_NB115	128.000	127.979	-0.02	0%
NB02SED080	NB01SED060	119.000	118.937	-0.06	0%
NB02SED079	NB01SED057	129.000	128.994	-0.01	0%
USACEP2-14	39_PRP-99-01	37.100	37.321	0.22	1%
USACEP2-01A	39_PRP-99-02	277.500	277.173	-0.33	0%
USACEP2-15	NB01SED003	64.100	64.551	0.45	1%
USACEP2-16	NB01SED003	64.100	64.470	0.37	1%
USACEP2-13	NB01SED023	108.000	100.019	-7.98	-7%
USACEP2-02A	26_NB044	153.900	152.775	-1.13	-1%
USACEP2-17	17_42A	62.000	62.285	0.29	0%
USACEP2-05A	NB01SED041	201.000	200.682	-0.32	0%
USACEP2-03A	27_NB103	149.000	148.990	-0.01	0%
USACEP2-04A	NB01SED028	109.000	108.996	0.00	0%
USACEP2-12	NB01SED032	121.000	120.910	-0.09	0%
USACEP2-11	NB01SED051	119.000	118.909	-0.09	0%
USACEP2-07	NB01SED060	119.000	118.933	-0.07	0%
USACEP2-06A	27_NB110	49.600	49.646	0.05	0%
USACEP2-10	26_NB065	45.100	45.113	0.01	0%

* Values in yellow are greater than the UT, see text.
** Stations indicated as "USACEP2" are NBSA RI/FS Phase II sampling locations proposed by USACE to USEPA
*** Closest core: NBSA RI/FS Phase I or active historic core

Table 9. Estimated changes to contaminant concentrations at Phase II sampling locations, AEC analysis.

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
2,3,7,8 TCDD (ng/kg)					
NB02SED082	NB01SED013	3.580	3.581	0.00	0%
NB02SED070	NB01SED005	36.200	36.274	-0.07	0%
NB02SED075	NB01SED049	133.500	133.495	-0.01	0%
NB02SED071	NB01SED007	33.200	33.371	0.17	1%
NB02SED072	NB01SED022	40.200	40.213	0.01	0%
NB02SED074	NB01SED044	76.550	76.498	-0.05	0%
NB02SED073	NB01SED032	67.300	67.286	-0.01	0%
NB02SED076	NB01SED051	89.600	89.542	-0.06	0%
NB02SED077	NB01SED056	145.000	144.999	0.00	0%
NB02SED078	NB01SED052	105.550	105.515	-0.04	0%
KK02SED081	NB207	6.070	6.092	0.02	0%
NB02SED080	NB01SED060	79.300	79.258	-0.04	0%
NB02SED079	NB01SED057	93.100	93.096	0.00	0%
USACEP2-14	NB211	29.400	29.457	0.06	0%
USACEP2-01A	39_PRP-99-02	155.000	154.777	-0.22	0%
USACEP2-15	NB01SED003	14.700	14.872	0.17	1%
USACEP2-16	NB01SED003	14.700	14.839	0.14	1%
USACEP2-13	NB01SED023	63.600	60.021	-3.58	-6%
USACEP2-02A	NB01SED023	63.600	63.342	-0.26	0%
USACEP2-17	17_42A	19.000	19.832	0.83	4%
USACEP2-05A	NB01SED041	51.400	51.396	0.00	0%
USACEP2-03A	NB01SED028	48.800	48.799	0.00	0%
USACEP2-04A	NB01SED028	48.800	48.801	0.00	0%
USACEP2-12	NB226	40.050	40.087	0.04	0%
USACEP2-11	NB01SED051	89.600	89.537	-0.06	0%
USACEP2-07	NB01SED060	79.300	79.260	-0.04	0%
USACEP2-06A	NB901	130.000	129.892	-0.11	0%
USACEP2-10	NB01SED066	40.200	40.203	0.00	0%

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Benzo(a)pyrene (mg/kg)					
NB02SED082	NB01SED013	0.450	0.450	0.00	0%
NB02SED070	NB01SED005	0.870	0.876	0.00	1%
NB02SED075	NB01SED049	2.750	2.750	0.00	0%
NB02SED071	NB01SED007	0.530	0.537	0.00	1%
NB02SED072	NB01SED022	0.760	0.760	0.00	0%
NB02SED074	NB01SED044	1.180	1.180	0.00	0%
NB02SED073	NB01SED032	0.790	0.790	0.00	0%
NB02SED076	NB01SED051	1.600	1.599	0.00	0%
NB02SED077	NB01SED056	1.700	1.700	0.00	0%
NB02SED078	NB01SED052	2.050	2.049	0.00	0%
KK02SED081	NB207	3.000	2.999	0.00	0%
NB02SED080	NB01SED060	2.900	2.897	0.00	0%
NB02SED079	NB01SED057	1.700	1.700	0.00	0%
USACEP2-14	NB211	1.100	1.101	0.00	0%
USACEP2-01A	39_PRP-99-02	0.725	0.727	0.00	0%
USACEP2-15	NB01SED003	0.600	0.614	0.01	2%
USACEP2-16	NB01SED003	0.600	0.613	0.01	2%
USACEP2-13	NB01SED023	1.300	1.237	-0.06	-5%
USACEP2-02A	26_NB044	0.570	0.575	0.00	1%
USACEP2-17	17_42A	0.330	0.353	0.02	7%
USACEP2-05A	NB01SED041	0.830	0.831	0.00	0%
USACEP2-03A	27_NB103	0.720	0.720	0.00	0%
USACEP2-04A	NB01SED028	0.750	0.750	0.00	0%
USACEP2-12	NB226	1.500	1.499	0.00	0%
USACEP2-11	NB01SED051	1.600	1.599	0.00	0%
USACEP2-07	NB01SED060	2.900	2.897	0.00	0%
USACEP2-06A	27_NB110	0.140	0.142	0.00	1%
USACEP2-10	26_NB065	2.000	2.000	0.00	0%

* Values in yellow are greater than the UT, see text.
** Stations indicated as "USACEP2" are NBSA RI/FS Phase II sampling locations proposed by USACE to USEPA
*** Closest core: NBSA RI/FS Phase I or active historic core

Table 9. Estimated changes to contaminant concentrations at Phase II sampling locations, AEC analysis.

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Total PCBs (mg/kg)					
NB02SED082	NB01SED013	0.069	0.069	0.00	0%
NB02SED070	NB01SED005	0.693	0.691	0.00	0%
NB02SED075	NB01SED049	2.415	2.415	0.00	0%
NB02SED071	NB01SED007	0.537	0.537	0.00	0%
NB02SED072	NB01SED022	0.538	0.538	0.00	0%
NB02SED074	NB01SED044	0.679	0.679	0.00	0%
NB02SED073	NB01SED032	0.521	0.521	0.00	0%
NB02SED076	NB01SED051	0.642	0.642	0.00	0%
NB02SED077	NB01SED056	1.090	1.090	0.00	0%
NB02SED078	NB01SED052	0.548	0.548	0.00	0%
KK02SED081	27_NB115	0.298	0.298	0.00	0%
NB02SED080	NB01SED060	0.450	0.450	0.00	0%
NB02SED079	NB01SED057	0.573	0.573	0.00	0%
USACEP2-14	39_PRP-99-01	0.047	0.050	0.00	5%
USACEP2-01A	39_PRP-99-02	2.565	2.562	0.00	0%
USACEP2-15	NB01SED003	0.146	0.151	0.01	4%
USACEP2-16	NB01SED003	0.146	0.150	0.00	3%
USACEP2-13	NB01SED023	0.818	0.790	-0.03	-3%
USACEP2-02A	26_NB044	0.517	0.518	0.00	0%
USACEP2-17	17_42A	0.048	0.062	0.01	30%
USACEP2-05A	NB01SED041	0.391	0.391	0.00	0%
USACEP2-03A	27_NB103	0.381	0.381	0.00	0%
USACEP2-04A	NB01SED028	0.461	0.461	0.00	0%
USACEP2-12	NB01SED032	0.521	0.521	0.00	0%
USACEP2-11	NB01SED051	0.642	0.642	0.00	0%
USACEP2-07	NB01SED060	0.450	0.450	0.00	0%
USACEP2-06A	27_NB110	0.083	0.084	0.00	1%
USACEP2-10	26_NB065	0.163	0.163	0.00	0%

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Mercury (mg/kg)					
NB02SED082	NB01SED013	0.830	0.830	0.00	0%
NB02SED070	NB01SED005	2.000	2.006	0.01	0%
NB02SED075	NB01SED049	77.000	76.994	-0.01	0%
NB02SED071	NB01SED007	1.100	1.113	0.01	1%
NB02SED072	NB01SED022	1.400	1.401	0.00	0%
NB02SED074	NB01SED044	2.200	2.200	0.00	0%
NB02SED073	NB01SED032	1.500	1.500	0.00	0%
NB02SED076	NB01SED051	2.500	2.500	0.00	0%
NB02SED077	NB01SED056	3.100	3.100	0.00	0%
NB02SED078	NB01SED052	2.050	2.050	0.00	0%
KK02SED081	27_NB115	1.730	1.730	0.00	0%
NB02SED080	NB01SED060	2.200	2.200	0.00	0%
NB02SED079	NB01SED057	2.400	2.400	0.00	0%
USACEP2-14	39_PRP-99-01	0.016	0.026	0.01	65%
USACEP2-01A	39_PRP-99-02	19.850	19.817	-0.03	0%
USACEP2-15	NB01SED003	1.500	1.522	0.02	1%
USACEP2-16	NB01SED003	1.500	1.518	0.02	1%
USACEP2-13	NB01SED023	3.000	2.847	-0.15	-5%
USACEP2-02A	26_NB044	3.796	3.775	-0.02	-1%
USACEP2-17	17_42A	2.200	2.199	0.00	0%
USACEP2-05A	NB01SED041	1.800	1.801	0.00	0%
USACEP2-03A	27_NB103	2.350	2.350	0.00	0%
USACEP2-04A	NB01SED028	1.400	1.400	0.00	0%
USACEP2-12	NB01SED032	1.500	1.502	0.00	0%
USACEP2-11	NB01SED051	2.500	2.500	0.00	0%
USACEP2-07	NB01SED060	2.200	2.200	0.00	0%
USACEP2-06A	27_NB110	0.517	0.519	0.00	0%
USACEP2-10	26_NB065	0.408	0.409	0.00	0%

* Values in yellow are greater than the UT, see text.
** Stations indicated as "USACEP2" are NBSA RI/FS Phase II sampling locations proposed by USACE to USEPA
*** Closest core: NBSA RI/FS Phase I or active historic core

Table 9. Estimated changes to contaminant concentrations at Phase II sampling locations, AEC analysis.

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
DDTs (mg/kg)					
NB02SED082	NB01SED013	0.036	0.036	0.00	0%
NB02SED070	NB01SED005	0.038	0.041	0.00	7%
NB02SED075	NB01SED049	0.065	0.064	0.00	0%
NB02SED071	NB01SED007	0.014	0.014	0.00	5%
NB02SED072	NB01SED022	0.016	0.016	0.00	0%
NB02SED074	15_31	0.122	0.122	0.00	0%
NB02SED073	NB01SED032	0.033	0.033	0.00	0%
NB02SED076	NB01SED051	0.035	0.035	0.00	0%
NB02SED077	NB01SED056	0.035	0.035	0.00	0%
NB02SED078	NB01SED052	0.029	0.029	0.00	0%
KK02SED081	27_NB115	0.052	0.052	0.00	0%
NB02SED080	NB01SED060	0.015	0.015	0.00	0%
NB02SED079	NB01SED057	0.027	0.027	0.00	0%
USACEP2-14	39_PRP-99-01	0.001	0.003	0.00	170%
USACEP2-01A	39_PRP-99-02	0.225	0.226	0.00	0%
USACEP2-15	NB01SED003	0.043	0.049	0.01	13%
USACEP2-16	NB01SED003	0.043	0.048	0.00	11%
USACEP2-13	NB01SED023	0.112	0.104	-0.01	-7%
USACEP2-02A	26_NB044	0.135	0.135	0.00	0%
USACEP2-17	17_42A	0.051	0.052	0.00	2%
USACEP2-05A	NB01SED041	0.197	0.197	0.00	0%
USACEP2-03A	27_NB103	0.101	0.101	0.00	0%
USACEP2-04A	NB01SED028	0.025	0.025	0.00	0%
USACEP2-12	NB01SED032	0.033	0.033	0.00	0%
USACEP2-11	NB01SED051	0.035	0.035	0.00	0%
USACEP2-07	NB01SED060	0.015	0.015	0.00	0%
USACEP2-06A	27_NB110	0.011	0.011	0.00	1%
USACEP2-10	26_NB065	0.008	0.008	0.00	0%

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Chromium (mg/kg)					
NB02SED082	NB01SED013	28.000	28.003	0.00	0%
NB02SED070	NB01SED005	105.000	105.022	0.02	0%
NB02SED075	NB01SED049	191.500	191.494	-0.01	0%
NB02SED071	NB01SED007	81.600	81.713	0.11	0%
NB02SED072	NB01SED022	98.400	98.394	-0.01	0%
NB02SED074	NB01SED044	115.500	115.474	-0.03	0%
NB02SED073	NB01SED032	121.000	120.979	-0.02	0%
NB02SED076	NB01SED051	119.000	118.977	-0.02	0%
NB02SED077	NB01SED056	153.000	153.000	0.00	0%
NB02SED078	NB01SED052	110.500	110.500	0.00	0%
KK02SED081	27_NB115	128.000	127.991	-0.01	0%
NB02SED080	NB01SED060	119.000	118.977	-0.02	0%
NB02SED079	NB01SED057	129.000	128.997	0.00	0%
USACEP2-14	39_PRP-99-01	37.100	37.379	0.28	1%
USACEP2-01A	39_PRP-99-02	277.500	277.224	-0.28	0%
USACEP2-15	NB01SED003	64.100	64.777	0.68	1%
USACEP2-16	NB01SED003	64.100	64.676	0.58	1%
USACEP2-13	NB01SED023	108.000	104.394	-3.61	-3%
USACEP2-02A	26_NB044	153.900	153.120	-0.78	-1%
USACEP2-17	17_42A	62.000	63.114	1.11	2%
USACEP2-05A	NB01SED041	201.000	200.752	-0.25	0%
USACEP2-03A	27_NB103	149.000	148.993	-0.01	0%
USACEP2-04A	NB01SED028	109.000	109.000	0.00	0%
USACEP2-12	NB01SED032	121.000	120.969	-0.03	0%
USACEP2-11	NB01SED051	119.000	118.976	-0.02	0%
USACEP2-07	NB01SED060	119.000	118.983	-0.02	0%
USACEP2-06A	27_NB110	49.600	49.685	0.09	0%
USACEP2-10	26_NB065	45.100	45.126	0.03	0%

* Values in yellow are greater than the UT, see text.
** Stations indicated as "USACEP2" are NBSA RI/FS Phase II sampling locations proposed by USACE to USEPA
*** Closest core: NBSA RI/FS Phase I or active historic core

Table 10. Dredge volumes used in the calculation of cumulative effects.

Dredge Area	Area (yd2)	Total HDP Dredge Volumes	Other USACE Dredging	PANYNJ Other Dredging	Total Other Dredge Volumes	Cumulative Dredge Volume
O&MBasicShoalArea1	91,684	0.00	130,000		130,000	130,000
O&MOptionShoal3456	178,581	0.00	55,276		55,276	55,276
In Channel	54,270	0.00	6,690	72,283	78,972	78,972
O&MOptionShoal1A	37,779	0.00	3,034	50,317	53,351	53,351
S-AK-1	321,506	120,600.00				120,600
S-AK-2	400,838	59,100.00				59,100
S-AK-3	354,185	21,000.00	117,000	81,070	198,070	219,070
S-E-1(A)	544,356	414,289.00	65,000	114,035	179,035	593,324
S-E-1(B)	298,296	215,111.00		61,091	61,091	276,202
S-NB-1(A)	284,313	143,164.00	30,000		30,000	173,164
S-NB-1(B)	383,928	219,622.00				219,622
S-NB-1(C)	647,677	214,514.00	20,250	134,399	154,649	369,163
S-NB-2(A)	471,760	129,138.00	14,750	97,745	112,495	241,633
S-NB-2(B)	148,509	200,594.00				200,594
S-NB-2(C)	385,651	97,068.00				97,068

Notes

1. The area of Option Shoal Area 3456 used in the model (Figure 18) represents areas where dredging has recently been performed. Future dredging will cover the entire Port Newark Branch Channel, which includes Area 3456, as well as the smaller area extending inland from Area 3456 to the entrance to the Port Newark Inland Channel (the pierhead). Dredge volumes are accurate current estimates of future dredging volumes. The approximation of the footprint area is unlikely to materially affect model results.

2. The area of Option Shoal Area 1A and 2 used in the model (Figure 18) represents areas where dredging has recently been performed. Future dredging will cover the entire inland Port Newark Channel. Dredge volumes are accurate current estimates of future dredging volumes. The approximation of the footprint area is unlikely to materially affect model results.

3. The 117,000 cy of material to be dredged from the area of S-AK-3 represents work performed to deepen the channel. All other entries labeled "Other USACE" and "Other PANYNJ" represent O&M.

Table 11. Estimated changes to contaminant concentrations at NBSA RI/FS Phase II sampling locations, cumulative analysis.

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
2,3,7,8 TCDD (ng/kg)					
NB02SED082	NB01SED013	3.580	3.583	0.00	0%
NB02SED070	NB01SED005	36.200	35.913	-0.29	-1%
NB02SED075	NB01SED049	133.500	133.487	-0.01	0%
NB02SED071	NB01SED007	33.200	33.039	-0.16	0%
NB02SED072	NB01SED022	40.200	40.171	-0.03	0%
NB02SED074	NB01SED044	76.550	76.422	-0.13	0%
NB02SED073	NB01SED032	67.300	67.265	-0.03	0%
NB02SED076	NB01SED051	89.600	89.474	-0.13	0%
NB02SED077	NB01SED056	145.000	144.999	0.00	0%
NB02SED078	NB01SED052	105.550	105.484	-0.07	0%
KK02SED081	NB207	6.070	6.082	0.01	0%
NB02SED080	NB01SED060	79.300	79.213	-0.09	0%
NB02SED079	NB01SED057	93.100	93.100	0.00	0%
USACEP2-14	NB211	29.400	29.443	0.04	0%
USACEP2-01A	39_PRP-99-02	155.000	153.759	-1.24	-1%
USACEP2-15	NB01SED003	14.700	14.802	0.10	1%
USACEP2-16	NB01SED003	14.700	14.705	0.01	0%
USACEP2-13	NB01SED023	63.600	56.338	-7.26	-11%
USACEP2-02A	NB01SED023	63.600	62.978	-0.62	-1%
USACEP2-17	17_42A	19.000	19.114	0.11	1%
USACEP2-05A	NB01SED041	51.400	51.318	-0.08	0%
USACEP2-03A	NB01SED028	48.800	48.796	0.00	0%
USACEP2-04A	NB01SED028	48.800	48.798	0.00	0%
USACEP2-12	NB226	40.050	40.037	-0.01	0%
USACEP2-11	NB01SED051	89.600	89.461	-0.14	0%
USACEP2-07	NB01SED060	79.300	79.210	-0.09	0%
USACEP2-06A	NB901	130.000	129.849	-0.15	0%
USACEP2-10	NB01SED066	40.200	40.190	-0.01	0%

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Benzo(a)pyrene (mg/kg)					
NB02SED082	NB01SED013	0.450	0.450	0.00	0%
NB02SED070	NB01SED005	0.870	0.867	0.00	0%
NB02SED075	NB01SED049	2.750	2.750	0.00	0%
NB02SED071	NB01SED007	0.530	0.528	0.00	0%
NB02SED072	NB01SED022	0.760	0.759	0.00	0%
NB02SED074	NB01SED044	1.180	1.178	0.00	0%
NB02SED073	NB01SED032	0.790	0.790	0.00	0%
NB02SED076	NB01SED051	1.600	1.597	0.00	0%
NB02SED077	NB01SED056	1.700	1.700	0.00	0%
NB02SED078	NB01SED052	2.050	2.049	0.00	0%
KK02SED081	NB207	3.000	2.999	0.00	0%
NB02SED080	NB01SED060	2.900	2.896	0.00	0%
NB02SED079	NB01SED057	1.700	1.700	0.00	0%
USACEP2-14	NB211	1.100	1.098	0.00	0%
USACEP2-01A	39_PRP-99-02	0.725	0.728	0.00	0%
USACEP2-15	NB01SED003	0.600	0.612	0.01	2%
USACEP2-16	NB01SED003	0.600	0.610	0.01	2%
USACEP2-13	NB01SED023	1.300	1.141	-0.16	-12%
USACEP2-02A	26_NB044	0.570	0.567	0.00	-1%
USACEP2-17	17_42A	0.330	0.334	0.00	1%
USACEP2-05A	NB01SED041	0.830	0.829	0.00	0%
USACEP2-03A	27_NB103	0.720	0.720	0.00	0%
USACEP2-04A	NB01SED028	0.750	0.750	0.00	0%
USACEP2-12	NB226	1.500	1.498	0.00	0%
USACEP2-11	NB01SED051	1.600	1.597	0.00	0%
USACEP2-07	NB01SED060	2.900	2.895	0.00	0%
USACEP2-06A	27_NB110	0.140	0.141	0.00	1%
USACEP2-10	26_NB065	2.000	1.999	0.00	0%

* Values in yellow are greater than the UT, see text.
** Stations indicated as "USACEP2" are NBSA RI/FS Phase II sampling locations proposed by USACE to USEPA
*** Closest core: NBSA RI/FS Phase I or active historic core

Table 11. Estimated changes to contaminant concentrations at NBSA RI/FS Phase II sampling locations, cumulative analysis.

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Total PCBs (mg/kg)					
NB02SED082	NB01SED013	0.069	0.069	0.00	0%
NB02SED070	NB01SED005	0.693	0.686	-0.01	-1%
NB02SED075	NB01SED049	2.415	2.415	0.00	0%
NB02SED071	NB01SED007	0.537	0.532	0.00	-1%
NB02SED072	NB01SED022	0.538	0.537	0.00	0%
NB02SED074	NB01SED044	0.679	0.678	0.00	0%
NB02SED073	NB01SED032	0.521	0.521	0.00	0%
NB02SED076	NB01SED051	0.642	0.642	0.00	0%
NB02SED077	NB01SED056	1.090	1.090	0.00	0%
NB02SED078	NB01SED052	0.548	0.548	0.00	0%
KK02SED081	27_NB115	0.298	0.297	0.00	0%
NB02SED080	NB01SED060	0.450	0.449	0.00	0%
NB02SED079	NB01SED057	0.573	0.573	0.00	0%
USACEP2-14	39_PRP-99-01	0.047	0.056	0.01	18%
USACEP2-01A	39_PRP-99-02	2.565	2.546	-0.02	-1%
USACEP2-15	NB01SED003	0.146	0.153	0.01	5%
USACEP2-16	NB01SED003	0.146	0.150	0.00	3%
USACEP2-13	NB01SED023	0.818	0.741	-0.08	-9%
USACEP2-02A	26_NB044	0.517	0.514	0.00	-1%
USACEP2-17	17_42A	0.048	0.053	0.01	12%
USACEP2-05A	NB01SED041	0.391	0.390	0.00	0%
USACEP2-03A	27_NB103	0.381	0.381	0.00	0%
USACEP2-04A	NB01SED028	0.461	0.461	0.00	0%
USACEP2-12	NB01SED032	0.521	0.520	0.00	0%
USACEP2-11	NB01SED051	0.642	0.642	0.00	0%
USACEP2-07	NB01SED060	0.450	0.449	0.00	0%
USACEP2-06A	27_NB110	0.083	0.083	0.00	0%
USACEP2-10	26_NB065	0.163	0.163	0.00	0%

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Mercury (mg/kg)					
NB02SED082	NB01SED013	0.830	0.830	0.00	0%
NB02SED070	NB01SED005	2.000	1.988	-0.01	-1%
NB02SED075	NB01SED049	77.000	76.984	-0.02	0%
NB02SED071	NB01SED007	1.100	1.095	0.00	0%
NB02SED072	NB01SED022	1.400	1.399	0.00	0%
NB02SED074	NB01SED044	2.200	2.197	0.00	0%
NB02SED073	NB01SED032	1.500	1.499	0.00	0%
NB02SED076	NB01SED051	2.500	2.497	0.00	0%
NB02SED077	NB01SED056	3.100	3.100	0.00	0%
NB02SED078	NB01SED052	2.050	2.049	0.00	0%
KK02SED081	27_NB115	1.730	1.730	0.00	0%
NB02SED080	NB01SED060	2.200	2.198	0.00	0%
NB02SED079	NB01SED057	2.400	2.400	0.00	0%
USACEP2-14	39_PRP-99-01	0.016	0.058	0.04	265%
USACEP2-01A	39_PRP-99-02	19.850	19.682	-0.17	-1%
USACEP2-15	NB01SED003	1.500	1.526	0.03	2%
USACEP2-16	NB01SED003	1.500	1.515	0.02	1%
USACEP2-13	NB01SED023	3.000	2.655	-0.34	-11%
USACEP2-02A	26_NB044	3.796	3.755	-0.04	-1%
USACEP2-17	17_42A	2.200	2.153	-0.05	-2%
USACEP2-05A	NB01SED041	1.800	1.797	0.00	0%
USACEP2-03A	27_NB103	2.350	2.350	0.00	0%
USACEP2-04A	NB01SED028	1.400	1.400	0.00	0%
USACEP2-12	NB01SED032	1.500	1.499	0.00	0%
USACEP2-11	NB01SED051	2.500	2.496	0.00	0%
USACEP2-07	NB01SED060	2.200	2.198	0.00	0%
USACEP2-06A	27_NB110	0.517	0.518	0.00	0%
USACEP2-10	26_NB065	0.408	0.408	0.00	0%

* Values in yellow are greater than the UT, see text.
** Stations indicated as "USACEP2" are NBSA RI/FS Phase II sampling locations proposed by USACE to USEPA
*** Closest core: NBSA RI/FS Phase I or active historic core

Table 11. Estimated changes to contaminant concentrations at NBSA RI/FS Phase II sampling locations, cumulative analysis.

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
DDTs (mg/kg)					
NB02SED082	NB01SED013	0.036	0.036	0.00	0%
NB02SED070	NB01SED005	0.038	0.041	0.00	7%
NB02SED075	NB01SED049	0.065	0.064	0.00	0%
NB02SED071	NB01SED007	0.014	0.014	0.00	1%
NB02SED072	NB01SED022	0.016	0.016	0.00	0%
NB02SED074	15_31	0.122	0.122	0.00	0%
NB02SED073	NB01SED032	0.033	0.033	0.00	0%
NB02SED076	NB01SED051	0.035	0.035	0.00	0%
NB02SED077	NB01SED056	0.035	0.035	0.00	0%
NB02SED078	NB01SED052	0.029	0.028	0.00	0%
KK02SED081	27_NB115	0.052	0.052	0.00	0%
NB02SED080	NB01SED060	0.015	0.015	0.00	0%
NB02SED079	NB01SED057	0.027	0.027	0.00	0%
USACEP2-14	39_PRP-99-01	0.001	0.010	0.01	927%
USACEP2-01A	39_PRP-99-02	0.225	0.230	0.00	2%
USACEP2-15	NB01SED003	0.043	0.054	0.01	26%
USACEP2-16	NB01SED003	0.043	0.050	0.01	17%
USACEP2-13	NB01SED023	0.112	0.098	-0.01	-12%
USACEP2-02A	26_NB044	0.135	0.134	0.00	-1%
USACEP2-09	26_NB066	0.105	0.104	0.00	0%
P2-71A	26_NB045	0.035	0.035	0.00	0%
USACEP2-05A	NB01SED041	0.197	0.196	0.00	0%
P2-74A	15_31	0.122	0.121	0.00	-1%
USACEP2-04A	NB01SED028	0.025	0.025	0.00	0%
USACEP2-12	NB01SED032	0.033	0.033	0.00	0%
USACEP2-07	NB01SED060	0.015	0.015	0.00	0%
USACEP2-06A	27_NB110	0.011	0.011	0.00	0%
USACEP2-10	26_NB065	0.008	0.008	0.00	0%

NBSA RI/FS Phase II Core ID	Closest Core ***	Current Concentration	Predicted Post-HDP Concentration	Concentration Difference	Relative Percent Difference
Chromium (mg/kg)					
NB02SED082	NB01SED013	28.000	28.011	0.01	0%
NB02SED070	NB01SED005	105.000	104.591	-0.41	0%
NB02SED075	NB01SED049	191.500	191.478	-0.02	0%
NB02SED071	NB01SED007	81.600	81.315	-0.28	0%
NB02SED072	NB01SED022	98.400	98.343	-0.06	0%
NB02SED074	NB01SED044	115.500	115.397	-0.10	0%
NB02SED073	NB01SED032	121.000	120.954	-0.05	0%
NB02SED076	NB01SED051	119.000	118.904	-0.10	0%
NB02SED077	NB01SED056	153.000	152.999	0.00	0%
NB02SED078	NB01SED052	110.500	110.473	-0.03	0%
KK02SED081	27_NB115	128.000	127.976	-0.02	0%
NB02SED080	NB01SED060	119.000	118.928	-0.07	0%
NB02SED079	NB01SED057	129.000	129.000	0.00	0%
USACEP2-14	39_PRP-99-01	37.100	38.299	1.20	3%
USACEP2-01A	39_PRP-99-02	277.500	275.990	-1.51	-1%
USACEP2-15	NB01SED003	64.100	65.093	0.99	2%
USACEP2-16	NB01SED003	64.100	64.716	0.62	1%
USACEP2-13	NB01SED023	108.000	100.002	-8.00	-7%
USACEP2-02A	26_NB044	153.900	152.626	-1.27	-1%
USACEP2-17	17_42A	62.000	62.307	0.31	0%
USACEP2-05A	NB01SED041	201.000	200.592	-0.41	0%
USACEP2-03A	27_NB103	149.000	148.989	-0.01	0%
USACEP2-04A	NB01SED028	109.000	108.996	0.00	0%
USACEP2-12	NB01SED032	121.000	120.906	-0.09	0%
USACEP2-11	NB01SED051	119.000	118.894	-0.11	0%
USACEP2-07	NB01SED060	119.000	118.926	-0.07	0%
USACEP2-06A	27_NB110	49.600	49.647	0.05	0%
USACEP2-10	26_NB065	45.100	45.114	0.01	0%

* Values in yellow are greater than the UT, see text.
** Stations indicated as "USACEP2" are NBSA RI/FS Phase II sampling locations proposed by USACE to USEPA
*** Closest core: NBSA RI/FS Phase I or active historic core

Table A-1. USEPA 2005 NBSA RI/FS Phase 1 Data.

				Benzo(a)pyrene			Chromium			Total DDTs			Mercury			Total PCBs			2,3,7,8-TCDD		
SAMPLE_ID	Date	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
HR01SED067B-01	12/1/2005	0	0.5	0.5	G, M	EXCL	27	M	EXCL	0.035	U	EXCL	0.2	M	EXCL	0.165	B	EXCL	4.18		EXCL
HR01SED067B-02	12/1/2005	0.5	1.5	0.7	U, M	EXCL	33	M	EXCL	0.043	U	EXCL	0.78	M	EXCL	0.0116	B	EXCL	0.854	G	EXCL
HR01SED067B-03	12/1/2005	1.5	2.5	0.5	U, M	EXCL	27.1	M	EXCL	0.002	J	EXCL	0.069	B, M	EXCL	0.00181	B	EXCL	0.482	G	EXCL
HR01SED067B-04	12/1/2005	2.5	3.5	0.4	U, M	EXCL	37.5	M	EXCL	0.021	U	EXCL	0.032	B, M	EXCL	0.000397	B	EXCL	0.102	U	EXCL
HR01SED067B-04-DUP	12/1/2005	2.5	3.5	0.4	U, M	EXCL	35.9	M	EXCL	0.021	U	EXCL	0.024	B, M	EXCL	0.00141	B	EXCL	0.256	U	EXCL
HR01SED067B-05	12/1/2005	3.5	5	0.3	U, M	EXCL	34.8	M	EXCL	0.02	U	EXCL	0.028	B, M	EXCL	0.00165	B	EXCL	0.162	U	EXCL
HR01SED067B-06	12/1/2005	5	6.5	0.4	U, M	EXCL	34.5	M	EXCL	0.021	U	EXCL	0.028	B, M	EXCL	0.000577	B	EXCL	0.192	U	EXCL
HR01SED069C-01	12/1/2005	0	0.5	4.8		EXCL	21		EXCL	0.003	J	EXCL	0.14		EXCL	0.0266	B	EXCL	2.67		EXCL
HR01SED069C-02	12/1/2005	0.5	1.5	0.1	G	EXCL	18		EXCL	0.013	U	EXCL	0.015	B	EXCL	0.000442	B	EXCL	0.111	U	EXCL
NB01SED001B-01	11/13/2005	0	0.5	1.5	G, D, M	DW	124	*, M	DW	1.13	J	DW	3	*, M	DW	0.85	D, B	DW	45.9		DW
NB01SED001B-02	11/13/2005	0.5	1.5	2.1	J	DW	120	*, M	DW	0.7	J	DW	3.2	*, M	DW	0.912	D, B	DW	33		DW
NB01SED001B-02-DUP	11/13/2005	0.5	1.5	2.6	G, D, M	DW	130	*, M	DW	1.2	J	DW	2.6	*, M	DW	0.868	D, B	DW	36.5		DW
NB01SED001B-03	11/13/2005	1.5	3	3.7	J	DW	146	*, M	DW	1.62	J	DW	3.8	*, M	DW	1.74	D, B	DW	46.7		DW
NB01SED002B-01	10/30/2005	0	0.5	0.9	G, D, M	DW	140	M	DW	0.8	J	DW	4.9	M	DW	1.23	B	DW	45.8		DW
NB01SED002B-02	10/30/2005	0.5	1.5	0.4	G, D, M	DW	72.8	M	DW	0.296		DW	2.7	M	DW	0.461	B	DW	20.6		DW
NB01SED002B-03	10/30/2005	1.5	2.5	0.8	U, D, M	DW	42.2	M	DW	0.039	U	DW	0.0053	U, M	DW	0.0131	B	DW	0.609	EMPC	DW
NB01SED002B-04	10/30/2005	2.5	3.5	0.6	U, D	DW	20.2		DW	0.019	U	DW	0.0091	B	DW	0.0328	B	DW	1.51		DW
NB01SED002B-05	10/30/2005	3.5	5	0.2	U	DW	24.6		DW	0.004	U	DW	0.0026	U	DW	0.000681	B	DW	0.794	EMPC	DW
NB01SED003D-01	10/31/2005	0	0.5	0.6		S	64.1		S	0.043	J	S	1.5		S	0.146	B	S	14.7		S
NB01SED003D-02	10/31/2005	0.5	1.5	2.6	M	S,NA	137	M	S,NA	0.078	J	S,NA	4.7	M	S,NA	0.088	D, B	S,NA	9.89		S,NA
NB01SED003D-03	10/31/2005	1.5	2.5	1.9	M	S,NA	102	M	S,NA	0.1	U	S,NA	3.7	M	S,NA	0.00356	D, B	S,NA	0.574	EMPC	S,NA
NB01SED003D-04	10/31/2005	2.5	4	0.4	U, M	S,NA	39.9	M	S,NA	0.001	J	S,NA	0.059	B, M	S,NA	0.00396	D, B	S,NA	0.89		S,NA
NB01SED004B-01	10/30/2005	0	0.5	0.8	G, D, M	S	107	M	S	0.199	J	S	2	M	S	0.683	B	S	37.6		S
NB01SED004B-02	10/30/2005	0.5	1.5	1.0	G, D, M	S,NA	164	M	S,NA	0.09	J	S,NA	3.5	M	S,NA	1.2	B, D	S,NA	57.9		S,NA
NB01SED004B-02-DUP	10/30/2005	0.5	1.5	1.1	G, D, M	S,NA	177	M	S,NA	0.088	J	S,NA	3.8	M	S,NA	1.32	D, B	S,NA	65.2		S,NA
NB01SED004B-03	10/30/2005	1.5	3	1.4	D, M	S,NA	306	M	S,NA	0.128	J	S,NA	7.2	M	S,NA	2.8	D, B	S,NA	139		S,NA
NB01SED005A-01	11/2/2005	0	0.5	0.9	M	S	105	*, M	S	0.038	J	S	2	*, M	S	0.693		S	36.2		S
NB01SED005A-02	11/2/2005	0.5	1.5	0.7	M	S,NA	92.3	*, M	S,NA	0.029	J	S,NA	1.5	*, M	S,NA	0.547		S,NA	22.9		S,NA
NB01SED005A-03	11/2/2005	1.5	3.5	1.1	M	S,NA	330	*, M	S,NA	0.12		S,NA	6.9	*, M	S,NA	2.69		S,NA	115		S,NA
NB01SED005A-04	11/2/2005	2.5	3.5	1.0	G, D, M	S,NA	367	*, M	S,NA	0.11	J	S,NA	10.4	*, M	S,NA	4.13		S,NA	180		S,NA
NB01SED006AA-01	11/27/2005	0	0.5	0.4	G, D, M	EXCL	69.2	M	EXCL	0.016	J	EXCL	1.2	*, M	EXCL	0.425	D, B	EXCL	21.4		EXCL
NB01SED006AA-02	11/27/2005	0.5	1.5	0.6	G, D, M	EXCL	73.4	M	EXCL	0.013	J	EXCL	1.1	*, M	EXCL	0.471	D, B	EXCL	13.3		EXCL
NB01SED006AA-03	11/27/2005	1.5	3	0.4	G, D, M	EXCL	80.5	M	EXCL	0.019	J	EXCL	1	*, M	EXCL	0.441	D, B	EXCL	14.3		EXCL
NB01SED007A-01	11/9/2005	0	0.5	0.5	G, D	S	81.6	N	S	0.027	U	S	1.1	*	S	0.537	D, B	S	33.2		S
NB01SED007A-02	11/9/2005	0.5	1.5	0.7	G, D, M	S,NA	119	N	S,NA	0.127	J	S,NA	1.6	*, M	S,NA	0.679	D, B	S,NA	40		S,NA
NB01SED007A-03	11/9/2005	1.5	2.5	1.2	J	S,NA	160	N	S,NA	0.072	J	S,NA	2.6	*	S,NA	1.49	D, B	S,NA	74.3		S,NA
NB01SED007A-04	11/9/2005	2.5	3.5	1.6	G, D	S,NA	187	N	S,NA	0.092	U	S,NA	3.3	*	S,NA	2.13	D, B	S,NA	94.3		S,NA
NB01SED008AA-01	11/14/2005	0	0.5	0.7	J	EXCL	328	*, M	EXCL	0.13	J	EXCL	3.6	*, M	EXCL	3.7	D, B	EXCL	154		EXCL
NB01SED008AA-02	11/14/2005	0.5	1.5	1.9	G, D, M	EXCL	463	*, M	EXCL	0.13	J	EXCL	10.4	*, M	EXCL	4.42	D, B	EXCL	175		EXCL
NB01SED008AA-03	11/14/2005	1.5	3	1.7	G, D, M	EXCL	493	*, M	EXCL	0.239	J	EXCL	16.4	*, M	EXCL	5.84	D, B	EXCL	204		EXCL
NB01SED009A-01	11/6/2005	0	0.5	1.8	D, M	S	114	E, J	S	0.145	J	S	2.9	N, *, J, L	S	0.802	B, D	S	39.4		S
NB01SED009A-02	11/6/2005	0.5	1.5	7.7	D, M	S,NA	214	E, J	S,NA	0.006	J	S,NA	6.2	N, *, J, L	S,NA	0.0369	B, D	S,NA	2.44	G	S,NA
NB01SED009A-03	11/6/2005	1.5	2.5	8.8	D	S,NA	159	E, J	S,NA	0.008	J	S,NA	6.3	N, *, J, L	S,NA	0.00455	B, D	S,NA	0.686	G	S,NA
NB01SED009A-04	11/6/2005	2.5	3.5	3.5		S,NA	108	E, J	S,NA	0.002	J	S,NA	6.9	N, *, J, L	S,NA	0.00359	B, D	S,NA	0.427	U	S,NA
NB01SED010I-01	10/31/2005	0	0.5	1.1	D	DW	61.7		DW	0.107		DW	1.2		DW	0.146	D, B	DW	8.77		DW
NB01SED010I-02	10/31/2005	0.5	1.3	1.9	G, D	DW	128		DW	0.096	U	DW	4.4		DW	0.119	D, B	DW	0.436	G	DW
NB01SED010I-02-DUP	10/31/2005	0.5	1.3	1.7	G, D	DW	107		DW	0.087	U	DW	3.3		DW	0.14	D, B	DW	0.296	EMPC	DW

Table A-1. USEPA 2005 NBSA RI/FS Phase 1 Data.

				Benzo(a)pyrene			Chromium			Total DDTs			Mercury			Total PCBs			2,3,7,8-TCDD		
SAMPLE_ID	Date	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
NB01SED010I-03	10/31/2005	1.3	2	1.8	G, D	DW	97		DW	0.08	U	DW	2.3		DW	0.129	D, B	DW	0.326	G	DW
NB01SED011B-01	11/1/2005	0	0.5	1.0	G, D	DW	218		DW	0.075	U	DW	5.6		DW	0.134	D, B	DW	5.01		DW
NB01SED011B-02	11/1/2005	0.5	1.5	0.3	U	DW	29.8		DW	0.001	J	DW	0.04	B	DW	0.00596	D, B	DW	0.382	G EMPC	DW
NB01SED011B-03	11/1/2005	1.5	2.5	0.6	U, M	DW	47.7	M	DW	0.001	J	DW	0.05	B, M	DW	0.00332	D, B	DW	0.203	EMPC	DW
NB01SED011B-04	11/1/2005	2.5	3.5	0.3	U	DW	18.5		DW	0.002	J	DW	0.023	B	DW	0.00577	D, B	DW	0.397	G EMPC	DW
NB01SED011B-05	11/1/2005	3.5	4.5	0.4	U, M	DW	27.8	M	DW	7E-04	J	DW	0.061	B, M	DW	0.00615	D, B	DW	0.58	EMPC	DW
NB01SED011B-06	11/1/2005	4.5	5.5	0.2	U	DW	24.1		DW	0.009	J	DW	0.019	B	DW	0.00381	D, B	DW	0.216	G EMPC	DW
NB01SED012A-01	11/1/2005	0	0.5	8.0	D, M	S	329	M	S	0.17	U	S	17.4	M	S	7.69	D, B	S	230		S
NB01SED012A-02	11/1/2005	0.5	1.5	1.1	M	S,NA	491	M	S,NA	0.24	U	S,NA	19.3	M	S,NA	4.59	D, B	S,NA	245		S,NA
NB01SED012A-03	11/1/2005	1.5	2.5	0.9	D, M	S,NA	269	M	S,NA	0.14	U	S,NA	13.1	M	S,NA	5.61	D, B	S,NA	223		S,NA
NB01SED012A-04	11/1/2005	2.5	3.5	1.1	M	S,NA	423	M	S,NA	0.52	J	S,NA	16.1	M	S,NA	6.34	D, B	S,NA	555		S,NA
NB01SED012A-05	11/1/2005	3.5	5	1.5	G, D, M	S,NA	442	M	S,NA	0.39	J	S,NA	22.8	M	S,NA	7.02	D, B	S,NA	334		S,NA
NB01SED012A-06	11/1/2005	5	6.5	2.4	D, M	S,NA	528	*, M	S,NA	0.64	J	S,NA	38.7	*, M	S,NA	3.22		S,NA	322		S,NA
NB01SED012A-06-DUP	11/1/2005	5	6.5	2.3	D, M	S,NA	647	*, M	S,NA	1.4	J	S,NA	22.8	*, M	S,NA	3.83		S,NA	466	J	S,NA
NB01SED012A-07	11/1/2005	6.5	8	3.5	D, M	S,NA	474	*, M	S,NA	0.95	J	S,NA	17.1	*, M	S,NA	1.28		S,NA	26.3		S,NA
NB01SED013C-01	10/31/2005	0	0.5	0.5	G, D	S	28		S	0.036	J	S	0.83		S	0.0686	D, B	S	3.58		S
NB01SED013C-02	10/31/2005	0.5	1.5	3.1	D	S,NA	37		S,NA	0.021	U	S,NA	0.56		S,NA	0.00211	D, B	S,NA	0.465	U	S,NA
NB01SED013C-03	10/31/2005	1.5	2.5	7.0	D	S,NA	76.3		S,NA	0.028	U	S,NA	2.2		S,NA	0.000614	D, B	S,NA	0.432	U	S,NA
NB01SED013C-04	10/31/2005	2.5	3.5	0.1	G, J	S,NA	30.8		S,NA	0.006	U	S,NA	0.019	B	S,NA	9.81E-05	D, B	S,NA	0.0872	U	S,NA
NB01SED014A-01	11/8/2005	0	0.5	3.4	G, D, M	S	143	M	S	0.053	J	S	3	M	S	0.17	D, B	S	10.3		S
NB01SED014A-02	11/8/2005	0.5	1.5	3.1	J	S,NA	101		S,NA	0.003	J	S,NA	2.2		S,NA	0.00252	D, B	S,NA	0.829	U	S,NA
NB01SED014A-03	11/8/2005	1.5	2.5	0.8	U, D	S,NA	22.3		S,NA	0.015	U	S,NA	0.0035	U	S,NA	4.61E-05	B	S,NA	0.111	U	S,NA
NB01SED014A-04	11/8/2005	2.5	3.5	0.9	U, D	S,NA	26.6		S,NA	0.017	U	S,NA	0.011	B	S,NA	1.77E-05	D, B	S,NA	0.299	U	S,NA
NB01SED015A-01	11/1/2005	0	0.5	1.5	G, D, M	S	218	M	S	0.12	U	S	7	M	S	1.52	D, B	S	68.2		S
NB01SED015A-02	11/1/2005	0.5	1.5	0.3		S,NA	40.6		S,NA	0.564	J	S,NA	0.63		S,NA	5.06	D, B	S,NA	166		S,NA
NB01SED015A-03	11/1/2005	1.5	2.5	2.2	G, D, M	S,NA	625	*, M	S,NA	0.27	J	S,NA	21.6	*, M	S,NA	7.48		S,NA	811		S,NA
NB01SED015A-04	11/1/2005	2.5	3.5	4.4	D, M	S,NA	189	*	S,NA	0.074	J	S,NA	5.8	*	S,NA	1.08		S,NA	148		S,NA
NB01SED016C-01	11/13/2005	0	0.5	0.5	J	DW	79.5	*, M	DW	0.023	J	DW	1	*, M	DW	0.394	D, B	DW	24.2		DW
NB01SED016C-02	11/13/2005	0.5	1.5	0.5	J	DW	87.2	*, M	DW	0.128	J	DW	1.5	*, M	DW	0.632	D, B	DW	25.7		DW
NB01SED016C-03	11/13/2005	1.5	2.5	0.6	J	DW	84.2	*	DW	0.019	J	DW	1.3	*	DW	0.607	D, B	DW	37.2		DW
NB01SED016C-04	11/13/2005	2.5	3.5	1.0	J	DW	95	*	DW	0.026	J	DW	1.5	*	DW	0.622	D, B	DW	33.5		DW
NB01SED017B-01	11/20/2005	0	0.5	0.4	G, D	S&DW	62.1		S&DW	0.019	U	S&DW	0.98	N, J, H	S&DW	0.293	D	S&DW	17.6		S&DW
NB01SED017B-02	11/20/2005	0.5	1.5	0.5	G, D, M	S&DW	71.7	M	S&DW	0.024	U	S&DW	0.79	N, J, H	S&DW	0.309	D	S&DW	15.3		S&DW
NB01SED017B-03	11/20/2005	1.5	3	0.5	G, D, M	S&DW	62.6		S&DW	0.021	U	S&DW	0.75	N, J, H	S&DW	0.232	D	S&DW	8.55		S&DW
NB01SED018D-01	11/6/2005	0	0.5	0.2	G	S	31.3	E, J	S	0.013	U	S	0.11	N, *, J, L	S	0.199	B, D	S	16.8		S
NB01SED018D-01-DUP	11/6/2005	0	0.5	0.3	G, D	S	34.6	E, J	S	0.014	U	S	0.62	N, *, J, L	S	0.146	B, D	S	13.2		S
NB01SED018D-02	11/6/2005	0.5	1.5	0.2	U	S,NA	17.6	E, J	S,NA	0.004	U	S,NA	0.22	N, *, J, L	S,NA	0.0472	B, D	S,NA	7.34		S,NA
NB01SED018D-03	11/6/2005	1.5	2.5	0.2	U	S,NA	13.8	E, J	S,NA	0.004	U	S,NA	0.14	N, *, J, L	S,NA	0.015	B, D	S,NA	2	J	S,NA
NB01SED018D-04	11/6/2005	2.5	3.5	6.7	D	S,NA	18.6	E, J	S,NA	0.005	U	S,NA	0.11	N, *, J, L	S,NA	0.0171	B, D	S,NA	3.43		S,NA
NB01SED019A-01	11/2/2005	0	0.5	1.5	G, D, M	S	649	E, J	S	1	J	S	9.5	M	S	2.91	D, B	S	592		S
NB01SED019A-02	11/2/2005	0.5	1.5	0.4		S,NA	112	E, J	S,NA	0.153	J	S,NA	2		S,NA	0.0982	D, B	S,NA	5.86		S,NA
NB01SED019A-03	11/2/2005	1.5	2.5	0.3	U	S,NA	25	E, J	S,NA	0.006	J	S,NA	0.046	B	S,NA	0.0938	B	S,NA	1.49		S,NA
NB01SED019A-04	11/2/2005	2.5	3.5	0.5	G, D	S,NA	229	*	S,NA	0.072	J	S,NA	4.4	*	S,NA	0.00422		S,NA	0.868		S,NA
NB01SED019A-05	11/2/2005	3.5	5	0.2	U	S,NA	16.6	E, J	S,NA	0.004	U	S,NA	0.017	B	S,NA	0.0107	B	S,NA	0.167	U	S,NA
NB01SED019A-05-DUP	11/2/2005	3.5	5	0.2	U	S,NA	17.2	E, J	S,NA	0.004	U	S,NA	0.016	B	S,NA	3.63E-06	B	S,NA	0.163	U	S,NA
NB01SED019A-06	11/2/2005	5	6.5	0.2	U	S,NA	17.4	E, J	S,NA	0.004	U	S,NA	0.0056	B	S,NA	0.000162	B	S,NA	0.132	U	S,NA
NB01SED020A-01	11/8/2005	0	0.5	0.5	J	S	134		S	0.045	J	S	2.1		S	0.902	D, B	S	182		S

Table A-1. USEPA 2005 NBSA RI/FS Phase 1 Data.

				Benzo(a)pyrene			Chromium			Total DDTs			Mercury			Total PCBs			2,3,7,8-TCDD		
SAMPLE_ID	Date	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
NB01SED020A-01-DUP	11/8/2005	0	0.5	0.6	G, D	S	104		S	0.039	J	S	1.7		S	0.822	D, B	S	185		S
NB01SED020A-02	11/8/2005	0.5	1.5	1.0	G, D	S,NA	124		S,NA	0.05	J	S,NA	2.4		S,NA	0.886	D, B	S,NA	129		S,NA
NB01SED020A-03	11/8/2005	1.5	2.5	4.1	G, D, M	S,NA	374	M	S,NA	1.04	J	S,NA	5.9	M	S,NA	0.48	D, B	S,NA	5.29		S,NA
NB01SED020A-04	11/8/2005	2.5	3.5	4.1	G, D	S,NA	154		S,NA	0.018	U	S,NA	3.3		S,NA	0.152	D, B	S,NA	2.14	G	S,NA
NB01SED020A-05	11/8/2005	3.5	5	4.1	G, D	S,NA	147		S,NA	0.017	U	S,NA	2.7		S,NA	0.011	D, B	S,NA	1.2	G	S,NA
NB01SED020A-06	11/8/2005	5	6.5	6.4	D	S,NA	103		S,NA	0.002	J	S,NA	2.7		S,NA	0.00082	D, B	S,NA	0.858	U	S,NA
NB01SED021B-01	11/20/2005	0	0.5	0.8	G, D, M	DW	56.8		DW	0.024	U	DW	0.8	N, J, H	DW	0.171	D	DW	8.54		DW
NB01SED021B-02	11/20/2005	0.5	1.5	0.2	G, D, M	DW	39.9		DW	0.02	U	DW	0.49	N, J, H	DW	0.161	D	DW	7.32		DW
NB01SED021B-03	11/20/2005	1.5	3	0.2	U	DW	13.3		DW	0.004	U	DW	0.0057	B, N, J, H	DW	0.00237		DW	0.21	G	DW
NB01SED022A-01	11/9/2005	0	0.5	0.8	G, D, M	S	98.4	N	S	0.031	U	S	1.4	*, M	S	0.538	D, B	S	40.2		S
NB01SED022A-02	11/9/2005	0.5	1.5	0.9	G, D	S,NA	150	N	S,NA	0.041	J	S,NA	1.7	*	S,NA	0.78	D, B	S,NA	55.3		S,NA
NB01SED022A-03	11/9/2005	1.5	2.5	1.2	G, D, M	S,NA	148	N	S,NA	0.112	J	S,NA	2.3	*, M	S,NA	0.934	D, B	S,NA	74		S,NA
NB01SED022A-04	11/9/2005	2.5	3.5	0.8	G, D, M	S,NA	198	N	S,NA	0.1	J	S,NA	3.1	*, M	S,NA	1.16	D, B	S,NA	84		S,NA
NB01SED023A-01	11/1/2005	0	0.5	1.3		S	108	*	S	0.112	J	S	3	*	S	0.818		S	63.6		S
NB01SED023A-02	11/1/2005	0.5	1.5	0.7		S,NA	238	*	S,NA	0.1	J	S,NA	7.6	*	S,NA	2.49		S,NA	223		S,NA
NB01SED023A-03	11/1/2005	1.5	2.5	0.7	G, D	S,NA	89.3	*	S,NA	0.048	J	S,NA	1.7	*	S,NA	0.685		S,NA	30.9		S,NA
NB01SED023A-04	11/1/2005	2.5	3.5	4.3	D, M	S,NA	350	*, M	S,NA	2.83	J	S,NA	6	*, M	S,NA	0.327		S,NA	2.19	U J EMPC	S,NA
NB01SED024B-01	11/8/2005	0	0.5	0.4	G, D, M	DW	82.9	M	DW	0.023	J	DW	1	M	DW	0.309	D, B	DW	19.6		DW
NB01SED024B-02	11/8/2005	0.5	1	0.2	G, D	DW	27.3		DW	0.005	J	DW	0.25		DW	0.085	D, B	DW	5.2		DW
NB01SED025B-01	11/8/2005	0	0.5	0.2	J	EXCL	32.3		EXCL	0.14	J	EXCL	0.56		EXCL	0.193	D, B	EXCL	12.3		EXCL
NB01SED025B-02	11/8/2005	0.5	1.5	2.1	G, D, M	EXCL	276	M	EXCL	0.023	U	EXCL	4.5	M	EXCL	0.167	D, B	EXCL	0.685	U	EXCL
NB01SED025B-03	11/8/2005	1.5	2.5	3.5	G, D, M	EXCL	373	M	EXCL	0.12	U	EXCL	6.4	M	EXCL	0.24	D, B	EXCL	0.905	G	EXCL
NB01SED025B-04	11/8/2005	2.5	3.5	4.2	G, D, M	EXCL	313	M	EXCL	0.11	U	EXCL	6	M	EXCL	0.146	D, B	EXCL	0.963	G	EXCL
NB01SED025B-05	11/8/2005	3.5	5	3.9	G, D, M	EXCL	333	M	EXCL	0.12	U	EXCL	6.1	M	EXCL	0.14	D, B	EXCL	0.449	U	EXCL
NB01SED025B-06	11/8/2005	5	6.5	3.7	J	EXCL	224		EXCL	0.006	J	EXCL	4.3		EXCL	0.00481	D, B	EXCL	0.79	U	EXCL
NB01SED026A-01	11/2/2005	0	0.5	0.6		DW	179	*	DW	0.043	J	DW	3.9	*	DW	2.48		DW	82.4		DW
NB01SED026A-02	11/2/2005	0.5	1.5	0.1	G	DW	23.3	*	DW	0.004	J	DW	0.21	*	DW	0.187		DW	13.6		DW
NB01SED026A-03	11/2/2005	1.5	3	0.1	G	DW	46.6	*	DW	0.006	J	DW	0.57	*	DW	0.2		DW	12.5		DW
NB01SED027A-01	11/14/2005	0	0.5	0.3	G, J	DW	51.7	*	DW	0.022	J	DW	0.52	*	DW	0.222	D, B	DW	16.3	J	DW
NB01SED027A-02	11/14/2005	0.5	1.5	0.2	G, J	DW	49.6	*	DW	0.012	J	DW	0.42	*	DW	0.148	D, B	DW	8.42	J	DW
NB01SED027A-03	11/14/2005	1.5	3	0.1	G, J	DW	36.9	*	DW	0.021	J	DW	0.25	*	DW	0.138	D, B	DW	4.83	J	DW
NB01SED028C-01	11/9/2005	0	0.5	0.8	J	S	109	N	S	0.025	J	S	1.4	*, M	S	0.461	D, B	S	48.8		S
NB01SED028C-02	11/9/2005	0.5	1.5	0.7	G, D, M	S,NA	143	N	S,NA	0.03	J	S,NA	2	*, M	S,NA	0.629	D, B	S,NA	64.7		S,NA
NB01SED028C-03	11/9/2005	1.5	2.5	0.8	G, D, M	S,NA	154	N	S,NA	0.051	J	S,NA	2.3	*, M	S,NA	0.753	D, B	S,NA	160		S,NA
NB01SED028C-04	11/9/2005	2.5	3.5	1.3	J	S,NA	341	N	S,NA	0.1		S,NA	6.9	*, M	S,NA	3.25	D, B	S,NA	198		S,NA
NB01SED028C-05	11/9/2005	3.5	5	1.6	J	S,NA	396	N	S,NA	0.11	U	S,NA	6.9	*, M	S,NA	4.58	D, B	S,NA	474	J	S,NA
NB01SED028C-05-DUP	11/9/2005	3.5	5	1.6	J	S,NA	403	N	S,NA	0.13	U	S,NA	7.5	*, M	S,NA	4.42	D, B	S,NA	453		S,NA
NB01SED028C-06	11/9/2005	5	6.5	2.7	D	S,NA	121	N	S,NA	0.005		S,NA	2.5	*	S,NA	0.0387	D, B	S,NA	3.94		S,NA
NB01SED029C-01	11/15/2005	0	0.5	0.6	G, D	DW	72		DW	0.025	J	DW	0.97		DW	0.439	D, B	DW	33.5		DW
NB01SED029C-02	11/15/2005	0.5	1.5	0.4	G, D	DW	57.8		DW	0.016	J	DW	0.84		DW	0.387	D, B	DW	50		DW
NB01SED029C-03	11/15/2005	1.5	2.5	0.6	G, D	DW	64		DW	0.015	J	DW	0.8		DW	0.34	D, B	DW	20.3		DW
NB01SED029C-03	11/15/2005	1.5	2.5	0.6	G, D	DW	70		DW	0.111	J	DW	0.98		DW	0.467	D, B	DW	44.2		DW
NB01SED029C-04-DUP	11/15/2005	2.5	3.5	0.5	G, D	DW	90.1		DW	NA		DW	1.2		DW	0.464	D, B	DW	33.5		DW
NB01SED029C-05	11/15/2005	3.5	4.5	3.6	D	DW	92.4		DW	0.03	J	DW	1.3		DW	0.554	D, B	DW	33.4		DW
NB01SED029C-06	11/15/2005	4.5	5.5	0.8	G, D	DW	109		DW	0.042	J	DW	1.7		DW	0.647	D, B	DW	49.9		DW
NB01SED030B-01	11/15/2005	0	0.5	0.5	G, D	DW	58.1		DW	0.016	J	DW	0.75		DW	0.264	D, B	DW	19.4		DW
NB01SED030B-02	11/15/2005	0.5	1.5	0.5	G, D, M	DW	62.2	M	DW	0.016	J	DW	0.8	M	DW	0.356	D, B	DW	17.8		DW

Table A-1. USEPA 2005 NBSA RI/FS Phase 1 Data.

				Benzo(a)pyrene			Chromium			Total DDTs			Mercury			Total PCBs			2,3,7,8-TCDD		
SAMPLE_ID	Date	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
NB01SED031A-01	11/14/2005	0	0.5	0.3	G, D, M	DW	74.4	M	DW	0.029		DW	1.1	N, J, L	DW	0.271	D, B	DW	50.8		DW
NB01SED031A-02	11/14/2005	0.5	1.5	0.5	G, D	DW	69		DW	0.074	J	DW	0.84	N, J, L	DW	0.262	D, B	DW	22.5		DW
NB01SED031A-03	11/14/2005	1.5	2.8	0.2	G, D	DW	66.6		DW	0.034		DW	0.85	N, J, L	DW	0.247	D, B	DW	16.2		DW
NB01SED032A-01	11/13/2005	0	0.5	0.8	J	S	121	*, M	S	0.033	J	S	1.5	*, M	S	0.521	D, B	S	67.3	J	S
NB01SED032A-02	11/13/2005	0.5	1.5	0.5	J	S,NA	210	*, M	S,NA	0.064	J	S,NA	4.6	*, M	S,NA	1.23	D, B	S,NA	1100	J	S,NA
NB01SED032A-03	11/13/2005	1.5	2.5	1.2	J	S,NA	387	*, M	S,NA	0.072	J	S,NA	7	*, M	S,NA	4.03	D, B	S,NA	322		S,NA
NB01SED032A-04	11/13/2005	2.5	3.5	1.5	G, D, M	S,NA	444	*, M	S,NA	0.1	J	S,NA	7.4	*, M	S,NA	5.45	D, B	S,NA	680		S,NA
NB01SED033AD-01	12/11/2005	0	0.5	0.7	G, D	EXCL	66		EXCL	0.103	J	EXCL	0.89		EXCL	0.316	D	EXCL	49.4		EXCL
NB01SED033AD-02	12/11/2005	0.5	1.5	0.7	G, D, M	EXCL	71.3	M	EXCL	0.107	J	EXCL	0.85	M	EXCL	0.365	D	EXCL	29.9		EXCL
NB01SED034AC-01	12/11/2005	0	0.5	1.0	G, D, M	EXCL	97.8	M	EXCL	0.031	J	EXCL	1.3	M	EXCL	0.482	D	EXCL	68.3		EXCL
NB01SED034AC-02-DUP	12/11/2005	0.5	1.5	0.6	G, D, M	EXCL	81.5	M	EXCL	NA		EXCL	1.2	M	EXCL	0.486	D	EXCL	54.9		EXCL
NB01SED034AC-02	12/11/2005	0.5	1.5	0.6	G, D, M	EXCL	80.9	M	EXCL	0.019	J	EXCL	1.1	M	EXCL	0.433	D	EXCL	29.9		EXCL
NB01SED034AC-03	12/11/2005	1.5	3	0.6	G, D, M	EXCL	94.2	M	EXCL	0.024	J	EXCL	1.5	M	EXCL	0.449	D	EXCL	38.8		EXCL
NB01SED035AC-01	12/11/2005	0	0.5	0.8	G, D, M	EXCL	77.6	M	EXCL	0.03	J	EXCL	1.1	M	EXCL	0.441	D	EXCL	45.1		EXCL
NB01SED036F-01	11/27/2005	0	0.5	2.1	G, D, M	DW	265	M	DW	0.06	U	DW	2.4	*, M	DW	2.92	D, B	DW	42		DW
NB01SED036F-02	11/27/2005	0.5	1.5	1.4	G, D, M	DW	143	M	DW	0.019	U	DW	1.5	*, M	DW	0.927	D, B	DW	215		DW
NB01SED036F-03	11/27/2005	1.5	2.5	0.8	G, D, M	DW	95.3	M	DW	0.02	J	DW	1.5	*, M	DW	0.617	D, B	DW	30.6		DW
NB01SED036F-04	11/27/2005	2.5	3.5	0.6	G, D	DW	NA		DW	0.037	J	DW	NA		DW	0.673	D, B	DW	30.4		DW
NB01SED037C-01	11/14/2005	0	0.5	1.4	D, M	S	140	M	S	0.042		S	2.1	N, J, L	S	0.482	D, B	S	98		S
NB01SED037C-01-DUP	11/14/2005	0	0.5	1.0	G, D, M	S	146	M	S	0.04		S	2.3	N, J, L	S	0.456	D, B	S	89.4		S
NB01SED037C-02	11/14/2005	0.5	1.5	1.5	D, M	S,NA	385	M	S,NA	0.15		S,NA	8.2	N, J, L	S,NA	1.75	D, B	S,NA	405		S,NA
NB01SED037C-03	11/14/2005	1.5	2.5	2.2	D, M	S,NA	607	M	S,NA	0.33		S,NA	6.6	N, J, L	S,NA	1.8	D, B	S,NA	715		S,NA
NB01SED037C-04	11/14/2005	2.5	3.5	0.1	G, J	S,NA	19		S,NA	0.001	J	S,NA	0.012	B, N, J, L	S,NA	0.00211	B	S,NA	1.29		S,NA
NB01SED038A-01	11/20/2005	0	0.5	0.3	G, D	S	68.8		S	0.014	U	S	0.63	N, J, H	S	0.0381	D	S	3.08		S
NB01SED038A-02	11/20/2005	0.5	1.5	0.1	G, J	S,NA	18.6		S,NA	0.014	U	S,NA	0.014	B, N, J, H	S,NA	0.000189		S,NA	0.255	G	S,NA
NB01SED038A-03	11/20/2005	1.5	2.5	0.7	U, D	S,NA	18.7		S,NA	0.013	U	S,NA	0.0032	U, N, J, H	S,NA	0.000126		S,NA	0.127	G	S,NA
NB01SED038A-04	11/20/2005	2.5	4	0.6	U, D	S,NA	12.7		S,NA	0.012	U	S,NA	0.0034	B, N, J, H	S,NA	1.4E-06		S,NA	0.174	U	S,NA
NB01SED038A-04-DUP	11/20/2005	2.5	4	0.2	U	S,NA	13.1		S,NA	0.012	U	S,NA	0.0029	U, N, J, H	S,NA	0.000136		S,NA	0.143	U	S,NA
NB01SED039A-01	11/17/2005	0	0.5	2.7	D	S	118		S	0.016	J	S	1.8		S	0.333	D, B	S	45.3		S
NB01SED039A-02	11/17/2005	0.5	1.5	2.5	D	S,NA	110		S,NA	0.008	J	S,NA	2.3		S,NA	0.0361	D, B	S,NA	7.01		S,NA
NB01SED039A-03	11/17/2005	1.5	2.5	0.6	G, D	S,NA	21.6		S,NA	6E-04	J	S,NA	0.22		S,NA	0.00146	B	S,NA	0.667		S,NA
NB01SED039A-04	11/17/2005	2.5	3.5	0.8	U, D	S,NA	21.6		S,NA	0.005	U	S,NA	0.016	B	S,NA	0.00473	B	S,NA	0.209	EMPC	S,NA
NB01SED040A-01	11/15/2005	0	0.5	15.0	D, M	S	305	M	S	0.012	J	S	5.5	M	S	0.00439	D, B	S	0.947	G	S
NB01SED040A-02	11/15/2005	0.5	1.5	6.5	D, M	S,NA	247		S,NA	0.007	J	S,NA	4.1		S,NA	0.0109	D, B	S,NA	1.7	G	S,NA
NB01SED040A-03	11/15/2005	1.5	2.5	4.6	D	S,NA	182		S,NA	0.004	J	S,NA	2.4		S,NA	0.000626	B	S,NA	0.333	G	S,NA
NB01SED040A-04	11/15/2005	2.5	3.5	5.6	D, M	S,NA	275	M	S,NA	0.001	J	S,NA	3.7	M	S,NA	0.000644	B	S,NA	0.308	G	S,NA
NB01SED041A-01	11/15/2005	0	0.5	0.8	D	S	201	J, H	S	0.197	J	S	1.8		S	0.391	D, B	S	51.4		S
NB01SED041A-02	11/15/2005	0.5	1.5	5.6	D, M	S,NA	1020	M	S,NA	0.049	U	S,NA	6.7	M	S,NA	0.383	D, B	S,NA	2.25		S,NA
NB01SED041A-03	11/15/2005	1.5	2.5	5.6	D, M	S,NA	652	M	S,NA	0.052	U	S,NA	5.4	M	S,NA	0.198	D, B	S,NA	0.718	G	S,NA
NB01SED041A-04	11/15/2005	2.5	3.5	4.0	D, M	S,NA	499	M	S,NA	0.043	U	S,NA	4.2	M	S,NA	0.0589	D, B	S,NA	0.54	G	S,NA
NB01SED042B-01	12/5/2005	0	0.5	1.4	D, M	S	111	M	S	0.036		S	2.6	M	S	0.55	B, D	S	82.1		S
NB01SED042B-02	12/5/2005	0.5	1.5	1.4	D	S,NA	82.4		S,NA	0.025	J	S,NA	1.2		S,NA	0.37	B, D	S,NA	56		S,NA
NB01SED042B-03	12/5/2005	1.5	2.5	0.9	D, M	S,NA	89.3	M	S,NA	0.025	J	S,NA	1.4	M	S,NA	0.418	B, D	S,NA	37.7		S,NA
NB01SED043C-01	11/20/2005	0	0.5	0.8	G, D	S	90		S	0.018	U	S	1.1	N, J, H	S	0.348	D	S	35.3		S
NB01SED043C-02	11/20/2005	0.5	1.5	1.2	D, M	S,NA	114	M	S,NA	0.025	J	S,NA	1.5	N, J, H	S,NA	0.638	D	S,NA	48.6		S,NA
NB01SED043C-03	11/20/2005	1.5	2.8	0.4	G, D	S,NA	87.6		S,NA	0.019	J	S,NA	1.2	N, J, H	S,NA	0.451	D	S,NA	35		S,NA
NB01SED044A-01	11/27/2005	0	0.5	1.5	D, M	S	119	M	S	0.022	J	NA	2.2	*, M	S	0.586	D, B	S	73.5		S

Table A-1. USEPA 2005 NBSA RI/FS Phase 1 Data.

				Benzo(a)pyrene			Chromium			Total DDTs			Mercury			Total PCBs			2,3,7,8-TCDD		
SAMPLE_ID	Date	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
NB01SED044A-01-DUP	11/27/2005	0	0.5	0.9	G, D	S	112		S	0.024	J	NA	2.2	*	S	0.772	D, B	S	79.6		S
NB01SED044A-02	11/27/2005	0.5	1.5	1.2	D, M	S,NA	243	M	S,NA	0.047	J	NA	7.4	*, M	S,NA	1.62	D, B	S,NA	113		S,NA
NB01SED044A-03	11/27/2005	1.5	2.5	1.5	D, M	S,NA	392	M	S,NA	0.086	J	NA	11.6	*, M	S,NA	3.22	D, B	S,NA	203		S,NA
NB01SED044A-04	11/27/2005	2.5	3.5	1.1	D, M	S,NA	370	M	S,NA	0.091	J	NA	8.4	*, M	S,NA	3.6	D, B	S,NA	357		S,NA
NB01SED044A-05	11/27/2005	3.5	5	1.6	D, M	S,NA	530	M	S,NA	0.11	J	NA	8.9	*, M	S,NA	5.74	D, B	S,NA	787		S,NA
NB01SED044A-06	11/27/2005	5	6.5	1.5	D, M	S,NA	690	M	S,NA	0.17	J	NA	13.5	*, M	S,NA	5.85	D, B	S,NA	1390		S,NA
NB01SED045B-01	12/6/2005	0	0.5	6.4	D	S	165		S	0.092	J	S	3		S	0.291	D	S	75.9		S
NB01SED045B-02	12/6/2005	0.5	1.5	11.0	D	S,NA	129		S,NA	0.004	J	S,NA	2.3		S,NA	0.0171		S,NA	1.71		S,NA
NB01SED045B-03	12/6/2005	1.5	2.5	0.4	G, D	S,NA	39.3		S,NA	0.016	U	S,NA	1.2		S,NA	0.000471		S,NA	0.226	G	S,NA
NB01SED045B-04	12/6/2005	2.5	3.5	0.9	U, D	S,NA	28.3		S,NA	0.017	U	S,NA	0.021	B	S,NA	3.77E-05		S,NA	0.11	G	S,NA
NB01SED045B-05	12/6/2005	3.5	5	0.9	U, D	S,NA	29.3		S,NA	0.018	U	S,NA	0.028	B	S,NA	2.35E-05		S,NA	0.0811	U	S,NA
NB01SED045B-06	12/6/2005	5	6.5	0.8	U, D	S,NA	18.2		S,NA	0.016	U	S,NA	0.02	B	S,NA	0		S,NA	0.114	U	S,NA
NB01SED046E-01	12/5/2005	0	0.5	1.5	D	S	103		S	0.042	J	S	3.3		S	0.73	B, D	S	89.3		S
NB01SED046E-02	12/5/2005	0.5	1.5	1.8	G, D, M	S,NA	324	M	S,NA	0.09	J	S,NA	3.5	M	S,NA	2.45	B, D	S,NA	156		S,NA
NB01SED046E-03	12/5/2005	1.5	3.5	0.8	D	S,NA	181		S,NA	0.058	J	S,NA	2.5		S,NA	0.847	B	S,NA	235		S,NA
NB01SED047A-01	11/17/2005	0	0.5	1.3	D, M	S	140	M	S	0.055	J	S	2.7	M	S	0.885	D, B	S	79.3		S
NB01SED047A-02	11/17/2005	0.5	1.5	1.1	G, D, M	S,NA	153	M	S,NA	0.062	J	S,NA	3.2	M	S,NA	0.904	D, B	S,NA	89.2		S,NA
NB01SED047A-03	11/17/2005	1.5	3	0.7	G, D	S,NA	122		S,NA	0.071	J	S,NA	2.8		S,NA	0.782	D, B	S,NA	63.9		S,NA
NB01SED048A-01	11/17/2005	0	0.5	1.2	G, D, M	S	97.4	M	S	0.033	J	S	2.6	M	S	0.533	D, B	S	57.6		S
NB01SED048A-02	11/17/2005	0.5	1.5	1.8	J	S,NA	93.8	M	S,NA	0.022	J	S,NA	1.9	M	S,NA	0.584	D, B	S,NA	55.1		S,NA
NB01SED049C-01	11/17/2005	0	0.5	2.0	J	S	201	M	S	0.077		S	88.1	M	S	2.69	D, B	S	139		S
NB01SED049C-01-DUP	11/17/2005	0	0.5	3.5	D, J	S	182	M	S	0.052	J	S	65.9	M	S	2.14	D, B	S	128		S
NB01SED049C-02	11/17/2005	0.5	1.5	3.1	D, M	S,NA	237	M	S,NA	0.11		S,NA	161	M	S,NA	4.45	D, B	S,NA	193		S,NA
NB01SED049C-03	11/17/2005	1.5	2.5	2.7	J	S,NA	218	M	S,NA	0.064	J	S,NA	282	M	S,NA	3.2	D, B	S,NA	175		S,NA
NB01SED049C-04	11/17/2005	2.5	3.5	2.4	D, M	S,NA	284	M	S,NA	0.09	J	S,NA	758	M	S,NA	3.5	D, B	S,NA	140		S,NA
NB01SED049C-05	11/17/2005	3.5	5	3.1	D, M	S,NA	171	M	S,NA	0.048	J	S,NA	53.6	M	S,NA	1.67	D, B	S,NA	173	J L	S,NA
NB01SED049C-06	11/17/2005	5	6.5	3.5	D, M	S,NA	207	M	S,NA	0.054	J	S,NA	75.5	M	S,NA	2.88	D, B	S,NA	228		S,NA
NB01SED050A-01	12/4/2005	0	0.5	0.8		S	41.3		S	0.015	J	S	0.36		S	0.0625	B	S	16.5		S
NB01SED050A-02	12/4/2005	0.5	1.5	0.3	U	S,NA	29.8		S,NA	0.019	U	S,NA	0.049	B	S,NA	0.000837	B	S,NA	1.32		S,NA
NB01SED050A-03	12/4/2005	1.5	2.5	0.3	U	S,NA	21.9		S,NA	0.018	U	S,NA	0.023	B	S,NA	0.000223	B	S,NA	0.137	G	S,NA
NB01SED050A-04	12/4/2005	2.5	3.5	0.3	U	S,NA	14.4		S,NA	0.015	U	S,NA	0.0087	B	S,NA	4.34E-05	B	S,NA	0.104	U	S,NA
NB01SED051D-01	12/5/2005	0	0.5	1.6	D	S	119		S	0.035	J	S	2.5		S	0.642	B, D	S	89.6		S
NB01SED051D-02	12/5/2005	0.5	1.5	1.9	G, D, M	S,NA	341	M	S,NA	0.11		S,NA	11.2	M	S,NA	2.24	B, D	S,NA	188		S,NA
NB01SED051D-03	12/5/2005	1.5	2.5	1.1	G, D, M	S,NA	356	M	S,NA	0.14	J	S,NA	7	M	S,NA	2.74	B, D	S,NA	307		S,NA
NB01SED051D-04	12/5/2005	2.5	3.5	1.0	D, M	S,NA	262	M	S,NA	0.11		S,NA	3.4	M	S,NA	1.83	D	S,NA	1070		S,NA
NB01SED051D-04-DUP	12/5/2005	2.5	3.5	1.0	D	S,NA	234		S,NA	0.1		S,NA	3.6		S,NA	1.72	D	S,NA	582		S,NA
NB01SED051D-05	12/5/2005	3.5	5	2.4	D, J, L	S,NA	609	M	S,NA	0.18		S,NA	9.7	M	S,NA	4.95	D	S,NA	947		S,NA
NB01SED051D-06	12/5/2005	5	6.5	4.1	D, M	S,NA	1000	M	S,NA	0.31	J	S,NA	14.7	M	S,NA	7.96	D	S,NA	3220		S,NA
NB01SED052B-01	11/30/2005	0	0.5	1.9	D	S	104	E, J	S	0.028	J	S	2		S	0.54		S	85.1		S
NB01SED052B-01-DUP	11/30/2005	0	0.5	2.2	D	S	117	E, J	S	0.029	J	S	2.1		S	0.556		S	126		S
NB01SED052B-02	11/30/2005	0.5	1.5	2.7	D, M	S,NA	194	E, J	S,NA	0.053	J	S,NA	5.1	M	S,NA	1.14		S,NA	127		S,NA
NB01SED052B-03	11/30/2005	1.5	3.5	2.4	D, M	S,NA	464	E, J	S,NA	0.11	J	S,NA	13	M	S,NA	3.74		S,NA	212		S,NA
NB01SED052B-04	11/30/2005	3.5	6	1.8	D, M	S,NA	356	E, J	S,NA	0.11	J	S,NA	8.1	M	S,NA	3.55		S,NA	401		S,NA
NB01SED052B-05	11/30/2005	6	8.5	2.4	D, M	S,NA	541	E, J	S,NA	0.1	U	S,NA	10.8	M	S,NA	9.09		S,NA	957		S,NA
NB01SED052B-06	11/30/2005	8.5	11	3.0	D, M	S,NA	749	E, J	S,NA	0.14	J	S,NA	16.2	M	S,NA	11.1		S,NA	2230		S,NA
NB01SED053B-01	12/4/2005	0	0.5	0.9		S	48.9		S	0.009	J	S	0.66		S	0.149	B	S	15.3		S
NB01SED053B-01-DUP	12/4/2005	0	0.5	0.9		S	58.9		S	0.008		S	0.64		S	0.1	B	S	17.8		S

Table A-1. USEPA 2005 NBSA RI/FS Phase 1 Data.

				Benzo(a)pyrene			Chromium			Total DDTs			Mercury			Total PCBs			2,3,7,8-TCDD		
SAMPLE_ID	Date	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
NB01SED053B-02	12/4/2005	0.5	1.5	0.3	U	S,NA	28.6		S,NA	0.017	U	S,NA	0.056		S,NA	0.00413	B	S,NA	0.878		S,NA
NB01SED053B-03	12/4/2005	1.5	2.5	0.3	U	S,NA	28.6		S,NA	0.017	U	S,NA	0.047	B	S,NA	0.002	B	S,NA	0.649		S,NA
NB01SED053B-04	12/4/2005	2.5	3.5	0.3	U	S,NA	31.3		S,NA	0.018	U	S,NA	0.038	B	S,NA	0.000865	B	S,NA	0.241	EMPC	S,NA
NB01SED053B-05	12/4/2005	3.5	5	0.3	U	S,NA	29.9		S,NA	0.018	U	S,NA	0.032	B	S,NA	0.00183	B	S,NA	0.267	G	S,NA
NB01SED053B-06	12/4/2005	5	6.5	0.3	U	S,NA	14.1		S,NA	0.014	U	S,NA	0.029	B	S,NA	0.000463	B	S,NA	0.117	U	S,NA
NB01SED054A-01	11/30/2005	0	0.5	0.3	G, D	S	33	E, J	S	0.019	U	S	0.27		S	0.0429		S	6.75		S
NB01SED054A-02	11/30/2005	0.5	1.5	0.8	U, D	S,NA	17.6	E, J	S,NA	0.015	U	S,NA	0.081		S,NA	0.00691		S,NA	1.21		S,NA
NB01SED054A-03	11/30/2005	1.5	2.5	0.7	U, D	S,NA	8.7	E, J	S,NA	0.013	U	S,NA	0.0069	B	S,NA	0.00043		S,NA	0.0788	U	S,NA
NB01SED054A-04	11/30/2005	2.5	3.5	0.6	U, D	S,NA	7.4	E, J	S,NA	0.012	U	S,NA	0.0089	B	S,NA	6.65E-05		S,NA	0.0687	U	S,NA
NB01SED055D-01	11/30/2005	0	0.5	1.9	D, M	S	90.7	E, J	S	0.02	J	S	1.6	M	S	0.393		S	70.6		S
NB01SED055D-02	11/30/2005	0.5	1.5	1.1	D	S,NA	83.9	E, J	S,NA	0.028		S,NA	2.1		S,NA	0.535		S,NA	91.1		S,NA
NB01SED055D-03	11/30/2005	1.5	2.5	0.6	G, D	S,NA	158	E, J	S,NA	0.076		S,NA	2		S,NA	0.801		S,NA	895		S,NA
NB01SED056B-01	11/30/2005	0	0.5	1.7	D	S	153	E, J	S	0.035	J	S	3.1		S	1.09		S	145		S
NB01SED056B-02	11/30/2005	0.5	1.5	1.2	D, M	S,NA	262	E, J	S,NA	0.078	J	S,NA	4.4	M	S,NA	2.04		S,NA	287		S,NA
NB01SED056B-03	11/30/2005	1.5	2.5	2.9	D, M	S,NA	637	E, J	S,NA	0.089	J	S,NA	13.8	M	S,NA	6.47		S,NA	1160		S,NA
NB01SED056B-04	11/30/2005	2.5	3.5	2.4	D, M	S,NA	705	E, J	S,NA	0.17	J	S,NA	10.8	M	S,NA	6.53		S,NA	1760		S,NA
NB01SED056B-05	11/30/2005	3.5	5	0.8	G, D, M	S,NA	505	E, J	S,NA	0.16	J	S,NA	5.6	M	S,NA	1.48		S,NA	718		S,NA
NB01SED056B-06	11/30/2005	5	6.5	4.4	D, M	S,NA	985	E, J	S,NA	0.4		S,NA	15.3	M	S,NA	5.29		S,NA	2290		S,NA
NB01SED057B-01	12/6/2005	0	0.5	1.7	D, M	S	129	M	S	0.027	J	S	2.4	M	S	0.573	D	S	93.1		S
NB01SED057B-02	12/6/2005	0.5	1.5	1.7	D, M	S,NA	235	M	S,NA	0.069	J	S,NA	5.9	M	S,NA	2.13	D	S,NA	289		S,NA
NB01SED057B-03	12/6/2005	1.5	2.5	1.8	D, M	S,NA	597	M	S,NA	0.072	J	S,NA	12.2	M	S,NA	5.3	D	S,NA	812		S,NA
NB01SED057B-04	12/6/2005	2.5	3.5	1.5	D, M	S,NA	566	M	S,NA	0.077	J	S,NA	11.3	M	S,NA	4.21	D	S,NA	990		S,NA
NB01SED058B-01	11/21/2005	0	0.5	1.0	D	S	182		S	0.051	J	S	2.9		S	1.69	D, B	S	149		S
NB01SED058B-02	11/21/2005	0.5	1.5	1.5	D, M	S,NA	734	M	S,NA	0.15	J	S,NA	8.6	M	S,NA	3.77	D, B	S,NA	1060		S,NA
NB01SED058B-03	11/21/2005	1.5	2.5	1.1	D	S,NA	300		S,NA	0.125		S,NA	3.3		S,NA	0.71	D, B	S,NA	235		S,NA
NB01SED058B-04	11/21/2005	2.5	4	1.0	U, D	S,NA	43.6		S,NA	0.006	U	S,NA	0.081		S,NA	0.0068	B	S,NA	1.92		S,NA
NB01SED059A-01	12/8/2005	0	0.5	0.9		S	78.7		S	0.012	J	S	1.1		S	0.246	B, D	S	106	J	S
NB01SED059A-01-DUP	12/8/2005	0	0.5	1.0		S	71.7		S	0.012	J	S	0.98		S	0.271	B	S	35.3	J	S
NB01SED059A-02	12/8/2005	0.5	1.5	0.1	G	S,NA	36.4		S,NA	0.011	U	S,NA	0.099		S,NA	0.0357	B	S,NA	4.51		S,NA
NB01SED059A-03	12/8/2005	1.5	2.5	0.3	U	S,NA	35		S,NA	0.012	U	S,NA	0.024	B	S,NA	0.00169	B	S,NA	0.341	G	S,NA
NB01SED059A-04	12/8/2005	2.5	3.5	0.3	U	S,NA	37.9		S,NA	0.013	U	S,NA	0.018	B	S,NA	0.000979	B	S,NA	0.199	G	S,NA
NB01SED060B-01	11/21/2005	0	0.5	2.9	D	S	119		S	0.015	J	S	2.2		S	0.45	D, B	S	79.3		S
NB01SED060B-02	11/21/2005	0.5	1.5	3.6	D, M	S,NA	159	M	S,NA	0.024	J	S,NA	2.4	M	S,NA	0.615	D, B	S,NA	93.9		S,NA
NB01SED060B-03	11/21/2005	1.5	2.5	2.5	D, M	S,NA	163	M	S,NA	0.028	J	S,NA	2.9	M	S,NA	0.749	D, B	S,NA	111		S,NA
NB01SED060B-04	11/21/2005	2.5	3.5	1.8	D, M	S,NA	203	M	S,NA	0.033	J	S,NA	3.9	M	S,NA	1.04	D, B	S,NA	105		S,NA
NB01SED061A-01	11/28/2005	0	0.5	2.4	D, M	S	86.1	M	S	0.015	J	NA	1.3	*, M	S	0.329	D, B	S	42.6		S
NB01SED061A-02	11/28/2005	0.5	1	1.8	J	S,NA	55.9		S,NA	0.005	J	NA	0.64	*	S,NA	0.71	D, B	S,NA	60		S,NA
NB01SED062A-01	11/21/2005	0	0.5	0.9	D	S	72.7		S	0.005	U	S	0.63		S	0.0338	D, B	S	6.66		S
NB01SED062A-02	11/21/2005	0.5	1.5	0.1	G, J	S,NA	44.7		S,NA	0.006	U	S,NA	0.22		S,NA	0.00708	B	S,NA	1.65		S,NA
NB01SED062A-03	11/21/2005	1.5	2.5	1.0	U, D, M	S,NA	38.7	M	S,NA	0.007	U	S,NA	0.019	B, M	S,NA	0.000702	B	S,NA	0.313	G	S,NA
NB01SED062A-04	11/21/2005	2.5	3.5	3.3	U, D, M	S,NA	23.8	M	S,NA	0.007	J	S,NA	0.019	B, M	S,NA	0.000573	B	S,NA	0.423	U	S,NA
NB01SED063C-01	12/8/2005	0	0.5	7.6	D	S	84.4		S	0.021	U	S	1.2		S	0.471	D	S	96.7		S
NB01SED063C-02	12/8/2005	0.5	1.5	1.9	D	S,NA	113		S,NA	0.03	J	S,NA	3.4		S,NA	0.76	B, D	S,NA	105		S,NA
NB01SED063C-03	12/8/2005	1.5	3.5	3.7	D	S,NA	261		S,NA	0.071	J	S,NA	5.4		S,NA	1.73	B, D	S,NA	240		S,NA
NB01SED063C-04	12/8/2005	3.5	4.5	5.5	J	S,NA	431		S,NA	0.11	U	S,NA	8.1		S,NA	3.49	B, D	S,NA	900		S,NA
NB01SED064B-01	11/21/2005	0	0.5	1.3	U, M	S	62.1	M	S	0.026	U	S	0.29	M	S	0.0338	B	S	3.95		S
NB01SED064B-01-DUP	11/21/2005	0	0.5	0.4	G, M	S	49.1	M	S	0.022	U	S	0.32	M	S	0.0156	B	S	1.72		S

Table A-1. USEPA 2005 NBSA RI/FS Phase 1 Data.

				Benzo(a)pyrene			Chromium			Total DDTs			Mercury			Total PCBs			2,3,7,8-TCDD		
SAMPLE_ID	Date	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
NB01SED064B-02	11/21/2005	0.5	1.5	0.3	U	S,NA	9.7		S,NA	0.005	U	S,NA	0.012	B	S,NA	0.00011	B	S,NA	0.102	U	S,NA
NB01SED064B-03	11/21/2005	1.5	2.5	0.2	U	S,NA	8.8		S,NA	0.004	U	S,NA	0.008	B	S,NA	1.83E-06	B	S,NA	0.0757	U	S,NA
NB01SED064B-04	11/21/2005	2.5	3.5	0.2	U	S,NA	8.3		S,NA	0.004	U	S,NA	0.0027	U	S,NA	0		S,NA	0.109	U	S,NA
NB01SED064B-05	11/21/2005	3.5	5	0.2	U	S,NA	8.7		S,NA	0.004	U	S,NA	0.0035	B	S,NA	0		S,NA	0.0984	U	S,NA
NB01SED064B-06	11/21/2005	5	6.5	0.2	U	S,NA	6.3		S,NA	0.004	U	S,NA	0.0024	U	S,NA	6.52E-06	B	S,NA	0.111	U	S,NA
NB01SED065A-01	11/21/2005	0	0.5	3.6	D	S	120		S	0.019	U	S	1.6	N, J, H	S	0.317	D	S	132		S
NB01SED065A-02	11/21/2005	0.5	1.5	4.0	D, M	S,NA	194		S,NA	0.009	J	S,NA	3	N, J, H	S,NA	0.0222		S,NA	5.35		S,NA
NB01SED065A-03	11/21/2005	1.5	2.5	4.7	D, M	S,NA	236	M	S,NA	0.022	U	S,NA	4.5	N, J, H	S,NA	0.00348		S,NA	1.2		S,NA
NB01SED065A-04	11/21/2005	2.5	3.5	0.6	G, D	S,NA	42.7		S,NA	0.006	J	S,NA	0.6	N, J, H	S,NA	0.00117		S,NA	0.667		S,NA
NB01SED065A-05	11/21/2005	3.5	5	0.5	G, D	S,NA	31.4		S,NA	0.003	J	S,NA	0.52	N, J, H	S,NA	0.000423		S,NA	0.247	G	S,NA
NB01SED065A-06	11/21/2005	5	6.5	0.1	G, J	S,NA	28.5		S,NA	0.016	U	S,NA	0.18	N, J, H	S,NA	6.79E-05		S,NA	0.0874	EMPC	S,NA
NB01SED066E-01	12/8/2005	0	0.5	3.7		S	75.2		S	0.051		S	3.3		S	0.256	B, D	S	40.2		S
NB01SED066E-02	12/8/2005	0.5	1.5	6.1	D	S,NA	97.1		S,NA	0.012		S,NA	2		S,NA	0.0384	B, D	S,NA	1.04		S,NA
NB01SED068B-01	10/30/2005	0	0.5	1.5	D, M	DW	123	M	DW	0.49	J	DW	3.1	M	DW	0.741	D, B	DW	38.3		DW
NB01SED068B-02	10/30/2005	0.5	1.5	0.8	G, D, M	DW	103	M	DW	0.64	J	DW	2.4	M	DW	0.769	D, B	DW	62.4		DW
NB01SED068B-03	10/30/2005	1.5	2.5	0.7	G, D, M	DW	114	M	DW	0.84	J	DW	2.4	M	DW	0.729	D, B	DW	38.4		DW
NB01SED068B-04	10/30/2005	2.5	3.5	1.1	G, D, M	DW	127	M	DW	0.23		DW	2.7	M	DW	0.715	D, B	DW	32.1		DW
NB01SED068B-05	10/30/2005	3.5	5	0.9	G, D, M	DW	133	M	DW	0.88	J	DW	3.1	M	DW	0.884	D, B	DW	44.2		DW
NB01SED068B-06	10/30/2005	5	6.5	1.4	D, M	DW	185	M	DW	0.51	J	DW	17.2	M	DW	1.14	D, B	DW	47.4		DW

NOTES:

DATA SOURCES:

1) 2005 EPA Phase I database

USE CODES

DW - Depth integrated concentration of core used in dredge areas
S - Surface concentration of core used in impact areas
DW&S - Both depth-integrated and surface concentrations are used.
NA - Sample not analyzed for this contaminant
S,NA - Sample unused, not on the surficial sediment
EXCL - Core excluded due to location

Table A-2. Historical Newark Bay Study Area Data

					Benzo(a)pyrene			Chromium			Total DDT			Mercury			Total PCBs			2,3,7,8-TCDD		
Station	Geomorphic Unit	Dredged	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
09_16	Channel	Active	0.0	3.0	1.14		S	84.50		S	0.05		S	1.40		S	0.19		S	NA		NA
09_17	Channel	Active	0.0	3.0	2.92		DW	163.50		DW	1.57		DW	3.90		DW	0.60		DW	NA		NA
13_R19	Flat	Active	0.0	15.2	5.90		EXCL	74.00		EXCL	0.09		EXCL	1.10		EXCL	1.20		EXCL	12.00		EXCL
13_R7	Flat	Active	0.0	15.2	2.00	U	EXCL	65.00		EXCL	3.09		EXCL	1.50		EXCL	0.05	U	EXCL	14.00	U	EXCL
15_20	Flat	Active	0.0	3.0	3.20		S	96.30		S	0.04		S	1.92		S	0.15		S	38.00		S
15_21	Channel	Active	0.0	3.0	2.80		S	135.00		S	0.05		S	1.90		S	0.26		S	140.00		S
15_22	Channel	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	38.00		S
15_23	Channel	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	3.60		S
15_24	Channel	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	3.30		S
15_25	Channel	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	96.80		S
15_26	Flat	Active	0.0	3.0	0.54		S	277.00		S	0.11		S	3.89		S	1.28		S	470.00		S
15_27	Flat	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	134.00		S
15_29	Port	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	113.60		S
15_30	Port	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	155.00		S
15_31	Port	Active	0.0	3.0	0.45		S	NA		NA	0.12		S	2.34		S	0.26		S	62.00		S
15_32	Port	Previously Dredged	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	45.70		DW
15_33	Port	Previously Dredged	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	132.00		S
15_34	Flat	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	50.70		S
15_35	Flat	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	42.60		S
15_36	Flat	Active	0.0	3.0	0.74		S	122.00		S	0.17		S	1.89		S	0.30		S	55.00		S
15_37	Port	Previously Dredged	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	96.40		DW
15_38	Flat	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	59.60		DW
15_39	Channel	Previously Dredged	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	268.00		DW
15_40	Channel	Previously Dredged	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	56.70		DW
15_41	Channel	Previously Dredged	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	10.60		DW
15_44	Flat	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	91.80		S
15_48	Channel	Previously Dredged	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	55.80		DW
15_49	Channel	Previously Dredged	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	48.40		DW
15_51	Flat	Active	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	47.60		S
15_54	Flat	Previously Dredged	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	59.60		S
15_55	Channel	Previously Dredged	0.0	3.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	65.00		S
15_56	Flat	Previously Dredged	0.0	3.0	0.55		S	NA		NA	0.10		S	1.79		S	0.20		S	30.00		S
15_57	Channel	Previously Dredged	0.0	3.0	0.08		S	72.85		S	0.01		S	0.66		S	0.01		S	3.60		S
16_90-260	Flat	Active	0.0	2.0	0.33		S	130.00		S	0.03		S	2.36		S	0.05		S	NA		NA
17_26A	Flat	Active	0.0	5.2	0.53	J	S	153.00	JX	S	0.04	NJ	S	5.70		S	0.17		S	110.00		S
17_26A	Flat	Active	45.7	50.9	0.50	U	S,NA	25.50	JX	S,NA	0.01	U	S,NA	0.12	U	S,NA	0.05	U	S,NA	0.15	U	S,NA
17_26A	Flat	Active	96.6	101.5	0.55	U	S,NA	23.50	JX	S,NA	0.01	U	S,NA	0.12	U	S,NA	0.05	U	S,NA	185.00		S,NA
17_37A	Flat	Active	0.0	5.2	0.50	U	S	24.80		S	0.01	U	S	0.12	U	S	0.05	U	S	0.37	U	S
17_37A	Flat	Active	45.7	50.9	0.60	U	S,NA	30.50		S,NA	0.01	U	S,NA	0.14	U	S,NA	0.06	U	S,NA	0.18	U	S,NA
17_37A	Flat	Active	96.6	101.5	2.15	U	S,NA	23.70	JX	S,NA	0.06	UJ	S,NA	1.10	UJ	S,NA	0.44	UJ	S,NA	0.25	U	S,NA
17_42A	Flat	Active	0.0	5.2	0.33	J	S	62.00		S	0.05	NJ	S	2.20		S	0.05	U	S	19.00		S&DW
17_42A	Flat	Active	45.7	50.9	0.42	U	S,NA	12.10		S,NA	0.01	U	S,NA	0.09	U	S,NA	0.04	U	S,NA	0.33	U	S&DW
17_42A	Flat	Active	96.6	101.5	0.39	U	S,NA	24.70		S,NA	0.01	U	S,NA	0.09	U	S,NA	0.04	U	S,NA	0.11	U	S&DW
17_44A	Flat	Active	0.0	5.2	1.40	J	S	148.00	JX	S	0.03	NJ	S	4.30	JX	S	0.08	U	S	25.00		S
17_44A	Flat	Active	20.4	25.3	2.90		S,NA	191.00	JX	S,NA	0.10		S,NA	7.80	JX	S,NA	0.31		S,NA	38.00		S,NA
17_44A	Flat	Active	45.7	50.9	1.60	J	S,NA	335.00	JX	S,NA	0.02	U	S,NA	13.00	JX	S,NA	0.27		S,NA	42.00		S,NA
17_47A	Channel	Previously Dredged	0.0	5.2	11.00	D	DW	71.30		DW	0.18	U	DW	3.90		DW	0.05	U	DW	28.00		DW
17_47A	Channel	Previously Dredged	20.4	25.3	0.38	U	DW	21.70		DW	0.01	U	DW	0.09	U	DW	0.04	U	DW	0.31	U	DW
17_47A	Channel	Previously Dredged	45.7	50.9	0.39	U	DW	17.20		DW	0.01	U	DW	0.09	U	DW	0.04	U	DW	0.41	U	DW
17_48A	Flat	Active	0.0	5.2	1.10	J	EXCL	84.90	JX	EXCL	0.01	U	EXCL	3.90	JX	EXCL	0.08	U	EXCL	1.05	U	EXCL
17_48A	Flat	Active	20.4	25.3	2.10		EXCL	255.00	JX	EXCL	0.32		EXCL	5.00	JX	EXCL	0.73		EXCL	39.00		EXCL
17_48A	Flat	Active	45.7	50.9	1.40	J	EXCL	383.00	JX	EXCL	0.14		EXCL	14.10	JX	EXCL	0.65		EXCL	80.00		EXCL
17_49A	Flat	Active	0.0	5.2	0.47	J	EXCL	29.30	JL	EXCL	0.05	NJ	EXCL	0.96	JX	EXCL	0.04	U	EXCL	4.40		EXCL
17_49A	Flat	Active	45.7	50.9	0.38	U	EXCL	6.10	JL	EXCL	0.01	U	EXCL	0.18	UJ	EXCL	0.04	U	EXCL	0.09	U	EXCL
17_49A	Flat	Active	96.6	101.5	0.31	J	EXCL	40.90	JL	EXCL	0.01	U	EXCL	0.29	UJ	EXCL	0.06	U	EXCL	0.48	U	EXCL
18_63A	Port	Previously Dredged	0.0	5.2	0.48		S	178.00		S	0.08		S	3.50		S	1.23		S	63.00		S
18_63A	Port	Previously Dredged	61.0	66.1	0.73		S,NA	175.00		S,NA	0.07		S,NA	2.90		S,NA	0.98		S,NA	110.00		S,NA
18_63A	Port	Previously Dredged	121.9	127.1	0.79		S,NA	214.00		S,NA	0.10	U	S,NA	8.50		S,NA	1.41		S,NA	94.00		S,NA
18_64A	Port	Active	0.0	5.2	0.70		S	178.00		S	0.05		S	3.40		S	1.08		S	50.00		S
18_64A	Port	Active	61.0	66.1	0.94		S,NA	150.00		S,NA	0.09		S,NA	3.30		S,NA	1.04		S,NA	81.00		S,NA
18_64A	Port	Active	121.9	127.1	17.50	U	S,NA	197.00		S,NA	0.05	U	S,NA	2.90		S,NA	0.78		S,NA	58.00		S,NA
18_65A	Port	Previously Dredged	0.0	5.2	23.00	U	DW	170.00		DW	0.12		DW	4.20		DW	0.97		DW	60.00		DW
18_65A	Port	Previously Dredged	61.0	66.1	0.43	U	DW	20.50		DW	0.01	U	DW	0.24		DW	0.04	U	DW	1.30		DW
18_65A	Port	Previously Dredged	121.9	127.1	0.44	U	DW	25.00		DW	0.01	U	DW	0.34		DW	0.02	U	DW	0.19	U	DW
18_66A	Port	Previously Dredged	0.0	5.2	0.44	U	DW	20.10		DW	0.01	U	DW	0.13		DW	0.04	U	DW	0.35	U	DW

Table A-2. Historical Newark Bay Study Area Data

					Benzo(a)pyrene			Chromium			Total DDT			Mercury			Total PCBs			2,3,7,8-TCDD		
Station	Geomorphic Unit	Dredged	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
18_66A	Port	Previously Dredged	61.0	66.1	0.44	U	DW	18.50		DW	0.01	U	DW	0.13		DW	0.04	U	DW	0.19	U	DW
18_66A	Port	Previously Dredged	121.9	127.1	0.44	U	DW	19.00		DW	0.01	U	DW	0.13		DW	0.04	U	DW	0.25	U	DW
18_68A	Channel	Previously Dredged	0.0	5.2	0.43		DW	157.00		DW	0.12	U	DW	3.00		DW	0.81	U	DW	45.00		DW
18_68A	Channel	Previously Dredged	61.0	66.1	0.49		DW	190.00		DW	0.24		DW	3.10		DW	0.71		DW	40.00		DW
18_68A	Channel	Previously Dredged	121.9	127.1	0.28		DW	95.50		DW	0.08	U	DW	1.40		DW	0.53	U	DW	28.00		DW
18_69A	Channel	Previously Dredged	0.0	5.2	0.75	U	DW	114.00		DW	0.06		DW	2.30		DW	0.28		DW	25.00		DW
18_69A	Channel	Previously Dredged	61.0	66.1	0.78		DW	158.00		DW	0.17		DW	3.60		DW	0.62		DW	46.00		DW
18_69A	Channel	Previously Dredged	121.9	127.1	0.32		DW	112.00		DW	0.05		DW	2.90		DW	0.18		DW	28.00		DW
18_70A	Channel	Previously Dredged	0.0	5.2	0.66		DW	159.00		DW	0.73		DW	3.40		DW	1.03		DW	88.00		DW
18_70A	Channel	Previously Dredged	61.0	66.1	0.74		DW	210.00		DW	0.32		DW	4.50		DW	1.16		DW	41.00		DW
18_70A	Channel	Previously Dredged	121.9	127.1	0.68		DW	163.00		DW	0.08		DW	2.90		DW	1.12		DW	33.00		DW
18_71A	Channel	Previously Dredged	0.0	5.2	0.47	U	DW	24.50		DW	0.01	U	DW	0.49		DW	0.05	U	DW	2.60		DW
18_71A	Channel	Previously Dredged	61.0	66.1	0.44	U	DW	22.80		DW	0.01	U	DW	0.53		DW	0.04	U	DW	0.26	U	DW
18_71A	Channel	Previously Dredged	121.9	127.1	0.44	U	DW	22.10		DW	0.01	U	DW	0.76		DW	0.04	U	DW	0.19	U	DW
18_72A	Flat	Active	0.0	5.2	0.43		S	206.00		S	0.20		S	3.50		S	0.10	U	S	49.00		S
18_72A	Flat	Active	61.0	66.1	0.44		S,NA	176.00		S,NA	0.10		S,NA	2.40		S,NA	0.25		S,NA	50.00		S,NA
18_72A	Flat	Active	121.9	127.1	0.49	U	S,NA	93.40		S,NA	0.02		S,NA	1.80		S,NA	0.13		S,NA	7.40		S,NA
20_81A	Channel	Active	0.0	5.2	0.61		S	142.00		S	0.07	U	S	2.10		S	0.48	U	S	120.00		S
20_81A	Channel	Active	55.8	61.0	1.20		S,NA	371.00		S,NA	0.16		S,NA	4.40		S,NA	0.70	U	S,NA	160.00		S,NA
20_81A	Channel	Active	116.7	121.9	0.70		S,NA	285.00		S,NA	0.34		S,NA	10.80		S,NA	1.89		S,NA	630.00		S,NA
20_82A	Flat	Active	0.0	5.2	1.10		S	177.00		S	0.09	U	S	3.30		S	0.62	U	S	79.00		S
20_82A	Flat	Active	55.8	61.0	0.26	U	S,NA	31.50		S,NA	0.01	U	S,NA	0.49		S,NA	0.05	U	S,NA	0.84		S,NA
20_82A	Flat	Active	116.7	121.9	0.52		S,NA	24.90		S,NA	0.01	U	S,NA	0.08	U	S,NA	0.06	U	S,NA	0.19	U	S,NA
20_84B	Flat	Active	0.0	5.2	0.83		S	68.70		S	0.19		S	2.50		S	1.05		S	4.30		S
20_84B	Flat	Active	55.8	61.0	0.58		S,NA	53.80		S,NA	0.12		S,NA	0.52		S,NA	0.04	U	S,NA	1.00		S,NA
20_84B	Flat	Active	116.7	121.9	3.60		S,NA	124.00		S,NA	0.21		S,NA	4.10		S,NA	1.90		S,NA	4.40		S,NA
20_85A	Port	Previously Dredged	0.0	5.2	2.10		S	397.00		S	0.26		S	2.70		S	4.64		S	180.00		S
20_85A	Port	Previously Dredged	55.8	61.0	4.90		S,NA	517.00		S,NA	0.37	U	S,NA	4.50		S,NA	14.14		S,NA	310.00		S,NA
20_85A	Port	Previously Dredged	116.7	121.9	6.10		S,NA	500.00		S,NA	0.30	U	S,NA	2.00		S,NA	9.35		S,NA	550.00		S,NA
20_86A	Port	Previously Dredged	0.0	5.2	0.56		DW	179.00		DW	0.08		DW	1.40		DW	1.41		DW	32.00		DW
20_86A	Port	Previously Dredged	55.8	61.0	0.78		DW	159.00		DW	0.12		DW	1.20		DW	2.21		DW	26.00		DW
20_86A	Port	Previously Dredged	116.7	121.9	0.42		DW	157.00		DW	0.11		DW	1.50		DW	1.89		DW	21.00		DW
20_87A	Flat	Active	0.0	5.2	2.10		S	367.00		S	0.23		S	6.70		S	2.82		S	1.80		S
20_87A	Flat	Active	55.8	61.0	1.20		S,NA	219.00		S,NA	0.01	U	S,NA	3.40		S,NA	0.63		S,NA	0.55		S,NA
20_87A	Flat	Active	116.7	121.9	0.46		S,NA	19.20		S,NA	0.01	U	S,NA	0.53		S,NA	0.04	U	S,NA	130.00		S,NA
20_88A	Flat	Active	0.0	5.2	0.25		S	37.70		S	0.02	U	S	0.61		S	0.13		S	5.50		S
20_88A	Flat	Active	55.8	61.0	0.58		S,NA	75.20		S,NA	0.10	U	S,NA	2.00		S,NA	0.49	U	S,NA	5.00		S,NA
20_88A	Flat	Active	116.7	121.9	0.41		S,NA	24.80		S,NA	0.01	U	S,NA	0.63		S,NA	0.04	U	S,NA	0.12	U	S,NA
21_98A	Flat	Active	0.0	5.2	1.50	U	S	25.60		S	0.03		S	0.06	U	S	0.73		S	19.00		S
21_98A	Flat	Active	86.3	91.4	0.25		S,NA	30.80		S,NA	0.01	U	S,NA	0.08	U	S,NA	0.06	U	S,NA	0.38	U	S,NA
21_98A	Flat	Active	137.2	142.3	0.41		S,NA	17.60		S,NA	0.01	U	S,NA	0.06	U	S,NA	0.05	U	S,NA	0.16	U	S,NA
21_98A	Flat	Active	177.7	182.9	0.25	U	S,NA	18.10		S,NA	0.01	U	S,NA	0.06	U	S,NA	0.05	U	S,NA	0.09	U	S,NA
26_NB021	Flat	Active	0.0	2.0	0.81		S	50.70		S	0.04		S	1.28		S	0.18		S	NA		NA
26_NB025	Flat	Active	0.0	2.0	1.20		S	165.90		S	0.04		S	2.54		S	0.30		S	NA		NA
26_NB027	Flat	Active	0.0	2.0	2.00		S	155.00		S	0.14		S	2.87		S	0.45		S	NA		NA
26_NB036	Flat	Active	0.0	2.0	0.93		S	180.60		S	0.32		S	2.94		S	0.99		S	NA		NA
26_NB039	Flat	Active	0.0	2.0	0.70		S	230.00		S	0.05		S	3.91		S	0.46		S	NA		NA
26_NB044	Flat	Active	0.0	2.0	0.57		S	153.90		S	0.14		S	3.80		S	0.52		S	NA		NA
26_NB045	Flat	Active	0.0	2.0	0.49		S	109.30		S	0.03		S	1.43		S	0.25		S	NA		NA
26_NB047	Channel	Active	0.0	2.0	0.63		DW	195.40		DW	0.89		DW	5.36		DW	0.69		DW	NA		NA
26_NB052	Flat	Active	0.0	2.0	0.28		S&DW	61.70		S&DW	0.02		S&DW	0.63		S&DW	0.17		S&DW	NA		NA
26_NB053	Flat	Previously Dredged	0.0	2.0	0.59		S	124.30		S	0.04		S	1.80		S	0.32		S	NA		NA
26_NB065	Flat	Active	0.0	2.0	2.00		S	45.10		S	0.01		S	0.41		S	0.16		S	NA		NA
26_NB066	Flat	Active	0.0	2.0	1.10		S	196.90		S	0.10		S	3.48		S	0.76		S	NA		NA
27_NB102	Port	Previously Dredged	0.0	2.0	0.78		DW	244.00		DW	0.09		DW	2.41		DW	1.44		DW	NA		NA
27_NB103	Flat	Active	0.0	2.0	0.72		S	149.00		S	0.10		S	2.35		S	0.38		S	NA		NA
27_NB104	Flat	Active	0.0	2.0	0.07		S	26.50		S	0.00		S	0.17		S	0.02		S	NA		NA
27_NB105	Channel	Active	0.0	2.0	0.38		S	132.00		S	0.05		S	2.17		S	0.28		S	NA		NA
27_NB106	Flat	Active	0.0	2.0	0.80		S	177.00		S	0.08		S	3.42		S	0.68		S	NA		NA
27_NB110	Flat	Active	0.0	2.0	0.14		S	49.60		S	0.01		S	0.52		S	0.08		S	NA		NA
27_NB112	Port	Active	0.0	2.0	0.48		S	162.00		S	0.08		S	2.75		S	0.31		S	NA		NA
27_NB113	Flat	Active	0.0	2.0	0.58		S	116.00		S	0.12		S	2.15		S	0.28		S	NA		NA
27_NB115	Flat	Active	0.0	2.0	0.55		S	128.00		S	0.05		S	1.73		S	0.30		S	17.98		S
34_RCHA-NE	Port	Previously Dredged	0.0	15.2	0.74		S	95.30		S	0.02	U	S	3.40		S	0.20		S	80.00		S
34_RCHA-NE	Port	Previously Dredged	15.2	100.6	0.36	U	S,NA	261.00		S,NA	0.06		S,NA	10.85		S,NA	0.41		S,NA	165.00		S,NA

Table A-2. Historical Newark Bay Study Area Data

					Benzo(a)pyrene			Chromium			Total DDT			Mercury			Total PCBs			2,3,7,8-TCDD		
Station	Geomorphic Unit	Dredged	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
34_RCHA-NW2	Port	Previously Dredged	0.0	15.2	0.41	U	S	128.00		S	0.01	U	S	5.30		S	0.10		S	90.00		S
34_RCHA-NW2	Port	Previously Dredged	15.2	54.9	0.36	U	S,NA	214.00		S,NA	0.03	U	S,NA	12.40		S,NA	0.21		S,NA	190.00		S,NA
34_RCHA-NW2	Port	Previously Dredged	54.9	97.5	0.57		S,NA	958.00		S,NA	0.31		S,NA	9.00		S,NA	0.85		S,NA	6200.00		S,NA
34_RCHA-SE	Port	Previously Dredged	0.0	15.2	0.40	U	S	25.60		S	0.04		S	5.40		S	0.23		S	120.00		S
34_RCHA-SE	Port	Previously Dredged	15.2	67.1	0.67		S,NA	221.00		S,NA	0.04	U	S,NA	5.60		S,NA	0.30		S,NA	130.00		S,NA
34_RCHA-SW	Port	Previously Dredged	0.0	15.2	0.47	U	S	105.00		S	0.01	U	S	4.10		S	0.10		S	80.00		S
34_RCHA-SW	Port	Previously Dredged	15.2	85.3	0.38		S,NA	368.00		S,NA	0.04		S,NA	15.70		S,NA	0.26		S,NA	320.00		S,NA
35_BCD1	Channel	Previously Dredged	0.0	15.2	0.69		DW	144.00		DW	0.15		DW	3.60		DW	0.84		DW	60.00		DW
35_BCD1	Channel	Previously Dredged	15.2	106.7	0.57		DW	182.00		DW	0.05	U	DW	4.60		DW	0.94		DW	110.00		DW
35_BCD2	Channel	Previously Dredged	0.0	15.2	0.61		DW	100.00		DW	0.05		DW	2.10		DW	0.73		DW	40.00		DW
35_BCD2	Channel	Previously Dredged	15.2	143.3	0.45		DW	113.00		DW	0.02	U	DW	3.50		DW	0.69		DW	60.00		DW
35_BCD3	Port	Previously Dredged	0.0	15.2	0.67		DW	131.00		DW	0.03	U	DW	2.40		DW	0.91		DW	50.00		DW
35_BCD3	Port	Previously Dredged	15.2	73.2	0.39		DW	132.00		DW	0.02	U	DW	2.90		DW	0.62		DW	70.00		DW
35_BCD4	Port	Previously Dredged	0.0	15.2	0.97		DW	183.00		DW	0.06	U	DW	1.90		DW	1.28		DW	40.00		DW
35_BCD4	Port	Previously Dredged	15.2	152.4	1.10		DW	233.00		DW	0.06		DW	3.20		DW	2.08		DW	70.00		DW
35_BCD5	Port	Previously Dredged	0.0	15.2	0.68		DW	95.40		DW	0.03		DW	1.80		DW	0.60		DW	40.00		DW
35_BCD5	Port	Previously Dredged	15.2	76.2	0.48		DW	127.00		DW	0.02		DW	2.70		DW	0.74		DW	70.00		DW
35_BCD6	Port	Previously Dredged	0.0	15.2	0.40		S	137.00		S	NA		NA	2.20		S	1.00		S	NA		NA
35_BCD6	Port	Previously Dredged	15.2	118.9	0.29		S,NA	117.00		S,NA	NA		NA	2.60		S,NA	1.00		S,NA	NA		NA
37_RA-01	Port	Previously Dredged	0.0	15.2	0.54		DW	71.10		DW	0.02	U	DW	1.19		DW	0.41		DW	40.00		DW
37_RA-01	Port	Previously Dredged	15.2	61.0	0.87		DW	563.00		DW	0.10	U	DW	4.55		DW	9.18		DW	910.00		DW
37_RA-02	Port	Previously Dredged	0.0	21.3	0.52		DW	143.00		DW	0.03	U	DW	3.60		DW	1.13		DW	100.00		DW
37_RA-03	Port	Previously Dredged	0.0	15.2	0.79		DW	105.00		DW	0.08		DW	2.16		DW	0.56		DW	30.00		DW
37_RA-03	Port	Previously Dredged	15.2	70.1	0.99		DW	141.00		DW	0.06		DW	2.90		DW	0.76		DW	70.00		DW
38_NB99RASD-1	Port	Previously Dredged	0.0	76.2	4.20		S	149.00		S	1.90		S	5.00		S	1.41		S	70.00		S
38_NB99RASD-3	Port	Previously Dredged	0.0	91.4	1.40		S	164.00		S	0.06	U	S	9.00		S	0.88		S	190.00		S
38_NB99RASD-4	Port	Previously Dredged	0.0	137.2	1.20		S	186.00		S	0.05		S	6.40		S	1.19		S	130.00		S
38_NB99RBSD-1	Port	Previously Dredged	0.0	76.2	0.57		S	129.50		S	0.05	U	S	3.30		S	0.77		S	90.00		S
38_NB99RBSD-2	Port	Previously Dredged	0.0	61.0	0.74		S	93.00		S	0.01	U	S	1.71		S	1.43		S	50.00		S
38_NB99RCSD-1	Port	Previously Dredged	0.0	61.0	0.64		DW	109.00		DW	0.01	U	DW	1.03		DW	0.93		DW	20.00		DW
38_NB99RCSD-2	Port	Previously Dredged	0.0	121.9	0.68		DW	137.00		DW	0.04		DW	3.20		DW	0.95		DW	70.00		DW
38_NB99RDSD-1	Channel	Previously Dredged	0.0	85.3	0.74		DW	142.00		DW	0.14		DW	3.30		DW	0.76		DW	70.00		DW
38_NB99RDSD-2	Channel	Previously Dredged	0.0	76.2	1.00		DW	116.00		DW	0.14		DW	2.50		DW	0.60		DW	50.00		DW
38_NB99RDSD-3	Channel	Previously Dredged	0.0	76.2	1.10		DW	155.00		DW	0.12	U	DW	3.90		DW	0.99		DW	80.00		DW
39_PRP-99-01	Channel	Active	0.0	30.5	0.05		S	37.10		S	0.00		S	0.02		S	0.05		S	0.35	U	S
39_PRP-99-02	Flat	Active	0.0	30.5	0.73		S	277.50		S	0.23		S	19.85		S	2.57		S	155.00		S
39_PRP-99-02	Flat	Active	30.5	91.4	0.77		S,NA	267.50		S,NA	0.19		S,NA	12.00		S,NA	1.87		S,NA	445.00		S,NA
39_PRP-99-02	Flat	Active	91.4	152.4	1.25		S,NA	441.50		S,NA	0.57		S,NA	24.10		S,NA	4.49		S,NA	390.00		S,NA
39_PRP9905SD1	EXCL	Active	0.0	30.5	0.00		EXCL	24.30		EXCL	0.02	U	EXCL	0.37		EXCL	0.26		EXCL	50.00		EXCL
39_PRP9906SD1	EXCL	Active	0.0	30.5	2.00	B	EXCL	88.00		EXCL	NA		EXCL	1.56		EXCL	1.32		EXCL	50.00		EXCL
KVK01	Flat	Active	0.0	10.0	0.79		S	174.00		S	0.08		S	NA		NA	1.09		S	120.00		S
NB201	Channel	Previously Dredged	0.0	15.0	0.26		DW	NA		NA	NA		NA	NA		NA	NA		NA	37.89		DW
NB202	Channel	Previously Dredged	0.0	15.0	0.60	NJ	DW	NA		NA	NA		NA	NA		NA	NA		NA	17.46		DW
NB206	Port	Previously Dredged	0.0	15.0	0.16		DW	NA		NA	NA		NA	NA		NA	NA		NA	17.34		DW
NB207	Flat	Active	0.0	15.0	3.00		S	NA		NA	NA		NA	NA		NA	NA		NA	6.07		S
NB211	Channel	Active	0.0	15.0	1.10		S&DW	NA		NA	NA		NA	NA		NA	NA		NA	29.40		S&DW
NB212	Channel	Previously Dredged	0.0	15.0	0.90		DW	NA		NA	NA		NA	NA		NA	NA		NA	50.43		DW
NB213	Flat	Active	0.0	15.0	0.20		S	NA		NA	NA		NA	NA		NA	NA		NA	118.99		NA
NB217	Flat	Active	0.0	15.0	3.00		S	NA		NA	NA		NA	NA		NA	NA		NA	65.93		S
NB218	Flat	Active	0.0	15.0	1.20		S	NA		NA	NA		NA	NA		NA	NA		NA	3.35		S
NB222	Flat	Active	0.0	15.0	1.10		S	NA		NA	NA		NA	NA		NA	NA		NA	92.98		S
NB223	Flat	Active	0.0	15.0	1.40		S	NA		NA	NA		NA	NA		NA	NA		NA	109.29		S
NB226	Flat	Active	0.0	15.0	1.50		S	NA		NA	NA		NA	NA		NA	NA		NA	40.05		S
NB227	Channel	Active	0.0	15.0	3.90		S	NA		NA	NA		NA	NA		NA	NA		NA	75.11		S
NB228	Channel	Active	0.0	15.0	0.45		S	NA		NA	NA		NA	NA		NA	NA		NA	0.91		S
NB231	Flat	Active	0.0	15.0	NA		NA	NA		NA	NA		NA	NA		NA	NA		NA	133.14		S
NB901	Flat	Active	0.0	10.0	1.43		S	128.00		S	0.03	B	S	NA		NA	NA		NA	130.00	B	S
NB901	Flat	Active	17.0	43.0	1.80		S,NA	241.00		S,NA	0.10	B	S,NA	NA		NA	NA		NA	260.00	B	S,NA
NB901	Flat	Active	43.0	69.0	1.90		S,NA	352.00		S,NA	0.16		S,NA	NA		NA	NA		NA	342.00	B	S,NA
NB901	Flat	Active	69.0	94.0	1.70		S,NA	265.00		S,NA	0.10	B	S,NA	NA		NA	NA		NA	396.00	B	S,NA
NB901	Flat	Active	94.0	119.0	1.70		S,NA	271.00		S,NA	0.10	B	S,NA	NA		NA	NA		NA	474.00	B	S,NA
NB901	Flat	Active	119.0	145.0	1.80		S,NA	410.00		S,NA	0.13		S,NA	NA		NA	NA		NA	541.00	B	S,NA
NB901	Flat	Active	145.0	170.0	2.40		S,NA	538.00		S,NA	0.17		S,NA	NA		NA	NA		NA	1170.00	B	S,NA
NB901	Flat	Active	170.0	196.0	1.50		S,NA	334.00		S,NA	0.19		S,NA	NA		NA	NA		NA	1210.00		S,NA
NB901	Flat	Active	196.0	229.0	1.50		S,NA	357.00		S,NA	0.18	D	S,NA	NA		NA	NA		NA	1610.00		S,NA

Table A-2. Historical Newark Bay Study Area Data

					Benzo(a)pyrene			Chromium			Total DDT			Mercury			Total PCBs			2,3,7,8-TCDD		
Station	Geomorphic Unit	Dredged	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
NBA06	Flat	Active	0.0	10.0	0.62	B	S	122.00		S	0.06		S	NA		NA	NA		NA	270.00		S
NWB01	Flat	Active	0.0	6.0	0.70		S	77.60		S	0.04		S	NA		NA	0.40		S	25.50		S
NWB01	Flat	Active	6.0	12.0	0.69		S,NA	116.00		S,NA	0.03		S,NA	NA		NA	0.39		S,NA	37.00		S,NA
NWB01	Flat	Active	12.0	24.0	1.50		S,NA	84.60		S,NA	0.05		S,NA	NA		NA	0.65		S,NA	57.00		S,NA
NWB01	Flat	Active	24.0	36.0	0.61		S,NA	98.10		S,NA	0.04		S,NA	NA		NA	0.59		S,NA	67.00		S,NA
NWB01	Flat	Active	36.0	48.0	0.07	J	S,NA	30.80		S,NA	0.00	U	S,NA	NA		NA	0.04		S,NA	3.30		S,NA
NWB01	Flat	Active	48.0	84.0	0.01	B	S,NA	14.60		S,NA	0.00	U	S,NA	NA		NA	0.00		S,NA	0.14	U	S,NA
NWB01A	Flat	Active	0.0	6.0	0.82	B	S	96.80		S	0.04	B	S	NA		NA	0.58		S	74.00		S
NWB01A	Flat	Active	6.0	12.0	0.91	B	S,NA	90.90		S,NA	0.03	B	S,NA	NA		NA	1.09		S,NA	68.00		S,NA
NWB01A	Flat	Active	12.0	22.0	0.78	B	S,NA	85.40		S,NA	0.03	B	S,NA	NA		NA	0.64		S,NA	60.00		S,NA
NWB01A	Flat	Active	22.0	52.0	0.78	B	S,NA	106.00		S,NA	0.03	B	S,NA	NA		NA	0.94		S,NA	76.00		S,NA
NWB01A	Flat	Active	52.0	72.0	0.23		S,NA	29.00		S,NA	0.01	B	S,NA	NA		NA	0.58		S,NA	43.00		S,NA
1NB	Channel	Active	Composite		1.34		DW	71.23		DW	0.01		DW	0.92		DW	0.23		DW	8.96		DW
2NB	Channel	Active	Composite		0.35		DW	99.05		DW	0.01		DW	1.27		DW	0.23		DW	12.64		DW
3NB	Channel	Active	Composite		0.48		DW	88.20		DW	0.05		DW	0.95		DW	0.33		DW	16.54		DW
4NB	Channel	Active	Composite		0.53		DW	91.68		DW	0.24		DW	1.02		DW	0.28		DW	14.10		DW
5NB	Channel	Active	Composite		0.61		DW	157.72		DW	0.07		DW	1.93		DW	0.57		DW	157.29		DW
6NB	Channel	Active	Composite		0.21		DW	72.67		DW	0.01		DW	0.58		DW	0.29		DW	15.21		DW
7NB	Channel	Active	Composite		0.33		DW	86.33		DW	0.01		DW	0.87		DW	0.26		DW	19.63		DW
8NB	Channel	Active	Composite		0.78		DW	116.59		DW	0.19		DW	1.70		DW	0.28		DW	28.90		DW
9NB	Channel	Active	Composite		0.05		DW	38.85		DW	0.00		DW	0.24		DW	0.19		DW	3.83		DW
10NB	Channel	Active	Composite		0.13		DW	53.39		DW	0.01		DW	0.29		DW	0.22		DW	3.86		DW
11KVK2	Channel	Previously Dredged	Composite		1.60		EXCL	124.00		EXCL	0.08		EXCL	4.20		EXCL	0.71		EXCL	37.28		EXCL
12KVK2	Channel	Previously Dredged	Composite		1.70		EXCL	50.10		EXCL	0.00		EXCL	2.40		EXCL	0.14		EXCL	0.14		EXCL
13KVK2	Channel	Previously Dredged	Composite		0.86		EXCL	243.00		EXCL	0.04		EXCL	5.30		EXCL	2.76		EXCL	188.65		EXCL
14KVK2	Channel	Previously Dredged	Composite		2.50		EXCL	119.00		EXCL	0.01		EXCL	3.60		EXCL	1.02		EXCL	66.38		EXCL
15KVK2	Channel	Previously Dredged	Composite		1.80		EXCL	242.00		EXCL	0.02		EXCL	6.20		EXCL	1.68		EXCL	109.15		EXCL
16KVK2	Channel	Previously Dredged	Composite		0.41		DW	60.80		DW	0.01		DW	1.10		DW	0.60		DW	14.38		DW
17KVK2	Channel	Previously Dredged	Composite		0.48		EXCL	58.30		EXCL	0.02		EXCL	1.00		EXCL	0.74		EXCL	10.24		EXCL
18KVK2	Channel	Previously Dredged	Composite		0.54		EXCL	50.40		EXCL	0.01		EXCL	0.82		EXCL	0.45		EXCL	13.37		EXCL
19KVK2	Channel	Previously Dredged	Composite		0.46		EXCL	48.90		EXCL	0.01		EXCL	0.62		EXCL	0.39		EXCL	6.39		EXCL
20AK23	Channel	Previously Dredged	Composite		1.04		DW	237.18		DW	0.06		DW	5.57		DW	2.65		DW	52.32		DW
21AK23	Channel	Previously Dredged	Composite		0.72		DW	157.77		DW	0.08		DW	2.77		DW	1.62		DW	33.44		DW
22AK23	Channel	Previously Dredged	Composite		0.54		DW	143.00		DW	0.18		DW	3.69		DW	1.39		DW	33.00		DW
23AK23	Channel	Previously Dredged	Composite		1.26		DW	244.06		DW	0.93		DW	6.87		DW	2.26		DW	49.40		DW
24AK23	Channel	Previously Dredged	Composite		1.13		DW	235.02		DW	0.27		DW	7.21		DW	1.67		DW	52.73		DW
25AK23	Channel	Previously Dredged	Composite		1.80		DW	314.35		DW	1.37		DW	8.90		DW	2.76		DW	78.11		DW
26AK23	Channel	Previously Dredged	Composite		1.45		DW	304.33		DW	1.09		DW	10.12		DW	3.98		DW	82.98		DW
27AK23	Channel	Previously Dredged	Composite		1.35		DW	358.90		DW	0.56		DW	11.58		DW	1.63		DW	169.73		DW
28AK23	Channel	Previously Dredged	Composite		1.48		DW	195.47		DW	3.25		DW	5.45		DW	1.49		DW	34.31		DW
29AK23	Channel	Previously Dredged	Composite		0.92		DW	139.44		DW	0.35		DW	3.06		DW	0.99		DW	45.54		DW
30AK23	Channel	Previously Dredged	Composite		1.47		DW	154.87		DW	0.50		DW	3.69		DW	1.84		DW	23.91		DW
31AK23	Channel	Previously Dredged	Composite		2.11		DW	308.78		DW	1.97		DW	12.50		DW	4.31		DW	73.72		DW
32AK23	Channel	Previously Dredged	Composite		0.96		DW	113.07		DW	1.22		DW	2.25		DW	0.91		DW	13.98		DW
33AK23	Channel	Previously Dredged	Composite		1.96		DW	215.96		DW	1.00		DW	7.12		DW	1.39		DW	60.23		DW
34AK23	Channel	Previously Dredged	Composite		3.53		DW	191.33		DW	1.15		DW	6.26		DW	0.99		DW	22.77		DW
35AK23	Channel	Previously Dredged	Composite		1.91		DW	264.24		DW	1.64		DW	8.14		DW	1.43		DW	59.62		DW
36AK23	Channel	Previously Dredged	Composite		1.43		DW	196.48		DW	0.77		DW	6.03		DW	1.04		DW	48.23		DW
37AK23	Channel	Previously Dredged	Composite		6.93		DW	109.50		DW	0.05		DW	1.38		DW	1.09		DW	10.45		DW
38AK23	Channel	Previously Dredged	Composite		9.88		DW	227.57		DW	0.08		DW	7.55		DW	1.68		DW	32.99		DW
39AK23	Channel	Previously Dredged	Composite		2.58		DW	209.09		DW	0.57		DW	6.53		DW	1.26		DW	29.61		DW
Composite A	Channel	Active	Composite		0.36		EXCL	98.70		EXCL	0.01	U	EXCL	2.20		EXCL	1.01		EXCL	51.80		EXCL
Composite B	Channel	Active	Composite		0.29		EXCL	90.70		EXCL	0.01	U	EXCL	1.75		EXCL	0.82		EXCL	56.00		EXCL
Composite C	Channel	Active	Composite		0.67		EXCL	202.00		EXCL	0.01	U	EXCL	2.23		EXCL	0.52		EXCL	42.00		EXCL
Composite D	Channel	Active	Composite		0.35		DW	76.00		DW	0.01	U	DW	1.48		DW	1.01		DW	24.40		DW
Composite E	Channel	Active	Composite		0.39		EXCL	92.90		EXCL	0.01	U	EXCL	1.94		EXCL	1.11		EXCL	48.00		EXCL
Composite F	Channel	Active	Composite		0.61		EXCL	93.00		EXCL	0.01	U	EXCL	4.22		EXCL	0.50		EXCL	91.10		EXCL
Composite F	Channel	Active	Composite		0.82		EXCL	98.40		EXCL	0.01	U	EXCL	3.99		EXCL	0.50		EXCL	90.60		EXCL
Composite G	Channel	Active	Composite		0.44		EXCL	82.40		EXCL	0.01	U	EXCL	1.35		EXCL	0.49		EXCL	88.00	Q	EXCL
Composite G	Channel	Active	Composite		0.50		EXCL	83.40		EXCL	0.01	U	EXCL	2.24		EXCL	0.53		EXCL	60.10	Q	EXCL
Composite H	Channel	Active	Composite		0.32		EXCL	59.50		EXCL	0.01	U	EXCL	1.57		EXCL	0.34		EXCL	76.70	Q	EXCL
Composite I	Channel	Active	Composite		0.46		EXCL	82.50		EXCL	0.01	U	EXCL	1.98		EXCL	0.52		EXCL	66.80	Q	EXCL
Composite J	Channel	Active	Composite		0.49		EXCL	78.10		EXCL	0.01	U	EXCL	1.63		EXCL	0.42		EXCL	63.80	Q	EXCL
Composite K	Channel	Active	Composite		0.53		EXCL	76.30		EXCL	0.01	U	EXCL	1.10		EXCL	0.43		EXCL	68.60	Q	EXCL
Composite K	Channel	Active	Composite		0.62		EXCL	76.50		EXCL	0.01	U	EXCL	2.12		EXCL	0.45		EXCL	80.00	Q	EXCL

Table A-2. Historical Newark Bay Study Area Data

					Benzo(a)pyrene			Chromium			Total DDT			Mercury			Total PCBs			2,3,7,8-TCDD		
Station	Geomorphic Unit	Dredged	Start Depth (cm)	End Depth (cm)	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	mg/kg	Qualifier	Use	ng/kg	Qualifier	Use
Composite L	Channel	Active	Composite		0.34		EXCL	93.00		EXCL	0.01	U	EXCL	1.92		EXCL	0.50		EXCL	13.90		EXCL
Composite M	Channel	Active	Composite		0.16		EXCL	102.00		EXCL	0.01	U	EXCL	1.51		EXCL	0.52		EXCL	71.20		EXCL
Composite N	Channel	Active	Composite		0.50		EXCL	69.90		EXCL	0.01	U	EXCL	1.72		EXCL	0.92		EXCL	68.40		EXCL
Composite N	Channel	Active	Composite		0.48		EXCL	79.20		EXCL	0.01	U	EXCL	1.56		EXCL	0.42		EXCL	52.00		EXCL
Composite O	Channel	Active	Composite		0.54		EXCL	103.00		EXCL	0.01	U	EXCL	2.42		EXCL	0.48		EXCL	119.00		EXCL
Composite O	Channel	Active	Composite		0.14		EXCL	112.00		EXCL	0.01	U	EXCL	2.28		EXCL	0.58		EXCL	80.00		EXCL
Composite P	Channel	Active	Composite		0.54		EXCL	93.10		EXCL	0.01	U	EXCL	1.92		EXCL	1.35		EXCL	69.00		EXCL

NOTES:

DATA SOURCES:

1) NOAA Query Manager Database
2) REMAP 1998/99 Database
3) Contaminant Assessment and Reduction Project (CARP) Database
4) USACE 2003 - 2004 Composite Core Database
5) Port Newark O&M Database

USE CODES

DW - Depth integrated concentration of core used in dredge areas
S - Surface concentration of core used in impact areas
DW&S - Both depth weighted and surface concentrations are used.
NA - Sample not analyzed for this contaminant
S,NA - Sample unused, not on the surficial sediment
EXCL - Core excluded due to location

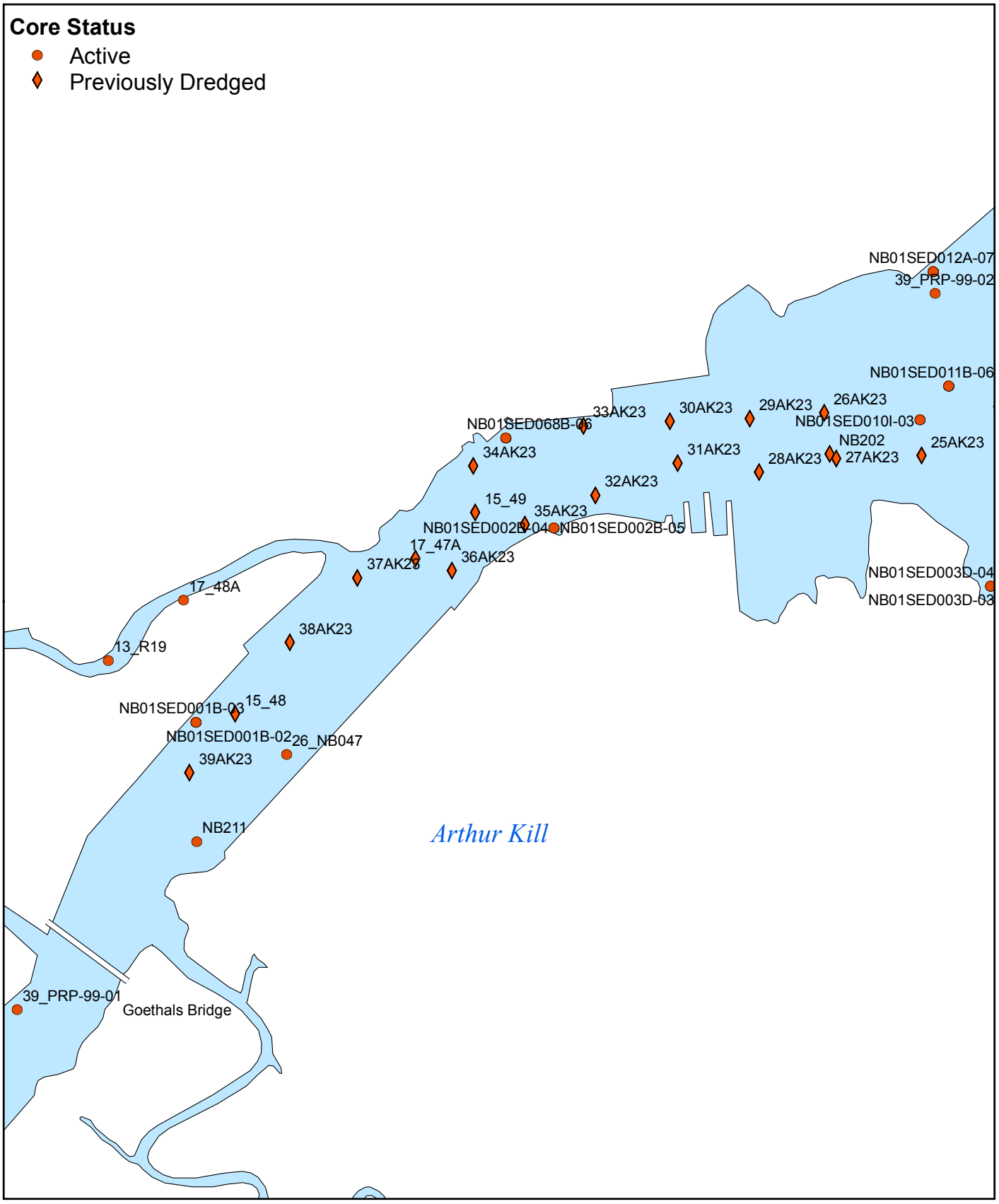


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Figure A-3a
Newark Bay Sediment
Sampling Location
Arthur Kill

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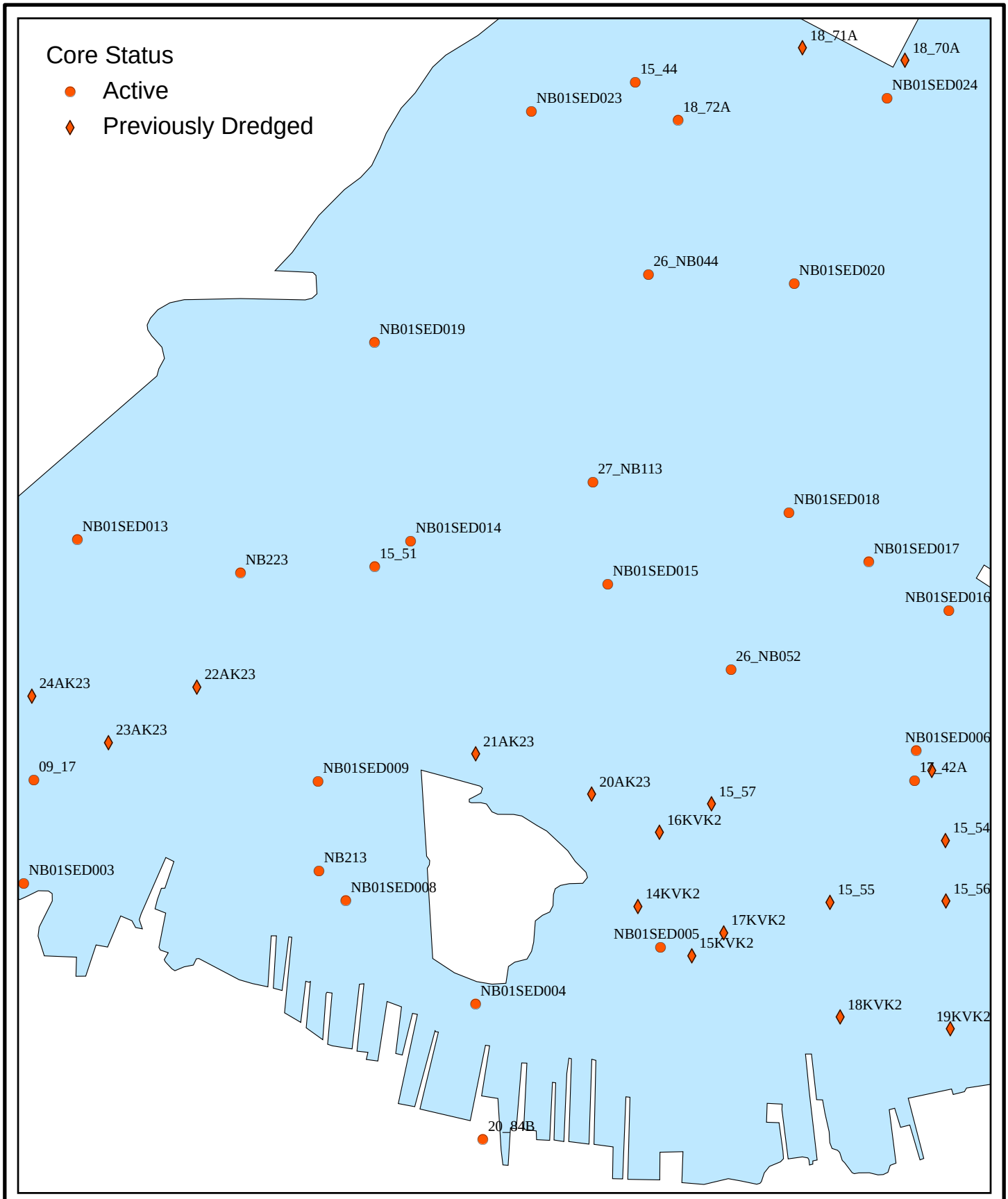
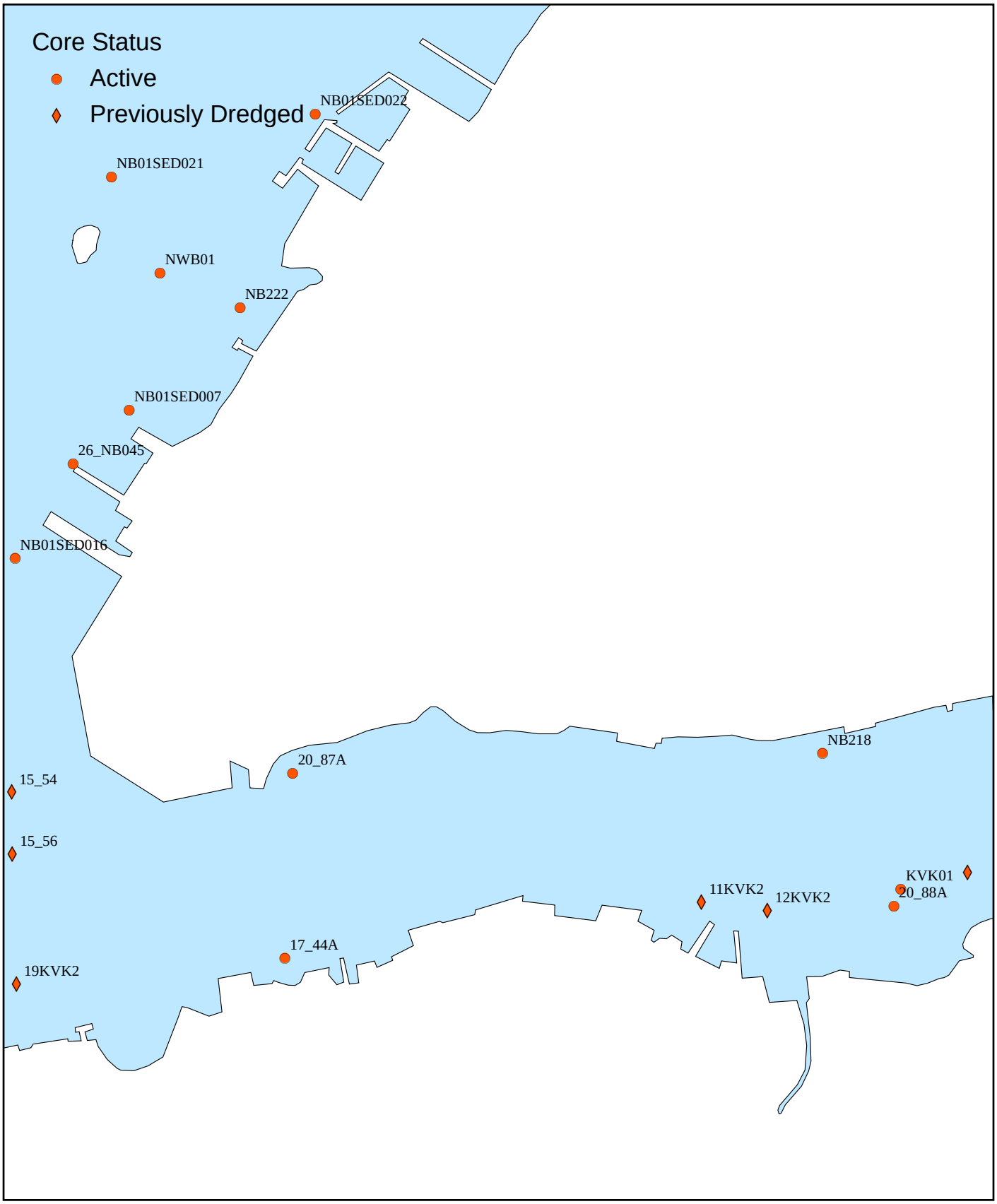


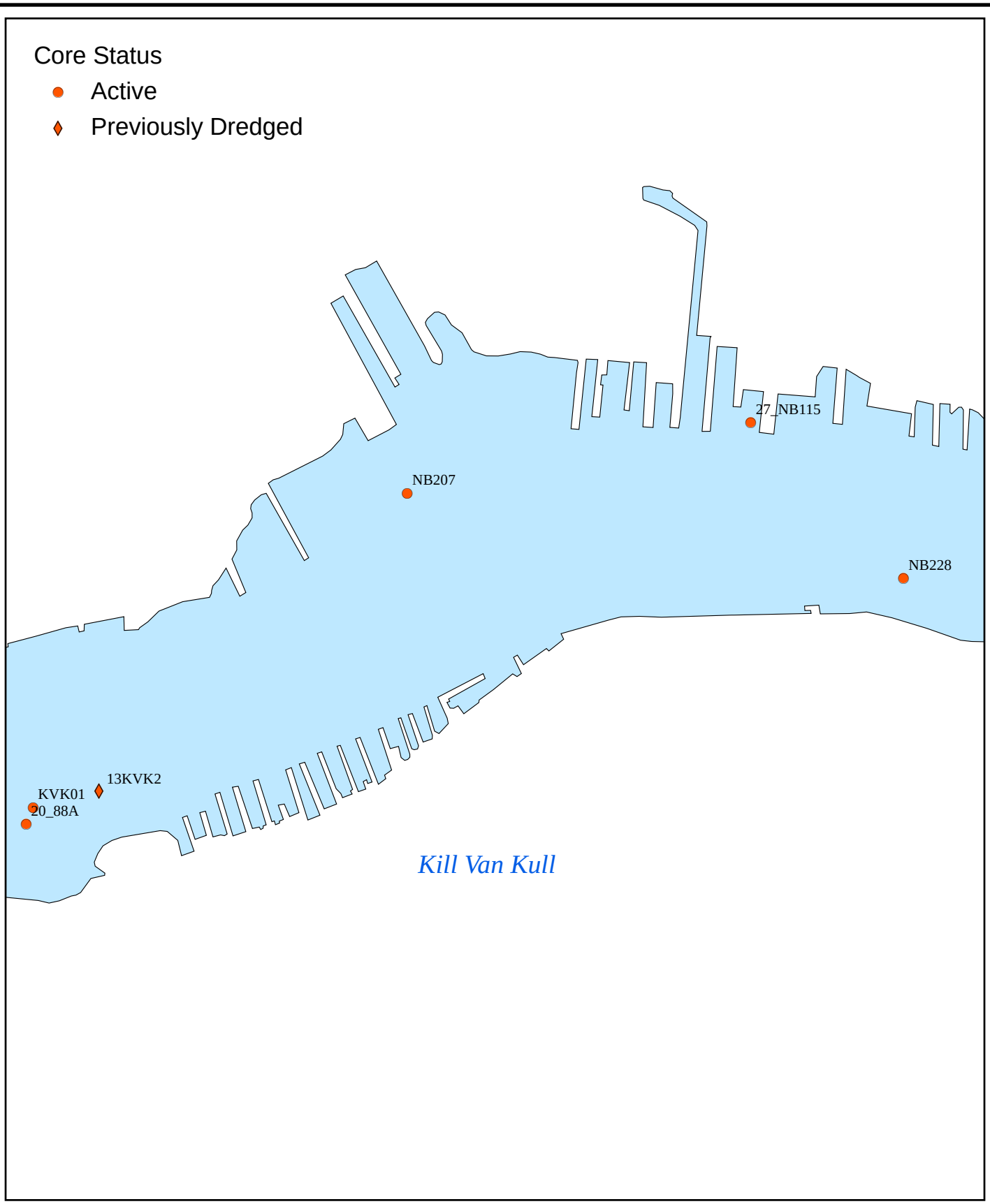
US Army Corps of Engineers
New York District

Figure A-3b
Newark Bay Sediment
Sampling Location
Shooters Island



US Army Corps of Engineers
New York District

Figure A-3c
Newark Bay Sediment
Sampling Location
Kill Van Kull

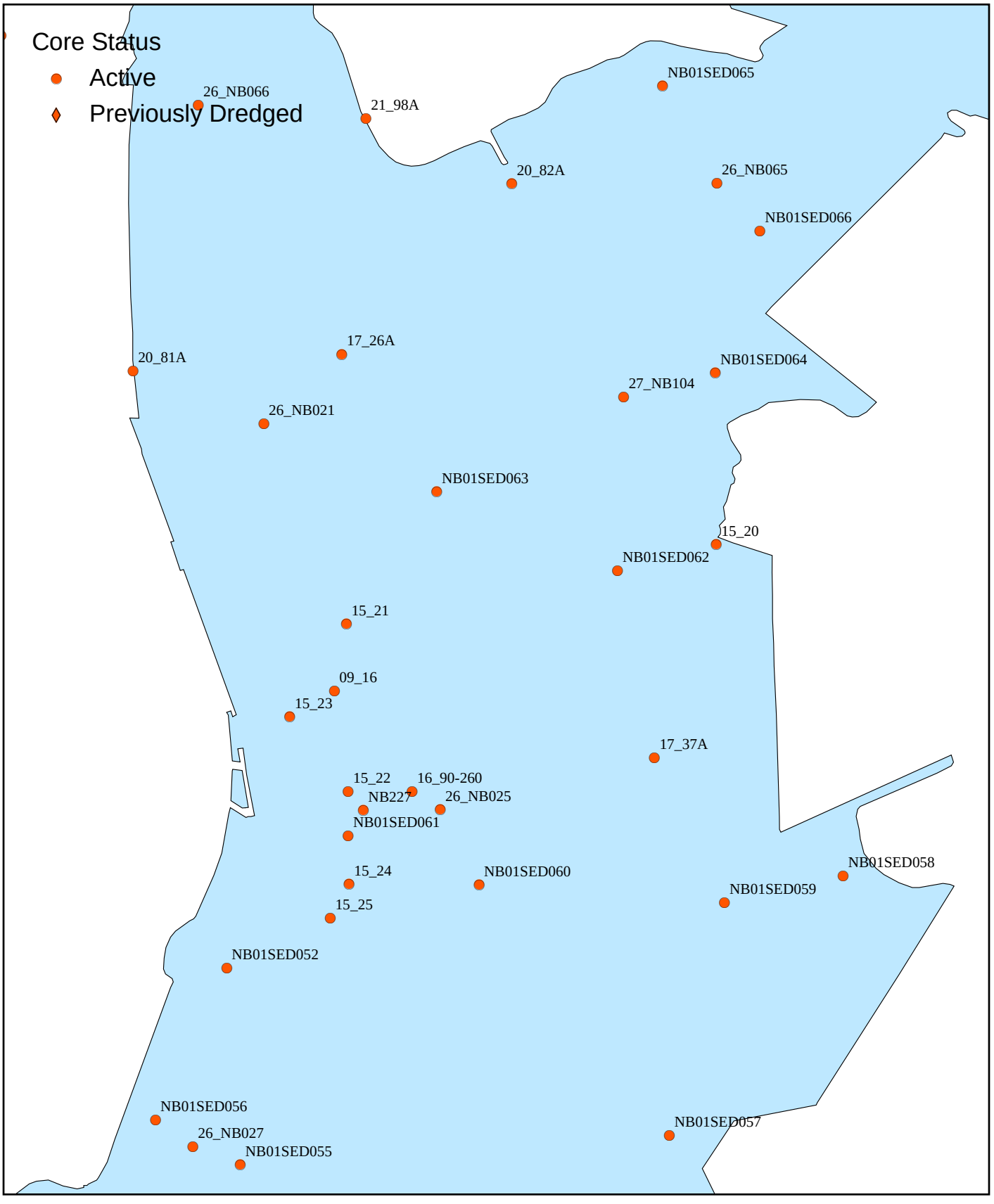


US Army Corps of Engineers
New York District

Figure A-3d
Newark Bay Sediment
Sampling Location
Kill Van Kull

US Army Corps of Engineers
New York District

Figure A-3e
Newark Bay Sediment Sampling Location
Newark Bay



US Army Corps of Engineers
New York District

Figure A-3f
Newark Bay Sediment Sampling Location
Rivers

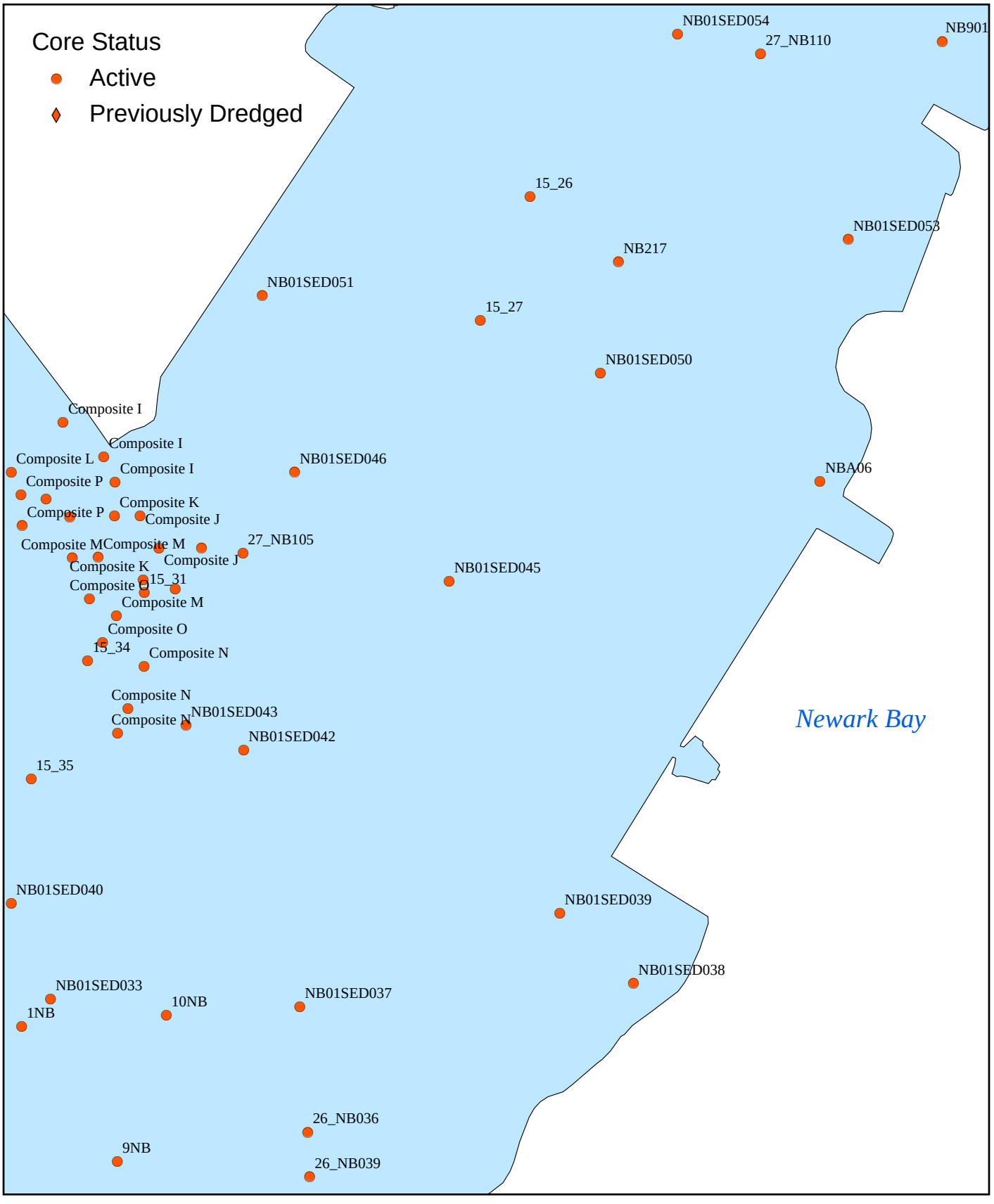


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Figure A-3g
Newark Bay Sediment Sampling Location
Northern Newark Bay

US Army Corps of Engineers
New York District

Figure A-3h
Newark Bay Sediment Sampling Location
Port Channels

Attachment 4
Dry Bulk Density Estimation

Dry bulk density ("BD") refers to the amount of sediment mass present in a specific volume of sediments. BD is important to the EA for two reasons. First, to estimate the mass of sediments resuspended during the HDP, the volume of dredged material (m^3) must be converted to a dry mass (kg dry mass). The bulk density (BD, kg/m^3) is the conversion factor. Second, the particle tracking model calculates the dispersion and subsequent redeposition of this mass of material in units of kg dry mass/m^2 of sediments. To calculate the depth of the redeposited material on the flats of Newark Bay, it is necessary to convert this mass of deposited sediment (kg dry mass/m^2) into a depth value (m). The depth of deposition (D_{DM}) is calculated using the computed mass of deposited sediment (M_{DM}, in units of kg/m^2) and the dry bulk density value:

$$D_{DM} = \frac{M_{DM}}{BD}$$

The bulk densities of HDP and O&M material were calculated using data collected within the respective areas to be dredged. BD values for HDP and O&M material were calculated independently, because O&M dredging generally removes recently deposited, less consolidated sediments, while the HDP will also remove older, more consolidated material. Measured bulk densities in surface sediments throughout the bay were used to calculate the depth of deposition.

Bulk Density of HDP dredged material

The mass of resuspended solids was estimated using field measurements of the bulk density of sediments to be dredged, using sediment cores collected by USACE for geotechnical characterization of the channels and side slopes of Newark Bay prior to dredging. There were two sources of data:

- Samples collected in 1998 and 2001 and reported in Table 24 of Appendix F of the Limited Reevaluation Report (USACE 2004).
- Samples collected in 1998 and reported in the plans and specifications for the Kill van Kull and Arthur Kill dredging contracts.

The field measurements for these samples consisted of moisture content (r_w, units of lb water/lb solids) and moist unit weight (r_s, units of lb total/ft^3). These were analyzed as follows to compute BD[1]:

$$BD = \frac{r_s}{1 + r_w} conv$$

[1] Note that lb water + lb solids = lb total mass, and BD is in units of kg solids / m^3 total volume.

where:

conv = conversion factor (16 [kg/m^3] / [lb/ft^3])

The dry bulk density data are presented in Table 1. In most cases, more than one sample was measured per core; core-specific values are presented in Table 2. Also indicated in Table 1 is the geomorphic area in which each core was collected: channel vs. slope. The average BD for the three channel samples was 1,600 kg/m^3. The average for slope samples was 1,100 kg/m^3.

A weighted average of the channel and slope values was used to calculate the overall BD of the dredged material. Approximately 15% of the dredged material is expected to originate on the slopes, based upon estimates available for dredge contract area S-NB-1. Using this as a weighting factor, the overall average BD is computed to be 1,500 kg/m^3. This value was used to represent the BD of HDP material.

Bulk Density of additional dredged material

To represent O&M and additional dredged sediments, the NBSA Phase 1 data collected in the channels, on the side slopes and along the industrial waterfront were used. These data are available for sediments within the top one to three feet and thus are probably representative of recently deposited material that would be removed during O&M dredging. Field measurements of percent moisture were converted to bulk density using as follows:

$$m_w = \frac{\text{percent moisture}}{100}$$

$$m_s = 1 - m_w$$

$$BD = \frac{m_s}{\frac{m_s}{\rho_s} + \frac{m_w}{\rho_w}}$$

where:

m_s = mass proportion of solids in the sample (kg solids/kg sample)
ρ_s = density of solids (2,650 kg solids/m^3 solids)
m_w = mass proportion of water in the sample (kg water/kg sample)
ρ_w = density of water (1,000 kg water/m^3 water)

Length-weighted BD values were computed for each core. The individual core values are presented in Table 1. BD was similar throughout the study area; an analysis of variance indicated no significant variation among the regions. The overall average BD for all areas was 800 kg/m^3; this value was used to represent the BD of O&M material for all regions.

Bulk Density of Surface Sediments

The dry bulk density of the newly deposited dredged material was set equal to the dry bulk density of the surface sediments. This is reasonable, given that the newly deposited dredged material, along with material deposited from other sources, will be mixed into the active layer of the sediment bed, thus taking on the characteristics of the surface layer of the bay.

The dry bulk density of surface sediments was calculated using the 6-inch surface slices of the NBSA Phase 1 data. Calculations were performed based upon the percent moisture data, as described above. The resulting dry bulk densities are presented in Table 3. The overall average BD for surface sediments in Newark Bay in the NBSA Phase 1 data set was 750 kg/m^3. This value was used in the calculation of the effects of deposition on surface sediment contaminant concentrations in Newark Bay.

Reference

USACE, 2004. Limited Reevaluation Report. Appendix F: Geotechnical

Table 1. Dry Bulk Density Data for Dredged Materia

Source	Geomorphic Area	Area	Sample ID	Moisture Content kg water /kg solids * 100	Moist Unit Weight lb/ft3	Dry density kg/m3
URS 1999	Channel/slopes	E	E-98-15	31.7	121.5	1477.7
URS 1999	Channel/slopes	E	E-98-15	38.8	116.7	1346.8
URS 1999	Channel/slopes	E	E-98-15	37.1	117.6	1374.0
URS 1999	Channel/slopes	PN	PN-98-06	21.6	131.1	1726.9
URS 1999	Channel/slopes	PN	PN-98-06	18.5	134.7	1820.8
URS 1999	Channel/slopes	PN	PN-98-06	17.1	138.0	1887.7
URS 1999	Channel/slopes	SE	SE-98-3	38.0	118.7	1377.8
URS 1999	Channel/slopes	SE	SE-98-3	30.2	123.7	1521.8
URS 1999	Channel/slopes	SE	SE-98-3	24.5	128.5	1653.3
URS 1999	Channel/slopes	AK	AK-98-4	45.0	109.7	1211.8
URS 1999	Channel/slopes	AK	AK-98-4	13.5	141.9	2002.6
USACE 2004	Channel/slopes	AK	AK-01-SF1-5	62.0	101.3	1001.6
USACE 2004	Channel/slopes	AK	AK-98-3	99.0	90.0	724.4
USACE 2004	Channel/slopes	AK	AK-98-3	99.2	89.9	722.9
USACE 2004	Channel/slopes	AK	AK-98-3	99.9	89.3	715.6
USACE 2004	Channel/slopes	AK	AK-98-3	86.5	93.7	804.8
USACE 2004	Channel/slopes	AK	AK-98-10	72.1	99.3	924.2
USACE 2004	Channel/slopes	AK	AK-98-10	69.4	103.4	977.7
USACE 2004	Channel/slopes	AK	AK-98-11A	102.0	91.5	725.6
USACE 2004	Channel/slopes	AK	AK-98-11A	108.1	90.7	698.1
USACE 2004	Channel/slopes	AK	AK-98-11A	99.0	91.0	732.5
USACE 2004	Channel/slopes	AK	AK-98-11A	110.9	88.4	671.4
USACE 2004	Channel/slopes	AK	AK-98-11A	120.1	87.3	635.3
USACE 2004	Channel/slopes	AK	AK-01-SFI-1	71.0	99.4	931.1
USACE 2004	Channel/slopes	AK	AK-01-SFI-2	75.0	96.7	885.1
USACE 2004	Channel/slopes	AK	AK-01-SFI-3	59.0	110.1	1109.2
USACE 2004	Channel/slopes	AK	AK-01-SFI-4	75.0	97.6	893.3
USACE 2004	Channel/slopes	AK	AK-01-SFI-6	71.0	99.6	933.0
USACE 2004	Channel/slopes	AK	AK-01-SFI-6	59.0	103.0	1037.6
USACE 2004	Channel/slopes	E	E-01-SFI-1	47.0	107.2	1168.1
USACE 2004	Channel/slopes	E	*E-01-SFI-1*	24.0	128.9	1665.1
USACE 2004	Channel/slopes	E	E-01-SFI-2	28.0	127.0	1589.3
USACE 2004	Channel/slopes	KVK	KVK-01-SFI-2	141	80.7	536.4
USACE 2004	Channel/slopes	KVK	KVK-01-SFI-6	45	107.3	1185.3
USACE 2004	Channel/slopes	KVK	KVK-01-SFI-6B	68	92.9	885.8
USACE 2004	Channel/slopes	NBN	NBN-01-SFI-2	22.0	133.3	1750.2
USACE 2004	Channel/slopes	NBN	NBN-01-SFI-2	27.0	126.4	1594.2
USACE 2004	Channel/slopes	NBN	NBN-01-SFI-3	26.0	127.1	1615.8
USACE 2004	Channel/slopes	NBN	NBN-01-SFI-3	40.0	110.6	1265.4
USACE 2004	Channel/slopes	NBN	NBN-01-SFI-4	94.0	90.1	743.9
USACE 2004	Channel/slopes	NBN	NBN-01-SFI-4	35.0	121.4	1440.4
USACE 2004	Channel/slopes	NBN	NBN-01-SFI-5	38.0	111.9	1298.8
USACE 2004	Channel/slopes	NBN	NBN-01-SFI-5B	30.0	122.0	1503.2
USACE 2004	Channel/slopes	SE	SE-01-SFI-01	35.0	118.4	1404.8
EPA NBSA Phase 1	Industrial Waterfront Area	AK	NB01SED002			1185
EPA NBSA Phase 1	Industrial Waterfront Area	AK	NB01SED068			557
EPA NBSA Phase 1	Southern Navigation Channels	AK	NB01SED001A			517
EPA NBSA Phase 1	Southern Navigation Channels	AK	NB01SED010A			918
EPA NBSA Phase 1	Transitional Slopes	AK	NB01SED011			1003
EPA NBSA Phase 1	Industrial Waterfront Area	E	NB01SED036			454
EPA NBSA Phase 1	Port Channels	E	NB01SED034A			600
EPA NBSA Phase 1	Port Channels	E	NB01SED035A			510
EPA NBSA Phase 1	Southern Navigation Channels	NB	NB01SED017			642
EPA NBSA Phase 1	Southern Navigation Channels	NB	NB01SED021			1240
EPA NBSA Phase 1	Southern Navigation Channels	NB	NB01SED027			1032
EPA NBSA Phase 1	Southern Navigation Channels	NB	NB01SED030			690
EPA NBSA Phase 1	Southern Navigation Channels	NB	NB01SED031			805
EPA NBSA Phase 1	Southern Navigation Channels	NB	NB01SED033A			703
EPA NBSA Phase 1	Transitional Slopes	NB	NB01SED016			803
EPA NBSA Phase 1	Transitional Slopes	NB	NB01SED029			783
EPA NBSA Phase 1	Industrial Waterfront Area	PN	NB01SED049			540
EPA NBSA Phase 1	Port Channels	PN	NB01SED047			677
EPA NBSA Phase 1	Port Channels	PN	NB01SED048			637
EPA NBSA Phase 1	Industrial Waterfront Area	SE	NB01SED025			690
EPA NBSA Phase 1	Port Channels	SE	NB01SED024			1025
EPA NBSA Phase 1	Port Channels	SE	NB01SED026			1557
EPA NBSA Phase 1	Industrial Waterfront Area	exclude	HR01SED067			564

Table 1. Dry Bulk Density Data for Dredged Materia

Source	Geomorphic Area	Area	Sample ID	Moisture Content kg water /kg solids * 100	Moist Unit Weight lb/ft3	Dry density kg/m3
EPA NBSA Phase 1	Industrial Waterfront Area	exclude	HR01SED069			1280
EPA NBSA Phase 1	Industrial Waterfront Area	exclude	NB01SED012			558
EPA NBSA Phase 1	Industrial Waterfront Area	exclude	NB01SED065			815
EPA NBSA Phase 1	Inter-tidal Area	exclude	NB01SED003			678
EPA NBSA Phase 1	Inter-tidal Area	exclude	NB01SED038			1416
EPA NBSA Phase 1	Inter-tidal Area	exclude	NB01SED058			710
EPA NBSA Phase 1	Northern Navigation Channels	exclude	NB01SED046			877
EPA NBSA Phase 1	Northern Navigation Channels	exclude	NB01SED052			610
EPA NBSA Phase 1	Northern Navigation Channels	exclude	NB01SED055			1148
EPA NBSA Phase 1	Northern Navigation Channels	exclude	NB01SED061			870
EPA NBSA Phase 1	Northern Navigation Channels	exclude	NB01SED063			864
EPA NBSA Phase 1	Northern Navigation Channels	exclude	NB01SED066			1447
EPA NBSA Phase 1	Southern Navigation Channels	exclude	NB01SED004			532
EPA NBSA Phase 1	Southern Navigation Channels	exclude	NB01SED006A			582
EPA NBSA Phase 1	Southern Navigation Channels	exclude	NB01SED008A			462
EPA NBSA Phase 1	Southern Navigation Channels	exclude	NB01SED043			878
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED005			673
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED007			753
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED009			727
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED013			1167
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED014			994
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED015			747
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED019			1340
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED020			843
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED022			639
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED023			854
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED028			687
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED032			603
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED037			728
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED039			1079
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED040			713
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED041			641
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED044			542
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED045			955
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED050			911
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED051			629
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED053			953
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED054			1296
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED056			624
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED057			580
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED059			854
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED060			686
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED062			640
EPA NBSA Phase 1	Sub-tidal Flats	exclude	NB01SED064			1770
EPA NBSA Phase 1	Transitional Slopes	exclude	NB01SED018			1627
EPA NBSA Phase 1	Transitional Slopes	exclude	NB01SED042			646

EPA data are length-weighted averages. Percent moisture values can be found in the EPA Phase 1 database.

Areas:

NB	Newark Bay
AK	Arthur Kill
PN	Port Newark Channel
E	Port Elizabeth Channel
SE	South Elizabeth Channel
KVK	Kill van Kull
exclude	Not located in HDP or O&M areas within the study area

Table 1. Dry Bulk Density Data for Dredged Material

Source	Geomorphic Area	Area	Sample ID	Moisture Content kg water /kg solids * 100	Moist Unit Weight lb/ft3	Dry density kg/m3

Table 2. Dry Bulk Density Measured by USACE - Average by core

Region	Region	Core ID	Number of Observations Per Core	Average	Standard Deviation	Channel	Slopes
AK	Arthur Kill	AK-98-4	2	1,607	559	1,607	
SE	South Elizabeth Channel	SE-98-3	3	1,518	138		1,518
E-	Elizabeth Channel	E-98-15	3	1,399	69	1,399	
PN	Port Newark	PN-98-06	3	1,812	81	1,812	
AK	Arthur Kill	AK-98-3	4	742	42		742
AK	Arthur Kill	AK-98-10	2	951	38		951
AK	Arthur Kill	AK-98-11A	5	693	40		693
AK	Arthur Kill	AK-01-SFI-1	1	931	N/A		931
AK	Arthur Kill	AK-01-SFI-2	1	885	N/A		885
AK	Arthur Kill	AK-01-SFI-3	1	1,109	N/A		1,109
AK	Arthur Kill	AK-01-SFI-4	1	893	N/A		893
AK	Arthur Kill	AK-01-SFI-6	2	985	74		985
E-	Elizabeth Channel	E-01-SFI-1	2	1,417	351		1,417
E-	Elizabeth Channel	E-01-SFI-2	1	1,589	N/A		1,589
KV	Kill van Kull	KVK-01-SFI-2	1	536	N/A		536
KV	Kill van Kull	KVK-01-SFI-6	1	1,185	N/A		1,185
KV	Kill van Kull	KVK-01-SFI-6B	1	886	N/A		886
NB	Newark Bay	NBN-01-SFI-2	2	1,672	110		1,672
NB	Newark Bay	NBN-01-SFI-3	2	1,441	248		1,441
NB	Newark Bay	NBN-01-SFI-4	2	1,092	493		1,092
NB	Newark Bay	NBN-01-SFI-5	1	1,299	N/A		1,299
NB	Newark Bay	NBN-01-SFI-5B	1	1,503	N/A		1,503
SE	South Elizabeth Channel	SE-01-SFI-01	1	1,405	N/A		1,405
AK	Arthur Kill	AK-01-SF1-5	1	1,002	N/A		1,002
			Average	1,190		1,606	1,130
			Std. Dev.	345		206	321
			Count	24		3	21
			Proportion of Dredge Material			0.85	0.15
			Weighted Average for HDP				**1,535**

US Army Corps of Engineers
New York District

Figure A-5
NBSA RI/FS Phase II
Proposed Sampling Locations

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