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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of Ocean Resources Conservation and Assessment
Hazardous Materials Response and Assessment Division
Coastal Resources Coordination Branch
7600 Sand Point Way N.E. — Bin C15700
Seattle, Washington 98115
July 22, 1992

Douglas Tomchuk, Project Manager
New York/Caribbean Superfund Branch II
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
26 Federal Plaza
New York, NY 10278

Dear Mr. Doug Tomchuk:

Enclosed are NOAA's preliminary draft comments on the Phase 2 Work Plan and Sampling Plan for the Hudson River PCB Reassessment RI/FS. Formal comments will be submitted by the end of the comment period on July 24. We are coordinating our comments with our co-trustees.

Also enclosed is a copy of a proposed draft sediment sampling plan for the Lower Hudson River and a review of selected resources and habitats of the lower river.

If you have any questions about these comments, please contact either Frank Csulak or myself (206-526-6404).

Sincerely,

L. Jay Field
Marine Biologist

10.3934

Lower Hudson River: Proposed Sediment Sampling Plan

As noted in a series of discussions among the trustees and between the trustees and EPA, the trustees have identified additional data needed to complete the natural resource risk assessment of the reassessment Remedial Investigation of the Hudson River PCB site. EPA's recently released Phase 2 Work Plan identifies two major questions that the Reassessment will address: what reductions in PCB concentrations are necessary to decrease fish tissue concentrations to levels that meet human health criteria; and what source areas may require remediation to achieve that reduction. The emphasis on the concentrations in fish is appropriate because it provides a convenient basis for a common "currency" for addressing both human and natural resource health issues. However, the protection of natural resources in the river and that use the river for forage and habitat should be explicitly recognized as an important goal of the reassessment.

The concentrations of PCBs in fish will be estimated in the proposed Phase 2 study by applying a simple PCB uptake model that relates the concentrations in fish tissue to the concentrations of PCBs in suspended particulate matter and sediments to which the fish are exposed. As noted in our other comments, this model is probably appropriate for the level of precision needed at this stage of the reassessment, but we question whether the data needed to use this approach are available for all areas for which the calculations should be made. As per our earlier discussion, the trustees feel that there are a number of locations of particular habitat significance and areas of substantial commercial and recreational fisheries. Exposure of resources to PCBs in those habitats hence poses particular risks to both natural resources and to humans. Areas of particular importance to natural resources have been survey recently by the NYS Department of Coastal Resources and Waterfront Revitalization. These habitats have the common nature of being shallow subtidal to intertidal mudflats and wetlands and essentially all provide spawning and nursery areas for anadromous fish and forage areas for waterfowl. In addition, a number of sites are important forage areas for raptors including osprey and bald eagles. Those habitats that are accessible from the shore usually have high recreational fishing activity. Four of the sites have been designated as Natural Estuarine Research Reserves.

In addition, the present Phase 2 Plan is expending substantial effort to identify other potential sources of PCBs to the Hudson River Estuary. However, minimal recognition appears to be given to the fact that contamination from past inputs that are present in the sediments of the estuary also constitute a source to the water and biota of the estuary that may currently be as large or larger than any other source. It may thus be difficult to understand the utility and effectiveness of remedial actions in the Upper Hudson River if the conditions in the estuary are not also reasonably well understood. The sampling proposed below will supplement the data that would be collected from the detailed coring work in the estuary presently included in the Phase 2 Work Plan. The latter data will be used primarily to estimate historical and recent conditions in the water column associated with the suspended sediment loading, and the suspended matter component of the fish uptake model. The broader sampling of surficial sediments described below would provide a better basis for estimating the sediment-related inputs and the sediment component of the fish uptake model.

Note that the trustees also continue to feel strongly that, while the simple fish uptake model is appropriate for this stage of the reassessment, it will be difficult to defend the results without some verification with additional, coincident sampling of fish in both the upper river and the estuary that the concentrations in fish are related to the concentrations in the abiotic components. Because of EPA's expressed reluctance to sample fish as part of the Phase 2 effort, we have not attempted to identify a specific plan at this time.

To address these data needs, i.e., what is the risk posed to human and animal consumers of fish from the river and how important to the conditions in the estuary are the source(s) in the upper river, the following additional sampling is suggested.

Sediment Sampling

The NYSDCRWR identified 41 wetland and tideflat habitats in the estuary that were shown to be of particular importance to natural resources. These habitats are described in the attached summary and are located on the attached map. Of these, three locations were deep, main channel habitats that are not expected to accumulate sediments suitable for sampling. The remaining habitats appear to constitute shallow silty habitats that are considered likely to be depositional areas for PCB-contaminated sediments, but it is expected that further review and consideration will identify a few others that are not appropriate for sampling because the habitat is inappropriate or the area is likely to be influenced by local sources. The deep cores proposed for the estuary will all be collected from a subset of these habitats. In addition, the fish samples collected by NYDEC have also been taken from a subset of these habitats. The important habitats range in a reasonably uniform distribution from Piermont Marsh at RKM 40 (RM 25) to Normans Kill near Albany. Most of these areas are still largely undisturbed by human activities. For the purposes of the this draft plan, approximately 35 of these habitats of importance will likely be appropriate for sampling (i.e., will consist of undisturbed, fine-grained, depositional sediments). This number of sampling locations would provide a distribution of similar habitats that can be used to establish a consistent gradient from the Troy Dam to the lower estuary, if such a gradient exists. To provide a means of resolving statistically any differences in the concentrations among the habitats, three sediment samples would be collected from each habitat. Surficial sediments would be collected to reflect current conditions. PCB congeners, total organic carbon, grain-size should be measured in all of the samples.

These samples would be used to test differences (and similarities) among the habitats to establish a gradient if present, and also to determine statistically where major changes in PCB concentrations exist (if any) that might reflect the influence of changes in hydrologic or other conditions (e.g., the area transition from fresh to salt water) or local sources. Such information would be needed to interpret the influence of the present inputs from the upper river and hence help determine the effects of any remedial actions in the upper river on conditions in the lower river.

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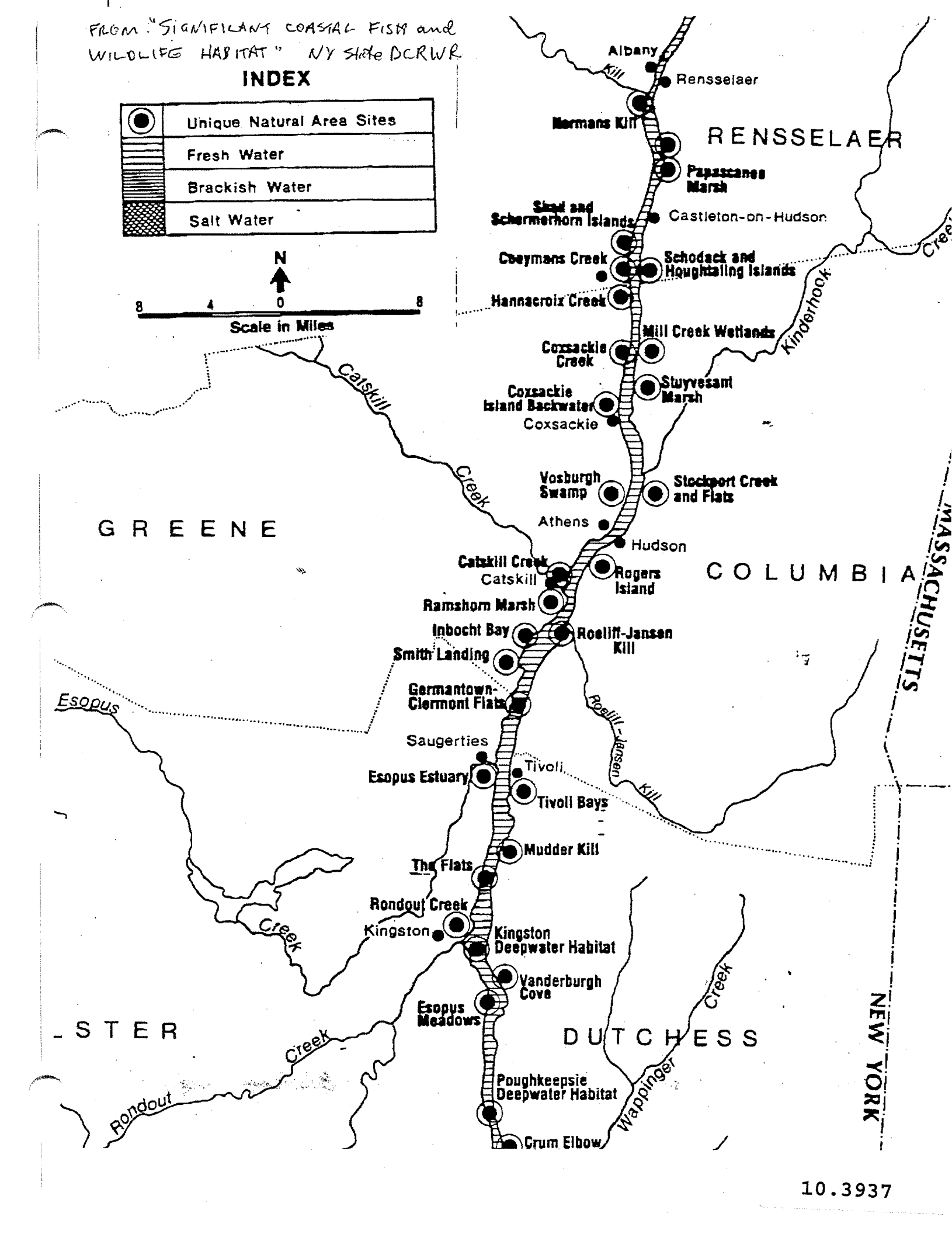
FROM "SIGNIFICANT COASTAL FISH and WILDLIFE HABITAT" NY State DCRWR



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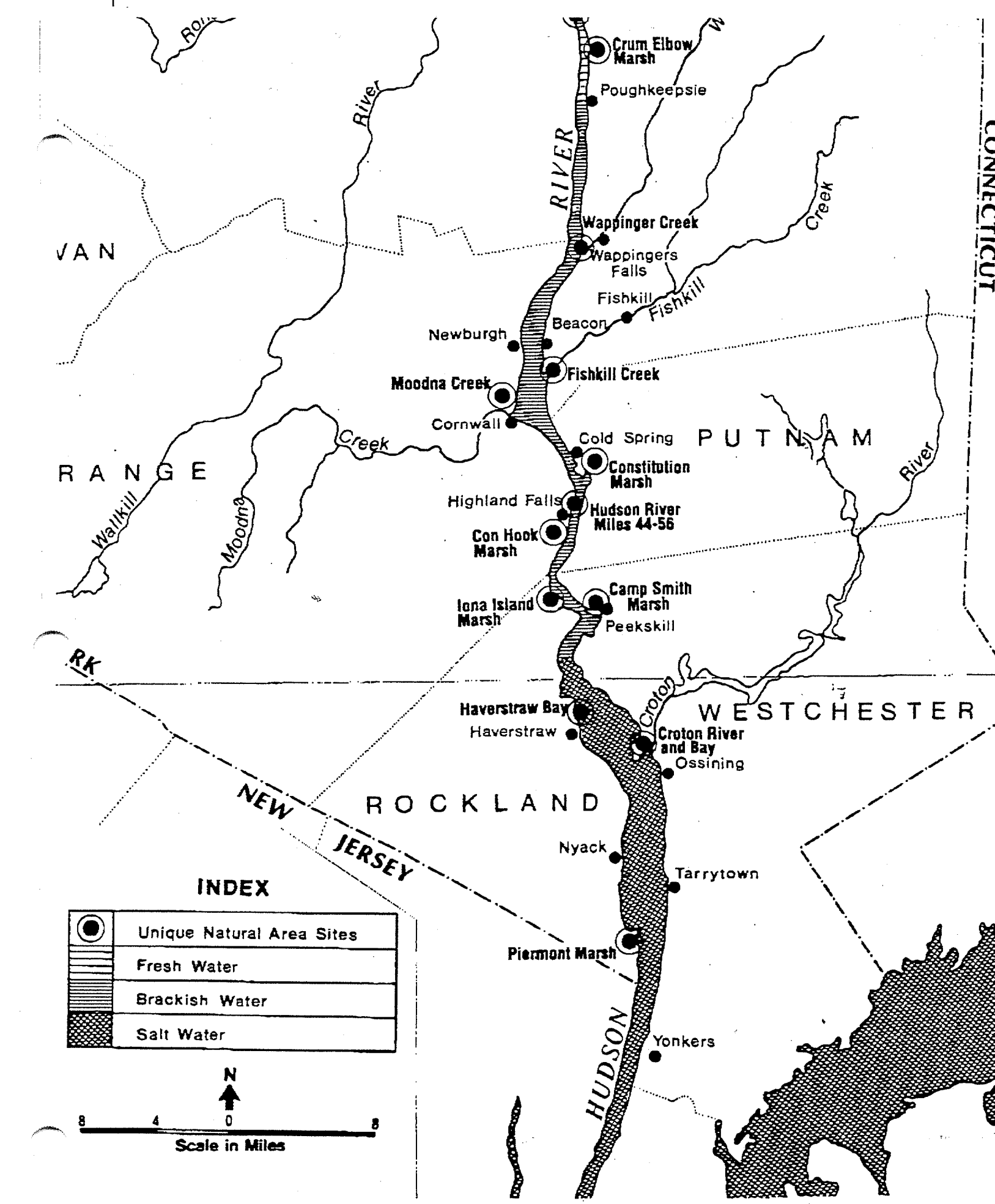
Crum Elbow Marsh
Poughkeepsie
RIVER
Wappinger Creek
Wappingers Falls
Fishkill
Fishkill
Beacon
Newburgh
Fishkill Creek
Moodna Creek
Cornwall
Cold Spring
PUTNAM
Constitution Marsh
Highland Falls
Hudson River Miles 44-56
Con Hook Marsh
Camp Smith Marsh
Iona Island Marsh
Peekskill
Haverstraw Bay
Haverstraw
Croton River and Bay
Ossining
WESTCHESTER
ROCKLAND
NEW JERSEY
Nyack
Tarrytown
Piermont Marsh
Yonkers
HUDSON
RANGE
Wallkill
Moodna
Creek
River
Creek
River
Croton
INDEX
Unique Natural Area Sites
Fresh Water
Brackish Water
Salt Water
N
8 4 0 8
Scale in Miles

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NOAA has a number of serious concerns about the Hudson River Phase 2 Work Plan as presented for review by EPA:

General Comments on Hudson River Phase 2 Workplan

1) The scope of the study is limited to considering potential remediation only in upper river sediments, although evidence indicates that lower river sediment contamination may be a significant factor in the elevated levels of PCBs in lower river fish. This is also inconsistent with EPA's definition of the site as extending from Hudson Falls to the Battery.

EPA also has stated previously that if information became available during Phase 1 suggesting problem with Lower Hudson sediment, then further information may be required.

> Phase 1 preliminary human health assessment concluded that risk was comparable for consumption of fish from upper and lower (freshwater, tidal) sections of river.
>
> The results of the Thomann model reviewed in the Phase 1 report suggest that even the elimination of upper hudson source would not substantially affect levels in striped bass in the lower river and that residual sediment contamination in lower river may be an important factor.

2) The overall objectives of the work plan focus on determining what it would take to reduce concentrations of PCBs in fish tissue to levels safe for human consumption. While we generally agree with this objective (with the exception that reducing ecological risk should also be a primary objective), the work plan fails to acknowledge (or address) the importance of reducing PCB levels in lower river fish.

3) The work plan proposes to use (a) a PCB mass balance approach "to predict the PCB levels in water and sediment on a year by year and reach by reach average basis," and (b) a correlation analysis approach to determine the relationship between PCBs in biota and PCBs in both water and sediment. These are essential components in determining the potential effects of remedial alternatives on the bioaccumulation of PCBs in fish. However, the data needed to accomplish this are only being collected from the upper river. Therefore, one can conclude that EPA does not intend to evaluate the potential impact of remediation on lower river fish. This is completely inconsistent with EPA's stated primary objective for the Phase 2 study.

4) The primary objective of the work plan for the lower river is to determine the relative importance of PCB loading from the upper river to the total PCB load in the lower river. It is not clear how this type of information will be used in a decision-making framework. In our view, the absolute magnitude of the loading, and the associated risk to human health and the environment, should be the primary consideration.

5) The definition of the study area for the ecological assessment excludes the marine and transitional zones 75 miles below the freshwater tidal section, in spite of EPA's definition of the site as extending to the Battery. Many of the species of major concern spend part of their annual cycle or life history in more than one of the three zones, and the potential risk from exposure to site-related PCBs would be cumulative.

6) The data available for the risk assessment and exposure modeling appear to be inadequate for the Lower Hudson River. The ecological assessment approach relies on determining "exposure point concentrations" for target species, yet we are not aware of any data for the lower river, either in the existing database or proposed to be collected as part of the Phase 2 work, that can be used in the development of those values.

7) Although the main objective of the Phase 2 work plan centers on PCBs in fish tissue, no collections or analyses of fish tissue are proposed, and there is no integration of any of the proposed work with measurements of PCB concentrations in fish tissue from other studies. At the very least, the work plan should clearly state how existing data will be used and evaluate the adequacy of the database for the proposed analysis. It is important that this evaluation be conducted during the work plan stage, so that any major data gaps could be addressed as part of the Phase 2 sampling.

Scope of the study:

"the scope of potential remedial activities for this Reassessment is limited to the PCB-contaminated Hudson River sediments between Hudson Falls and Federal Dam at Troy" (p. 1-1)

This appears to be inconsistent with the definition of the site as extending from Hudson Falls to the Battery and, therefore, is an inappropriate pre-selection of the No Action Alternative for the lower river.

No rationale was presented for this position except that it is consistent with the approach taken in developing the 1984 No Action ROD.

No data were reviewed or presented in Phase I that reduced trustee concerns about the current extent of PCB contamination below the Federal Dam, the ecological or human health risk associated with those contaminated sediments, or the potential benefits of remedial action. In fact, the Phase 1 Report , citing Bopp (1979) and Bopp and Simpson (1989), stated that 85,000 kg of PCBs remain in lower river sediments.

Overall objectives of Phase 2 Workplan

The overall objectives of the Phase 2 Workplan were stated as follows: "What is the reduction in PCB levels which is necessary to decrease fish tissue concentrations to levels that meet human health criteria and...which source areas, if any, may require remediation in order to achieve that reduction?" (p. 1-3). It should be explicitly stated that the decrease in fish tissue concentrations needs to occur in both the Upper and Lower Hudson, since the Phase 1 Report stated that there was an unacceptable human health risk associated with consumption of fish from both the upper hudson and the freshwater section of the Lower Hudson. Reducing ecological risk also needs to be considered as a potential major objective in Phase 2 if it can be used in Phase 3 to aid in remedial alternative selection. It cannot be assumed that reducing human health risk will automatically address ecological risk due to the potential presence of endangered species and critical habitats.

The data available for the risk assessment and exposure modeling appear to be inadequate for the Lower Hudson River. The work plan appears to clearly identify the concentrations of PCBs in the surficial sediments as a key factor in both the modeling effort and in the risk assessment, but only proposes to collect an additional five individual cores in Study Area C. In addition, if any of those cores does not have a "chronologically interpretable" profile, it would be rejected. Bopp has stated that even in areas where usable cores were obtained in the past, 2/3 of the cores taken are rejected.

The high resolution cores may prove useful in describing historical trends in suspended sediment loading in the water column, but will not provide much information on loading from existing PCB contamination in the sediment.

The work plan does not adequately consider the necessity of collecting data in a manner and in quantities that will allow statistical treatment of the results. It can be expected, and the data included in the work plan demonstrate, that many of the proposed measurements have large variances. Unless the work plan clearly establishes an approach for addressing that variance, the ability to draw conclusions from the measurements of those variables will be substantially compromised.

Specific objectives for the Lower Hudson River

p. 2-10 "The main objective of the Phase 2 investigation in Study Area C is to evaluate the relative importance of loading from Study Area B to the overall PCB load in Study Area C."

p. 2-11 "Once an estimate has been made of the relative importance of current Study Area B-derived loads on the total Study Area C PCB burden, it will be possible to assess the relative impact of remedial alternatives for Study Area B on Study Area C."

How will the estimate of the total PCB load in Study Area C be determined? The only samples to be collected between RM 55 and RM 154 are 5 individual high resolution sediment core samples. While these cores can be used to examine historical trends in suspended sediment concentrations, they cannot be used to estimate the current total loading from lower hudson sediments.

Decision-making process

How will the relative loading data be used? The need to determine the "relative" contribution of the various sources to the Lower Hudson is not apparent. The only input question should be whether the deposits contribute enough PCBs to injure resources in the estuary. The implication of this section is that, if it could be shown that the input from the Upper Hudson is *relatively* small, then the inputs from the Upper Hudson are not important. This should be seen clearly as an incorrect conclusion. The data may be relevant to a feasibility study because it may not make sense to perform remedial actions if all sources are not eliminated or reduced, but that reasoning does not apply to the examination of historical trends. The relative inputs also should not affect the decision as to whether clean-up of the Upper Hudson is warranted (as appears to be implied by the 2nd full paragraph on page 2-11)— the absolute contribution is important. (p 2-10 through 2-13, Sections 2.2.3 and 2.2.4)

Specific Concerns on the Phase 2 Work Plan:

Overview of Data Collection Program for Phase 2

p 2-7, 2nd¶: Comparisons of cores would yield estimates of total loss (i.e., degradation, diffusion, and sediment mass movement), rather than simply degradation. In addition, because small scale horizontal spatial variability is likely to be large compared to the down-core variability, multiple cores will be required for the comparison to estimate the variation in the data that may be

associated with the spatial variability. It may be possible to use a normalizing factor, such as TOC or grain-size, to reduce observed spatial variations.

p 2-13. The data used to estimate the loading from New York City were not "current, " as stated in the first paragraph, but are from the early 1980s.

Main Data Collection Tasks

3.1 Congener-specific analysis of PCBs. We support the decision to use congener-specific analysis.

p 3-3, Section 3.2.1. Transect sampling design is good. However, we have some concern that insufficient data will be collected to statistically establish whether spatial changes are "real" or simply reflect the variations in the water column chemistry. For example, it is not clear whether the data presented in Figure 3.4 demonstrate actual "temporal changes" as discussed in the text, or simply variations in the water column conditions. For example, what is the chance that repetitive sampling on any of the dates presented in Figure 3.4 would generate the same range of data as found over the month and one-half of sampling?

Interpretation of PCB data from water column transects: We strongly suggest that in the interpretation of the PCB data each congener be considered a separate entity, rather than coalesce the data into homologs or Aroclor equivalents.

p 3.4, last ¶: The available theory on PCB chemistry would argue that the distribution of the PCBs between dissolved and particulate phases is controlled by the partitioning. Acceptance of this theory is also implied in approaches presented, for example, in the discussion of the high-resolution cores presented earlier in the work plan. The discussion in the paragraph starting at the bottom of page 3.4 implies that the distribution on the particles is a function of the source. The theory would state that, because the distribution is controlled by the chemical partitioning, the distribution would be the same no matter what the source (i.e., no matter where they came from, the PCB distribution would adjust according to the partitioning values for the specific congeners). Similarly, we disagree with the conclusions of the related discussion presented in Section 3.2.2. Specifically, the filter medium is known to dramatically alter the retention of PCBs, as noted by Bopp. In addition, no statistical confidence intervals were presented for the distribution. Most laboratory dosing-type experiments indicate that adsorption/desorption reactions with suspended particulates are rapid (completed in minutes). Thus, these experiments are likely not to show what is expected by the authors of the work plan. Unless enough samples are run to develop reasonable statistical limits and the experiments are designed carefully to avoid secondary effects (such as wall effects, differential settling, bacterial growth, etc.), the results may be confusing to the overall interpretation.

p 3.5, flux equation: As noted above, this equation should be applied to specific congeners, not simply to the total PCB, because the flux of specific types of PCBs is as important as the total flux.

p 3-8, Section 3.2.3. The main concern we have with the approach presented here is whether the number of samples will generate data that will support the conclusions that are expected to be made. For example, the GE data presented in Figure 3.6 imply some temporal changes in PCB loading, but it also appears that the variance associated with any sampling episode was large. Probably large enough to prevent most of locations from being statistically resolved as different

from one another, with the possible exception that the mean concentration of the samples from the Bakers Falls Bridge may be lower than the mean concentrations from the other locations. With reduced number of samples, the ability to predict the "average" flow will be limited in precision. It may be possible that among-sample differences can be "normalized" on the basis of the measurements of other water column variables, e.g., DOC and TSS, and that comparisons of "normalized" concentrations will have much lower variances.

p 3-10, Section 3.2.4. Care must be taken with the interpretation of the data from the re-analysis of the old samples. Methodological differences, "aging" in the laboratory, and other unknown factors may result in non-comparable data sets. Some effort should be made to at least verify that the sampling approach used by USGS will generate data similar to that being obtained in this study.

p 3-12, Section 3.3.1. The proposed radio nuclide markers are limited primarily to single year marks, i.e., 1954, 1963, and recent. Because sedimentation in the river is unlikely to be uniform over time (resulting from flow variations, particularly associated with floods), and because in-place activities such as bioturbation "smear" these markers, the ability of these limited markers to provide a reliable temporal scale for the cores is limited. The data presented from Bopp (Figure 3.9) indicates an uncertainty in the dating of about 4 years. Additional radio nuclides should be considered, such as 228Th (half-life of 1.9 yr) and 210Pb (half-life of 22 yrs). It might be possible to use careful analyses of other parameters such as grain-size, TOC, and TOC/TON ratios to assist in the interpretation, as suggested in the work plan, but the success of these approaches cannot be predicted.

The discussion of the analysis of the data from the high resolution cores should be expanded. The assumption that suspended particulate matter is the only transport mechanism for PCBs, and that therefore the cores from depositional areas (we assume they mean by definition, areas where suspended sediments fall out) can be easily interpreted to depict PCB loading is only partially correct. There is, in theory at least, a range of particle sizes that would be permanently or seasonally part of the suspended phase. The PCB concentrations would be expected to vary, other factors being equal, as a function of the sizes of those particles. Thus the down-core, as well as among core, variations in PCBs will reflect both the loading environment at the time (i.e., the overall concentrations of PCBs moving down river), but also the depositional environment at the specific time and location of deposition. In addition, while the bed load may transport much less PCB than that associated with the suspended phase, bed load contribution to the deposit, even in "depositional" areas can be substantial, particularly during major floods. These episodes can create thick deposits of coarse-grained materials even in areas that where fine-grained sediments normally collect, that affect the interpretation of the core profiles. Similarly, bioturbation acts to mix sediments upwards and downwards in the core. The rate and depth of bioturbation also varies spatially and over time. As a result, the down-core and among core comparisons will have to carefully consider the overall differences in the types of material constituting the core and the reliability of the dating data to identify corresponding sections. It may be that measurements of TOC and grain-size of the sediments in the core can be used to normalize and correct for the differences induced by different sedimentation regimes, but this will have to be considered carefully.

p 3-19, Section 3.3.4. The scaling of this effort is not well established. For example, will the confirmation effort focus on defining the sediment characteristics associated with a geophysical response, or will the survey focus on confirming the conditions within specific locations?

It should be noted that the X-ray analyses proposed in this section should be considered for all of the high-resolution cores. This procedure is non-destructive and can provide detailed (e.g., on 1-cm intervals) information regarding down-core variations in sediment texture. Such data may be very useful in interpreting the distributions of PCBs and other data.

p 3-19, Section 3.4. This effort should be provide useful information to determine broad-scale features of the potential deposits of PCBs, if performed well. However, achieving useful bottom penetration with sonic probes is not a trivial matter. The work plan should be more specific regarding the frequencies and equipment to be used, how shallow they can get, the expected types of subbottom features/characteristics they expect to resolve, and the precision of the techniques (e.g., the ability to determine depths of deposits to plus or minus 1 ft. may not be particularly helpful).

Contaminant Fate and Transport Analysis

p 5-3, Section 5.1. We agree with the contention in the work plan that a fairly simple model is appropriate for this effort. However, we are concerned with the difficulty in developing realistic/applicable parameters for any model. For example, the work plan points out that "dissolved" PCBs is an operational definition that changes depending on the size of the filter used to retain the particulate matter, and the presence of other macromolecules and colloids that help suspend the PCBs. As a result, consistent results can be obtained for a range of data (as long as the data are internally consistent, e.g., collected with the same filter), but the answers would be different.

p 5-9, Section 5.2. We agree in general with the proposed approach. However, the work plan does not adequately deal with the difficulties in accomplishing what is proposed. For example, as pointed out above, the concentrations of PCB on the particulate matter will depend to some degree on the measurement technique used to recover the suspended particulates. Similarly, determining what concentration value to use to fish in different areas may be difficult, particularly given the relatively limited data that will be available regarding the concentrations in the upper layers of the sediments, . For example, it is not clear whether the model will determine the probable range of a particular fish species and use an average of all of the sediment and TSS data within that range, or simply use the data from the single (or few locations) nearest the point where the fish were collected? Depending on the species, time of year, and other factors, either or both approaches may be demonstrably wrong. It may be possible to approach the problem by demonstrating that the concentrations of PCBs in fish are directly correlated with the sediment concentrations (or with sediment- and TSS-phase PCBs). If that is true, then the *rate of change* of the concentrations in the fish is related to the *rate of change* of PCBs in the abiotic phases, and the basic empirical measurements of current concentrations could be used to predict future concentrations for different species. Thus, an absolutely reliable ability to predict a precise PCB concentration in the fish on the basis of the concentrations in the abiotic phases is not necessary. Note also that this approach may have limited utility in the Lower River because so little information is available on concentrations of PCBs in the surficial sediments.

Baseline Ecological Risk Assessment

A major concern is that the work plan is too vague on how key features of the risk assessment will be performed. One of the main potential problems is that, while the approach specifies the development of exposure-point concentrations (on a reach-by-reach basis), we are not aware of data that will allow those values to be developed for most of Study Area C. The work plan states

that only data in the data base would be collected for the exposure-point analysis, even though Section 7.3 states specifically that sediment data would be needed.

Definition of the study area for ecological assessment (RM 75-195)

The rationale for only considering the freshwater section of the Hudson River and excluding the transition zone (RM 55-75) and more saline zone (RM 0-55) from consideration was presented as follows:

p. 7-1 "First, the PCBs in this section of the Hudson can be linked directly to Upper Hudson discharges and are likely to represent the greatest ecological risk posed by PCBs within a significant portion of the Hudson River."

These may be reasonable hypotheses, but the objectives of a reasonable ecological risk evaluation should be to determine which areas pose the greatest risk. There may be areas that represent a greater risk even though levels of contamination are not as high due to the presence of critical habitat, endangered species, etc. It is unwarranted to make this conclusion before conducting the study or without presenting good evidence of its validity. Since very little is known about the current degree or extent of PCB contamination in the lower river sediments, it also cannot be assumed that all or most of the PCBs in the freshwater section of the lower river are linked to current Upper Hudson discharges.

p. 7-1 "Second, the freshwater region can be viewed as a more ecologically consistent portion of the Hudson River compared to the complex ecological mosaic indicative of either the transition or more marine zones."

"Ecological consistency" of an area (whatever that means) is not a valid reason for restricting the study area. The complexity of an area may make it more difficult to study, but does not make it any less important. It certainly is not sufficient justification for eliminating it from consideration, especially when there is considerable evidence that large amounts of PCBs from the Upper Hudson have been desposited in these sections of the Lower Hudson and may continue to affect resources and fisheries in those areas.

Both the transition zone (RM 55-75) and more saline zone (RM 0-55) should be addressed in the ecological assessment for the Hudson River PCB site. Many of the species of major concern spend part of their annual cycle or life history in more than one of the three zones, and the potential risk from exposure to site-related PCBs would be cumulative. It would be reasonable, however, to use a higher level of effort for the freshwater portion of the lower river. [It should be pointed out that this is not the case in the effort to determine relative loading to the lower river: 4 cores will be collected from the freshwater section of the lower river compared to 7 from the rest of the lower river.]

7.1 Ecological study area description and characterization

There is no mention of Endangered species (e.g., shortnose sturgeon, bald eagle) or habitats of particular concern (e.g., the Estuarine Research Reserves, spawning or feeding areas of important receptors).

p. 7-4 "This approach entails identification of a limited number of species representing major trophic levels and species for which toxicity information is available or measurable"

Receptors from important trophic pathways should be identified in addition to species of specific concern (e.g., shortnose sturgeon, bald eagle). Availability of toxicity information should not be one of the primary criteria for determining receptors. If toxicity information is not available or measurable, then information from other species can be used with the appropriate uncertainty considerations. It is expected that both the ecological risk assessment and the human health assessment will depend on the tissue PCB residue levels in selected fish species.

7.3 Exposure assessment

p. 7-2 "Exposure pathways...will be examined and exposure point concentrations will be quantified."

p. 7-4 "Exposure point concentrations will be based on both measured data and fate and transport models. For example, estimates of future PCB levels in fish will be based on PCB bioaccumulation from both water and sediments,..."

It may be possible to determine exposure point concentrations for Study Area B, but it is not clear that data are available for below the Federal Dam. Of the principal exposure pathways for aquatic organisms—water, sediment, and food web—only 4 individual sediment samples are proposed to be collected from the part of the lower river study area (RM 75-154) that is proposed for consideration. How will these exposure point concentrations be determined for Area B and the freshwater section of Area C from data to be collected and any existing data? If models are to be used, how will the model results be verified by existing conditions? The work plan should clearly state how these exposure point concentrations will be derived for Study Areas B and C, including the data to be used and method of verifying model results.

The emphasis on bioaccumulation of PCBs in fish from water and sediment raises the question of why there is no attempted integration of the NYDEC fish collection and analysis program with the exposure assessment both from analytical and sampling perspectives. The congener-specific PCB sediment core and water column measurements are to be compared to PCB concentrations in fish that are based on Aroclor analysis only. Since bioaccumulation factors differ considerably between PCB congeners, it should be explained how these two types of data will be used together. In addition, since the exposure point concentrations will be determined on a reach-by-reach basis, the work plan should describe how that will be integrated with data from the NYDEC fish data collection program.

7.4 Ecological Effects Assessment

It is not clear how the proposed Reconnaissance surveys (p. 7-3 and A-16, 17) would provide useful information for the ecological effects assessment portion of the risk assessment. The absence of a particular species from the limited sampling proposed cannot be used as an indication of ecological effects. Unless the importance of such a superficial survey can be more clearly defined, we recommend that this component be eliminated from the work plan.

Baseline Human Health Risk Assessment

p. 6-1 "The Phase 1 Report ...indicated that there was an unacceptable human health risk associated with eating fish from the Upper Hudson River." It should also be noted that

the Phase 1 Report stated that comparable risk was associated with consumption of fish from the Lower Hudson River (at least for the freshwater section) (Phase 1 Report, B.6-45).

p. 6-4 "Efforts in Study Area C during Phase 2 will be directed to characterizing better the relative magnitude of the Upper Hudson PCB source compared to other sources in the Lower Hudson."

The primary objective of the risk assessment for Study Area C should be the evaluation of risk. While it is important to determine the relative magnitude of the Upper Hudson source, it is also necessary to consider the relative magnitude of the source derived from past inputs to Lower Hudson sediments.

p. 6-2 Exposure Point Concentrations in Fish: Only the Upper Hudson is discussed. Since comparable risk was associated with consumption of fish from the freshwater tidal section of the lower hudson, an exposure point analysis should be conducted for this region also.

p. 6-2 "NYDEC fish sampling data for 1990 will be available for Phase 2. These data, along with any data available for 1991 and 1992, will be used to refine the estimates of current and projected, future PCB concentrations in fish."

The work plan should describe in detail how the information from NYDEC will be used (see comments on Section 7.3 above).

Feasibility Study Analyses

p 8-1, Section 8. The only concern with Section 8, which has been stated before, is that the work plan addresses remediation only of Study Area B, even though the risk assessment may show risks to natural resources (and to humans) in other areas.

Miscellaneous

p A-1. The sampling plan provides very limited information regarding the instruments and equipment that will be used, as well as other major details of the effort (e.g., sample handling and storage). For example, what are the dimensions of the hand corer that will be used for the high-resolution cores; will the cores be collected by divers or from the shore? What navigation device(s) will be used to achieve the ± 1 m precision? More importantly, what water collection equipment will be used; what filtration apparatus; and what filter type and pore-size will be used?