FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE CROTON WATER TREATMENT PLANT AT THE HARLEM RIVER SITE

7.14. NATURAL RESOURCES

7.14.1. Introduction

Natural resource parameters such as upland vegetation; wetlands, waterways, and floodplains; fish and benthic invertebrates; essential fish habitat (EFH); birds; herpetiles; mammals; and endangered, threatened, or rare plant and animal species were assessed at the Harlem River Site and surrounding study area. The study area extends 400 feet beyond the project site's boundaries. The assessment was to identify the potential effects of the construction and operation of the proposed Croton Water Treatment Plant (WTP) project on the surrounding natural resources if the project were to be built at this site.

For the methodology of this analysis, refer to the Section 4.14, Data Collection and Impact Methodologies, Natural Resources.

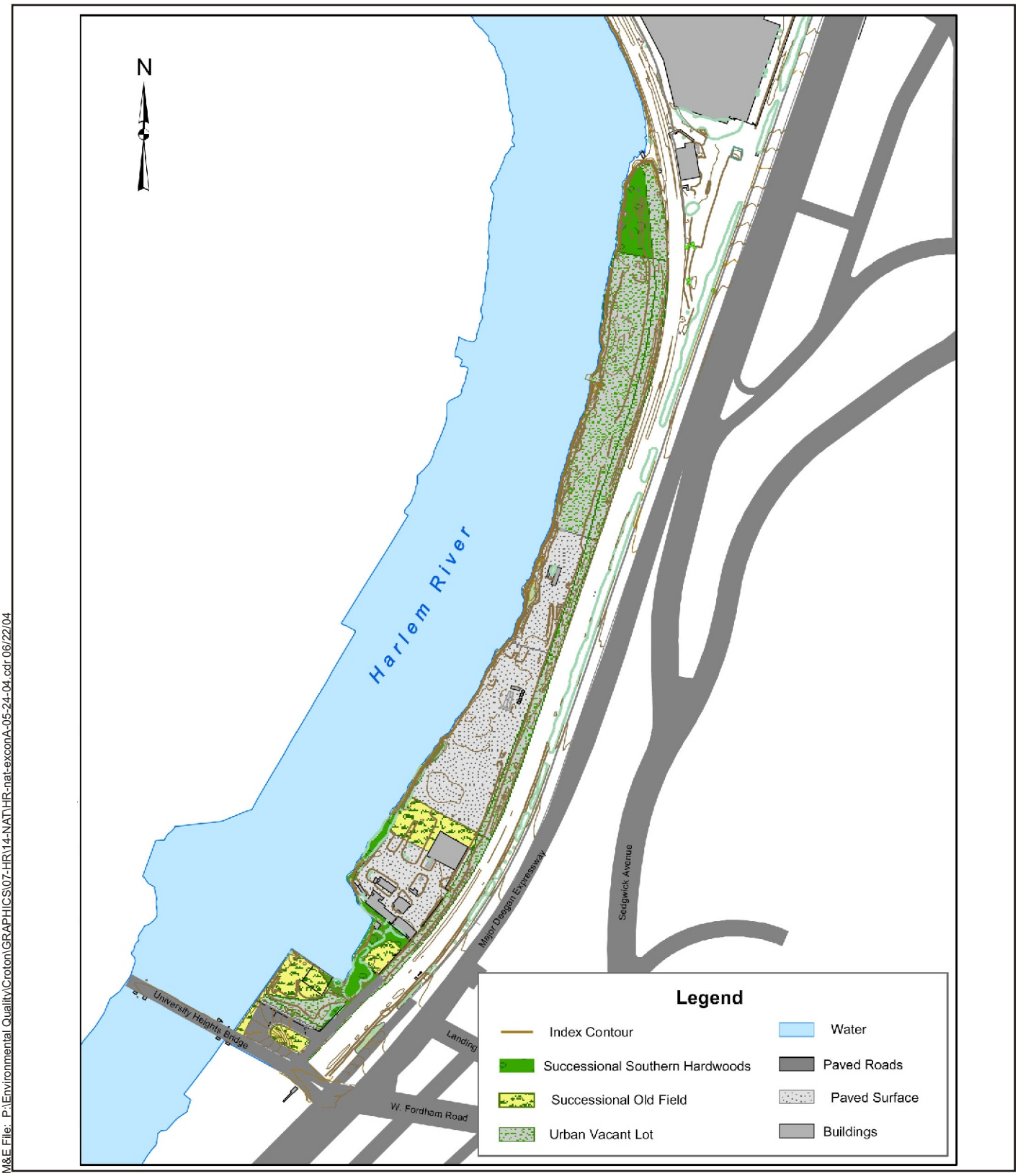
7.14.2. Baseline Conditions

As described in Section 7.2 Land Use, Zoning and Public Policy and Section 7.3 Visual Character, the water treatment plant site is situated adjacent to the Harlem River, with the River to the west and Exterior Street, the Metro-North Rail tracks, and the Major Deegan Expressway to the east. The water treatment plant site is bounded to the north by West 225th Street/Kingsbridge Road and to the south by the West Fordham Road/University Heights Bridge. The Harlem River Site has a total area of approximately 17.5 acres.

7.14.2.1. Existing Conditions

7.14.2.1.1. Vegetation

The plant species composition, distribution, and percent cover of the tree, shrub and herb layers present at the water treatment plant site were assessed during August 2002 field surveys. The water treatment plant site is a previously disturbed habitat that is primarily comprised of urban vacant lot and paved surfaces that are interspersed with trees, shrubs, and herbs located within successional southern hardwood and successional old field habitats. The most common vegetative layer at the water treatment plant site is the herbaceous layer that covers approximately 35 percent of the observed area. The tree layer comprises approximately 15 percent, and the shrub layer covers 10 percent. The remainder of the site is paved (Figure 7.14-1). Table 7.14-1 presents a list of habitat types and the associated dominant vegetation occurring at the water treatment plant site. Table 7.14-2 provides a summary of all the trees that were identified on-site.



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Scale in Feet

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Natural Resources Existing Conditions Harlem River Site

Croton Water Treatment Plant

Figure 7.14-1

TABLE 7.14-1. DOMINANT VEGETATION AT THE HARLEM RIVER SITE

Vegetative Community	Stratum	Common Name	Scientific Name
Urban Vacant Lot	Tree/Sapling	Black locust	*Robinia pseudo-acacia*
		Eastern cottonwood	*Populus deltoides*
		Tree-of-heaven	*Ailanthus altissima*
		Red mulberry	*Morus rubra*
		Crabapple	*Malus* sp.
	Shrub	Tree-of-heaven	*Ailanthus altissima*
	Herbaceous	Common mugwort	*Artemisia vulgaris*
		Common ragweed	*Ambrosia artemisiifolia*
		Queen Anne's lace	*Daucus carota*
		White sweet clover	*Melilotus alba*
		Various goldenrods	*Solidago* spp.
		Various grasses	Family Poaceae
		Orchard grass	*Dactylis glomerata*
		Lamb's quarters	*Chenopodium album*
		Horse nettle	*Solanum carolinense*
		Common sow thistle	*Sonchus oleraceus*
Successional Southern Hardwood	Tree/Sapling	Black locust	*Robinia pseudo-acacia*
		Crabapple	*Malus sp.*
		Zelkova	*Zelkova serrata*
	Shrub	Black locust	*Robinia pseudo-acacia*
		Eastern cottonwood	*Populus deltoides*
	Herbaceous	Various asters	*Aster* spp.
		White sweet clover	*Melilotus alba*
		Various grasses	Family Poaceae
Successional Old Field	Shrub	Tree-of-heaven	*Ailanthus altissima*
		Chinese elm	*Ulmus parviflora*
		Crabapple	*Malus* sp.
		Red mulberry	*Morus rubra*
	Herbaceous	Common mugwort	*Artemisia vulgaris*
		Common ragweed	*Ambrosia artemisiifolia*
		Queen Anne's lace	*Daucus carota*
		White sweet clover	*Melilotus alba*
		Various goldenrods	*Solidago* spp.
		Various grasses	Family Poaceae
		Orchard grass	*Dactylis glomerata*
		Common cocklebur	*Xanthium chinense*
		Common nightshade	*Solanum ptychanthum*
		Common reed	*Phragmites australis*
		Black locust	*Robinia pseudo-acacia*
		Smartweed	*Polygonum* spp.
		Oriental bittersweet	*Celastrus orbiculatus*
		Various asters	*Aster* spp.

TABLE 7.14-1. DOMINANT VEGETATION AT THE HARLEM RIVER SITE

Vegetative Community	Stratum	Common Name	Scientific Name
		Japanese knotweed	*Polygonum cuspidatum*
		Lamb's quarters	*Chenopodium album*
		Horse nettle	*Solanum carolinense*
		Common sow thistle	*Sonchus oleraceus*
		Bristly foxtail	*Setaria faberii*
		Horseweed	*Erigeron canadensis*
		Wild peppergrass	*Lepidium virginicum*
		Trailing wild bean	*Strophostyles helvola*
		Tansy	*Tanacetum vulgare*

Notes: Based on field surveys conducted on September 26, 2002.

TABLE 7.14-2. SUMMARY OF TREES IDENTIFIED ON THE HARLEM RIVER SITE

Common Name	Scientific Name	Number	Average dbh (inches)	Total Area (sq. inches)
American Elm	*Ulmus americana*	1	5.1	20.43
Crabapple	*Malus sp.*	2	5.66	166.32
Black Locust	*Robinia pseudoacacia*	32	7.04	2,327.01
Box Elder	*Acer negundo*	1	5.2	21.24
Eastern Cottonwood	*Populus deltoides*	33	9.24	3,250.05
Red Mulberry	*Morus rubra*	6	7.91	591.62
Slippery Elm	*Ulnus rubra*	1	7.5	146.97
Tree of Heaven	*Ailanthus altissima*	9	6.52	457.86
White Poplar	*Populus alba*	1	4.7	17.35
Zelkova	*Zelkova serrata*	15	7.25	845.03
	Totals	**101**		**7843.88**

7.14.2.1.2. Wetlands, Waterways, and Floodplains

No freshwater wetlands were depicted on the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) map or the NYS Department of Environmental Conservation (NYSDEC) Freshwater Wetlands map for the study area surrounding the Harlem River Site. The Harlem River and the cove are mapped by NYSDEC as tidal wetlands. The size of the existing cove is 1.3 acres. No freshwater wetlands, waterways, or floodplains were evident during the September 2002 field surveys that were conducted in this area for vegetation and wildlife. The presence of concrete bulkheads and concrete boulder riprap that lies along the entire accessible

shoreline of the water treatment plant site may be one reason for the lack of a bordering vegetated wetland.

7.14.2.1.3. Fish and Benthic Macroinvertebrates

Fish Larvae Sampling. During March to July 2001, the fish larval communities within the New York Harbor were sampled. A sampling station located within the Harlem River was used to characterize the fish community in the vicinity of the proposed site. See Figure 7.14-2 for the location of the sampling station. The results of the sampling efforts are provided in Table 7.14-3 below. The species in the ichthyoplankton data were repeated with different taxon counts because two replicates were taken at the station.

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Not To Scale

Harlem River Site
Natural Resources

Croton Water Treatment Plant

Figure 7.14-2

TABLE 7.14-3. ICHTHYOPLANKTON DATA COLLECTED FROM THE HARLEM RIVER, MARCH - JULY 2001

Date	Common Name	Scientific Name	Count	Life Stage
3/27/2001	American sand lance	*Ammodytes americanus*	2	02
	American sand lance	*Ammodytes americanus*	6	02
	American sand lance	*Ammodytes americanus*	10	03
	American sand lance	*Ammodytes americanus*	32	03
	Atlantic herring	*Clupea harengus harengus*	2	03
	Atlantic herring	*Clupea harengus harengus*	7	03
	Atlantic tomcod	*Microgadus tomcod*	2	01
	Atlantic tomcod	*Microgadus tomcod*	2	01
	Atlantic tomcod	*Microgadus tomcod*	240	02
	Atlantic tomcod	*Microgadus tomcod*	272	02
	Myoxocephalus	*Myoxocephalus*	36	02
	Myoxocephalus	*Myoxocephalus*	56	02
5/22/2001	Atlantic menhaden	*Brevoortia tyrannus*	90	
	Atlantic menhaden	*Brevoortia tyrannus*	306	00
	Atlantic menhaden	*Brevoortia tyrannus*	2	03
	Cunner	*Tautogolabrus adspersus*	2	01
	Cunner	*Tautogolabrus adspersus*	2	99
	Herrings	Clupeidae	6	01
	Herrings	Clupeidae	18	99
	Herrings	Clupeidae	26	99
	Unidentified	Unidentified	2	00
	Unidentified	Unidentified	6	00
	Unidentified	Unidentified	2	99
	Unidentified damaged	Unidentified damaged	42	00
	Unidentified damaged	Unidentified damaged	52	00
	Unidentified damaged	Unidentified damaged	12	97
	Unidentified damaged	Unidentified damaged	18	99
	Windowpane	*Scophthalmus aquosus*	10	02
	Windowpane	*Scophthalmus aquosus*	20	02
	Winter flounder	*Pseudopleuronectes americanus*	2	02
	Winter flounder	*Pseudopleuronectes americanus*	4	03
	Winter flounder	*Pseudopleuronectes americanus*	4	97
	Wrasses	Labridae	2	00
	Wrasses	Labridae	2	99
7/11/2001	Anchovies	*Anchoa*	10	02
	Anchovies	*Anchoa*	16	02
	Anchovies	*Anchoa*	2	03
	Anchovies	*Anchoa*	10	03

TABLE 7.14-3. ICHTHYOPLANKTON DATA COLLECTED FROM THE HARLEM RIVER, MARCH - JULY 2001

Date	Common Name	Scientific Name	Count	Life Stage
	Atlantic menhaden	*Brevoortia tyrannus*	2	97
	Bay anchovy	*Anchoa mitchelli*	250	00
	Bay anchovy	*Anchoa mitchelli*	402	00
	Feather blenny	*Hypsoblennius hentzi*	6	02
	Hogchoker	*Trinectes maculatus*	2	02
	Hogchoker	*Trinectes maculatus*	4	02
	Northern pipefish	*Syngnathus fuscus*	2	97
	True gobies	Gobiidae	42	02
	True gobies	Gobiidae	68	02
	True gobies	Gobiidae	6	03
	True gobies	Gobiidae	10	03
	Unidentified	Unidentified	14	00
	Unidentified	Unidentified	38	00
	Unidentified damaged	Unidentified damaged	8	97
	Unidentified damaged	Unidentified damaged	46	97
	Wrasses	Labridae	12	00
	Wrasses	Labridae	12	00

Life Stage Explanation:

Number	Stage	Description
97	Unknown Larvae	Unknown larvae stage
99	Unknown	Unknown stage or unknown/unidentifiable species
00	Egg	
01	Yolk Sac Larvae	
02	Pre-flexure Larvae	
03	Post-flexure Larvae	
04	Juvenile	

Epibenthic Recruitment Studies. Between April and September 2001, epibenthic recruitment studies were performed using a nine-plate array. See Figure 7.14-2 for the location of the sampling station. In June (after a three month duration), one panel was removed from the field and brought to the lab for analysis. A clean panel replaced it. In September (after another three month duration), the replacement panel, which represented a three-month exposure period, and an original panel, which represented a six-month exposure period, were collected and brought to the lab for analysis. The remaining plates were observed in the field. The results of the three panels are provided in Table 7.14-4.

TABLE 7.14-4. EPIBENTHIC DATA COLLECTED FROM THE HARLEM RIVER, APRIL – SEPTEMBER 2001

Date Of Retrieval	Type	Duration (Days)	Common Name	Latin Name
6/25/2001	Artificial Substrates	90	Medusae	*Hydroida*
			Ivory Barnacle	*Balanus eburneus*
9/27/2001	Artificial Substrates	180	Common Clamworm	*Nereis succinea*
			Ivory Barnacle	*Balanus eburneus*
			Sowbugs	Isopoda
			Sea Grapes (Sea Squirt)	*Molgula manhattensis*
			Hydroid	*Campanularia*
9/27/2001	Artificial Substrates	90	Common Clamworm	*Nereis succinea*
			Edible Blue Mussel	*Mytilus edulis*
			Ivory Barnacle	*Balanus eburneus*
			Sowbugs	Isopoda
			Sea Grapes (Sea Squirt)	*Molgula manhattensis*
			Hydroid	*Campanularia*

Benthic Macroinvertebrate Sampling. In addition to the epibenthic recruitment studies, *in situ* benthic macroinvertebrate sampling was conducted in the vicinity of the Harlem River Site. The results of this study were used to determine whether or not any species of special concern (rare, threatened, or endangered) are present in the area of the proposed project.

Six locations were selected along the eastern shoreline of the Harlem River (Figure 7.14-3). Sampling was conducted on December 19, 2002, and a second round of sampling was completed on January 7, 2003. All samples were collected by either boat or from the bulkhead areas. Two of the samples were located approximately 500 feet north and south of the site (samples A-1 and D). Two of the sample locations (samples A and B) were in front of sewer outfalls located north of the water treatment plant site. These sample locations best exemplify a habitat combining Harlem River habitat and the sewer outfall habitat. The final two sample locations were along the bulkhead line, spaced evenly along the site boundary and downstream of the sewer outfalls (samples B-1 and C).

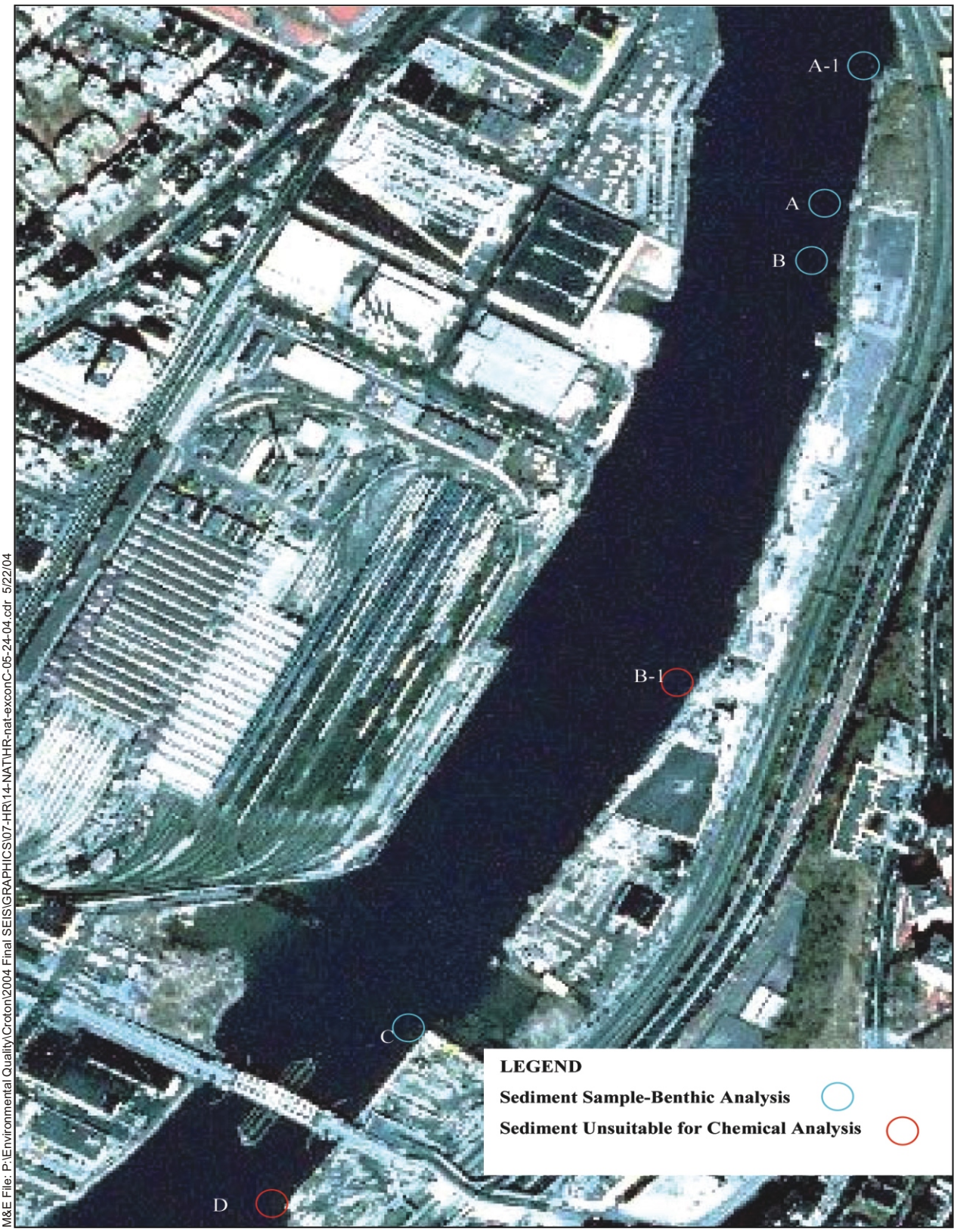
The Harlem River, in the vicinity of the water treatment plant site, is highly scoured from daily tidal action. As a result, the substrates along the bulkhead line are generally a mixture of sand, gravel and cobble extending from the riprap bank out to approximately 50 feet. Fine-grained sediments, or organic detritus, were not anticipated along these hard substrates since the energy of the environment prevents their accumulation. It was difficult to retain samples throughout this area since the substrate matrix prevented the ponar dredge from retaining fine sediments where gravel and cobble substrates are present. Consequently, samples were only obtained at four out of the six sample locations (A, A-1, B and C).

The general substrate characteristics for samples A, A-1 and B consisted of shells and small and large gravel (Table 7.14-5). The substrates at site C are highly influenced by the 1.3-acre cove located upstream from the site that acts as a settling area for organics and fine sediments. Consequently, the substrates located along the bulkhead line in the vicinity of sample C consisted mostly of organics and fines.

TABLE 7.14-5. GRAIN SIZE ANALYSIS OF SAMPLES TAKEN AT THE HARLEM RIVER SITE

Site	Date	% Organics	% Fines	% Sand	% Small Gravel	% Large Gravel	% Small Cobbles	% Shells
A	12/19/2002	Not available	10	10	30	20	5	25
A-1	12/19/2002	Not available	Not available	25	20	20	10	25
B	12/19/2002	5	10	25	20	20	Not available	20
C	1/7/2003	20	45	Not available	35	Not available	Not available	Not available

Notes: Grain size determined visually



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Benthic Sample Locations
Harlem River Site

Croton Water Treatment Plant

Figure 7.14-3

Overall, 24 species of invertebrates were collected by ponar dredge (Table 7.14-6). The communities of invertebrates found within samples A, A-1, and B are similar to the communities described in the recruitment study (Tables 7.14-7, 7.14-8, 7.14-9). In general, species occurring in these sediments are more planktonic and typically recruit on cobbles and rocks within an estuarine environment. The most common organism found was the Ivory Barnacle (*Balanus ebureus*) that occurred in all samples at a high percentage. Samples A and B, which are in close proximity to a sewer outfall, were similar with respect to species composition. The most common polychaete worms found in the vicinity of the sewer outfall were represented by blister worms (*Polydora ligni)* and cement tube worms *(Sabellaria vulgaris)*. The area represented by sample A-1 had the highest diversity of species. Of note was the presence of the introduced Pacific Shore Crab, which was found with other species of bivalves and amphipods. Since the ponar was poor at retaining fine sediments, few organisms typically associated with fine organic substrates were found. Sample C had the least diverse species composition, consisting mostly of polychaete worms (Table 7.14-10). Polychaete worms in the family Capeitellidae dominated the microfauna. In general this sample had organisms that are more typical of softer organically enriched sediments.

Overall, the species diversity and abundance of the macroinvertebrate communities along the water treatment plant site are typical of a New England Estuary. No state or federally endangered or threatened species were found in any of the samples.[1] An organism's presence (or absence) at a site can indicate specific environmental conditions. If an organism known to be intolerant of pollution is found to be abundant at a site, high water quality conditions can be inferred.[2] Conversely, dominance by pollution tolerant organisms implies a degraded condition. A well-known indicator for degraded systems is the polychaete in the family Capitelladae. In general, the presence of this species corresponds to a dominance of deposit feeders that colonize an area as organic pollution increases. The high abundance of *M. ambiseta* at site C (80% relative abundance) may indicate polluted or organically enriched sediments. Caution must be taken when making this assumption, as these organisms may be ubiquitous and found in high abundance in minimally impaired waters throughout the Hudson River estuary. Nevertheless, the relative abundance of *M. ambiseta* was much higher at site C where the substrates (i.e. fine organic substrates) are better at holding toxicants.

Since the fauna described at sites A, A-1 and B are generally more planktonic than the species found in sample C, the organisms that inhibit this scoured area may be more influenced by factors outside the estuary. Therefore, the communities found in these locations may be relatively sensitive to stress. Overall, the organisms that inhibit this area are very tolerant of a changing and somewhat polluted environment.

[1] NHP 2002 Rare Animal List. List of rare animal species actively inventoried by the NY Natural Heritage Program for the official state threatened and endangered list.

[2] Estuaries and Near Coastal Areas Bioassessment & Biocriteria Guidance (USEPA).

TABLE 7.14-6. LIST OF MACROINVERTEBRATE SPECIES FOUND AT THE HARLEM RIVER SITE.

Class	Order	Family	Genus	Species	Common Name	Life History Characteristics
Phylmum Porifera	-	-	*Halicona*	-	Sponge	Common on rocks, shells and algae in the lower intertidal zone
Anthozoa	Actiniaria	-	*Diadumene*	*lineata*	Orangestriped Green Anemone	Very common in tidal marshes and on seaweed in rocks, especially within the intertidal zone.
Anthozoa	Actiniaria	-	*Haloclava*	*producta*	Burrowing Anemone	Commonly found in the intertidal sand and mud flats.
Hydrozoa	-	Campanularia	-	-	Hydroids with Goblet shaped Collars	Attaches to pilings, seaweeds and eelgrasses.
Turbellaria	Polycladida	-	*Stylochus*	*ellipticus*	Tide pool Flatworm	Lives under stones in shallow waters and tide pools. Feeds on barnacles and oysters and other bivalves.
Ectoprocta	-	-	*Membranipora*	*tenuis*	Lacy	Found in shallow water and estuaries with lower salinities
Gastropoda	-	Hydrobiidae	*Hydrobia*	*totteni*	Minute Hydrobia snail	Found commonly in salt marshes and pools and on seaweed.
Bivalva	Pelycypoda	Ostreidae	*Crassostrea*	*virginica*	Eastern Oyster	Found at or below the low tide level attached to rocks, pilings, or other shells. Very common in this area.
Bivalvia	Pelecypoda	Mytilidae	*Mytilus*	*edulis*	Common Blue Mussel	Common in beds near the low tide line. Attaches to rocks and shells
Bivalvia	Pelecypoda	Mytilidae	*Geukensia*	*demissa*	Ribbed Mussel	Common in tidal marshes partially embedded in the peat.
Bivalvia	Pelecypoda	Myidae	*Mya*	*arenaria*	Shoft Shelled Clam	Lives in a deep burrow. Very common in the intertidal zone and in shallow waters.

TABLE 7.14-6. LIST OF MACROINVERTEBRATE SPECIES FOUND AT THE HARLEM RIVER SITE.

Class	Order	Family	Genus	Species	Common Name	Life History Characteristics
Polychaeta	-	Sabellariidae	*Sabellaria*	*vulgaris*	Cement-Tube worm	Builds well cemented sand tubes which form reef like structures. Common on shells and rocks.
Polychaeta	-	Nerridae	*Nereis*	*succinea*	Yellow Jawed Clam Worm	Found in marshes and estuaries where salinities can be as low as 9 parts per thousand
Polychaeta	-	Spionidae	*Polydora*	*ligni*	Mud or Blister Worm	Builds soft mud covered vertical tubes attached to shells, bottom mud and hard objects in shallow water and near the low tide level.
Polychaeta	-	Capitellidae	*Mediomastus*	*ambiseta*	Capitellid Thread Worms	Commonly eat their way through sandy mud like an earthworm. Particularly tolerant of polluted or stressed conditions in harbors and bays, often being one of the first animals to recolonize after a stressor such as an oil spill or dredging.
Insecta	Diptera	Chironomidae	-	-	Minge	Tolerant of most polluted environments.
Crustacea	Ascothoracica	-	*Balanus*	*ebureus*	Ivory Barnacle	Dominant where salinity is lower and commonly found in the intertidal zone and shallow waters of some estuaries
Crustacea	Isopoda	Anthuridae	*Cyathura*	*polita*	Isopod	Very common on shelly and muddy bottoms in the intertidal zone. Commonly found on eelgrasses and algae.
Crustacea	Isopoda	Sphaeromatidae	*Sphaeroma*	*quadridentata*	Sea Pill Bug Isopod	Occurs in the lower intertidal zone and among seaweed beds.

TABLE 7.14-6. LIST OF MACROINVERTEBRATE SPECIES FOUND AT THE HARLEM RIVER SITE.

Class	Order	Family	Genus	Species	Common Name	Life History Characteristics
Crustacea	Valvifera	Idoteidae	*Idotea*	*phosphorea*	Isopod	Occurs in the lower intertidal zone and shallow water.
Crustacea	Amphipoda	Pleustidae	-	-	Amphipod	Found on the bottom in muddy substrates
Crustacea	Amphipoda	Corophiidae	-	-	Tube dwelling Amphipods	Builds soft flexible tubes of mud and sand and are commonly attached to rocks and sponges. Very common in the intertidal zone on sandy mudflats.
Crustacea	Decopoda	Grapsidae	*Hemigrapsus*	*sanguineus*	Pacific Grapsid Shore Crab	Lives under cobbles and rocks, first introduced in 1990 and is now one of the most common crabs found in the intertidal zone. Very tolerant of adverse environmental conditions.
Ascidiacea	-	-	*Mogula*	*manhattensis*	Sea Squirt	Very common on eelgrass, pilings, boats and many other substrates.

TABLE 7.14-7. SPECIES OF MACROINVERTEBRATES AT SITE A, HARLEM RIVER DECEMBER 19, 2002

Family	Genus	Species	Count	Relative Abundance (%)	Common Name
-	*Diadumene*	*lineata*	1	0	Orangestriped Green Anemone
Campanularia	-	-	5	2	Hydroids with Goblet shaped Collars
-	*Stylochus*	*ellipticus*	10	5	Tide pool Flatworm
-	*Membranipora*	*tenuis*	25	12	Lacy Bryozoan
Hydrobiidae	*Hydrobia*	*totteni*	7	3	Minute Hydrobia snail
Ostreidae	*Crassostrea*	*virginica*	5	2	Eastern Oyster
Mytilidae	*Mytilus*	*edulis*	2	1	Common Blue Mussel
Myidae	*Mya*	*arenaria*	2	1	Shoft Shelled Clam
Mytilidae	*Geukensia*	*Demissa*	6	3	Ribbed Mussel
Nerridae	*Nereis*	*succinea*	4	2	Yellow Jawed Clam Worm
Spionidae	*Polydora*	*ligni*	22	10	Mud or Blister Worm
Sabellariidae	*Sabellaria*	*vulgaris*	27	13	Cement-Tube worm
-	*Balanus*	*ebureus*	70	33	Ivory Barnacle
Idoteidae	*Idotea*	*phosphorea*	1	0	Isopod
Sphaeromatidae	*Sphaeroma*	*quadridentata*	2	1	Sea Pill Bug Isopod
Corophiidae	-	-	5	2	Tube dwelling Amphipods
Pleustidae	-	-	10	5	Amphipod
-	*Mogula*	*manhattensis*	9	4	Sea Squirt

TABLE 7.14-8. SPECIES OF MACROINVERTEBRATES AT SITE A-1, HARLEM RIVER - DECEMBER 19, 2002

Family	Genus	Species	Count	Relative Abundance (%)	Common Name
-	*Halicona*	-	1	0	Sponge
-	*Haloclava*	*producta*	2	1	Burrowing Anemone
-	*Diadumene*	*lineata*	3	1	Orangestriped Green Anemone
-	*Stylochus*	*ellipticus*	16	6	Tide pool Flatworm
-	*Membranipora*	*tenuis*	69	27	Lacy Bryozoan
Ostreidae	*Crassostrea*	*virginica*	4	2	Eastern Oyster
Mytilidae	*Mytilus*	*edulis*	1	0	Common Blue Mussel
Mytilidae	*Geukensia*	*demissa*	1	0	Ribbed Mussel
Myidae	*Mya*	*arenaria*	2	1	Shoft Shelled Clam
Nerridae	*Nereis*	*succinea*	3	1	Yellow Jawed Clam Worm
Spionidae	*Polydora*	*ligni*	23	9	Mud or Blister Worm
Sabellariidae	*Sabellaria*	*vulgaris*	24	9	Cement-Tube worm
Chironomidae			2	1	Minge
-	*Balanus*	*ebureus*	89	35	Ivory Barnacle
Sphaeromatidae	*Sphaeroma*	*quadridentata*	1	0	Sea Pill Bug Isopod
Idoteidae	*Idotea*	*phosphorea*	7	3	Isopod
Pleustidae	-	-	8	3	Amphipod
Grapsidae	*Hemigrapsus*	*sanguineus*	1	0	Pacific Grapsid Shore Crab

TABLE 7.14-9. SPECIES OF MACROINVERTEBRATES AT SITE B, HARLEM RIVER - DECEMBER 19, 2002

Family	Genus	Species	Count	Relative Abundance (%)	Common name
Campanularia	-	-	29	14	Hydroids with Goblet shaped Collars
-	*Stylochus*	*ellipticus*	1	0	Tide pool Flatworm
-	*Membranipora*	*tenuis*	30	14	Lacy Bryozoan
Myidae	*Mya*	*arenaria*	1	0	Shoft Shelled Clam
Mytilidae	*Mytilus*	*edulis*	2	1	Common Blue Mussel
Capitellidae	*Mediomastus*	*ambiseta*	8	4	Capitellid Thread Worms
Nerridae	*Nereis*	*succinea*	16	8	Yellow Jawed Clam Worm
Sabellariidae	*Sabellaria*	*vulgaris*	19	9	Cement-Tube worm
Spionidae	*Polydora*	*ligni*	49	23	Mud or Blister Worm
-	*Balanus*	*ebureus*	42	20	Ivory Barnacle
Idoteidae	*Idotea*	*phosphorea*	1	0	Isopod
Sphaeromatidae	*Sphaeroma*	*quadridentata*	2	1	Sea Pill Bug Isopod
Pleustidae	-	-	3	1	Amphipod
Corophiidae	-	-	7	3	Tube dwelling Amphipods
	Mogula	*manhattensis*	1	0	Sea Squirt

TABLE 7.14-10. SPECIES OF MACROINVERTEBRATES AT SITE C, HARLEM RIVER - DECEMBER 19, 2002

Family	Genus	Species	Count	Relative Abundance (%)	Common name
-	Membranipora	*tenuis*	20	8	Lacy Bryozoan
Myidae	Mya	*arenaria*	1	0	Shoft Shelled Clam
Nerridae	Nereis	*succinea*	9	4	Yellow Jawed Clam Worm
Spionidae	Polydora	*ligni*	11	4	Mud or Blister Worm
Capitellidae	Mediomastus	*ambiseta*	201	80	Capitellid Thread Worms
-	Balanus	*ebureus*	6	2	Ivory Barnacle
Anthuridae	Cyathura	*polita*	1	0	Isopod
Corophiidae	-	-	1	0	Tube dwelling Amphipods

7.14.2.1.4. Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801) require the identification of Essential Fish Habitat (EFH) for Federally managed fishery species and the implementation of measures to conserve and enhance this habitat. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Harlem River Site has been designated as EFH for 11 fish species that are listed in Table 7.14-11.

TABLE 7.14-11. ESSENTIAL FISH HABITAT DESIGNATIONS FOR THE HARLEM RIVER SITE

Species	Found in Ichthyo-plankton Field Survey (Y/N)	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Red hake *(Urophycis chuss)*			X	X	X	
Winter flounder *(Pleuronectes americanus)*	Y	X	X	X	X	X
Windowpane flounder *(Scopthalmus aquosus)*	Y	X	X	X	X	X
Atlantic sea herring *(Clupea harengus)*	Y		X	X	X	
Bluefish *(Pomatomus saltatrix)*				X	X	
Atlantic butterfish *(Peprilus triacanthus)*			X	X	X	
Summer flounder *(Paralicthys dentatus)*			X	X	X	
Black sea bass *(Centropristus striata)*				X	X	
King mackerel *(Scomberomorus cavalla)*		X	X	X	X	
Spanish mackerel *(Scomberomorus maculatus)*		X	X	X	X	
Cobia *(Rachycentron canadum)*		X	X	X	X	

Notes:
The EFH area is designated by the Hudson River / Raritan / Sandy Hook Bays, New York/ New Jersey block for major estuaries, bays, and rivers along the northeast United States coast.

The EFH designation for this species includes the mixing water/ brackish salinity zone of this bay or estuary (0.5 ppt < salinity < 25.0 ppt).

X = EFH has been designated within the 10 minute by 10 minute latitude and longitude squares for a given species and life stage.

Source: National Marine Fisheries Service. "Summary of Essential Fish Habitat (EFH) Designation" posted on the internet at http://www.nero.nmfs.gov/ro/doc/ny3.html

As stated in the Fish and Benthic Macroinvertebrate Section above, the Harlem River, in the vicinity of the water treatment plant site, is highly scoured from daily tidal action. As a result, the substrates along the bulkhead line consist generally of a mixture of sand, gravel and cobble extending from the rip rap bank out to approximately 50 feet. The shoreline consists of either concrete or steel vertical bulkhead or large stone riprap. The area within the cove consists of organics and fine sediments. No rooted vegetation was located anywhere along the shoreline or in the area where the filling would occur. The entire shoreline is channelized with the exception of the cove.

The physical and chemical water quality results from two Harlem River sampling locations (see Figure 7.14-2) are presented in Table 7.14-12. Additional physical and chemical data was collected to support the Water Resources analyses (see Section 7.15, Table 7.15-1). These results were used to identify which fish are likely to inhabit the site based on the environmental characteristics of the Harlem River sampling locations. Table 7.14-13 summarizes the designated fish and their habitat requirements by life stages.

TABLE 7.14-12. PHYSICAL AND CHEMICAL RESULTS FROM THE HARLEM RIVER

Station	Date	Time	Location[1]	Tot Depth (ft)	DO (mg/L)	DO (%)	Salinity (ppt)	Secchi (ft.)	Temp (^{o}C)
Ichthyoplankton Sampling Location	3/27/01	1017	B	24	12.2	96	4.1		4.2
			M	24	12.2	95.9	4.1		4.2
			T	24	12.0	94.5	4	1.5	4.2
	5/22/01	920	B	26	7.8	84.2	13.6		15.2
			M	26	9.1	98.9	13.5		15.2
			T	26	9.2	99.2	13.5	2.3	15.2
	7/11/01	1158	B	22	6.1	76.4	10.2		23.9
			M	22	6.1	76.8	10		23.9
			T	22	6.1	76.7	9.9	3.1	23.9
Benthic Macro-invertebrate Sampling Location	4/9/01	927	B	9.2	12.0	98.5	0.3		6.8
			M	9.2	12.1	99.3	0.3		6.8
			T	9.2	12.1	99.7	0.3	1.3	6.9
	2/7/01	1000	B	(blank)	12.1	93.7	10		2.1
			T	(blank)	12.1	93.5	10		2.2
	6/25/01	1224	B	14	6.5	79.5	7.8		23.1
			M	14	6.6	80.3	7.8		23.2
			T	14	6.9	82.8	3.8	1.5	23.2
	9/27/01	1040	B	6	4.7	57.6	16.5		21.2
			M	6	4.7	58.1	16.5		21.2
			T	6	4.7	58.6	16.2	5.2	21.2
Average					**8.8**	**85.01**	**8.62**	**2.48**	**14.39**

B = bottom; sample was taken within one meter from the substrate
M = middle; sample was taken at the approximate mid point of the water column
T = top; sample was taken within one meter of the surface

TABLE 7.14-13. ESSENTIAL FISH HABITAT DESCRIPTIONS FOR THE HARLEM RIVER

			Eggs			Larvae			Juveniles			Adults			Spawning Adults			
Species	**Collected in Harlem River Icthyo-plankton?**	**Life Stage**	**Water Temp (°C)**	**Depth (m)**	**Salinity (ppt)**	**Water Temp (°C)**	**Depth (m)**	**Salinity (ppt)**	**Water Temp (°C)**	**Depth (m)**	**Salinity (ppt)**	**Water Temp (°C)**	**Depth (m)**	**Salinity (ppt)**	**Water Temp (°C)**	**Depth (m)**	**Salinity (ppt)**	**Habitat Description**
Red hake *(Urophycis chuss)*	No	L, J, A	N/A	N/A	N/A	**<19**	**<200**	**>0.5**	<16	<100	31-33	<12	10-130	33-34	N/A	N/A	N/A	Surface waters (L), shell fragments (J); sand and mud (A, SA)
Winter flounder *(Pleuronectes americanus)*	Yes	E, L, J, A, SA	**<10**	**<5**	**10-30**	**<15**	**<6**	**4-30**	**<25**	**1-50**	**10-30**	**<25**	**1-100**	**15-33**	**<15**	**<6**	**5.5-36**	Pelagic and bottom water (L); mud, fine-grained sand (J); mud, sand, gravel (A); mud, muddy sand, sand, and gravel (SA)
Windowpane flounder *(Scopthalmus aquosus)*	Yes	E, L, J, A, S	**<20**	**<70**	**5.5-36**	**<20**	**<70**	**5.5-36**	**<25**	**1-100**	**5.5-36**	**<26.8**	**1-75**	**5.5-36**	**<21**	**1-75**	**5.5-36**	Pelagic water (L); mud, fine-grained sand (J, A, SA)
Atlantic sea herring *(Clupea harengus)*	Yes	L, J, A	N/A	N/A	N/A	**<16**	**50-90**	**~32**	<10	15-135	26-32	<10	20-130	>28	N/A	N/A	N/A	Pelagic waters (L, J, A); bottom habitat (J, A)
Bluefish *(Pomatomus saltatrix)*	No	J, A	N/A	N/A	N/A	N/A	N/A	N/A	**19-24**	**<180**	**<36**	**>14-16**	**6-43**	**<35**	N/A	N/A	N/A	Pelagic water (J, A)
Atlantic butterfish *(Peprilus triacanthus)*	No	L, J, A	N/A	N/A	N/A	9-19	0-1829	6-37	3-28	10-365 (most <120)	3-37	3-28	10-365 (most <120)	4-26	N/A	N/A	N/A	Pelagic waters (L, J, A); pelagic waters above sandy and muddy substrates (J, A)
Summer flounder *(Paralicthys dentatus)*	No	L, J, A	N/A	N/A	N/A	>11	10-70	0.5-25	**>3**	**0.5-5**	**10-30**	**5-21**	**0-25**	**>10**	N/A	N/A	N/A	Pelagic water (L); salt marsh creeks, eelgrass beds, mudflats (J); demersal water (J, A)
Black sea bass *(Centropristus striata)*	No	J, A	N/A	N/A	N/A	N/A	N/A	N/A	>6	1-38	>18	>6	20-50	>20	N/A	N/A	N/A	Rough bottom, shellfish/eelgrass beds (J); man-made structures, sandy-shelly areas (J, A)
King mackerel *(Scomberomorus cavalla)*	No	E, L, J, A	>20	35-180	>30	20-31	38-180	27-37	>20	<9	>30	>20	<80	32-36	N/A	N/A	N/A	All coastal inlets, sandy shoals of capes and offshore bars, high profile rock bottoms (E, L, J, A)
Spanish mackerel *(Scomberomorus maculatus)*	No	E, L, J, A	>20	<50	>30	20-32	9-84	28-37	**>20**	**Use estuaries**	**10-34**	>20	<75	>30	N/A	N/A	N/A	All coastal inlets, sandy shoals of capes and offshore bars, high profile rock bottoms (E, L, J, A)
Cobia *(Rachycentron canadum)*	No	E, L, J, A	28-30	*	>23	24-32	3.1-300	19-38	16.8-30	5-300	22-36	19-28	1-70	25-36	N/A	N/A	N/A	All coastal inlets, sandy shoals of capes and offshore bars, high profile rock bottoms, high salinity bays, estuaries, seagrass habitat (E, L, J, A)

Discover the Great Outdoors.com, Inc. 2001-2002. http://www.dto.com/swfishing/species/speciesnostate.jsp?speciesid=426

NOAA. Panama City Laboratory. http://www.sefscpanamalab.noaa.gov/docs/Cobia.doc

NOAA. Panama City Laboratory. http://www.sefscpanamalab.noaa.gov/docs/king_mackerel.doc

NOAA. Panama City Laboratory. http://www.sefscpanamalab.noaa.gov/docs/spanish_mackerel.doc

NOAA. 1999. Technical Memorandum NMFS-NE-144. Essential Fish Habitat Source Document: Bluefish, *Pomatomus saltatrix*, Life History and Habitat Characteristics. Sept. 1999.

National Marine Fishery Service. 1998. Guide to Essential Fish Habitat Descriptions. http://www.nero.nmfs.gov/ro/doc/list.htm.

National Marine Fishery Service. Summary of Essential Fish Habitat (EFH) and General Habitat Parameters for Federally Managed Species. www.nero.nmfs.gov/ro/doc/efhtables.pdf

Marine and Coastal Species Information System – Fish and Wildlife Information Exchange – VA Tech. http://fwie.fw.vt.edu/WWW/macsis

University of Delaware, Sea Grant Reporter. Special Issue 2000. Vol 19, No. 1. http://www.ocean.udel.edu/publications/Newsletter/reporter/special00/00.html#31

US Fish and Wildlife Service. Coastal Ecology Group, Waterways Experiment Station. 1986. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (South Florida) – King and Spanish Mackerel. Biological Report 82. June 1986.

* = Top meter of water column

The highlighted life stages meet the temperature, depth, and salinity ranges measured within the Harlem River Site.

Red Hake. The mixing zone of the Harlem River is identified as EFH for Red hake larvae, juveniles, and adults. Red hake larvae are the only life stage likely to occur in the Harlem River Site area. Typical conditions for larvae are surface temperatures below 19°C, water depths less than 200 meters, and salinity greater than 0.5 ppt.[3] The larvae are typically observed in surface waters between May and December, with peaks in September through October. The juveniles prefer bottom habitats with shell fragment substrate. Typically, the juveniles are found in water with temperatures below 16°C, depths less than 100 meters, and a salinity range of 31-33 ppt. Adult Red hake prefer sand and mud in water temperatures below 12°C, depths from 10-130 meters, and a salinity range of 33-34 ppt. The juvenile and adult Red hake require salinities greater than 30 ppt, which would exclude them from the Harlem River Site.

Winter Flounder. The mixing zone of the Harlem River is designated as EFH for eggs, larvae, juveniles, adults and spawning adults of Winter flounder. All Winter flounder life stages are likely to occur in the study area. Winter flounder eggs are typically found in bottom habitats consisting of sand, muddy sand, mud, and gravel with water temperatures less than 10°C, salinities between 10-30 ppt, and water depths less than five meters. Winter flounder larvae are found in pelagic and bottom waters with sea surface temperatures less than 15°C, salinities between 4-30 ppt, and water depths less than six meters. Young-of-the-year juvenile Winter flounder prefer substrates of mud or fine grained sand and habitat conditions where the water temperature is less than 28°C, between 0.1 – 10 meters deep, and salinities between 5 – 33 ppt. Age 1+ juveniles prefer a bottom habitats and inshore areas with substrates of mud or fine grained sand and are typically found in water temperatures below 25°C, depths from 1 – 50 meters, and salinities between 10 – 30 ppt. Adults are found in bottom habitats consisting of mud, sand, and gravel where water temperatures are less than 25°C, water is between 1-100 meters deep, and salinities are between 15-33 ppt. Adult spawning Winter flounder prefer bottom habitats with mud, muddy sand, sand, and gravel where water temperatures are less than 15°C, depths are less than six meters, and salinities are between 5.5-36 ppt.

Windowpane Flounder. The mixing zone of the Harlem River is designated as EFH for all life stages of the Windowpane flounder, and all life stages are likely to occur in the study area. Windowpane flounder eggs and larvae are generally found in waters where temperatures are less than 20°C, water depths are less than 70 meters, and salinities range between 5.5-36 ppt. Both the eggs and larvae are often observed from February to November, with peaks in May and October in the middle Atlantic and July through August on Georges Bank, Maine. Juveniles prefer substrates of mud or fine-grained sand with water temperatures less than 25°C, depths less than 100 meters, and salinities between 5.5 – 36 ppt. Both adults and spawning adults can be found in bottom habitats with substrate of mud or fine-grained sand. The adults generally select habitats where water temperatures are below 26.8°C, depths range from 1 – 75 meters, and salinities between 5.5-36 ppt. The spawning adults similarly prefer depths from 1 – 75 meters, and salinities between 5.5-36 ppt; however, they can be found in water with temperatures that are generally below 21°C. They are often observed spawning from February through December, with a peak in May in the middle Atlantic.

[3] Part per thousand

Atlantic Sea Herring. The mixing zone of the Harlem River is EFH for larvae, juvenile, and adult life stages of Atlantic sea herring. Based on the Atlantic sea herring's habitat requirements and the environmental characteristics of the Harlem River Site, none of the life stages are likely to occur there, with the exception of the larval stage. The species prefer waters that are deeper and higher in salinity than those of the Harlem River. However, ichthyoplankton surveys have resulted in the collection of Atlantic sea herring larvae at the Harlem River Site (see Table 7.14-3, above).

The larvae can typically be found in pelagic waters with sea surface temperatures below 16°C, water depths from 50-90 meters, and salinities around 32 ppt. Considering the larvae's environmental preferences, their presence was an unusual occurrence at this site. However, future occurrences can not be ruled out. Therefore, it is likely that the larvae would be found at the Harlem River.

Juvenile Atlantic sea herring are found in pelagic waters and bottom habitats where the water temperatures are below 10°C, depths range from 15-135 meters, and the salinity is between 26 – 32 ppt. Adults also are found in pelagic waters and bottom habitat with water temperatures below 10°C, water depths from 20-130 meters, and salinities above 28 ppt.

Bluefish. The mixing zone of the Harlem River is designated as EFH for juvenile and adult Bluefish. Based on the Bluefish's habitat requirements and the physical characteristics of the Harlem River, both of these life stages could occur there. Juveniles prefer water temperatures between 19-24°C, depths less than 180 meters, and salinity less than 36 ppt. The adults are mostly found in water temperatures greater than 14°C, depths ranging from 6-43 meters, and salinity less than 35 ppt. The juveniles have been found to migrate to estuarine habitats in the North Atlantic from June to October, then depart the estuaries and coastal areas to migrate south of Cape Hatteras, North Carolina in October.[4] The majority of studies indicate adult Bluefish prefer salinities ranging from 25-34 ppt.[5,6] However, adults in the Delaware Bay and River have been know to occur in water with salinities as low as 3.0 ppt.[7] Therefore, it is possible for the juvenile and adult Bluefish to utilize the Harlem River.

[4] NOAA. 1999. Technical Memorandum NMFS-NE-144. Essential Fish Habitat Source Document: Bluefish, *Pomatomus saltatrix,* Life History and Habitat Characteristics. Sept. 1999.

[5] Pristas, P.J. and L. Trent. 1977 Comparisons of catches of fishes in fill nets in relation to webbing material, time of day, and water depth in St. Andrew Bay, Florida. Fish Bull. (U.S.) 75(1): 103-108.

[6] McBride, R.S., M.D. Scherer, and J.C. Powell. 1995. Correlated variations in abundance, size, growth, and loss rates of age-0 bluefish in a southern New England estuary. Trans. Am. Fish. Soc. 124: 898-910.

[7] De Sylva, D.P., F.A. Kalber, Jr., and C.N. Shuster. 1962. Fishes and ecological conditions in the shore zone of the Delaware River estuary, with notes on other species collected in deeper water. University of Delaware Marine Laboratory, Information Series, Publ. No. 5. University of Delaware, Newark, DE. 164p.

Butterfish. The Harlem River mixing zone is EFH for larvae, juvenile, and adult Butterfish. However, none of these life stages are likely to occur within the Harlem River Site because the Butterfish prefers depths greater than those measured within the two Harlem River sampling locations. Larvae are generally found in water with temperatures between 9 – 19 °C and depths ranging from 10 – 1,829 meters. Juvenile and adult Butterfish are collected in waters with temperatures between 3 – 28 °C and between 10 – 365 meters deep. This specie is tolerant to salinity fluctuations and can occur between 6-37 ppt, 3-37 ppt, and 4-26 ppt, for the larvae, juvenile, and adult life stages, respectively.

Summer Flounder. The Harlem River mixing zone is designated as EFH for larvae, juvenile, and adult Summer flounder. Based on the physical data collected from the Harlem River sampling locations, the temperature, depth, and salinity measurements meet the requirements of the juvenile and adult Summer flounder. However, the substrate and vegetation that occur in the river may only meet the minimum requirements of the flounder. The substrate within the study area consists of sand, gravel, and cobble and does not have aquatic vegetation. The Summer flounder occur more frequently over sandy substrates than mud and tend to occupy areas with submerged vegetation.[8] The lack of aquatic vegetation also excludes the Harlem River study area from being designated as a Habitat Area of Particular Concern (HAPC) for the Summer flounder.

The most abundant populations of Summer flounder larvae were collected within 12-50 miles from shore at depths between 10 – 70 meters. Larvae are typically identified in mixing zones within water with temperatures greater than 11°C, between 10-70 meters deep, and salinity ranging from 0.5 – 25 ppt. They are most often observed in the northern part of the Mid-Atlantic Bight from September to February. Juveniles utilize demersal waters in estuarine habitats consisting of eelgrass beds and mudflats with water temperatures greater than 3°C, depths of 0.5-5 meters, and salinities from 10 – 30 ppt. The adult Summer flounder typically inhabits demersal estuarine waters during warmer months and deeper waters near the Continental Shelf in the winter with salinities greater than 10 ppt. A previous study conducted in Delaware indicated that the adult Summer flounder needed temperatures greater than 20°C to grow well.[9]

Black Sea Bass. The mixing zone of the Harlem River is designated as EFH for juvenile and adult Black sea bass. However, because they require higher salinity levels than those found in the Harlem River, and the adults prefer deeper waters, it is unlikely that any of the life stages would occur within the Harlem River Site. The juveniles and adults generally inhabit coastal waters warmer than 6°C with salinities greater than 18 ppt in the warmer months. The juveniles winter offshore from New Jersey and south, and the adult's winter south of New York to North Carolina. Both the juvenile and adult Black sea bass prefer sand and shell substrate and natural and man-made structured habitats.

[8] Marine and Coastal Species Information System – Fish and Wildlife Information Exchange – VA Tech. http://fwie.fw.vt.edu/WWW/macsis

[9] University of Delaware, Sea Grant Reporter. Special Issue 2000. Vol 19, No. 1. http://www.ocean.udel.edu/publications/Newsletter/reporter/special00/00.html#31

King Mackerel. The Harlem River mixing zone is designated as EFH for eggs, larvae, juvenile, and adult King mackerel. However, none of the life stages are likely to occur within the Harlem River Site because they require higher salinities than those measured at the Harlem River sampling locations, and the eggs and larvae prefer deeper water. The eggs and larvae have been found in water warmer than 20°C, between 35-180 meters, and with salinities of approximately 30 ppt. The juveniles also prefer water warmer than 20°C and with salinities of approximately 30 ppt; however, they may inhabit waters less than 9 meters deep. The adults prefer water warmer than 20°C, less than 80 meters deep, and with salinities greater than 32 ppt.

Spanish Mackerel. The Harlem River mixing zone is designated as EFH for eggs, larvae, juvenile, and adult Spanish mackerel. However, based on the Spanish mackerel's habitat requirements, only the juveniles are likely to occur within the Harlem River. The remaining life stages require salinities greater than 28 ppt. The eggs have been found in water warmer than 20°C, less than 50 meters deep, and with salinities greater than 30 ppt. The larvae prefer water warmer than 20°C, with depths between 9-84 meters, and with salinities greater than 28 ppt. The juveniles are known to use estuaries as nurseries and can tolerate salinity fluctuations between 10-34 ppt in waters with temperatures greater than 20°C. Adults also prefer water warmer than 20°C, but they require salinities greater than 30 ppt and depths up to 75 meters.

Cobia. The Harlem River mixing zone is designated as EFH for eggs, larvae, juvenile, and adult Cobia. Based on the habitat requirements of the Cobia, none of the life stages are likely to inhabit the Harlem River because the salinity is lower than what is required by the Cobia. The Cobia eggs are typically found in water with salinity greater than 23 ppt and between 28-30°C. The larvae prefer water ranging in temperature between 24-32°C, between 3.1-300 meters, and salinity ranging from 19-38 ppt. The juveniles are found in water with temperatures ranging between 17-30°C, at depths of 5-300 meters, with salinities between 22-36 ppt. The adults prefer water with temperatures ranging from 19-28°C, at depths of 1-70 meters, and salinities between 25-36 ppt.

7.14.2.1.5. Amphibians and Reptiles

The water treatment plant site was subjected to a walkover during ecological surveys conducted in August, September, and October of 2002 to develop a qualitative list of species potentially occurring at the water treatment plant site (see Section 4.14, Data Collection and Impact Methodologies, Natural Resources). No signs of amphibians or reptiles (herpetiles) were observed during the ecological investigations. Table 7.14-14 lists herpetile species potentially occurring in the vicinity of the water treatment plant site. This list was developed based on field observations of herpetiles or their sign, the ecology of each site, several sources that provided distribution maps and/or habitat preference descriptions, and the field experiences and best professional judgment of project ecologists visiting the water treatment plant site.

TABLE 7.14-14. AMPHIBIANS AND REPTILES POTENTIALLY OCCURRING AT THE HARLEM RIVER SITE

Common Name	Scientific Name
Turtles	
Common Snapping Turtle	*Chelydra s. serpentina*
Eastern Box Turtle	*Terrapene c. carolina*
Toads	
Eastern American Toad	*Bufo a. americanus*
Fowler's Toad	*Bufo fowleri*
Frogs	
Northern Spring Peeper	*Pseudacris c. crucifer*
Green Frog	*Rana clamitans melanota*
Lizards	
Italian Wall Lizard	*Podarcis sicula*
Northern Brown Snake	*Storeria d. dekayi*
Common Garter Snake	*Thamnophis sirtalis*

Source:

Author Unknown. 2002. Podarcus sicula. http://www.kingsnake.com/reptilia-talia/My_HomePage_file/luccampestre.htm

DeGraaf, R.M. and D.D. Rudis. 1983. Amphibians and Reptiles of New England - Habitats and Natural History. The University of Massachusetts Press, Amherst.

Indiana-Purdue University Fort Wayne (IPFW). 2002. Amphibians and Reptiles of the Midwest. http://herpcenter.ipfw.edu/outreach/MWHabitatGuide/highres/Midwest_Herps.pdf

New York State Department of Environmental Conservation. 1998. Division of Fish, Wildlife, and Marine Resources. Amphibian and Reptile Atlas Project. www.dec.state.ny.us/website/dfwmr/wildlife/herp/index.html

7.14.2.1.6. Birds

In November 1993, May 1994, March 1998, April 1998, and June 1998, as part of the *Croton Water Treatment Plant Project FEIS*[10] analysis, birds were surveyed to characterize the winter, breeding, and migratory avifauna at the Jerome Park Reservoir, which is one-half miles northeast from the water treatment plant site. Because the Jerome Park Reservoir and the Harlem River Site are in close proximity, contain surface water for avifauna, and are both located within an urban environment, the survey data for Jerome Park Reservoir was extrapolated for the water treatment plant site.

In addition during a field investigation of the Harlem River Site conducted on September 26, 2002, a black-crowned night-heron (*Nycticorax nycticorax*) was seen perched on an old wooden structure near the surface of the Harlem River. Table 7.14-15 contains all species of birds anticipated in the vicinity of the water treatment plant site.

[10] New York City Department of Environmental Conservation. 1999. Croton Water Treatment Plant Final EIS. New York, NY.

TABLE 7.14-15. AVIFAUNA POTENTIALLY OCCURRING AT THE HARLEM RIVER SITE

Common Name	Scientific Name	Migratory (Y/N)
Green Heron	*Butorides virescens*	N
Black-crowned Night-Heron	*Nycticorax nycticorax*	N
Double-crested Cormorant	*Phalacrocorax auritus*	N
Canada Goose	*Branta canadensis*	N
Mute Swan	*Cygnus olor*	N
American Black Duck	*Anas rubripes*	N
Wood Duck	*Aix sponsa*	N
Mallard	*Anas platyrhynchos*	N
Ruddy Duck	*Oxyura jamaicensis*	N
Hooded Merganser	*Lophodytes cucullatus*	N
Cooper's Hawk	*Accipiter cooperii*	N
Red-tailed Hawk	*Buteo jamaicensis*	N
American Kestrel	*Falco sparverius*	N
Ring-necked Pheasant	*Phasianus colchicus*	N
Spotted Sandpiper	*Actitis macularia*	N
Ring-billed Gull	*Larus delawarensis*	N
Herring Gull	*Larus argentatus*	N
Great Black-backed Gull	*Larus marinus*	N
Rock Dove	*Columba livia*	N
Mourning Dove	*Zenaida macroura*	N
Great Horned Owl	*Bubo virginianus*	N
Chimney Swift	*Chaetura pelagica*	N
Red-bellied Woodpecker	*Melanerpes carolinus*	N
Downy Woodpecker	*Picoides pubescens*	N
Belted Kingfisher	*Ceryle alcyon*	N
Northern Flicker	*Colaptes auratus*	N
Eastern Phoebe	*Sayornis phoebe*	N
Great Crested Flycatcher	*Myiarchus crinitus*	N
Eastern Kingbird	*Tyrannus tyrannus*	N
Warbling Vireo	*Vireo gilvus*	N
Red-eyed Vireo	*Vireo olivaceus*	N
Blue Jay	*Cyanocitta cristata*	N
American Crow	*Corvus brachyrhynchos*	N
Fish Crow	*Corvus ossifragus*	N
Tree Swallow	*Tachycineta bicolor*	N
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	N

TABLE 7.14-15. AVIFAUNA POTENTIALLY OCCURRING AT THE HARLEM RIVER SITE

Common Name	Scientific Name	Migratory (Y/N)
Bank Swallow	*Riparia riparia*	N
Barn Swallow	*Hirundo rustica*	N
Cliff Swallow	*Petrochelidon pyrrhonota*	N
Black-capped Chickadee	*Poecile atricapillus*	N
Tufted Titmouse	*Baeolophus bicolor*	N
White-breasted Nuthatch	*Sitta carolinensis*	N
House Wren	*Troglodytes aedon*	N
Wood Thrush	*Hylocichla mustelina*	N
American Robin	*Turdus migratorius*	N
Gray Catbird	*Dumetella carolinensis*	N
Northern Mockingbird	*Mimus polyglottos*	N
European Starling	*Sturnus vulgaris*	N
Cedar Waxwing	*Bombycilla cedrorum*	N
Yellow Warbler	*Dendroica petechia*	N
Pine Warbler	*Dendroica pinus*	N
Common Yellowthroat	*Geothlypis trichas*	N
Chipping Sparrow	*Spizella passerina*	N
Song Sparrow	*Melospiza melodia*	N
Northern Cardinal	*Cardinalis cardinalis*	N
Red-winged Blackbird	*Agelaius phoeniceus*	N
Common Grackle	*Quiscalus quiscula*	N
Brown-headed Cowbird	*Molothrus ater*	N
Orchard Oriole	*Icterus spurius*	N
Baltimore Oriole	*Icterus galbula*	N
House Finch	*Carpodacus mexicanus*	N
American Goldfinch	*Carduelis tristis*	N
House Sparrow	*Passer domesticus*	N

Source: Based on the ecological surveys conducted within the Jerome Park Reservoir study area on November 30, 1993, May 17-19, 1994, March 23, 1998, April 29, 1998, and June 5, 1998. The Jerome Park Reservoir is approximately one half mile from the Harlem River Site, and both contain open water within an urban setting. The New York State Department of Environmental Conservation, New York Breeding Bird Atlas Program was also consulted.

7.14.2.1.7. Mammals

The water treatment plant site was subjected to a walkover during ecological surveys conducted in August, September, and October of 2002 to develop a qualitative list of species potentially occurring at the water treatment plant site (see Section 4.14, Data Collection and Impact Methodologies, Natural Resources). Table 7.14-16 lists mammal species potentially occurring in the vicinity of the water treatment plant site. This list was developed based on field observations, the ecology of each site, several sources that provided distribution maps and/or habitat preference descriptions, and the field experiences and best professional judgment of project ecologists visiting the water treatment plant site.

During the natural resources investigation, no mammals were observed directly and no animal tracks were located. Potential habitat for small rodents, rabbits, and raccoons includes herbaceous vegetation along the Harlem River embankment.

TABLE 7.14-16. MAMMAL SPECIES POTENTIALLY OCCURRING IN THE VICINITY OF THE HARLEM RIVER SITE

Common Name	Scientific Name
Virginia Opossum	*Didelphis virginiana*
Eastern Mole	*Scalopus aquaticus*
Bats	Family Vespertilionidae (Evening Bats)
Eastern Cottontail	*Sylvilagus floridanus*
Rodents Gray Squirrel House Mouse Norway Rat	 *Sciurus carolinensis* *Mus musculus* *Rattus norvegicus*
Raccoon	*Procyon lotor*
Striped Skunk	*Mephitis mephitis*

Source:

Illinois State Museum. 1998. FAUNMAP - An Electronic Database Documenting the Late Quaternary Distribution of Mammal Species in the United States. http://www.museum.state.il.us/research/faunmap/aboutfaunmap.html

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Murie, O.J. 1974. A Field Guide to Animal Tracks, The Peterson Field Series. Houghton Mifflin Company. Boston, Mass.

Whitaker, J.O. 1980. The Audobon Society Field Guide to North American Mammals. Alfred A. Knopf. White Plains, NY.

Wilson, D.E., and D.M. Reeder (eds). 1993. Mammal Species of the World. Smithsonian Institution Press. Washington, D.C.

7.14.2.1.8. Rare, Threatened, and Endangered Species

Consultation with the United States Department of Commerce – National Oceanic and Atmospheric Administration (NOAA) indicated that federally threatened loggerheads (*Caretta caretta*) and endangered Kemp's ridley sea turtles (*Lepidochelys kempi*) can be found in New York waters during the summer months (see Appendix F). Because of limited evidence to confirm the presence or absence of these species in the New York City Harbor complex, it is uncertain whether these species do inhabit the Harbor area, specifically the Harlem River. It is reasonable to assume that sea turtles may inhabit the Upper and Lower Bays because sea turtles are in New York waters in the warmer months and are known to inhabit shallow harbors and embayments. Therefore, any discretionary federal action that may affect these species must undergo an Endangered Species Section 7 Consultation under the Federal Endangered Species Act (ESA) with the U.S. Fish and Wildlife Service (USFWS).

7.14.2.2. Future Without the Project

The Future Without the Project conditions were developed for the anticipated peak year of construction (2009) and the anticipated year of operation (2011) for the proposed project. The anticipated peak year of construction is based on peak truck traffic and the peak number of workers. In the Future Without the Project, it is anticipated that the water treatment plant site would remain relatively unchanged from its existing condition.

7.14.3. Potential Impacts

7.14.3.1. Potential Project Impacts

The anticipated year of operation for the proposed plant is 2011. Therefore, potential project impacts have been assessed by comparing the Future With the Project conditions against the Future Without the Project conditions for the year 2011.

7.14.3.1.1. Vegetation

During the operation of the proposed plant, all of the existing vegetation would be removed from the water treatment plant site. Fifty-five percent of the existing site is currently covered with vegetation (35 percent herbs, 15 percent trees, and 10 percent shrubs). The remaining areas are exposed soils, gravel, or impervious surfaces. One hundred and one trees were identified on-site, and all would be removed for the proposed project. The proposed site plan includes approximately 4.5 acres of new open space in the northern and southern portions of the site and three potential wetland mitigation areas totaling 1.8 acres on site (1.2 acres off site). The open space would be available to the public and the wetland mitigation areas would provide habitat for the wildlife. (See Section 7.14.3.1.2 below and Section 9.3.7 Natural Resources and Water Resources Mitigation, for details regarding the landscaping plan.) The loss of the existing vegetation at the Harlem River Site is not anticipated to be a significant impact on natural resources. The quality and composition of the vegetation does not provide unique or important

wildlife habitat. The loss of this vegetation would not significantly impact wildlife since the site is disturbed and fragmented and does not reflect an important foraging or breeding location for birds and mammals. In the future with the proposed project, the vegetation would be replaced by an increase in higher quality vegetated areas as part of the open space area.

7.14.3.1.2. Wetlands, Waterways, and Floodplains

As stated in the Existing Conditions, no freshwater wetlands were depicted on the USFWS National Wetland Inventory (NWI) map or the NYS Department of Environmental Conservation (NYSDEC) Freshwater Wetlands map for the study area surrounding the Harlem River Site. The Harlem River and the cove are mapped by NYSDEC as tidal wetlands. Habitat restoration would take place within the cove and along tidal wetlands adjacent to the site within the Harlem River. In addition, 1.8 acres of on-site and 1.2 acres of off-site mitigated tidal wetlands would be added to compensate for the 1.5 acres of shoreline that would be filled along the Harlem River. (See Section 9.3.7 Natural Resources and Water Resources Mitigation, for details pertaining to the wetland mitigation plan.) The proposed project would result in a potential significant adverse impact on wetlands resulting from the filling needed to facilitate the proposed project. This significant adverse impact would be completely mitigated. Because the tidal wetland habitat that the project would eliminate would not be of high quality in the Future Without the Project and does not potentially harbor unique or important aquatic resources, and because the mitigated area would be larger and of higher habitat value than the existing shoreline, the significant adverse impact would be mitigated.

7.14.3.1.3. Fish and Benthic Macroinvertebrates

As discussed in the Existing Conditions, the organisms that inhabit the Harlem River along the western site boundary are very tolerant of a changing and somewhat polluted environment. During the operation phase of the proposed plant at the Harlem River, a permanent bulkhead structure would occupy approximately 57,728 square feet (approximately 1.5 acres) along the Harlem River. This would be compensated with 1.8 acres of on-site and 1.2 acres of off-site mitigated tidal wetlands containing shoreline vegetation and breakwater rip-rap to provide protection from the scouring currently caused by the tidal energy of the estuary system. (See Section 9.3.7, Natural Resources and Water Resources Mitigation) During normal operations, the aquatic habitat would provide a higher quality system than occupied by the current aquatic community. Riprap would provide boulder and cobble habitat, and dense stands of plants would provide cover for many aquatic organisms.

In the event of an emergency overflow at the proposed plant flows would be diverted to the Harlem River, the water would be conveyed into the Harlem River via one eight foot pipe as described in Section 7.1, Introduction and Project Description. This outfall would be from the water treatment plant building and convey process water overflow from the backwash tanks, filter to waste tanks, and the waste backwash water tanks to the Harlem River in the event of an emergency shutdown of the process. Additionally, the outfall would convey raw water overflow from the pump station to the Harlem River from the raw water tunnel in the event that the turbines stop working abruptly. The Harlem River is a major tributary of the Hudson River that also receives runoff from sections of Manhattan and the Bronx through many combined sewer outfalls (CSOs).

The maximum overflow rate from the backwash water tanks would be approximately 153 mgd under the maximum raw water inflow. The backwash water tanks contain filtered water prior to ultraviolet light disinfection and the addition of sodium hypochlorite, corrosion inhibitor, and hydrofluorosilicic acid. No significant adverse impacts on the quality or the flow rate are anticipated to the Harlem River from the emergency overflow from the backwash water tanks.

This pipe would be positioned so that the flow would be directed into water that is deep enough to prevent scouring of the bottom and creating significant water surface flow that could interfere with boat traffic. The mixing would be rapid and the high flows in the river would make the discharge insignificant; therefore, no impacts are anticipated due to this rare occurrence.

7.14.3.1.4. Essential Fish Habitat

A portion of the shoreline (approximately 1,500 linear feet) would require filling to the bulkhead line and a retaining system. The retaining structures would be designed as a permanent bulkhead structure. The total infill area along the bulkhead line would be approximately 57,728 square feet (approximately 1.5 acres). On average, the fill would extend approximately 30 to 40 feet into the river.

Table 7.14-17 presents the life stages of fish, for which the Harlem River is designated as EFH, that are likely to occur in the Harlem River Site study area.

The proposed project would not negatively impact the EFH located within the Harlem River because the mitigation plan, which would be in place during the operation phase of the proposed plant, would provide higher quality aquatic habitat than that which currently exists along the shoreline. The proposed submerged aquatic zone, which is one element of the mitigation wetlands, would function as a permanently inundated area behind the riprap. This zone would provide habitat for fish and other aquatic organisms that use the salt marsh during incoming tides, and the organisms would not have to vacate the wetland system during low tide. See Section 9.3.7 Natural Resources and Water Resources Mitigation, for details.

TABLE 7.14-17. LIFE STAGES LIKELY TO OCCUR IN THE HARLEM RIVER STUDY AREA; DESIGNATED BY ESSENTIAL FISH HABITAT CRITERIA

Species	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Red hake *(Urophycis chuss)*		√			
Winter flounder *(Pleuronectes americanus)*	√	√	√	√	√
Windowpane flounder *(Scopthalmus aquosus)*	√	√	√	√	√
Atlantic sea herring *(Clupea harengus)*		√			
Bluefish *(Pomatomus saltatrix)*			√	√	
Summer flounder *(Paralicthys dentatus)*			√	√	
Spanish mackerel *(Scomberomorus maculatus)*			√		

√ = life stage is likely to occur in the Harlem River Site study area

7.14.3.1.5. Amphibians and Reptiles; Birds; and Mammals

During the operation of the proposed plant, the entire site would be developed with the proposed plant, its associated buildings, and parking structures; public amenity areas; and mitigation wetlands. (See Section 9.3.7 Natural Resources and Water Resources Mitigation.) Although the current habitat would be removed for the proposed project, the mitigation wetlands would provide higher quality habitat for wildlife that may occupy the site. Shoreline and upland vegetation would provide coverage and foraging areas for herpetiles, birds, and mammals. Therefore no significant impacts are anticipated with the operation of the proposed plant.

7.14.3.1.6. Rare, Threatened, and Endangered Species

Consultation with the USFWS and the NYSDEC in combination with the results of field surveys indicate that no Federal or State listed species occur on the Harlem River Site. However, consultation with NOAA indicated that federally threatened loggerheads (*Caretta caretta*) and the endangered Kemp's ridley sea turtles could be found in New York waters during the summer months.

The habitat preferred by the juvenile loggerheads and turtles is not a straight channelized river like the existing Harlem River. Adults would likely just pass through the Harlem River. Juveniles prefer sea grasses and rooted estuarine vegetation, none of which currently occur at the site. The mitigation wetlands could possibly provide habitat for juveniles within the rooted

vegetation being incorporated as part of the wetland plan. The operation of the proposed plant would not affect the turtles in the study area because mitigation plans would improve the existing habitat along the shoreline of the Harlem River. (See Section 9.3.7 Natural Resources and Water Resources Mitigation.)

7.14.3.2. Potential Construction Impacts

The anticipated year of peak construction for the proposed plant is 2009. Therefore, potential construction impacts have been assessed by comparing the Future With the Project conditions against the Future Without the Project conditions for the year 2009.

A portion of the shoreline (approximately 1,500 linear feet) would require filling to the bulkhead line. This action is being proposed because portions of the proposed building footprint would be located in this area. Filling a portion of the Harlem River to the bulkhead line would require a retaining system. The retaining system used would be dictated by subsurface conditions at the site, space restrictions, schedule, and permit restrictions. The retaining structures would be designed as a permanent bulkhead structure. The total infill area along the bulkhead line would be approximately 1.5 acres. On average, the filling would extend approximately 30 to 40 feet into the river.

The filling of the shoreline would impact the existing aquatic community along the western perimeter of the water treatment plant site. The aquatic habitat along the 1,500 linear feet of shoreline would be buried with fill. A silt curtain, permitting the aquatic community to swim past unimpeded, would isolate the construction area of the river. The filling along the shoreline of the Harlem River to the bulkhead line would be a significant impact that would be mitigatable. (See Section 9.3.7 Natural Resources and Water Resources Mitigation.) The species diversity and abundance indicates degraded habitat conditions. Mitigation plans include on-site mitigation wetlands totaling 1.8 acres and off-site mitigation wetlands totaling 1.2 acres, which would include rip rap, woody shrubs, and submerged aquatic vegetation. These features would be an improvement from existing conditions. Therefore, the proposed project would have a significant impact on the existing aquatic resources in the Harlem River Site Study Area, but the project would not have a negative effect on the resources because the proposed mitigation plan could improve the aquatic resources in the area.

Since there is no vegetation along the shoreline, there is limited coverage, nesting areas, and foraging areas along the shoreline for wildlife to utilize. Because of the low habitat quality in this area, the construction activities would not have a significant impact to herpetiles, birds, or mammals.

During the construction phase of the proposed plant, all existing habitat would be removed from the water treatment plant site in order to provide room for the staging and construction areas. One hundred one trees would be removed. This loss would not be considered to be significantly adverse because the existing habitat is fragmented and of low quality and would be replaced with the establishment of the proposed 4.5 acres of public amenity areas within the site. Because of the low habitat quality in this area, the construction activities would not have a significant impact to herpetiles, birds, or mammals.

It is possible that construction activities would generate noise and dust on-site and in the area surrounding the site. Because the site is located within an urban area that is highly developed, the wildlife occupying or in the vicinity of the site are acclimated to disturbances. Those that are able to migrate could relocate off-site during construction. Others would be displaced due to the removal of habitat. This would be a significant impact; however, 3.0 acres of wetland and 4.5 acres of public amenity areas would compensate for the habitat loss. The mitigation wetlands and public amenity areas would provide higher quality habitat for wildlife than what currently exists on-site. Because the mitigation plans are designed to provide a higher quality habitat than what currently exists on-site, no negative effects to wildlife would be anticipated as part of the project.