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INJURIES TO HUDSON RIVER FISHERY RESOURCES:  
FISHERY CLOSURES AND CONSUMPTION RESTRICTIONS  
HUDSON RIVER NATURAL RESOURCE DAMAGE ASSESSMENT

*Final Report*

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## **Injuries to Hudson River Fishery Resources: Fishery Closures and Consumption Restrictions**

### **EXECUTIVE SUMMARY**

The Hudson River fishery is an important natural resource that has provided significant recreational, economic, cultural and ecological services to the public. This report examines 1) the past and present injuries to fishery resources resulting from the accumulation of polychlorinated biphenyls (PCBs) in Hudson River fish, and 2) the subsequent actions taken by New York state officials to limit use of the resource in order to protect public health. Since 1974, numerous studies have documented high levels of PCBs in the water, sediments, and fish of the Hudson River, and the United States Environmental Protection Agency (EPA) has designated 200 miles of the Hudson River, from Hudson Falls to the Battery in New York City, as a Superfund site.

This injury report is a component of a broader investigation being carried out by three governmental agencies: the New York State Department of Environmental Conservation (DEC), the U.S. Department of the Interior (DOI), and the National Oceanic and Atmospheric Administration (NOAA). These agencies, which act on the public's behalf as trustees of the Hudson River's natural resources, are conducting a "natural resources damages assessment" to determine whether the Hudson's natural resources have been injured as a result of releases of PCBs to the River. The Trustees will then evaluate how best to restore those resources and the services they provide.

Since 1975, the presence of high levels of PCBs in the fish has led New York State officials to close various recreational and commercial fisheries and to issue advisories restricting the consumption of fish taken from the Hudson. Recreational fishing in the 40 mile reach of the upper Hudson between Hudson Falls and the Troy Dam was prohibited from 1976 until 1995. The recreational fishery in this reach was then designated as catch and release, although possession of fish remains illegal. In addition, a number of important commercial fisheries below Troy Dam have been closed or severely restricted for nearly twenty-five years. At the same time, advisories against consumption of Hudson River fish have been in effect over the entire 200 mile stretch of the river from Hudson Falls to the Battery. Many of these closures and advisories continue to the present day. This report documents the events that led to the imposition of these restrictions, their changing scope over time, and the nature of the restrictions that still exist today.

This report confirms that the public's use of the Hudson River fishery, whether for a livelihood, a source of recreational enjoyment, or for nutrition, has been and continues to be severely curtailed as a result of the closures and health advisories detailed in this report. The Trustees conclude that this constitutes an injury to this natural resource within the meaning of federal regulation. Additional reductions in PCB contamination levels will be necessary to bring about the removal of these restrictions. It is the Trustees' intention to prepare a future report which will present their evaluation of the type and amount of restoration that may be necessary to make the public whole for the loss of this injured resource.

## **List of Exhibits**

1. Locator Map for the Hudson River from Hudson Falls to the Battery
2. Total PCB (Wet Weight) vs Year Sampled for Thompson Island Pool
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## **Injuries to Hudson River Fishery Resources: Fishery Closures and Consumption Restrictions**

### **1. Introduction**

Since 1975, New York State has restricted fishing in the Hudson River and the consumption of fish taken from the Hudson because of the presence of high concentrations of polychlorinated biphenyls (PCBs) in the fish. The Hudson River fishery is an important natural resource which has provided significant recreational, economic, cultural and ecological services. Both the freshwater and estuarine portions of the river support diverse fish populations. The river is home to resident, anadromous, and marine species and has, in the past, supported both a commercial and a recreational fishery (Hetling et al., 1978). However, the presence of high levels of PCBs in the fish has led New York State officials to restrict the public's use of this resource. This report documents the events that led to the imposition of these restrictions, their changing scope over time, and the nature of the restrictions that still exist today.

This report is a component of a broader investigation of the impacts of PCBs on the Hudson River ecosystem being carried out by three governmental agencies: the New York State Department of Environmental Conservation (DEC), the U.S. Department of the Interior (DOI), and the National Oceanic and Atmospheric Administration (NOAA). These agencies act on the public's behalf as trustees of the Hudson River's natural resources.<sup>1</sup> The trustee agencies (the Trustees) initiated this investigation, called a "natural resources damages assessment," in 1997.<sup>2</sup> The goals of the assessment are to determine whether natural resources have been injured as a result of releases of PCBs to the River and, if so, to determine how to restore those resources.

The information collected and summarized in this report confirms that the public's use of and access to the Hudson River fishery have been severely curtailed because of the PCB contamination in the fish. A number of important commercial fisheries have been closed or severely restricted for nearly twenty-five years. Recreational fishing in the upper reaches of the Hudson below Hudson Falls has been prohibited for most of the same period. At the same time, advisories against consumption of Hudson River fish have been

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<sup>1</sup>The Trustees act under authority granted to them in section 107(f) of the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 U.S.C. § 9607(f), section 311(f)(5) of the Federal Clean Water Act (CWA), as amended, and other applicable Federal and state laws.

<sup>2</sup>The Trustees' decision to proceed with this investigation is documented in the *Preassessment Screen Determination for The Hudson River, New York*, issued by the State of New York, the National Oceanic and Atmospheric Administration, and the United States Department of the Interior, on October 1, 1997. The *Preassessment Screen* is available at the following website: <http://www.dec.state.ny.us/website/dfwmr/habitat/nrd/screen.htm>. The Trustees have also published a description of the assessment process in the *Scope for the Hudson River Natural Resource Damages Assessment Plan* (Sept. 1998).

in effect over the entire 200 mile length of the river from Hudson Falls in the north to New York Harbor in the south. Based on these facts, the Trustees conclude that this natural resource, the Hudson River fishery, has been injured. It is the Trustees' intention to prepare a future report which will present their evaluation of the type and amount of restoration that may be necessary to make the public whole for the loss of this injured resource.

## **2. Regulatory Background**

Regulations promulgated under CERCLA by DOI define the injury that is the subject of this investigation. The regulations provide that a natural resource injury exists whenever a hazardous substance, such as PCBs, is present in the fish flesh at concentrations sufficient to "exceed action or tolerance levels established by the Food and Drug Administration (FDA) under section 402 of the Food, Drug and Cosmetic Act, 21 U.S.C. §342, in edible portions of organisms ...;" or "exceed levels for which an appropriate State health agency has issued directives to limit or ban consumption of such organism."<sup>3</sup>

This report focuses on the New York State regulations and New York State Department of Health (DOH) consumption advisories restricting fishing and fish consumption in the Hudson which were triggered beginning in 1975 by high levels of PCBs in Hudson River fish. The Trustees are also reviewing contaminant data to assess the injury associated with exceedence of the FDA tolerance level for PCBs to be presented in a separate report.

## **3. PCB Contamination of the Hudson River**

### **3.1 Historical Releases of PCBs to the Hudson River**

Since 1974, numerous studies have documented high levels of PCBs in the water, sediments, and fish of the Hudson River (Horn et al., 1979; Armstrong and Sloan, 1988; Sloan and Armstrong, 1988; Brown et al., 1985; Sloan et al., 1983; Sloan et al., 1984; USEPA, 1991).<sup>4</sup> Because of this contamination, the United States Environmental Protection Agency ("EPA") designated a 200-mile stretch of the Hudson River, from Hudson Falls to the Battery in New York City, as a Superfund site (USEPA, 1984; USEPA, 1991).<sup>5</sup>

The primary contributors of PCBs to the Hudson River are two electrical capacitor manufacturing plants located at Hudson Falls and Fort Edward, NY, which are owned and were operated by the General Electric Company (USEPA, 1984). General Electric (GE) began using PCBs in its manufacturing processes at the Fort Edward and Hudson Falls plants in 1947 and 1952, respectively (Hetling, et al., 1978). Both

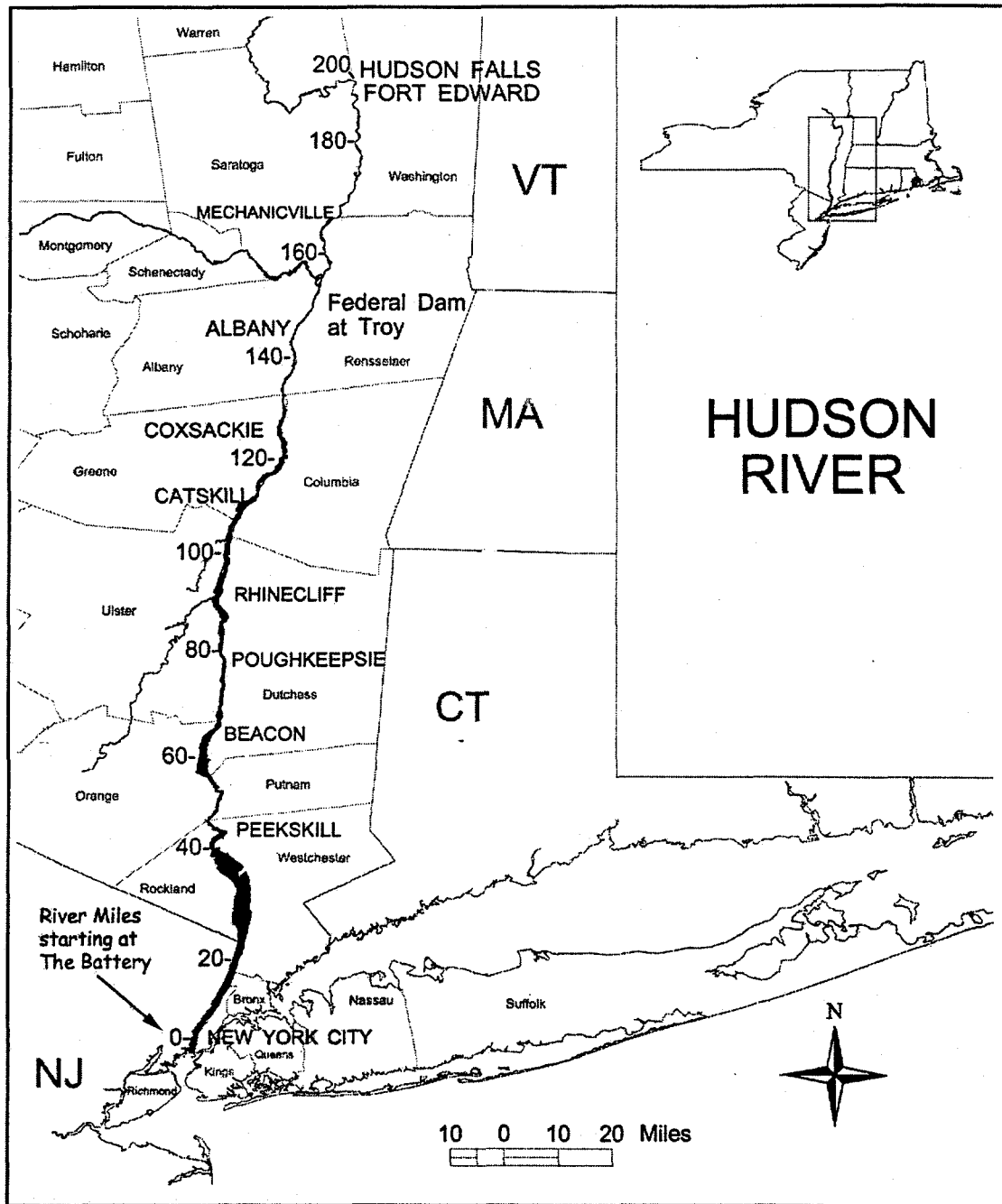
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<sup>3</sup>The regulations can be found at 43 CFR § 11.62(f)(1)(ii) and 43 CFR § 11.62(f)(1)(iii).

<sup>4</sup>PCBs are listed as hazardous substances in Table 302.4, List of Hazardous Substances and Reportable Quantities under CERCLA (40 CFR § 302.4(a)) and as toxic pollutants pursuant to 40 CFR § 401.15, as amended, under the CWA. PCBs are thus a hazardous substance within the meaning of CERCLA Section 101(14), 42 U.S.C. § 9601(14).

<sup>5</sup>Exhibit 1 depicts the location and geographic extent of the Superfund site.

Exhibit 1. LOCATOR MAP FOR THE HUDSON RIVER  
FROM HUDSON FALLS TO THE BATTERY



plants discharged manufacturing process wastewater containing PCBs directly to the Hudson River until 1977 (USEPA, 1991). Investigations of plant discharges by DEC staff in 1975 also revealed PCB discharges from the Hudson Falls plant to the sanitary sewer system leading to the Hudson Falls Village Sewage Treatment Plant, and PCB-contaminated storm water discharges to the Hudson River from both plants (NYSDEC, 1975). As discussed below, both plant sites continue to release PCBs into the river.

In 1991, EPA estimated that the amount of PCBs released from these plants to the sediments and waters of the Hudson River between 1947 and 1977 ranged from 209,000 to 1,330,000 pounds (USEPA, 1997).

### **3.2 Ongoing Releases of PCBs to the Hudson River**

Since GE ceased using PCBs at its plants in 1977, residual contamination at the plant sites has continued to impact the river (NYSDEC, 1999). In 1991 and 1992, measured PCB levels in the waters of the Hudson River rose significantly (O'Brien and Gere, 1994). As a result of further investigation, a continuing source of PCB releases to the Hudson River was discovered at the Hudson Falls plant site in October 1992. Past spills of PCBs at the plant had saturated the bedrock beneath the plant with PCB oils. These oils were found to be migrating to the river through bedrock fractures. PCBs had also accumulated inside an abandoned mill located adjacent to the Hudson Falls plant known as the Allen Mill. In September 1991, it is believed that a gate on the mill's upper raceway failed, allowing water to flow through the mill and scour out a large quantity of PCBs, causing a dramatic increase of PCB concentrations in the river water (*ibid*).

In 1994, as GE was conducting cleanup measures required by a DEC Order, other seeps of PCB-contaminated oil from GE's Hudson Falls plant were discovered. Initially, PCB product was collected from these seeps at an estimated rate of five to nine gallons daily. An unknown quantity of PCBs has entered the river through fractured bedrock under the Hudson Falls plant site (O'Brien and Gere, 1997). Estimates of current, ongoing discharges from both GE plant sites are approximately three ounces a day (Schweiger, 1999).

Contaminated sediments and soils also continue to contribute a significant amount of PCBs to the water column. EPA concluded that the contaminated sediments in the upper river are a major source of PCBs to the entire river environment as far as New York Harbor (USEPA, 1997). Sampling indicates that PCBs continue to be released from a contaminated area of river bank at the Fort Edward plant (NYSDEC, 2000; USEPA, 1997). In addition, contaminated soils/sediments in remnant deposit areas located in the upper river may also be a source of PCBs to the river (USEPA, 1991).<sup>6</sup>

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<sup>6</sup>Remnant deposits in the upper Hudson are shoals of previously submerged soil, sediment and debris which are contaminated with PCBs released from GE's Hudson Falls and Fort Edward plants. These deposits, which are located in the river between Hudson Falls and Fort Edward, were exposed when the removal of the Fort Edward dam in 1973 lowered the river level upstream of the former dam site by approximately 15 feet. Four of these deposits were capped by GE in 1991.



### 3.3 PCB Contamination of Hudson River Fish

Fish in the Hudson River accumulate PCBs in their tissues through exposure to contaminated sediment, water and food. Historical data establish a link between PCBs released and deposited to the upper river and PCBs in fish throughout the river (Sloan and Field, 1996; Skinner et al., 1996; NOAA, 1997).

New York State began assessing the levels of chemical contaminants in fish flesh in the early 1960s. Elevated levels of PCBs were first discovered in Hudson River biota in 1969, but "their importance was not recognized for several years" (Hetling et al., 1978). In the early 1970s, DEC began collecting limited data on PCBs in New York waters and fish. In 1973, the federal Food and Drug Administration (FDA) adopted a "tolerance" level for PCBs in food sold commercially, including fish, of 5 parts per million (ppm) in the edible portion (38 Fed. Reg. 18096). At least 7 of the 11 species of Hudson River fish sampled between 1970 and 1972 had concentrations of PCBs (wet weight) which exceeded that level. Largemouth bass were found to have PCB levels ranging from 0.66 ppm to 53.81 ppm. Other species had maximum concentrations ranging from 7.03 to 17.78 ppm (Spagnoli and Skinner, 1977). In 1973, Hudson River sampling focused on areas below the Troy Dam and included primarily American shad and striped bass. Sampling results confirmed elevated PCB levels of 2.3 to 67.4 ppm in American shad and 3.7 to 49.6 ppm in striped bass (*ibid*).

In August 1974, after the establishment of the FDA tolerance level, EPA conducted an investigation of PCB contamination in the Upper Hudson (Nadeau and Davis, 1974). Water column and sediment samples were taken in the vicinity of the Hudson Falls and Fort Edward plants, as well as composites of snails and samples of shiner minnows and rock bass. This preliminary field investigation revealed extremely high levels of PCB contamination in all media (2.8 ppm in water and 6,700 ppm in sediments at Fort Edward outfall; 45 ppm in snail composite; 78 ppm in shiner minnows; and 350 ppm in a rock bass) (Nadeau and Davis, 1976). EPA concluded that the contamination of the Hudson River exceeded, in level and scope, any other area in the United States (USEPA, 1975).

EPA reported these high PCB levels to DEC. As a consequence, beginning in December 1974, DEC undertook a systematic PCB sampling program, in conjunction with EPA, in order to determine the levels and extent of PCB contamination in the waters and sediments of the upper Hudson in the area of GE's plants, and to identify sources and assess the significance of the contamination. DEC found high levels of PCBs in Upper River water and sediments resulting from the activities of the GE plants (NYSDEC, 1975).

In 1975, DEC initiated a systematic program of sampling fish for PCB analysis. The 1975 sampling results for the Hudson River were reported in NYSDEC, 1976 and by Spagnoli and Skinner (1977). Close to 100% of all samples taken from stations at and below Fort Edward exceeded the 5 ppm FDA tolerance level. Reviewing the sampling data from the Hudson River from 1970-75, Spagnoli and Skinner concluded that "the Hudson River below Hudson Falls contains fish with the highest level of total PCBs of any waterway sampled" (Spagnoli and Skinner, 1977). Results above 50 ppm were not uncommon in the larger, oilier fish; the highest individual concentration recorded during this period was 559.25 ppm in a large eel.

Since 1975, DEC's monitoring program has regularly measured PCB levels in fish from the Hudson River. Elevated PCB levels were found in collections of many fish species during the 1970s, with the highest concentration of 1,836 ppm found in a goldfish from the Stillwater Pool in 1977 (NYSDEC, 2001). Initially, collections were targeted for 660 fish with an emphasis on recreational and commercially important species, including striped bass, American shad, largemouth bass, brown bullhead, yellow perch, goldfish, white perch, Atlantic tomcod and American eel (NYSDEC, 1977). At the present time, the long term PCB monitoring project samples as many as 960 fish from nine locations. The program emphasizes the same species as previously, with the exception that carp replaced goldfish, and catfish (white and channel) are now being emphasized more in some areas (Sloan, 2000).

In general, sampling results indicate that PCB concentrations in fish flesh are highest near Hudson Falls and Ft. Edward. PCB levels in the Hudson dropped quickly in the first three years following cessation of direct manufacturing discharges from the plant sites in 1977, but decreased much more slowly thereafter and have remained relatively stable since the early 1980s (USEPA, 2000) (see Exhibits 2, 3, 4 and 5). As noted above, there was an upsurge in PCB levels in 1992 and 1993, which coincided with the presumed failure of the gate structure in the old Allen Mill, and then a subsequent decline to pre-1992 levels as that release was reduced (*ibid*). Since 1995, fish PCB concentrations have been relatively stable, with levels in most species in the upper river remaining above the revised FDA tolerance level of 2 ppm set in 1984 (21 CFR Part 109.30(a)(7)); (USEPA, 2000; NYSDEC, 2001).<sup>7</sup> In 1996, PCB concentrations averaged 12 ppm for fish in the upper Hudson River and 3 ppm in the lower Hudson River (USEPA, 1996).

Numerous fish tissue samples taken throughout the river have shown lipid-based PCB concentrations (i.e., the concentrations of PCBs in the fatty tissues of the fish) up to four orders of magnitude, or 10,000 times, greater than background PCB levels in fish from other areas of the river basin (Sloan and Field, 1996). On a wet weight basis (i.e., concentrations of a substance in the fish in a fresh state), PCB concentrations remain one to three orders of magnitude greater than levels which have been identified as protective of human health or the environment (see Great Lakes Sport Fish Advisory Task Force, 1993; Newell et al, 1987; Sloan, 1999; Sloan and Field, 1996; USEPA, 1997 and 2000a).<sup>8</sup>

#### **4. State Directives to Limit or Ban Consumption of Hudson River Fish**

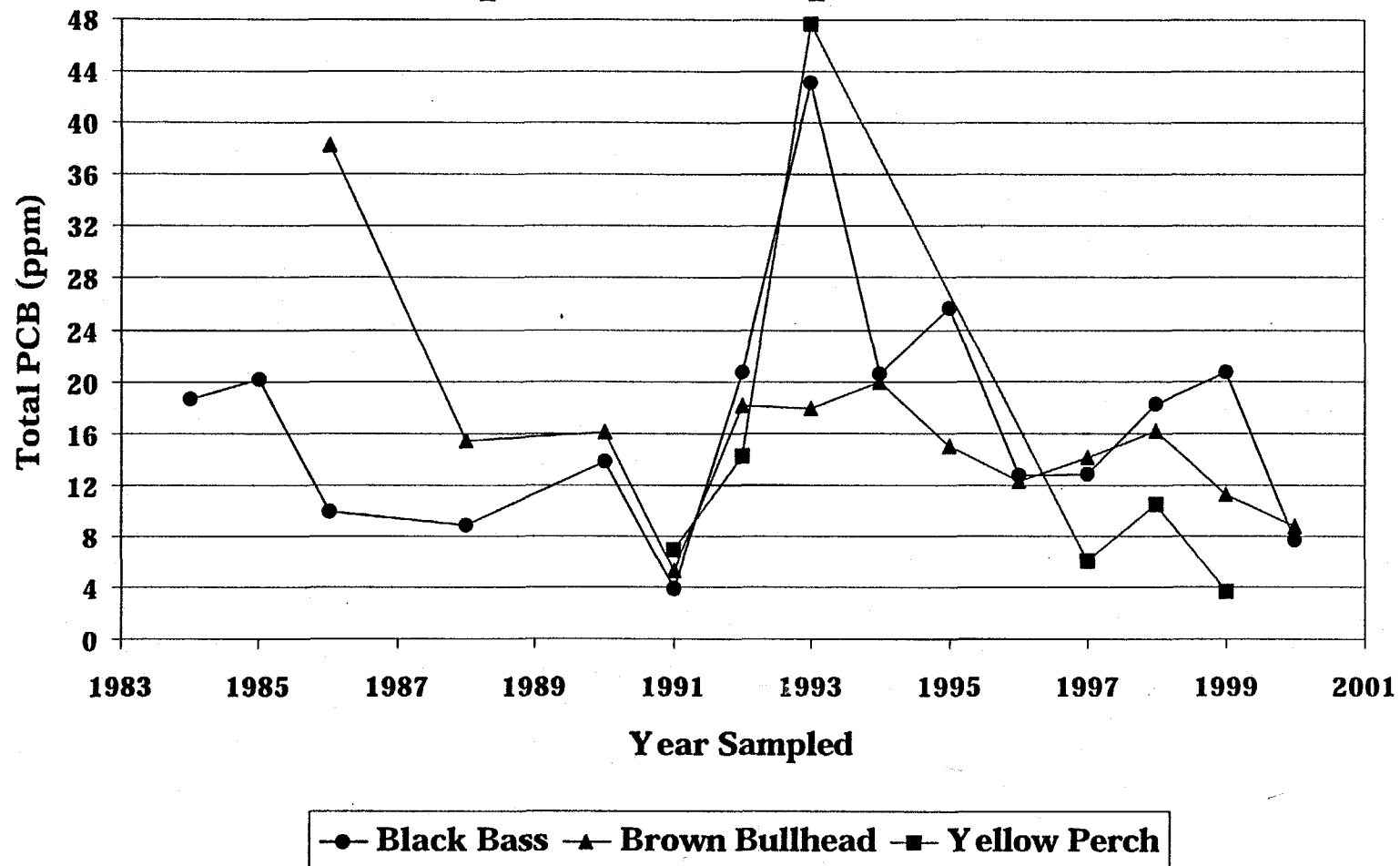
According to the DOI regulations, fishery resources are injured if the fish contain concentrations of a hazardous substance that exceed levels for which a state health agency has issued directives to limit or ban consumption of such organism [43 CFR § 11.62 (f)(1)(iii)]. Between 1975 and the present, New York State public health and environmental officials have taken two types of action in response to the high levels of PCBs measured in Hudson River fish. DEC has exercised its statutory authority to close fishing for certain or all species in a water body or to restrict the possession of fish. In addition, the New York State

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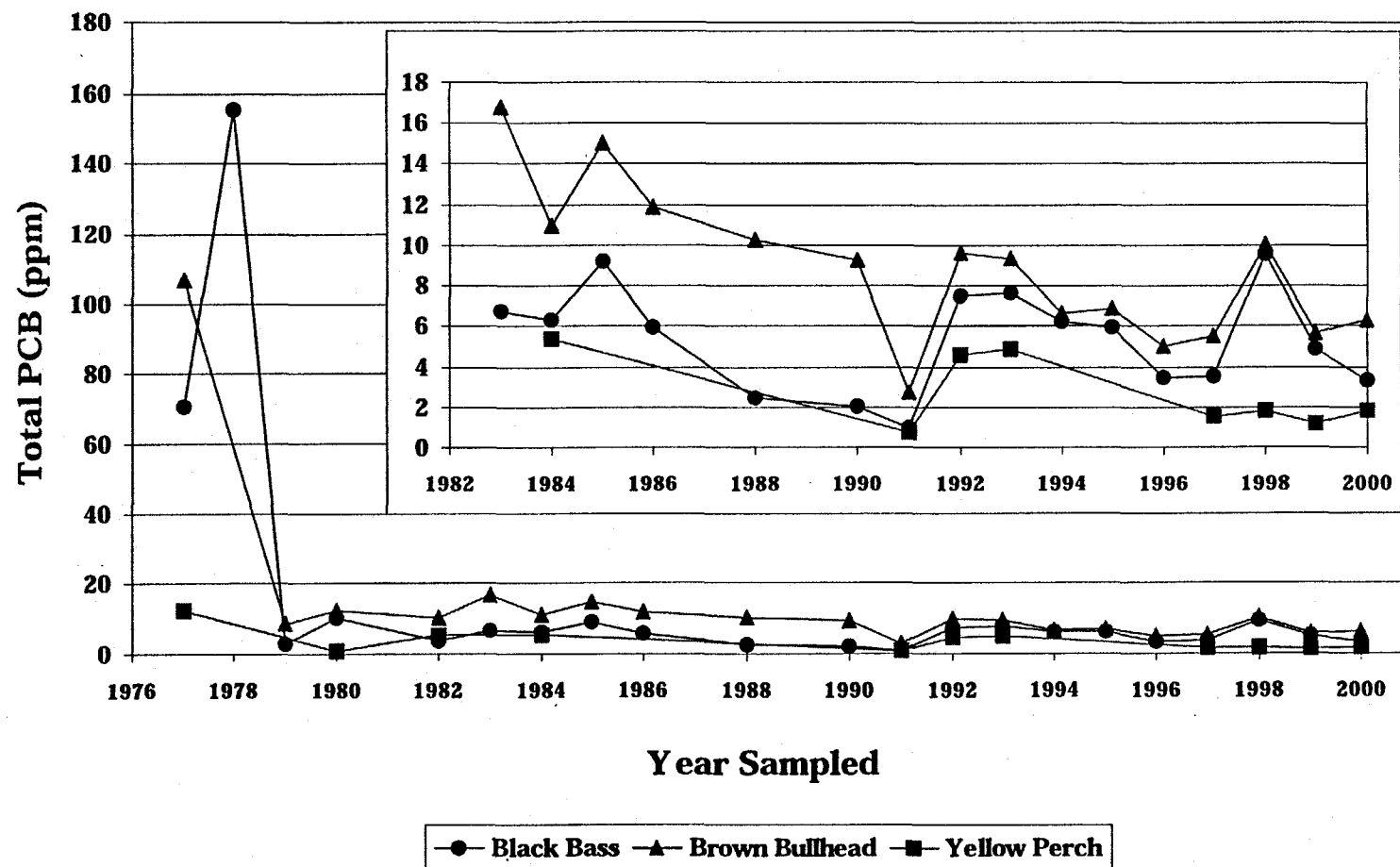
<sup>7</sup>Exhibits 2, 3, 4 and 5 depict PCB levels in selected fish in four locations in the upper (Thompson Island Pool and Stillwater/Coveville) and lower (Catskill and Tappan Zee) Hudson River over time, calculated on a wet weight basis.

<sup>8</sup>Lipid-based expression is the preferred method to evaluate contaminant trends through space and time. The concentration of a contaminant in fish flesh (wet weight basis) best expresses the potential dose of a contaminant that consumers of fish will receive.

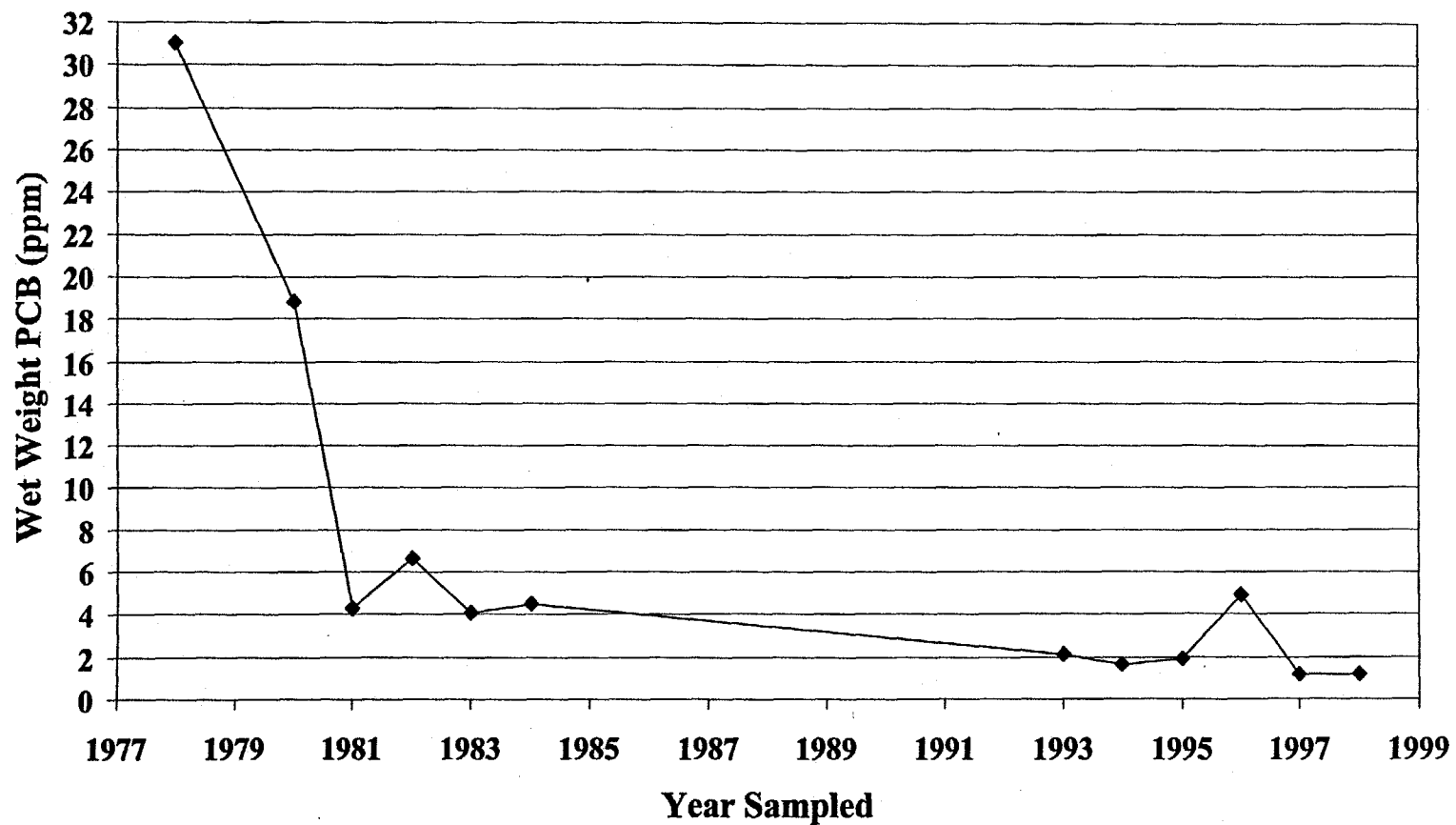
**Exhibit 2. Total PCB (Wet Weight)  
vs Year Sampled for Thompson Island Pool**



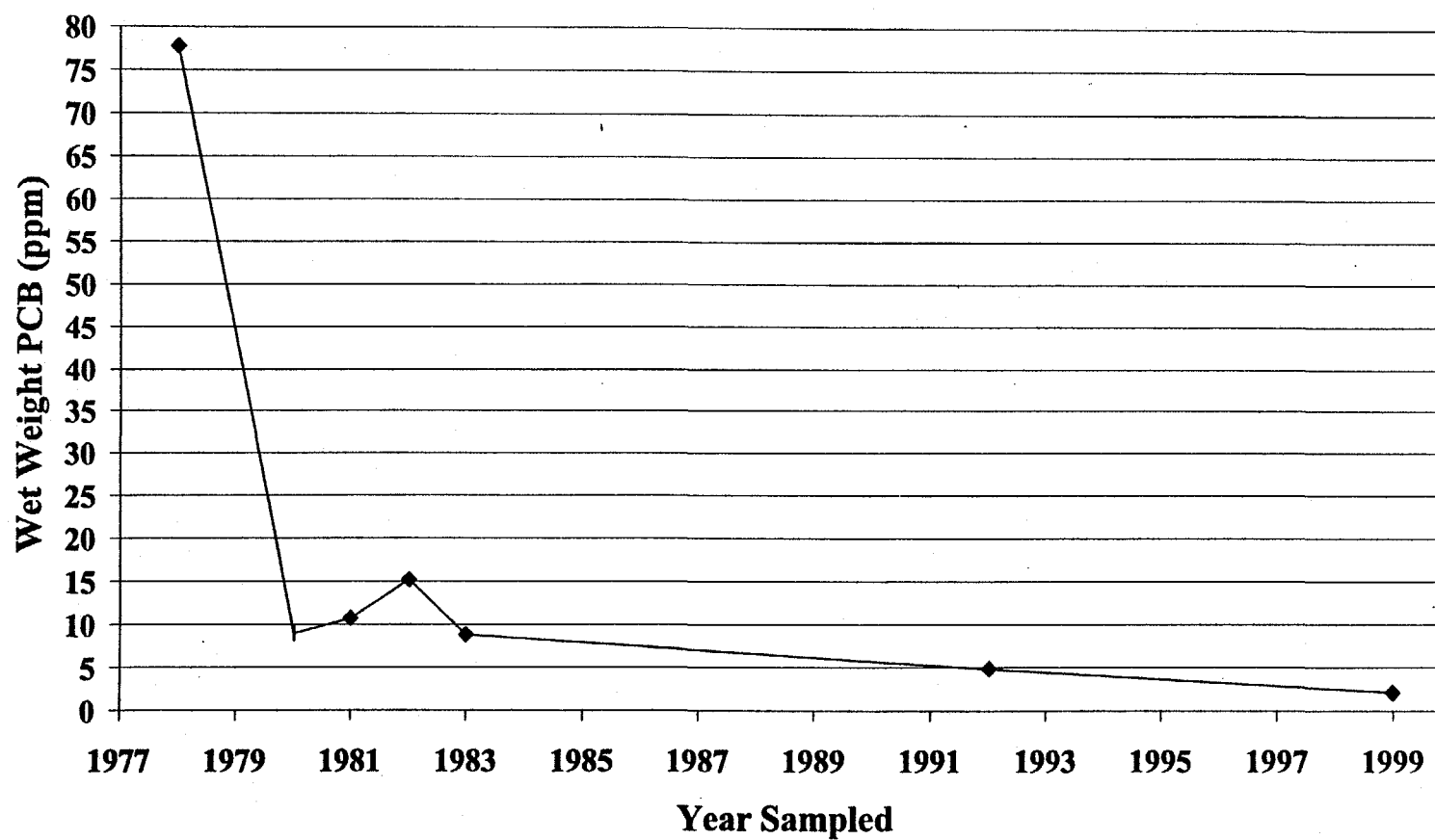
**Exhibit 3. Total PCB (Wet Weight)  
vs Year Sampled for Stillwater/Coveville**



**Exhibit 4. Total PCB (Wet Weight) in  
White Perch vs Year Sampled for Catskill**



**Exhibit 5. Total PCB (Wet Weight) in  
American Eel vs Year Sampled for Tappan Zee**



Department of Health (DOH) has issued advisories recommending that the public limit its consumption of contaminated fish species. Both agencies took these actions to protect public health by limiting or banning consumption of PCB-contaminated fish. These types of actions, "directives to limit or ban consumption," fall within the definition of injury provided by the DOI regulations. Provided below is a chronological history of the fishing closures and health advisories for Hudson River fish imposed because of PCB contamination.

#### **4.1 Recreational & Commercial Fishing Closures**

The New York Environmental Conservation Law was amended in May 1970 to give DEC the authority to restrict the taking of fish or the sale or possession of fish in response to a threat to public health certified by either the DOH or the New York State Department of Agriculture and Markets (DAM). In the early 1970s, DEC acted on the recommendation of an interagency committee of individuals representing each of the three agencies. More recently, DEC has taken action to regulate the taking, possession or sale of fish based on a DOH certification of a danger to the health and welfare of the human population. DEC issues specific regulations to establish these restrictions (see Exhibit 6 for a schematic overview of fishing closures from 1976 to 2001). The current version of these regulations can be found in the New York Code of Rules and Regulations (NYCRR), Title 6, Part 10 et seq. (see, in particular, 6 NYCRR §§ 11.2 and 11.3 restricting the taking of certain Hudson River fish and the possession and sale of striped bass).

##### **4.1.1 The First Regulatory Closure of the Fishery**

In October 1975, New York Governor Carey appointed a special commission to study the public health implications of elevated levels of PCBs in the Hudson River and to make recommendations for action. In its February 1976 report to the Governor, the Eisenbud Commission found that most species of Hudson River fish were contaminated with levels of PCBs that exceeded the FDA guideline of 5 ppm "by a substantial margin" (Eisenbud, 1975). The Commission recommended that no fish be taken from Fort Edward to the Troy Dam, and specifically indicated that "[t]his action is justified by the extraordinarily high levels of PCBs found in all species of fish in this reach of the river." In addition, it was recommended that no eels taken from the Hudson River be consumed, that the taking of eels be banned, and that, with the exception of shad, all commercial fishing in the reaches of the Hudson within New York State also be banned. Finally, the Commission recommended that, while sportfishing could be allowed below the Troy Dam, the public should restrict their intake of Hudson River fish to one meal a week; infants, young children, and pregnant women should avoid eating any fish from the Hudson River; and sale of such fish should be banned (*ibid*).

New York acted quickly after the Eisenbud Commission issued its report. On February 24, 1976, DOH Commissioner Whalen certified to DEC Commissioner Reid that "the health and welfare of the human population may be endangered by the consumption of fish taken from the Hudson River between Fort Edward and the Battery by reason of a concentration of polychlorinated biphenyls in such fish." Following the Commission's recommendations, Whalen advised that no fish taken between Fort Edward and Troy Dam be consumed, that no eels taken from the Hudson River be consumed, that public consumption of fish taken below Troy Dam be limited to one meal a week, and that infants and pregnant women eat no fish from the Hudson (Whalen, 1976). The next day, DEC Commissioner Reid issued an order and a set of regulations

Hudson River PCB-Based Regulatory Closures (Commercial and Recreational)																										
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>Commercial</b>																										
(Troy Dam to Battery)																										
Commercial fishing banned for:																										
All Species Including: <sup>1,2</sup>																										
Atlantic Sturgeon (less than 4 ft.)																										
Black Crappie																										
Brown Bullhead																										
Common Carp (except as bait)																										
Goldfish (except as ornaments)																										
Pumpkinseed																										
White Catfish																										
White Perch																										
Striped Bass																										
American Eel (Fort Edward to Battery)																										
<b>Recreational</b>																										
Recreational fishing banned for:																										
All Species (Fort Edward to Troy Dam)																										
American Eel (Fort Edward to Battery)																										
Striped Bass (Troy Dam to Battery)																										
Key:																										

- Notes:
- 1 Effective 2/25/76. Commercial fishing banned for all species except Atlantic Sturgeon greater than 4 ft. in length, Goldfish, and American Shad from Troy Dam to the Battery. All fishing and taking of American Eel prohibited from Fort Edward to Troy Dam.
  - 2 Commercial taking of baitfish allowed, 7/19/76.
  - 3 Ban on taking or possession of American Eel extended to Harlem and East Rivers, 8/4/77.
  - 4 Commercial fishing allowed for all species except Common Carp, Goldfish, White Catfish, or White Perch, effective 2/23/82. Taking of Carp and White Perch for use as bait permitted.
  - 5 Taking or possession of American Eel less than 14 in. in length for use or sale as bait permitted; taking and sale of American Eel to foreign countries allowed, 2/23/82, then prohibited, 10/6/82. Taking of Eel for bait permitted to the present.
  - 6 Commercial closure expanded to additional species, 2/8/85.
  - 7 Statewide closure of commercial and recreational Striped Bass fishery, 7/5/86. Recreational closure lifted 4/27/87.
  - 8 Closure area re-defined as Bakers Falls to Troy Dam, 11/2/87.
  - 9 Recreational catch and release fishing permitted from Ft. Edward to Troy Dam, 8/30/95. Possession of fish and American Eel remain prohibited.



prohibiting (1) all fishing and the taking of American eel between Fort Edward and Troy Dam; (2) all commercial fishing, except for Atlantic sturgeon greater than four feet, goldfish and American shad, from Troy Dam to the Battery; (3) all taking of American eel; and (4) the sale of any fish or American eel taken from the Hudson River from Fort Edward to the Battery (Reid, 1976; 6 NYCRR § 12.19). This event closed most of the commercial fisheries in the Hudson, prohibited recreational angling in the Upper River, and thus severely restricted the public's use of the resource (see Exhibit 7).

#### **4.1.2 Changes in the Regulatory Closures from 1976 to present**

Since 1976, DEC has adjusted the closures from time to time based on the accumulating contaminant data. This process was formalized in DEC's 1985 Policy on Contaminants in Fish, which provided that a closed recreational or commercial fishery could not be re-opened without a Health Department certification that the conditions requiring the closure were no longer present (NYSDEC, 1985). While there have been some modifications over time, as set out below, most of the components of the initial closures remain in place to this day (see Exhibit 8).

#### **4.1.3 Hudson Falls to the Troy Dam**

DEC's February 25, 1976 order closed *all* fishing from Hudson Falls to the Troy Dam, an expanse of more than 40 river miles. The prohibition applied to both recreational and commercial fishing. This ban remained in place until 1995, when DEC modified the regulations to permit "catch and release" recreational fishing within this reach (6 NYCRR §§ 10.3 and 11.2). Despite the fact that New York State Commissioner of Health DeBuono certified that she had no objection to a "catch and release" designation, she conditioned her opinion upon the requirement that an eat none advisory remain in effect, as discussed below at 4.2.5 (DeBuono, 1995). Commercial fishing is still prohibited in this reach.

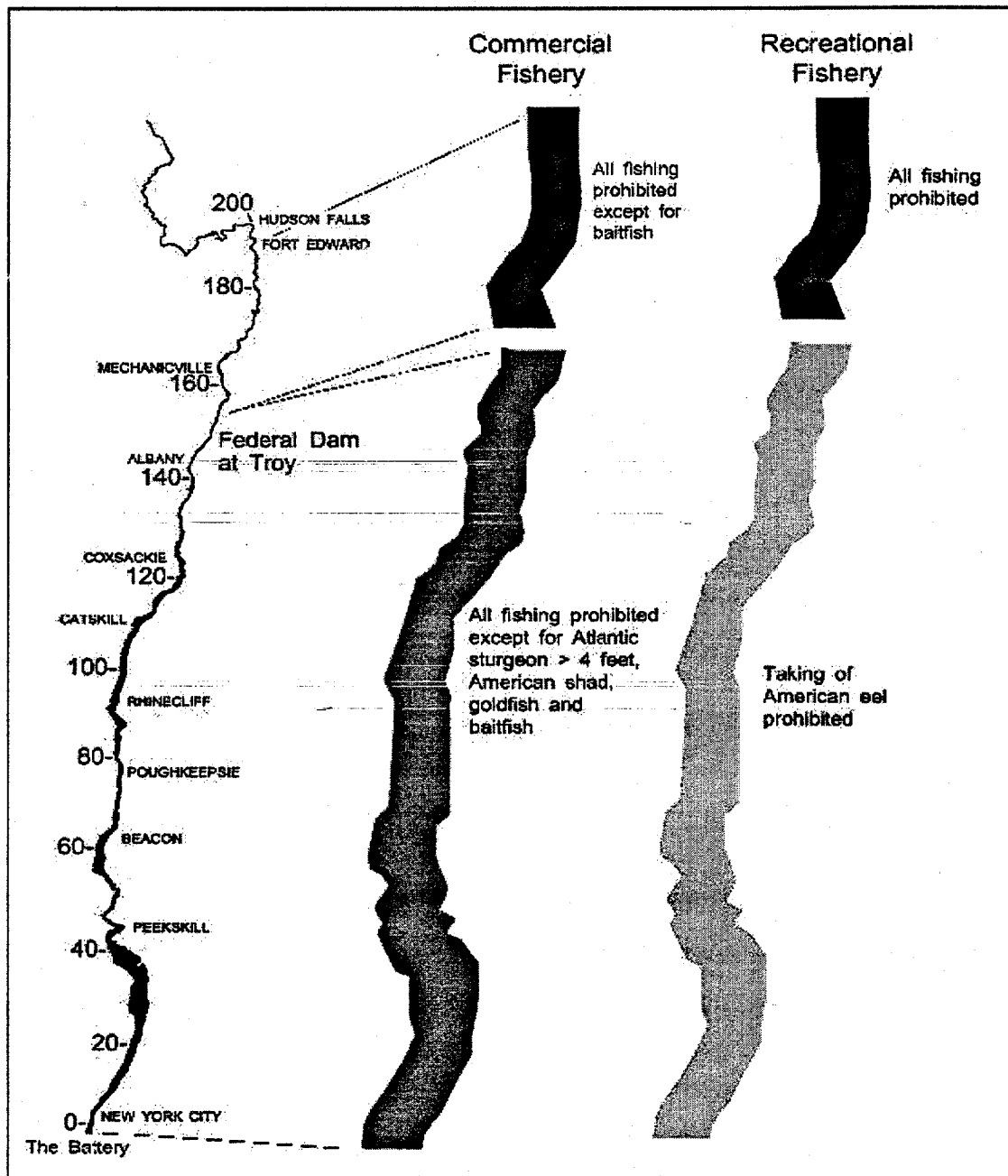
#### **4.1.4 Commercial Fishing Below the Troy Dam**

Beginning on February 25, 1976, *all* commercial fishing, with exceptions for baitfish, Atlantic sturgeon greater than four feet, American shad, and goldfish used for ornamental purposes, was banned in the Hudson River between the Troy Dam and the Battery in New York City (6 NYCRR § 12.19). The commercial fishing ban, with periodic adjustments, has remained in effect to the present. For example, in 1982 DEC re-opened this reach for certain species, but continued the ban on commercial fishing for striped bass, American eel, common carp, goldfish, white catfish and white perch (6 NYCRR §§ 11.2 and 11.4). In 1985, the commercial fishing closure below Troy was again expanded to include black crappie, brown bullhead and pumpkinseed (*id.*). These closures have remained unchanged since 1985 (6 NYCRR § 11.2).

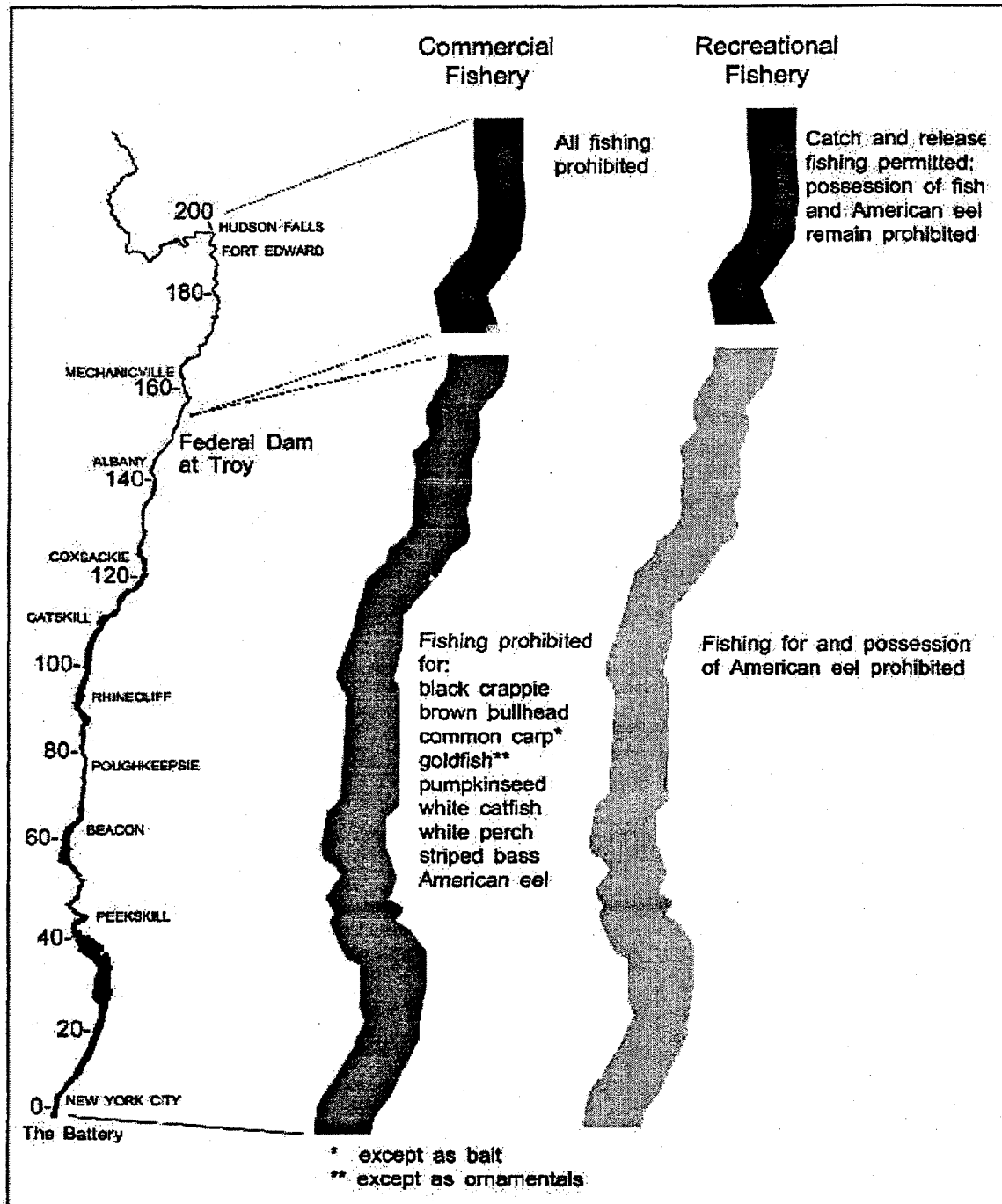
#### **4.1.5 Recreational Fishing Below the Troy Dam**

In general, NYSDEC has not prohibited recreational fishing in this part of the river. However, the state banned recreational striped bass fishing from May 6, 1986 until April 27, 1987, based in large part on the elevated PCB levels found in Hudson River striped bass (6 NYCRR § 11.3). DEC has also banned the taking of American eel from 1976 until the present (6 NYCRR § 12.19, renumbered § 11.3 and then § 11.2). During this period, DEC and DOH did issue fish consumption advisories warning the public to either avoid

# Exhibit 7. HUDSON RIVER FISHERY CLOSURES in 1976



# Exhibit 8. HUDSON RIVER FISHERY CLOSURES for 2000-2001



or limit consumption of Hudson River fish taken from this reach because of the excessive levels of PCB contamination found in them. These advisories are discussed below.

## **4.2 Fish Consumption Advisories**

In addition to the regulatory closures of the fishery described above, New York State health officials have also acted to protect the public by issuing fish consumption advisories. These warnings have been continuously in effect on the Hudson River, from Fort Edward to the Battery, since 1975 (see Exhibits 9a and 9b). Initially issued through DEC and DOH press releases, the state has also published these health advisories in DEC's *Fishing Regulations Guide* since 1978, and in an annual DOH Health Advisory publication titled *Chemicals in Sportfish and Game* beginning in 1990. The following section provides an overview of New York's advisory program and then describes the nature and extent of the advisories for Hudson River fish.

### **4.2.1 Overview of New York's Advisory Program**

Since 1970, the New York State Department of Health has issued health advisories recommending that people restrict their consumption of contaminated sportfish. The origin of health consumption advisories in New York State was the emerging evidence, in the early 1970s, of the presence of contaminants in sportfish from some New York waters, including Lake Ontario, Lake Champlain and Onondaga Lake. As a result, to be protective of human health across the state, the New York State Departments of Health, Agriculture and Markets, and Environmental Conservation established a general, statewide advisory to eat no more than one meal of fish per week from any waters of the state (State of New York, 1971). This step marked the beginning of the Department of Health's fish consumption advisories. The general advisory is not based on a specific, known contaminant, but rather is intended to protect the public against unlimited consumption of fish from waters that are as yet untested or may contain unidentified contaminants (see NYSDOH, 1989).

In addition to the general advisory, DOH applies more restrictive advisories to water bodies that have been determined to be contaminated with specific contaminants. These advisories may be to eat no more than one meal a month or to consume none of a specific species of sportfish from a specific water body. DOH further advises persons at special risk, such as women of childbearing age and children under the age of 15, not to eat *any* fish from water bodies subject to one of these more restrictive advisories. Since 1971, DOH has issued multiple advisories on sportfish from New York State waters because of their contamination with toxic chemicals. Over time, advisories have been imposed, revised and removed to reflect current data and the developing understanding of the health hazards posed by those contaminants.

### **4.2.2 Hudson River Advisories**

New York first issued advisories based on the elevated PCB levels in Hudson River fish in 1975. In an August 1975 press release, the Commissioners of both DOH and DEC joined in warning the public against consumption of any striped bass from the Hudson River and in recommending that people limit their consumption of other species of Hudson River fish because of the excessive concentrations of PCBs in those

Exhibit 9a

Summary of Hudson River PCB-based Fish Consumption Advisories: Hudson Falls to Catskill																												
Year Advisory Issued	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984 <sup>4</sup>	1984 <sup>4</sup>	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994 <sup>5</sup>	1995	1996	1997	1998	1999	2000	2001
<b>Hudson Falls to Troy Dam<sup>1</sup></b>																												
All Fish Species																												
<b>Troy Dam to Catskill</b>																												
<b>Persons at Special Risk<sup>2</sup></b>																												
All Fish Species																												
<b>General Population<sup>3</sup></b>																												
All Fish Species including:																												
Alewife																												
American Eel																												
Atlantic Needlefish																												
Black Crappie																												
Bluefish																												
Blueback Herring																												
Brown Bullhead																												
Carp																												
Goldfish																												
Largemouth Bass																												
Northern Pike																												
Pumpkinseed																												
Rainbow Smelt																												
Rock Bass																												
Smallmouth Bass																												
Striped Bass																												
Tiger Muskellunge																												
Walleye																												
White Catfish																												
White Perch																												
Yellow Perch																												
Blue Crab																												
Key:																												

- Notes:
- 1 Closure area redefined as Bakers Falls to Troy Dam, November 22, 1987.
  - 2 Defined as infants and pregnant women (1976-1982); as women of childbearing age, infants, and children under 15 (1982-present)
  - 3 Defined as all persons other than those at "special risk" (i.e., men, women over childbearing age, and children 15 and older).
  - 4 Initial 1984 advisory from 6/24/84 to 11/15/84; revised advisory from 11/16/84 to 5/24/85.
  - 5 Special advice for American shad, 1994-present: for persons at special risk, a few meals/year is an acceptable risk; for general population, statewide advisory applies.

900021

Summary of Hudson River PCB-based Fish Consumption Advisories: Catskill South																												
Year Advisory Issued	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984 <sup>1</sup>	1984 <sup>1</sup>	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994 <sup>2</sup>	1995	1996	1997	1998	1999 <sup>3</sup>	2000	2001 <sup>6</sup>
Catskill South <sup>1</sup>																												
Persons at Special Risk <sup>2</sup>																												
All Fish Species																												
General Population <sup>3</sup>																												
All Fish Species including:																												
American Eel																												
Atlantic Needlefish																												
Black Crappie																												
Bluegill																												
Blueback Herring																												
Bluefish																												
Brown Bullhead																												
Carp																												
Goldfish																												
Largemouth Bass																												
Northern Pike																												
Pumpkinseed																												
Rainbow Smelt																												
Smallmouth Bass																												
Striped Bass																												
Tiger Muskelunge																												
Walleye																												
White Catfish																												
White Perch																												
Blue Crab																												
Key:																												

- Notes: 1 1976-1985, southern terminus of advisory area-Hudson River to the Battery. 1985-1995, southern terminus expanded to include New York Harbor. From 1995 to present, advisory area narrowed to Upper Bay of New York Harbor (north of Verrazano-Narrows Bridge).
- 2 Defined as infants and pregnant women (1976-1982); as women of childbearing age, infants, and children under 15 (1982-present)
- 3 Defined as all persons other than those at "special risk" (i.e., men, women over childbearing age, and children 15 and older).
- 4 Initial 1984 advisory from 6/24/84 to 11/15/84; revised advisory from 11/16/84 to 5/24/85.
- 5 Special advice for American shad, 1994-present: for persons at special risk, a few meals/year is an acceptable risk; for general population, statewide advisory applies.
- 6 Advisory for American eel taken between Dobbs Ferry and Greystone: EAT NONE.

fish (NYSDEC, 1975).<sup>9</sup> Following this initial advisory, in his February 24, 1976 letter to DEC Commissioner Reid, DOH Commissioner Whalen certified that the health and welfare of the human population could be endangered by the consumption of fish taken from the Hudson River between Fort Edward and the Battery because of the concentration of PCBs in the fish (Whalen, 1976). He specifically advised that no fish taken between Fort Edward and Troy Dam be consumed, that eels taken from the Hudson River not be consumed, and that infants and pregnant women eat no fish from the Hudson River (*ibid*) (see Exhibit 10).

Since 1976, the Hudson River advisories have been modified as needed, when new fish contaminant data became available and when the FDA lowered the tolerance for PCBs in fish from 5 to 2 ppm. Contaminant level data collected by DEC is regularly communicated to DOH staff. DOH then reviews the data and determines whether any updating or revision of existing advisories is required. DOH notifies the public of any changes in the advisories through a DOH press release and through the publication of the current health advisories for all New York water bodies in both DOH's annual Health Advisory booklet and in DEC's annual Fishing Regulations Guide. The details of these advisory modifications are discussed below.

#### 4.2.3 Hudson River Advisories for Persons at Special Risk

As noted above, DOH sets more stringent consumption protocols for "persons at special risk." The reason for this specific advice is the concern that environmental contaminants such as PCBs can accumulate in a mother's body and be passed on to a fetus or to a nursing infant through the mother's milk, or can accumulate in a young child, with the potential to cause adverse effects to developing systems of the fetus or young child (NYSDOH, 1985). In 1976, state health officials specifically advised that infants, young children and pregnant women to avoid eating any fish from the Hudson River because of PCB contamination (State of New York, 1976). In 1982, the "persons at special risk" group was redefined as women of childbearing age, infants, and children under the age of 15, a definition that has remained unchanged to the present (Axelrod, 1982; NYSDOH, 2000).<sup>10</sup> The *no consumption* advisory for this group remains in effect, with the exception of special advice for American shad (see Exhibit 11).<sup>11</sup>

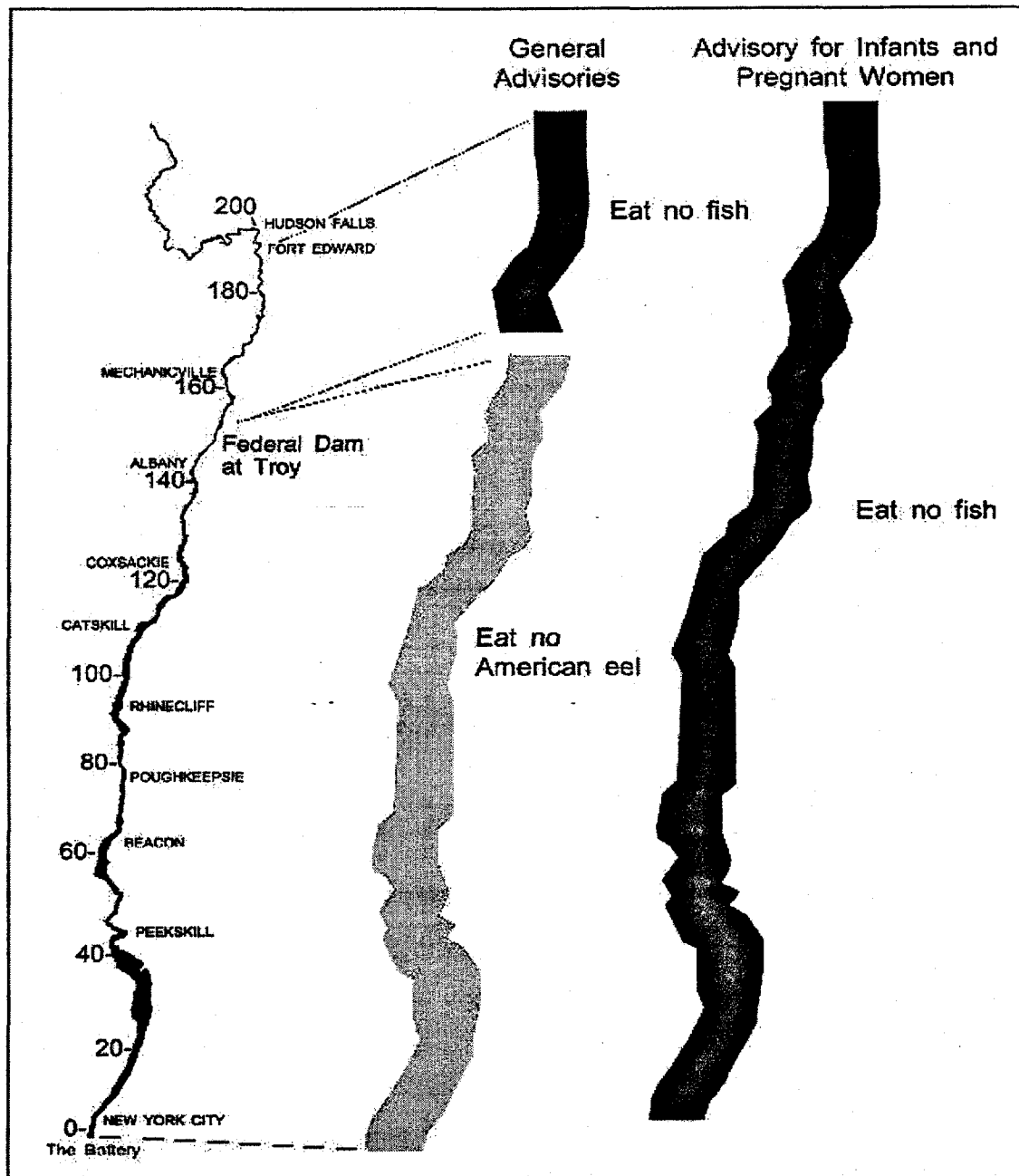
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<sup>9</sup>As stated in the 1975 and 1976 press releases and the 1976 DOH certification letter which established the first advisories, the basis for the Hudson River fish advisories was and continues to be the PCB contamination. The DOH Health Advisory publications from 1993 to the present specifically list PCB as the sole chemical of concern for Hudson River fish. See, e.g., *Chemicals in Sportfish and Game Health Advisories 2000-2001*. In contrast, the consumption advisory for blue crab taken from the Hudson, issued by DOH in 1981, is based on contamination with both cadmium and PCBs (NYSDOH, 1981). The *six crabs per week* blue crab advisory for the general population continues to the present (NYSDOH, 2000).

<sup>10</sup>In 1999, persons at special risk, as defined by DOH, represented approximately 44% of the population of New York State. This estimation was based on the number of all male children under the age of 15 and all females 45 and younger (National Data Book, 1999).

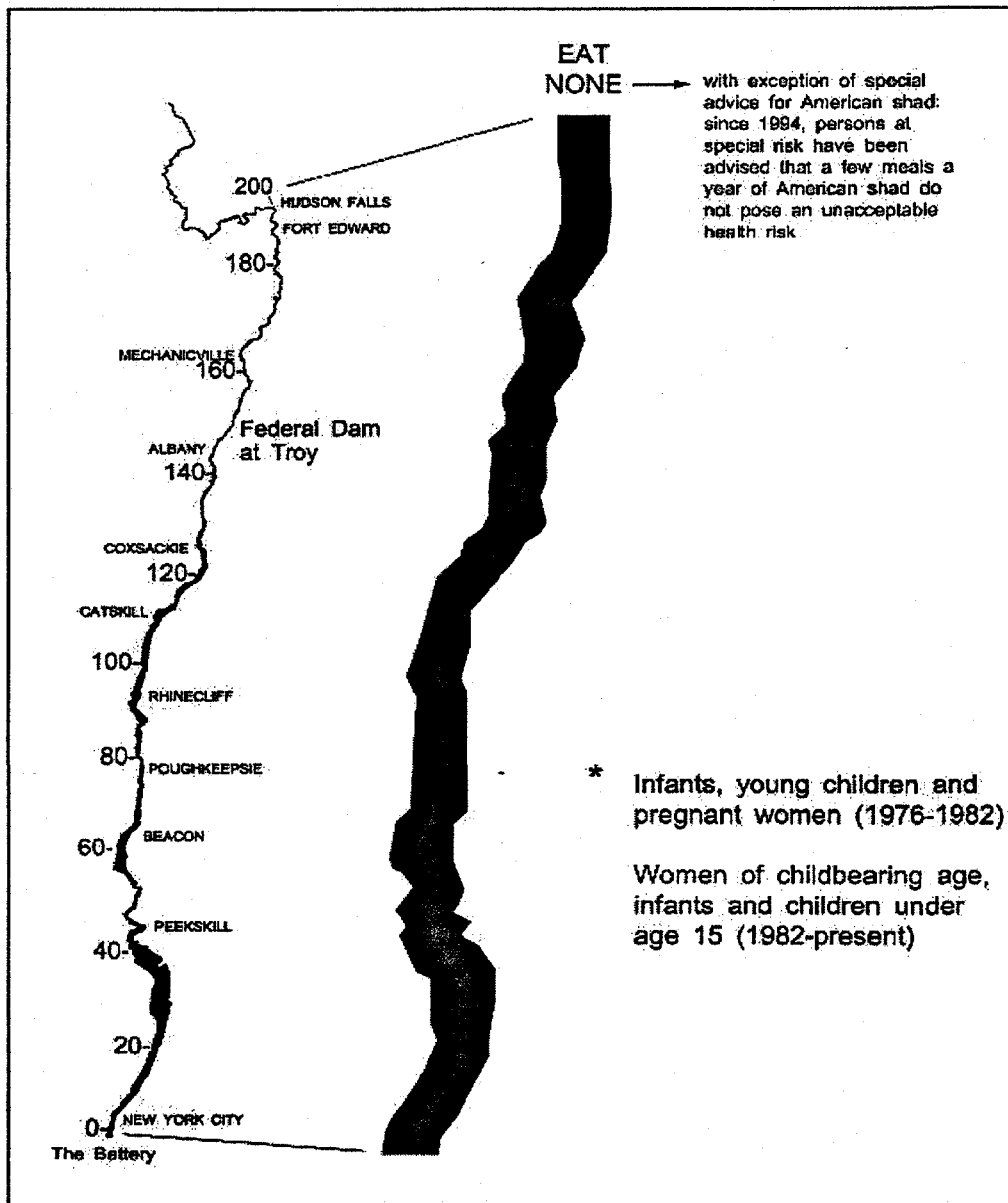
<sup>11</sup>Since 1994, DOH has advised that a few meals a year of Hudson River shad meat and roe would not pose an unacceptable risk to women and children, assuming that this is their only significant exposure to PCBs.

# Exhibit 10. HUDSON RIVER FISH CONSUMPTION ADVISORIES in 1976





# Exhibit 11. FISH CONSUMPTION ADVISORIES FOR PERSONS AT SPECIAL RISK\* 1976 to present



#### 4.2.4 History of Hudson River Fish Consumption Advisories, 1975 to present

Exhibit 9 depicts the geographic and species extent of the PCB-based fish consumption advisories which state health officials have put in effect for the Hudson River from 1975 to the present. There are several key advisories which have persisted throughout the period: the advisory to *eat none* of all species of fish in the upper river from Hudson Falls to Troy Dam; the no consumption advisory for all species of fish in the entire river, from Hudson Falls to the Battery, for persons at special risk; and the no consumption advisory for American eel from Hudson Falls to Catskill. There have also been changes in DOH's consumption advisories at several points in time. The first of these occurred in 1983 when DOH added restrictive advisories for striped bass and white perch (NYSDEC, 1983). Next, the lowering of the FDA tolerance limit for PCBs from 5 ppm to 2 ppm in August of 1984 caused New York to significantly modify its advisories in 1984 for the middle and lower reaches of the Hudson River (NYSDEC, 1984). Because of the timing of the change in the FDA tolerance, DOH in fact issued two sets of advisories in 1984, one in June and a second in November.

Another shift in advisories occurred in the early 1990s as a result of an increase in PCB concentrations in fish detected beginning in 1992. By the mid-1980s, PCB levels in fish from the Hudson River had declined, although average PCB levels in many species still exceeded the 2 ppm FDA tolerance level (Sloan, 1999; NYSDEC, 2001). However, fish taken from the upper Hudson River in May and June of 1992 and 1993 had PCB levels as high as those reported in the early 1980s (Sloan, 1999). As discussed in Section 3.2, additional releases from the area of the Hudson Falls plant (the Allen Mill event), discovered in the early 1990s, may have contributed to the increased levels of PCBs detected in the fish. As a result, in 1994, DOH substantially revised its advisories for the Troy Dam to Catskill reach of the lower river from species specific advice to *eat none* for all species except American shad (NYSDOH, 1994).

PCB concentrations in Hudson River fish gradually returned to pre-1992 levels as the Allen Mill release was brought under control (USEPA, 2000b). Despite these declines, the fish remain contaminated with PCBs (*ibid.*). PCB-based consumption advisories continue for many species of Hudson River fish, the most recent of which were issued for the year 2000 to 2001.<sup>12</sup>

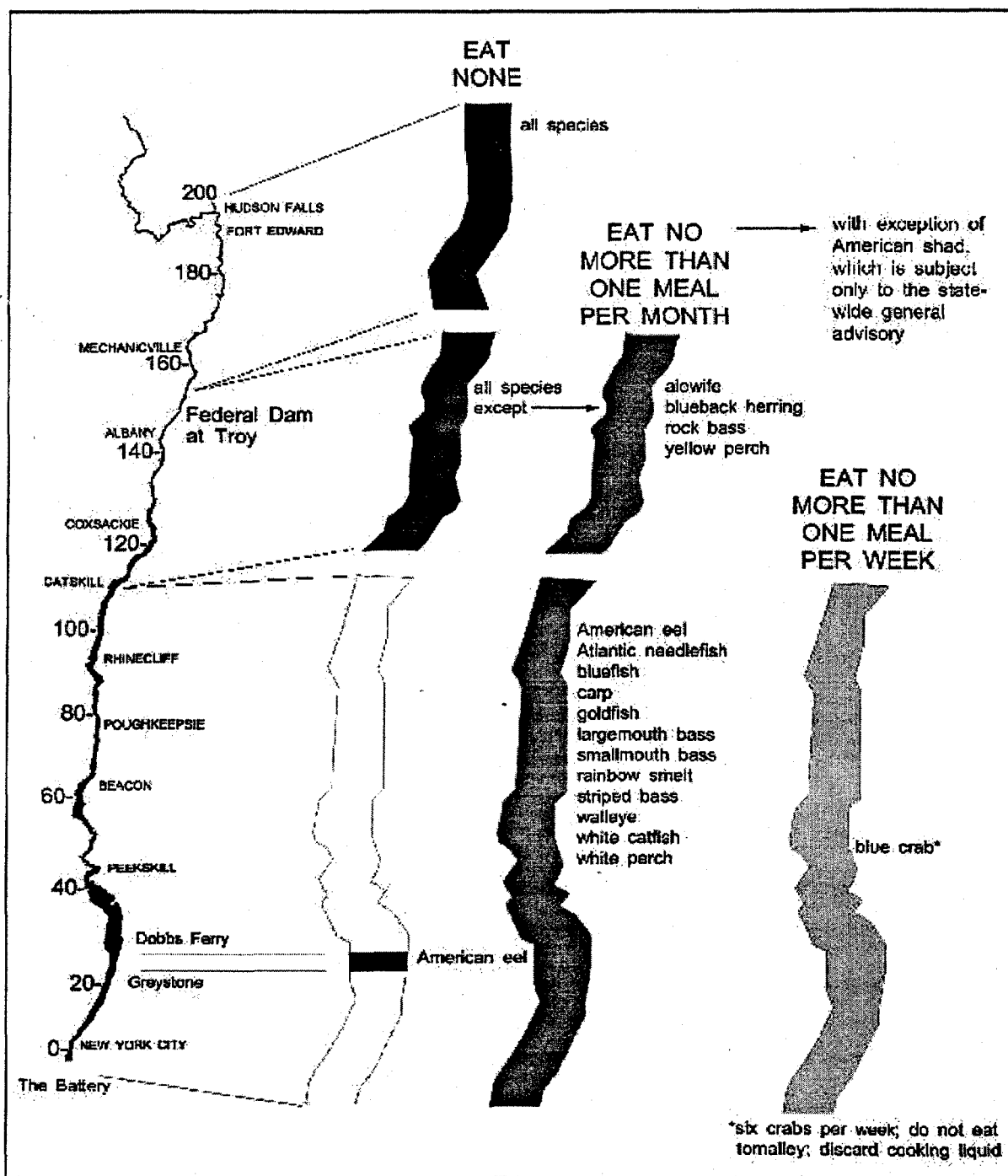
#### 4.2.5 Hudson Falls to the Troy Dam

Since February 24, 1976 to the present, DOH has warned against consumption of any species within the 40 mile reach of the Hudson River from Hudson Falls to the Troy Dam. This consistent *no consumption* advisory for all fish caught within this section of the river is based on the excessive levels of PCBs which have been found in all species of fish from this reach. This *no consumption* advice remains in effect despite the lifting of the regulatory ban on recreational fishing from Hudson Falls to Troy Dam in 1995. In fact, the Health Department's concurrence in re-opening a "catch and release" fishery in the Upper River was predicated on a continued *eat none* advisory (DeBuono, 1995).

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<sup>12</sup>Exhibit 12 depicts the extent of consumption advisories for Hudson River fish in 2001. The 2000-2001 health advisories are available at the following website:  
<http://www.health.state.us/nysdoh/environ/fish.htm>

# Exhibit 12. HUDSON RIVER FISH CONSUMPTION ADVISORIES for 2000-2001



#### 4.2.6 Troy Dam to Catskill

In 1976, DOH issued a general, limited consumption advisory for the section of the Hudson from Troy Dam to Catskill, with American eel being the only species subject to a *no consumption* advisory (Whalen, 1976). Between 1983 and 1994, more restrictive advisories for specific fish species were added (NYSDEC, 1983 and 1984). Beginning in 1994, the advisories were shifted to *no consumption* for all species with the exception of American shad (NYSDOH, 1994). This advisory continues to the present 2000-2001 advisory, with the exception of four species, alewife, blueback herring, rock bass, and yellow perch, which were upgraded in 1999 to a recommendation that *no more than one meal per month* be eaten (NYSDOH, 1999). The extent of these advisories for this section of the river is depicted in Exhibit 9. For white catfish, carp, and goldfish, a *no consumption* advisory has been in effect for 16 years, since November of 1984 to the present day. For striped bass and white perch, the *no consumption* advisory began with the 1982-1983 advisory, resulting in a *no consumption* advisory for these two fish species for 18 years. For the American eel, a *no consumption* advisory has been in effect continuously since 1976, a total of 25 years.

#### 4.2.7 Catskill South

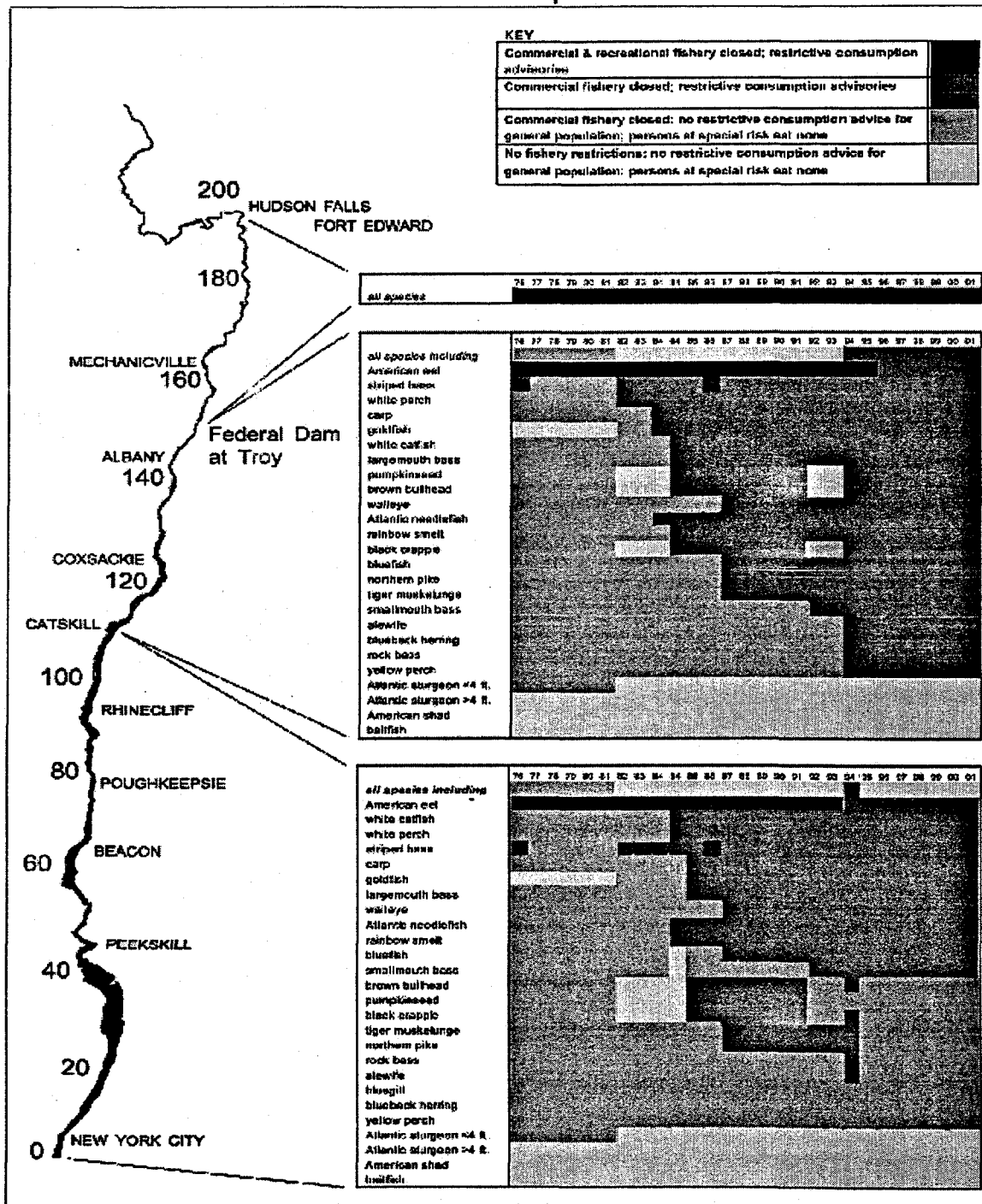
In the Hudson River reach south of Catskill, a *no consumption* advisory was in place for 10 different fish species for periods ranging from 5 years to 10 years between the mid 1980s and the mid 1990s (see Exhibit 9). These fish species include the American eel, brown bullhead, carp, goldfish, largemouth bass, pumpkinseed, striped bass, walleye, white catfish, and white perch. In the spring of 1994, in an attempt to make the Hudson River fish consumption advisories more easily understood, DOH abandoned the species-by-species approach and issued a blanket advisory for Catskill downstream to New York City to *eat no more than one meal per month* for all species, except American shad, Atlantic sturgeon, blueback herring, bluegill, pumpkinseed and yellow perch (NYSDOH, 1994). This changed the advisory status of many fish, imposing consumption advisories on many unintended freshwater and marine species. Consequently, DOH switched back to a species and reach specific format in the lower river south of Catskill in May of 1995 (NYSDOH, 1995a). In the most recent health advisory for 2000-2001, a recommendation that *no more than one meal per month* be eaten is still in effect for 12 fish species (see Exhibit 12).

### 5. Summary of Determination of Injury to Hudson River Fish

Extensive fishing bans and fish consumption advisories have been and continue to be in place for multiple fish species throughout the Hudson River downstream of Hudson Falls. These closures and advisories constitute directives to limit or ban consumption, issued by New York state officials from 1975 to the present because of the excessive levels of PCBs in Hudson River fish. The species, temporal, and geographic extent of the fishing closure and consumption advisory injuries for the Hudson River are depicted in Exhibit 13 and are summarized below.

From 1976 to the present, all species from Hudson Falls south to New York City have been subject to a *no consumption* advisory directed to women of childbearing age and all children under age 15 (see Exhibit 11). In the 43 miles of the Upper River, use of the fishery has been impacted by both regulatory fishing restrictions and a "no consumption" advisory from 1976 to the present. For 19 years, fishing was

# Exhibit 13. INJURY TO HUDSON RIVER FISHERY 1976 to present



banned in this reach of the river, and possession of any fish in this reach remains prohibited. The *no consumption* advisory applicable to all species in the Upper River has been in place for 25 years.

In the 41 miles from the Troy Dam to Catskill, all species except Atlantic sturgeon, goldfish and American shad were subject to a commercial fishing ban for six years from 1976 to 1982. From 1982 to 1994, a minimum of 6 and as many as 17 species of fish in this reach were the subject of a commercial or recreational fishing ban or a consumption advisory, or both. The consumption advice for the majority of those species was to *eat none*. From 1994 to the present, consumption advisories directed at all species except American shad have been in place; in most instances, these advisories have been at the *eat none* level.

Finally, in the 113 river miles from Catskill to the Battery, a commercial fishing closure was in effect for all species except baitfish, Atlantic sturgeon, goldfish and American shad for 6 years from 1976 to 1982. From 1982 to the present, between 6 and 19 species have been impacted by a commercial or recreational fishing ban, by a consumption advisory, or by both. Between 1985 and 1992, a majority of those species were subject to a *no consumption* advisory. Twelve species in this reach of the river continue to be subject to restrictive consumption advice to the present.

As a consequence, the Hudson River Natural Resource Trustees have concluded that a natural resource, the Hudson River fishery, has been injured as a result of the closures and health advisories documented herein. The imposition of these restrictions on fishing and fish consumption by state officials falls within the definition of an injury provided by the DOI regulations. Closures and other restrictions have been in effect for over twenty-five years and continue to the present day (see Exhibits 8 and 12). The public's uses of the fishery, whether for a livelihood, a source of recreational enjoyment, or for nutrition, have been dramatically reduced or, in some cases, completely eliminated. Additional reductions in PCB contamination levels will be necessary to bring about the removal of these restrictions. The injury to the resource is expected to continue into the future until that occurs. In a future report to the public, the Trustees will consider specific measures whereby the Hudson River fishery might be restored and the public might be compensated for the past and ongoing losses of this resource.

## REFERENCES:

- Armstrong, R.W. and R.J. Sloan. (1988). PCB patterns in Hudson River Fish. I. Resident freshwater species. Pp. 304-324. In C.L. Smith (ed.). Fisheries Research in the Hudson River. State University of New York Press, Albany, New York.
- Axelrod, D. (1982). Letter from NYSDOH Commissioner David Axelrod to NYSDEC Commissioner Robert F Flacke. March 15, 1982.
- Brown, M.P., M.B. Werner, R.J. Sloan and S.W. Simpson. (1985). Polychlorinated Biphenyls in the Hudson River. Environ. Sci. Technol. 19(9): 656-661.
- DeBuono, B.A. (1995). Letter from NYSDOH Commissioner Barbara A. DeBuono to NYSDEC Commissioner Michael D. Zagata. May 1, 1995.
- Eisenbud, M. (1975). Letter to Dr. Kevin Cahill, the Governor's Special Assistant for Health Affairs. December 18, 1975.
- Great Lakes Sport Fish Advisory Task Force. (1993). Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory. September 1995.
- Hetling, L.J., E.G. Horn, and R.J. Tofflemire. (1978). Summary of Hudson River PCB Study Results. NYSDEC, Albany, NY. April 1978.
- Horn, E.G., L.J. Hetling and R.J. Tofflemire. (1979). The problem of PCBs in the Hudson River System. Ann. NY Acad. Sci. 320: 591-609.
- Nadeau, R.J., and R.P. Davis. (1974). Investigation of Polychlorinated Biphenyls in the Hudson River: Hudson Falls - Fort Edward Area. USEPA, Region II.
- Nadeau, R.J., and R.P. Davis. (1976). Polychlorinated Biphenyls in the Hudson River (Hudson Falls to Fort Edward, New York State). Bulletin of Environmental Contamination and Toxicology. Vol. 16, No. 4, p. 436-444.
- National Oceanic and Atmospheric Administration (NOAA). (1996). Contaminant Levels in Muscle and Hepatic Tissue of Lobster from the New York Bight Apex. National Marine Fisheries Service. NJ. May 1996.
- NOAA. (1997). Hudson River Congener-Specific Analysis, Data Summary and Analysis Report. Prepared by EVS Consultants, Seattle, WA, for National Oceanic and Atmospheric Administration Damage Assessment Center, Silver Spring, MD. July 1997.

New York State Department of Environmental Conservation (NYSDEC). (1975). PCB Monitoring in the Upper Hudson River Basin. Division of Pure Waters. October 1975.

NYSDEC. (1975). Press Release: "Commissioner of Environmental Conservation Ogden Reid today advised against eating fish taken from the Hudson River . . . ." August 7, 1975.

NYSDEC. (1976). PCB Data in Hudson River Fish, Sediment, Water and Wastewater. New York State Department of Environmental Conservation, Albany, NY. March 1976.

NYSDEC. (1977). 1977 Fish Sampling and Analysis Program - Hudson River. New York State Department of Environmental Conservation, Albany, NY. 7 pp.

NYSDEC. (1983). New York State Fishing, Small Game Hunting and Trapping Regulations Guide. October 1, 1983 - September 30, 1984.

NYSDEC. (1984). New York State Fishing, Small Game Hunting and Trapping Regulations Guide. October 1, 1984 - September 30, 1985.

NYSDEC. (1984). Press Release: "New health advisories for fish consumption based on a reduction in the PCB tolerance level . . . ." November 15, 1984.

NYSDEC. (1985). Final Environmental Impact Statement for Policy on Contaminants in Fish. October 1985.

NYSDEC. (1994). Press Release: "More PCB Releases Found at G.E. Hudson Falls Plant." October 17, 1994.

NYSDEC. (1995). Fact Sheet: PCB Remedial Program Expanding at General Electric Hudson Falls Plant. August 1995.

NYSDEC. (1999). Proposed Remedial Action Plan: General Electric Hudson Falls Plant Site, Hudson Falls, Washington County, New York. Site No. 558013.

NYSDEC. (2000). Record of Decision: GE Fort Edward Plant Site, Town of Fort Edward, Washington County. Site Number 558004: Operable Units 3 and 4.

NYSDEC. (2001). Hudson River PCB Biota Database. Bureau of Habitat, Division of Fish, Wildlife and Marine Resources, Albany, NY. Updated March 13, 2001.

New York State Department of Health (NYSDOH). (1981). Joint Press Release: "The State Commissioners of Health and Environmental Conservation today advised against consumption . . . ." June 10, 1981.

NYSDOH. (1985). Press Release: "The State Health Department, based on recent monitoring of PCB levels . . . ." April 17, 1985.



NYSDOH. (1989). Health Advisories: Chemicals in Sportfish or Game. April 1989.

NYSDOH. (1994). Press Release: "The State Health Department is issuing new health advisories on eating sportfish . . . ." April 21, 1994.

NYSDOH. (1995). Letter from Commissioner Barbara A. DeBuono to NYSDEC Commissioner Michael D. Zagata. May 1, 1995.

NYSDOH. (1995a). Press Release: "The State Health Department . . . ." May 18, 1995.

NYSDOH. (1999). 1999-2000 Health Advisories: Chemicals in Sportfish and Game.

NYSDOH. (2000). 2000-2001 Health Advisories: Chemicals in Sportfish and Game.

Newell, A. J., W. Johnson and L. K. Allen. (1987). Niagara River Biota Contamination Project: Fish Flesh Criteria for Piscivorous Wildlife. New York State Department of Environmental Conservation, Albany, NY. July 1987.

O'Brien & Gere Engineers, Inc. (1994). Bakers Falls Remedial Investigation Report: Operable Unit 3. Prepared for the General Electric Company: Fort Edward, NY. January 1994.

O'Brien & Gere Engineers, Inc. (1997). Fort Edward Remedial Investigation Report: Operable Units 2A and 2B. Prepared for the General Electric Company: Fort Edward, NY. January 1997.

Reid, O. (1976). Order Regulating the Taking of Fish and American Eel in the Hudson River and Their Sale or Offer for Sale. February 25, 1976.

Schweiger, M. B. (1999). PRAP Comments for Site No. 558004, GE's Fort Edward, N.Y., Facility. General Electric Corporate Environmental Programs. Letter to Mr. Kevin Ferrar, NYSDEC, April 26, 1999.

Skinner, L.C., S.J. Jackling, G. Kimber, J. Waldman, J. Shastay, Jr., and A.J. Newell. (1996). Chemicals in Fish, Shellfish and Crustaceans from the New York-New Jersey Harbor Estuary: PCB, Organochlorine Pesticides and Mercury. NYSDEC, Albany, NY. November 1996.

Sloan, R.J., S.W. Simpson, R.A. Schroeder and C.R. Barnes. (1983). Temporal trends toward stability of Hudson River PCB contamination. Bull. Environ. Contam. Toxicol. 31: 377-385.

Sloan, R., M. Brown, R. Brandt and C. Barnes. (1984). Hudson River PCB relationships between resident fish, water and sediment. NE Environ. Sci. 3(3/4): 137-151.

Sloan, R.J., and R.W. Armstrong. (1998). PCB Patterns in Hudson River Fish: II. Migrant and Marine Species. In Fisheries Research in the Hudson River. C. L. Smith (ed.). State University of New York, Albany, NY.

Sloan, R.J. and J.L. Field. (1996). PCBs in Hudson River Fish: The Historical "Aroclor" Perspective. Poster presentation, 17th Annual SETAC Meeting: Washington D.C. November 21, 1996.

Sloan, R.J. (1999). Striped bass PCB decline - reopening consideration. Memo to J. Colquhoun. Briefing on 1997 PCB results. Bureau of Habitat, Division of Fish, Wildlife and Marine Resources, New York State Department of Environmental Conservation, Albany, New York. Feb. 11, 1999.

Sloan, R.J. (2000). Long Term Hudson River PCB Analysis Project. Bureau of Habitat, Division of Fish, Wildlife and Marine Resources, New York State Department of Environmental Conservation, Albany, New York. Revised November 21, 2000.

Spagnoli, J.J., and L.C. Skinner. (1977). PCBs in Fish from Selected Waters of New York State. Pesticides Monitoring Journal, Vol.11, No. 2, 69.

State of New York. (1971). Departments of Health, Agriculture and Markets, and Environmental Conservation. Press Release: "The State Commissioners of Health, Agriculture and Markets and Environmental Conservation today announced . . . ." May 20, 1971.

State of New York. (1976). State of New York, Executive Chamber, Hugh L. Carey, Governor. Press Release: "The Health Planning Commission, in a report to Governor Hugh L. Carey, has recommended sharp restrictions . . . ." February 22, 1976.

United States Environmental Protection Agency (USEPA): (1975). Scientific and Technical Assessment Report on Polychlorinated Biphenyls. January 1975.

USEPA. (1984). Record of Decision: Remedial Alternative Selection, Hudson River PCBs Site. Office of Solid Waste and Emergency Response. September 1984.

USEPA. (1991). Phase I Report: Review Copy. Volume 1 - Interim Characterization and Evaluation. Hudson River PCBs Reassessment RI/FS. Region II, New York. August 1991.

USEPA. (1996). Phase 2 Report: Further Site Characterization and Analysis. Database Report -Volume 2A. Hudson River PCBs Reassessment RI/FS. Region II, New York. March 1996.

USEPA. (1997). Phase 2 Report: Review Copy. Volume 2C - Data Evaluation and Interpretation Report. Hudson River PCBs Reassessment RI/FS. Region II, New York. February 1997.

USEPA. (1997a). Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. Volume 2 - Risk Assessment and Fish Consumption Limits. Second Edition. July 1977.

USEPA (2000a). Hudson River PCBs Superfund Site Proposed Plan. Region II, New York. December 2000.

USEPA. (2000b). Phase 3 Report: Feasibility Study. Hudson River PCBs Reassessment RI/FS. Region II, New York. December 2000.

Whalen, R.P. (1976). Letter from NYSDOH Commissioner Robert P. Whalen to NYSDEC Commissioner Ogden Reid. February 24, 1976.