Hudson River PCBs Superfund Site

CAG New Member Orientation
June 25, 2024

Agenda

- Background & Site History
- Dredging the Upper Hudson River
- Current Work & Ongoing Activities
- Lower River Investigation
- 3rd Five-Year Review

Hudson River PCBs SUPERFUND SITE

Part I: Background & Site History

Hudson River PCBs Superfund Site

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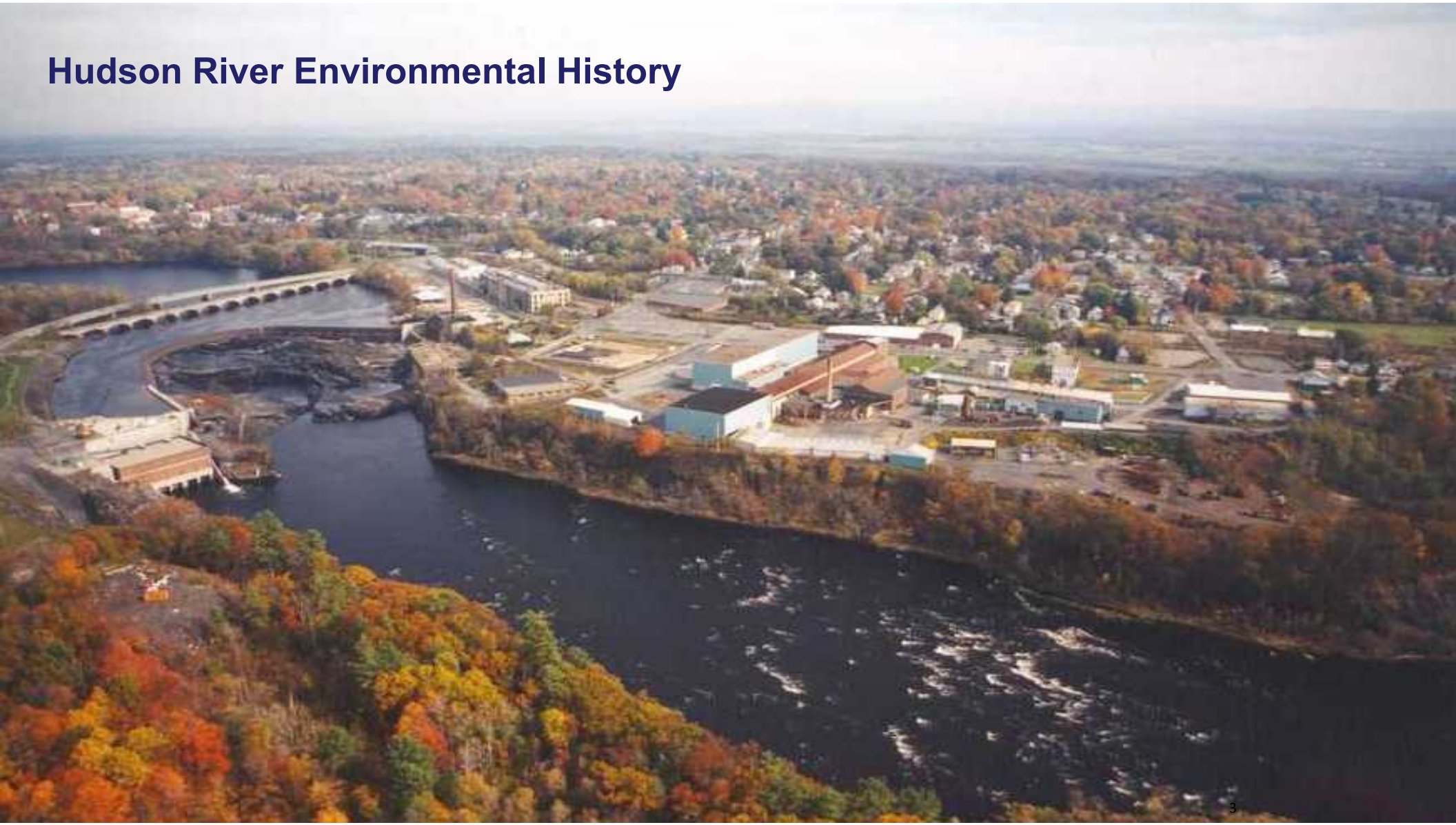
Hudson River Environmental History



Source of Contamination

- From the 1940's through the 1970's, the former General Electric (GE) plants in Hudson Falls, NY and Fort Edward, NY released polychlorinated biphenyls (PCBs) into the Hudson River

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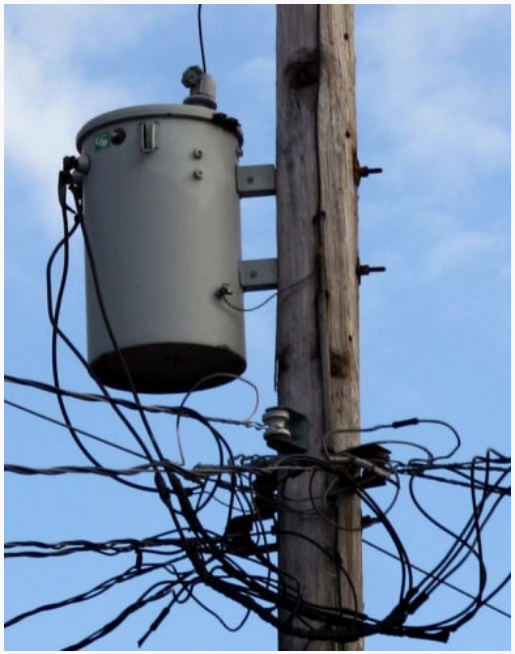
What are PCBs?

- PCBs are a group of chemicals consisting of 209 individual compounds (called congeners)
- PCBs were sold as mixtures labeled with an Aroclor identification number (for example 1242, 1260 …)
- PCBs were widely used including as a fire preventative and insulator in the manufacture of transformers and capacitors because of their ability to withstand exceptionally high temperatures
- The chemical stability of PCBs, which made them valuable for industrial uses, also makes them persistent in the environment



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Sediment Transport

- Once discharged from the GE plants, PCBs attached to river sediment and accumulated downstream, they also moved downstream in the water
- Erosion and river flows continually redistribute sediment across the river bottom
- This redistribution exposes the PCBs to bottom dwelling organisms like worms, crustaceans, and insect larvae, known as “benthic organisms” that get consumed by larger animals



Biomagnification

- Fish and other animals who eat the bottom dwelling organisms accumulate the PCBs into their body where the PCBs build up (bioaccumulate) primarily in fatty tissues
- PCBs can increase in concentration as they move up the food chain (biomagnification), eventually reaching humans and animals who eat contaminated fish

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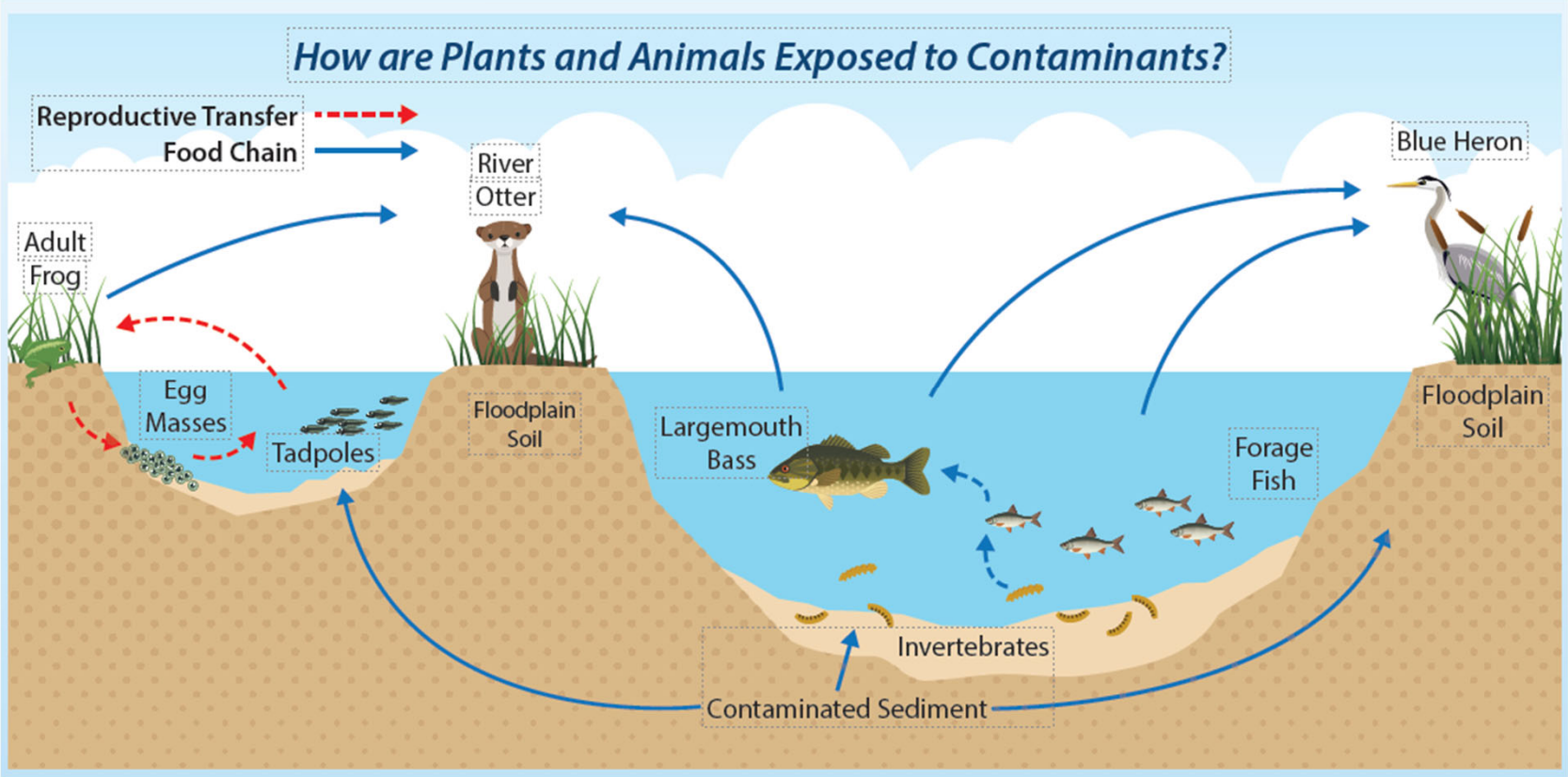
Biomagnification (con't)



Human Health Effects

- PCBs minimally degrade naturally over time, but the process, called dechlorination, does not make them harmless
  - PCBs adhere to organic materials in the river and become buried by cleaner sediment over time
  - EPA considers all PCBs, regardless of their level of chlorination, to be hazardous
- PCBs cause a variety of adverse health effects in people
- PCBs cause cancer in laboratory animals, are considered a probable cause of cancer in people, and can trigger reproductive and immunological health effects and low birth weight

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Fish Consumption Restrictions and Advisories

- Concerns about PCBs in Hudson River fish prompted New York State to place fishing restrictions and advisories in the upper river. Health advisories were also put in place for the lower river to help inform people about the risks from eating fish contaminated with PCBs.
  - **Women of childbearing age and children under 15 should not eat any fish** from the Hudson River from the South Glens Falls Dam in Warren County to the NYC Battery
  - The advice for men over 15 and women over 50 depends on where in the river you are fishing in the lower river and what type of fish you catch: New York State Department of Health (NYSDOH) Health Advice on Eating Hudson River Fish (PDF).
- More information can be found on the NYSDOH webpage

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Superfund Designation

- The PCB contamination led EPA to designate 200 miles of the Hudson River as a Superfund Site in 1983

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What is Superfund?

- Name of the fund established by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
- Enacted in the wake of the discovery of toxic waste dumps such as Love Canal in the 1970s to address hazardous waste sites
- Allows EPA to clean up sites and hold responsible parties accountable for performing the cleanups or reimbursing the government

Superfund: Removal vs. Remedial Actions

There are two basic types of responses that EPA uses to manage polluted sites: ***removal actions*** and ***remedial actions***

- **Removal Actions**: Used to handle emergency oil spills or chemical releases and short-term responses. Emergency actions are taken to eliminate immediate risks and ensure public safety.
- **Remedial Actions**: Used to handle complex sites needing a long-term response. Remedial actions manage releases that do not pose an urgent threat to public health or the environment and do not require immediate action. Remedial actions involve complex and highly contaminated sites that often require an extended periods of time to study the problem, develop a permanent solution, and clean up the hazardous wastes. These are the sites that most people think of when they hear about the Superfund program.

Steps in the Superfund Remedial Process

Remedial Investigation (RI): EPA evaluates the nature and extent of contamination and assesses risks to people and the environment. This usually involves multiple sampling events that can take several years. The RI is usually performed with the Feasibility Study (FS). Together they are usually referred to as the "RI/FS."

Feasibility Study (FS): EPA develops a list of possible ways to address the contamination at the site. During the Feasibility Study, the advantages and disadvantages of each cleanup method are explored.

Proposed Plan: EPA develops a Proposed Plan for cleaning up the site. The Proposed Plan summarizes the RI/FS and identifies one preferred cleanup alternative that EPA thinks balances all considerations. The Proposed Plan process includes a minimum 30-day public comment period.

Record of Decision (ROD) : The ROD explains which cleanup alternatives will be used at the site and the reason for the selection.

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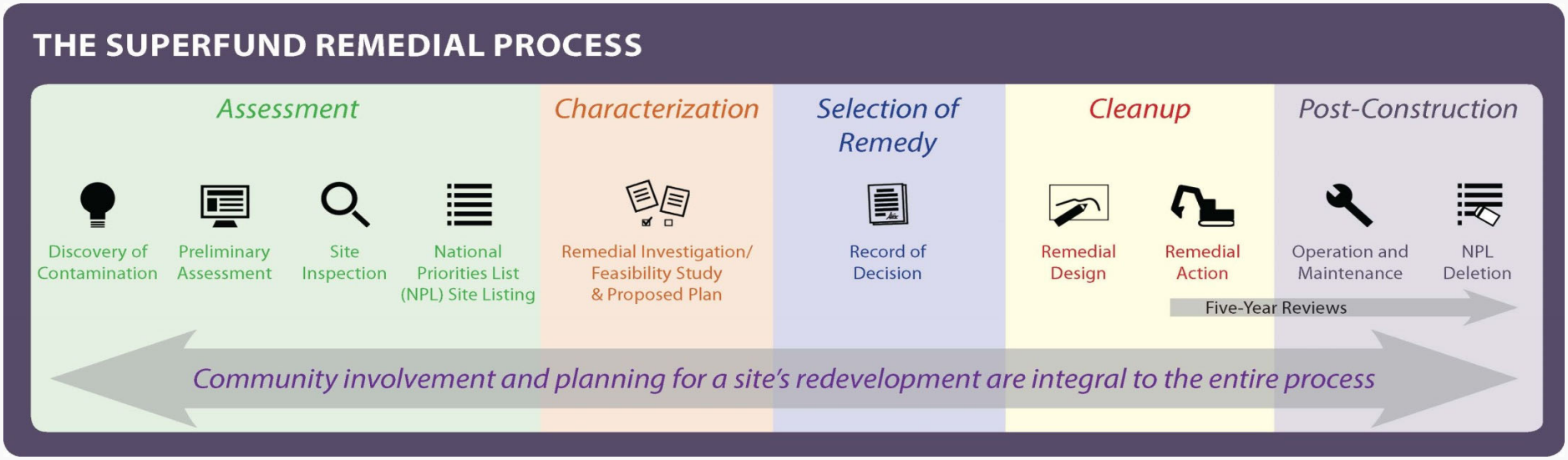
Steps in the Superfund Remedial Process (con't)



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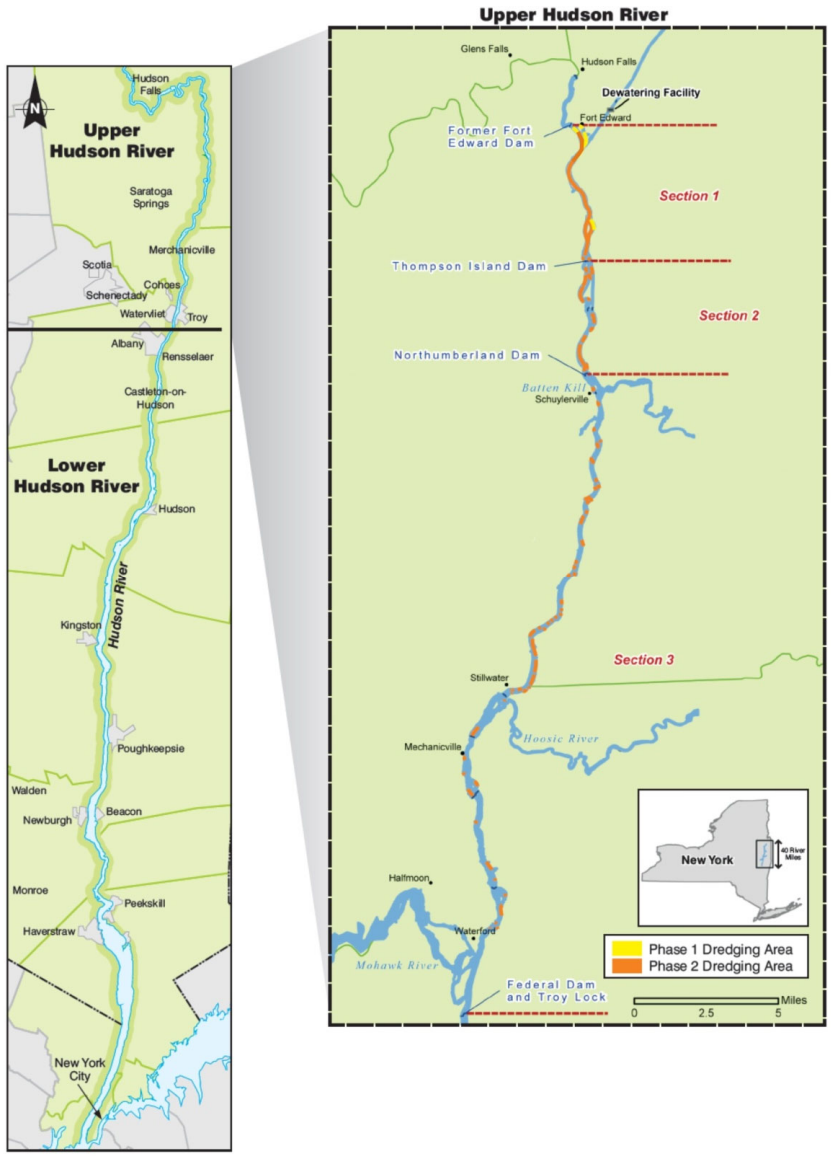


Hudson River PCBs Superfund Site

Site covers almost 200 miles from Hudson Falls, NY to the Battery in New York City

Upper Hudson River:
Hudson Falls to the Federal Dam in Troy (~40 miles)

Lower Hudson River:
Federal Dam in Troy to the southern tip of Manhattan (~160 miles)

Superfund Site Operable Units

The Hudson River PCBs Superfund site has been divided into five discrete components known as operable units (OUs):

OU-1: Remnant Deposits

The 1984 ROD addressed the Remnant Deposits (OU-1), areas of PCB-contaminated sediment that became exposed after the river water level dropped following the removal of the Fort Edward Dam in 1973. The cleanup of the remnant deposits included an in-place containment and cap system, perimeter fencing, and signage. The in-place containment was completed in 1991.

OU-2: Upper Hudson River in-river sediment

The 2002 ROD selected environmental dredging to address PCB-contaminated sediment in the Upper Hudson River, as well as monitored natural attenuation (MNA) of PCB contamination that remains in the river after dredging. Dredging occurred between 2009 and 2015. Long-term monitoring is being conducted to track the recovery of the river over time.

Superfund Site Operable Units (con't)

OU-3: Rogers Island
In 1999 EPA conducted a removal action on several residential properties on the northern portion of Rogers Island, which consisted of removing 4,400 tons of PCB- and lead-contaminated soil.

OU-4: Upper Hudson River floodplain
OU-4 of the Upper Hudson River includes the low-lying shoreline areas between Hudson Falls and Troy, New York, called the floodplain.

OU-5: Lower Hudson River in-river sediment
The 160-mile stretch of the lower river between the Troy Dam and the Battery has been designated as OU-5.

Site Cleanup Decisions to Date

To date, EPA has issued two cleanup decision documents, called Records of Decision (RODs), for the Hudson River PCBs Superfund site

- The first ROD was issued in 1984. It identified the selected cleanup for the remnant deposits **(OU-1)** and made an interim “no-action" decision for addressing Upper Hudson River in-river sediment (OU-2).
- EPA announced its decision to initiate a detailed **Reassessment Remedial Investigation (RI)/Feasibility Study (FS)** of the interim no-action decision for OU-2 in December 1989.
- The Reassessment RI/FS resulted in a February 2002 ROD, which called for the targeted environmental dredging of approximately 2.65 million cubic yards of PCB-contaminated sediment from the Upper Hudson River.

Hudson River
PCBs SUPERFUND SITE

Part II: Dredging the Upper Hudson River

2002 Record of Decision

- EPA selected its two-part cleanup plan for the Upper Hudson River in 2002
  - Dredging followed by an extended period of natural recovery (Monitored Natural Attenuation)
- For the purposes of the cleanup, the ROD divided the Upper Hudson River into three sections (each with specific cleanup criteria):
  - River Section 1 (from the former Fort Edward Dam to the Thompson Island Dam)
  - River Section 2 (from the Thompson Island Dam to the Northumberland Dam)
  - River Section 3 (from the Northumberland Dam to the Federal Dam at Troy)

2002 Record of Decision (con't)

- EPA's decision to clean up the Upper Hudson was made to protect people and the environment from unacceptable health risks from eating contaminated fish
- The cleanup plan set a goal for the amount of PCBs that can be found in fish that would allow people to eat fish from the river once a week. The EPA projected that meeting that goal will require more than 55 years of natural recovery time after dredging was completed.
- The plan established interim targets for PCB concentrations in fish that may allow New York State to relax the catch-and-release fishing restriction and the "Take no fish. Eat no fish" advisory in the Upper Hudson River over time to allow people to eat some fish.
- *Note: EPA evaluated a series of cleanup options in 2002, including one option that included more extensive dredging. While it would have removed more PCBs from the river, EPA did not select it because it would only have reduced the recovery time in fish by a few years which EPA believed did not justify the extra years of disruption to the river and river communities as well as the significant extra cost required.*

2002 Record of Decision

- GE completed the required dredging in 2015; all work was performed under EPA oversight. EPA certified that the work was completed as required in 2019.
- Long-term monitoring is ongoing to track the recovery of the river over time
- Periodic five-year reviews; 3rd five-year review underway

Hudson River PCBs SUPERFUND SITE

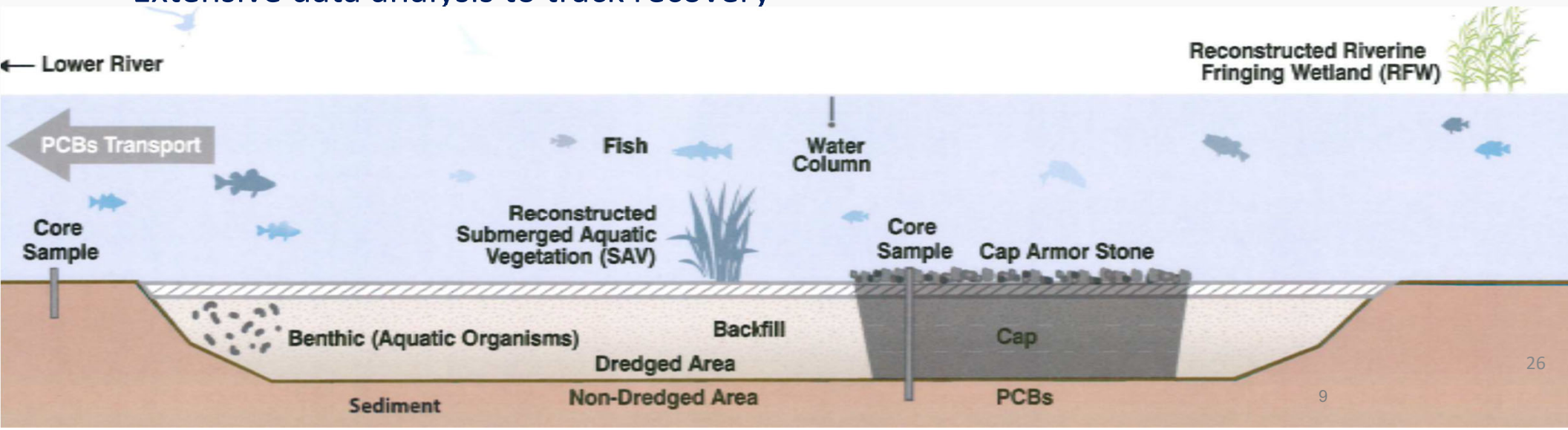
Upper Hudson Cleanup Timeline

1983: Site Listed on Superfund National Priorities List (NPL)
1984: 1st Record of Decision (ROD) – no dredging (capping of remnant deposits)
1991-2001: Reassessment Remedial Investigation/Feasibility Study (RI/FS)
2002: 2nd ROD: Large-scale dredging
2002-2005: GE/EPA agreements
2003-2008: Design, contracting, prep. for dredging
2009: 1st year of dredging (Phase 1)
2010: Independent Peer Review
2011-2016: Dredging and habitat restoration
2012: 1st five-year review report
December 2016: GE submits required Completion Report
2016-Current: Long-term monitoring
2019: 2nd five-year review report
2019: Certification of Completion of the Remedial Action
2024: 3rd five-year review (ongoing)

Hudson River
PCBs SUPERFUND SITE

Long-term monitoring

- Remedy/Cleanup – two parts: dredging and natural recovery
- Long-term monitoring includes:
  - Fish, sediment and water
  - Caps – limited capping
  - Habitat – including restoration
- Extensive data analysis to track recovery



Part III: Current Work & Ongoing Activities

Hudson River PCBs Superfund Site

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Upper Hudson
(~40 Miles)

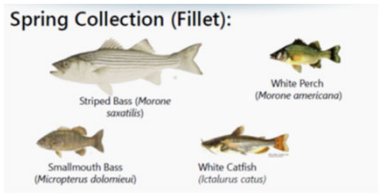
Lower Hudson
(~160 Miles)

Remnant Deposits

Dredging Remedy

Waterline Transfer to Municipalities

Lower River Monitoring (upper portion only)



Hudson Falls
(GE Plant Site - DEC)

Fort Edward
(GE Plant Site - DEC)

Former Fort Edward Dam
Rogers Island

Schuylerville

Waterford

Troy (Dam)

Albany

Catskill

PCB Sites (DEC)
- *BASF*
- *Hastings*
- *BIC*

Poughkeepsie
(salt front)

Tappan Zee

George Washington

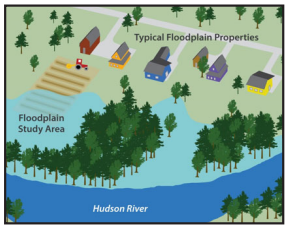
NJ

New York City Battery

NY Harbor

Powerhouse and Allen Mill Deconstruction

Floodplain RI/FS



Additional Investigations and Sampling

Hudson River Superfund Site

EPA Activities

(Conceptual- not to scale)

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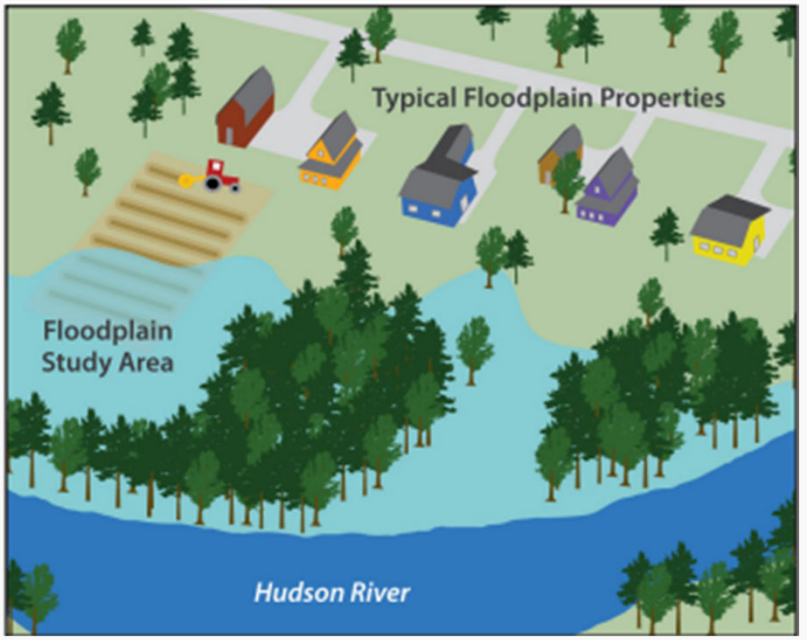
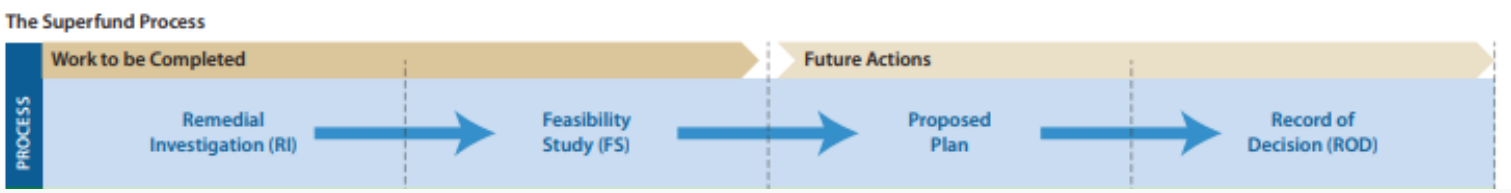
Upper Hudson River Floodplain Investigation

- EPA is evaluating the floodplain of the Upper Hudson River for the presence of PCBs
  - Purpose: determine where, and at what concentrations, PCBs are present in the floodplain
  - There are more PCBs upstream than downstream and more PCBs are located closer to the river than further away
  - 43-mile stretch between Hudson Falls and Troy, NY (~5,500 acres; 1,800 properties)



Upper Hudson River Floodplain Investigation

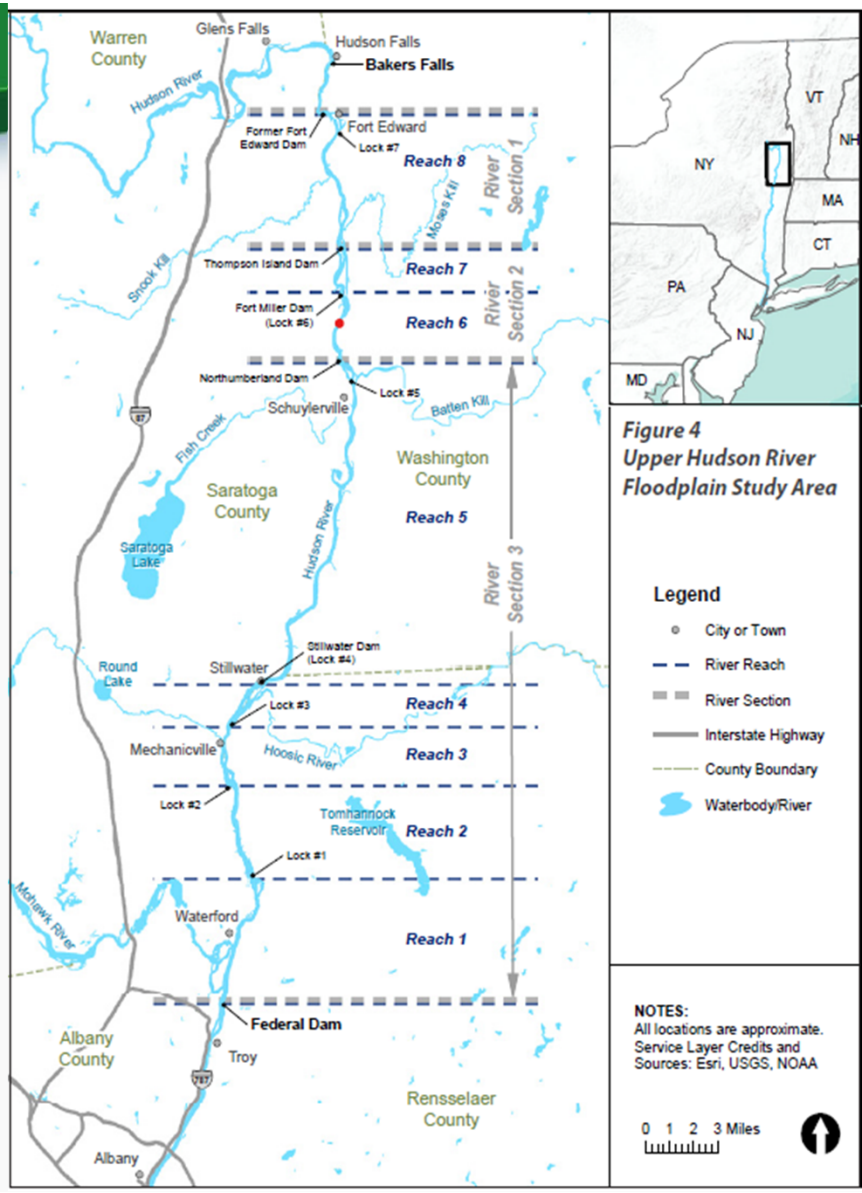
- The study includes an evaluation of risks to people and the environment and potential long-term cleanup solutions
- To date, more than 10,000 soil/sediment samples have been collected by various state/federal agencies and GE
- Proposed cleanup plan will include opportunity for public comment



River Reaches

The Upper Hudson River is comprised of eight dams and locks that form a series of “pools” known as reaches

- Reaches are numbered from south to north starting with Reach 1 located at the Federal Dam in Troy and continuing to Reach 8 which ends at the Bakers Falls Dam in Hudson Falls



Floodplain Short-Term Actions

- Sampling is prioritized in areas people use
- Community projects are also prioritized for sampling
- Actions are taken to address immediate threats to people's health (>10 parts per million PCBs)
  - Total of 72 Short-Term Actions to date
  - Each removal action is uniquely configured and may include:
    - Topsoil with grass or gravel covers
    - Signs - along trails and less frequently used areas

Powerhouse and Allen Mill Deconstruction

- Niagara Mohawk Power Corporation (NMPC) – property owner
- Located in Hudson Falls, NY, adjacent to former GE Hudson Falls plant site
- Powerhouse structure was condemned - needed to be deconstructed
  - GE Hudson Falls contamination migrated to the NMPC property
  - Disturbance during deconstruction and/or further building deterioration has potential to cause a release
- EPA announced legal agreement with NMPC and GE in July 2022 to oversee deconstruction

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Former GE Hudson Falls Plant
Allen Mill
Powerhouse
Baker's Falls Dam
Hudson River
(low flow condition)

Deconstruction of Powerhouse structure began in October 2022 and was completed in 2023.

Allen Mill Deconstruction

- Deconstruction of Powerhouse structure began in October 2022 and was completed in December 2023. Additional work associated with the floor slab is ongoing.
- Deconstruction of the Allen Mill is the next phase of work
  - The Parties (GE and NMPC) are required to submit a design plan to EPA for the Allen Mill work (expected fall 2024); Pre-design investigation work is underway
  - Allen Mill deconstruction work is expected to begin in 2025
  - Project timing is coordinated with low water levels because work will be conducted near the edge of the river
- EPA is overseeing all deconstruction work and is requiring extensive environmental monitoring and protective measures to prevent a release of PCBs to the Hudson River

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Part IV: Lower Hudson River Investigations

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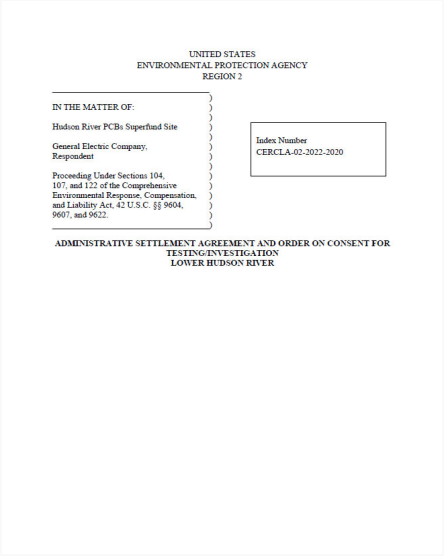
Lower Hudson River Sampling Agreement

- EPA signed a legal agreement with GE in September 2022 for extensive fish, water and sediment sampling
- EPA approved the workplan in March 2023
- Data will be used to determine next steps and scope of future work
- Field work began last spring and will continue through at least 2025
- Designed to be a phased process
  - Results from initial sampling will inform future sampling
- Focus is on PCBs – other contaminants are also being evaluated



UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 2

IN THE MATTER OF:

Hudson River PCBs Superfund Site

General Electric Company,
Respondent

Proceeding Under Sections 104, 107, and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9604, 9607, and 9622.

Index Number
CERCLA-02-2022-2020

ADMINISTRATIVE SETTLEMENT AGREEMENT AND ORDER ON CONSENT FOR TESTING/INVESTIGATION
LOWER HUDSON RIVER

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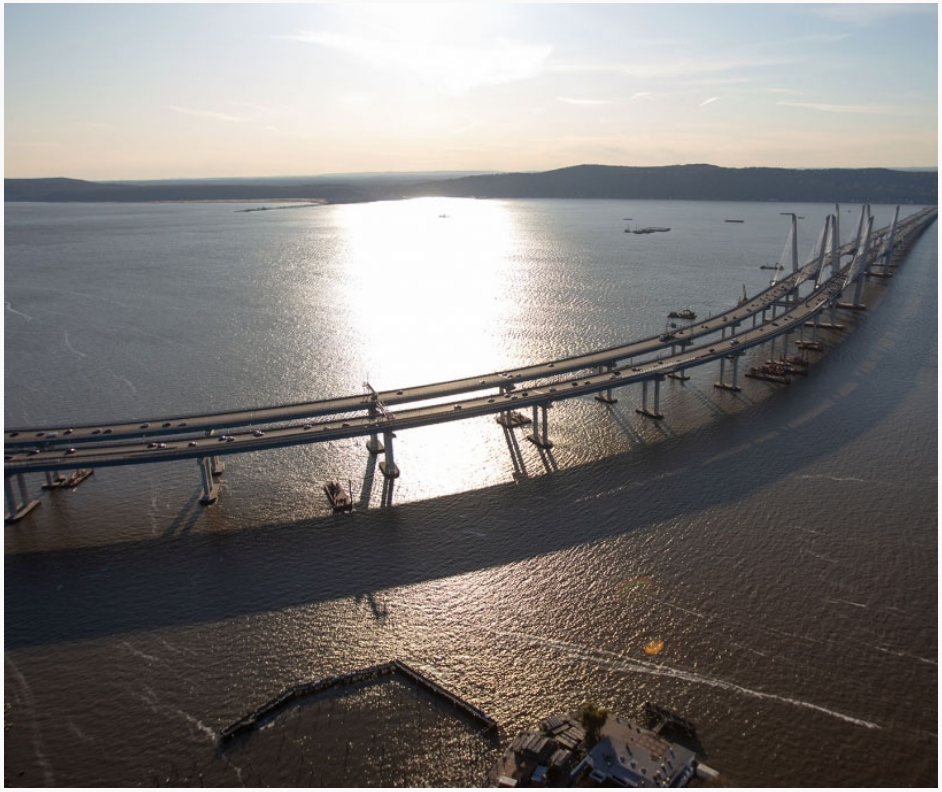
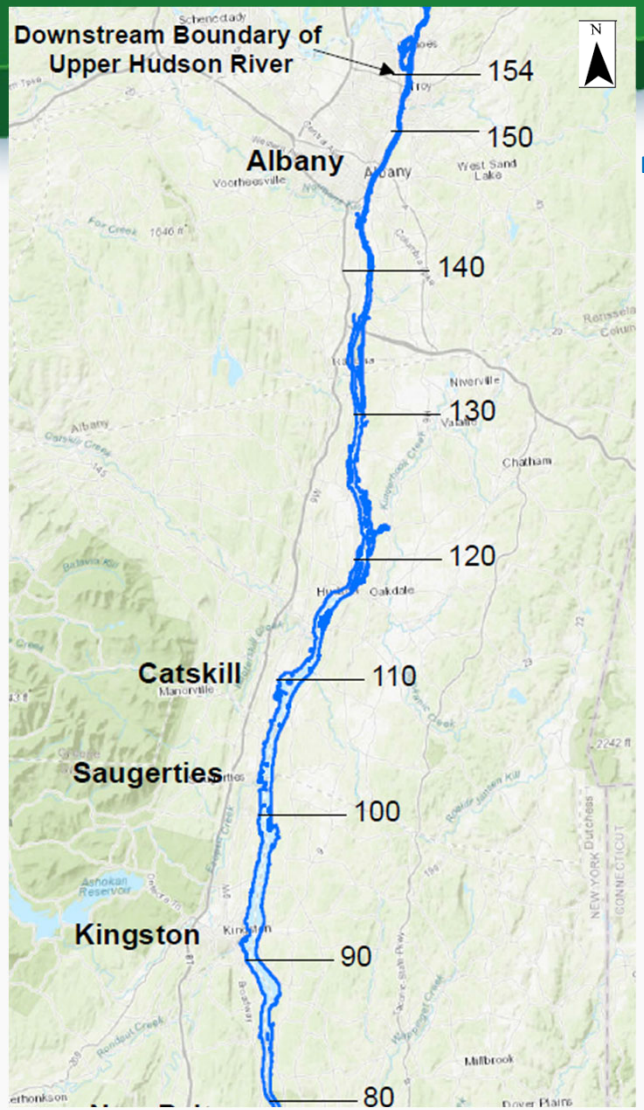
Lower Hudson River Sampling and Investigations



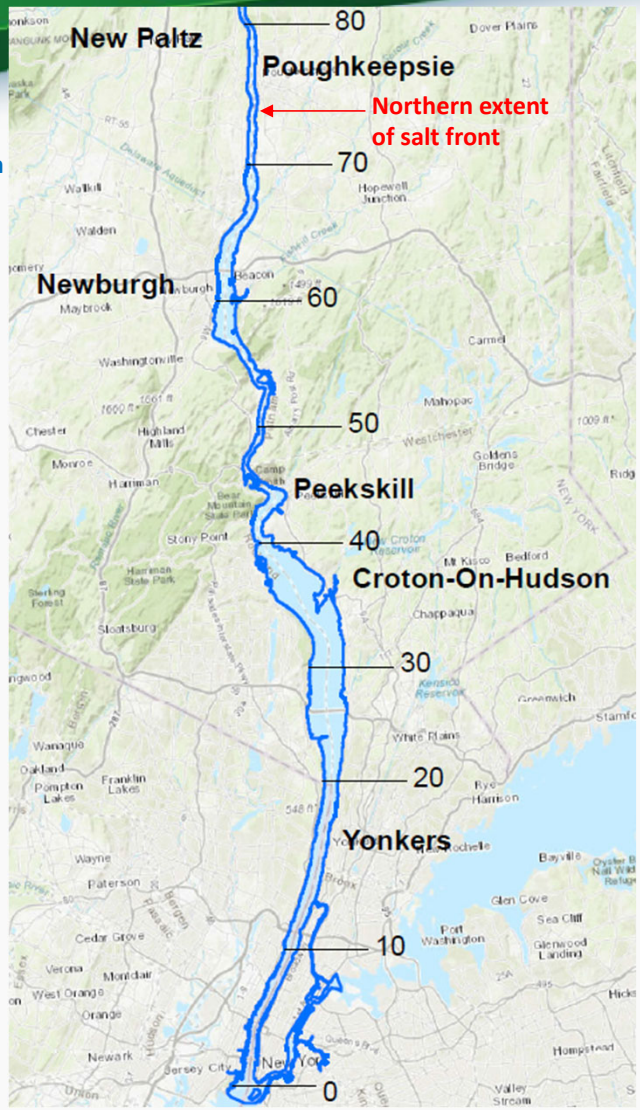
- GE remains legally responsible for its PCBs in the Lower Hudson River
- EPA is continuing to evaluate other parties that may also be responsible for PCBs or other contaminants in the Lower Hudson River
- The new data will supplement the results of EPA's investigation of the Lower Hudson River in the 1990s and GE's on-going periodic monitoring of Lower Hudson River fish and water since 2004
- EPA has been coordinating with New York State (DEC/DOH) and other project stakeholders since 2019 to gather additional information and data about the Lower River in support of these efforts

Lower Hudson River

- Lower River extends from Battery at Manhattan (RM 0) to the Federal Dam in Troy (RM 154)
- The lower Hudson River is an estuary where fresh water and salty seawater meet. The estuarine salt front extends upriver to Poughkeepsie (~ RM 73)



Direction of Flow



Legend

10 River Mile

Hudson River Shoreline

0 5 10 20 Miles

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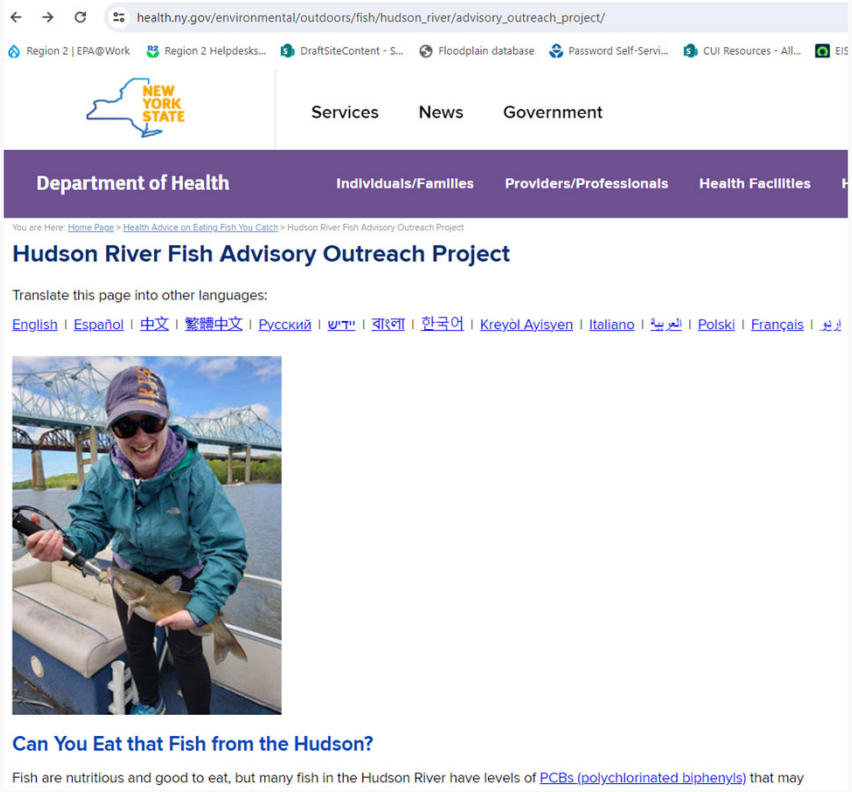
Why additional investigations are necessary for the Lower Hudson River

- Limited data are available for the Lower River; it appears there may be limited recovery in some parts of the Lower River
- Fish consumption advisories, as identified by the New York State Department of Health, remain in place throughout the Lower River



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Lower Hudson River Agreement

- Five primary programs:
  - Water column
  - Fish tissue
  - Recently deposited sediment
  - Supplemental sediment coring*
  - High-resolution sediment coring (historical trends)
- This work will not interfere with people's use of the river; some vessels may be visible from shoreline areas

**Core sampling is a process that removes sections of river sediment in hollow tubes for testing*





Hudson River PCBs SUPERFUND SITE

Fish Monitoring Program Summary

Stations

Primary Stations

- Albany/Troy (RM 145/152)
- Catskill (RM 112)
- Tappan Zee (RM 22)
- Poughkeepsie (RM 75)
- George Washington Bridge (RM 13)

Secondary Stations

- Coeymans (RM 131)
- Red Hook (RM 98)
- Newburgh (RM 60)
- Hudson Highlands (RM 45)
- NY Harbor (RM 5)

Collect 20 samples per species for sport fish and pumpkinseed, and 10 composite samples for forage fish

Target Species

- Striped Bass*
- Smallmouth Bass*
- Ictalurids (Channel Catfish and Bullhead)*
- White Perch*
- Bluefish
- Hogchoker
- Carp
- American Eel
- Forage Species (spottail shiner, silverside)*
- Blue Crab
- Pumpkinseed*
- Walleye

Note: Not all fish are targeted for collection at all stations

* Indicates the fish are also collected as part of the Upper Hudson River program

Sampling Techniques

Freshwater Locations

- Electroshocking
- Netting
- Trapping
- Seining
- Angling

Brackish (salty) water locations

- Angling
- Seines
- Traps or pots
- Gill nets

Eel pots may be used to collect American eels at Poughkeepsie and Tappan Zee, and traps will be used to target blue crab

*Sampling techniques are designed to minimize the potential to encounter sturgeon. Close coordination with DEC.

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Sampling and Investigations Schedule

2023

- Water sampling (monthly five stations)
- Fish sampling (800+) – based on availability of species
  - Salt and freshwater species
  - Migratory, local and forage fish
  - Blue crab and eel
- Sediment collection – recently deposited (100 tributary samples and 150 main stem)
- Data evaluation

2024

- Monthly water column sampling continued
- Fish sampling continued
- Sediment collection
  - Supplemental sediment sampling (10 areas with 20 samples per area at locations where fish are collected)
  - High resolution coring (10 location to span the length of the lower river)
- Data evaluation

2025

- Collect additional samples as necessary to support the objectives and purpose of the sampling work
- Develop next steps
- Data evaluation

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Summary

- This sampling, along with other information, is key to better understanding contamination in the Lower Hudson River
- We need this information to develop the scope of work for potential future studies and additional sampling, including prioritizing investigations in each portion of the Lower Hudson
- The data and information collected will inform EPA decision-making and next steps, including whether and how to approach additional investigations
- EPA took this approach with a focus on getting into the Lower Hudson River and collecting data as soon as possible
- GE remains legally responsible for its PCBs that migrated to this area
- EPA is continuing to evaluate whether other parties may also be liable for PCBs, as well as other contamination

Part V: 3rd Five-Year Review
Upper Hudson River PCB cleanup & Remnant deposits

Hudson River PCBs SUPERFUND SITE

What is a five-year review?

Purpose: To ensure that cleanups are working as intended and protective of people's health and the environment

- Legally required under the Superfund law every five years after the start of on-site construction when contaminants remain on site
- Uses current information (data, site visits, document review) to evaluate the implementation and performance of the selected cleanup plan
- The process is intended to assess protectiveness of the selected cleanup; not to explore alternative cleanup options or strategies

What is EPA reviewing?

Upper Hudson River PCB cleanup

- Final cleanup plan signed 2002: dredging followed by a period of natural recovery
- Start of on-site construction (building dewatering facility) - 2007
- Phase 1 dredging - 2009
- Peer Review - 2010
- Phase 2 dredging - 2011-2015
- 2.7M cubic yards of sediment removed (≈310,000 lbs of PCBs)
- Monitoring of sediment, water, and fish ongoing

Hudson River
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What is EPA reviewing? (continued)

Remnant deposits

- 1984 cleanup plan: addressed areas of PCB-contaminated sediment that became exposed after river water level dropped after the Fort Edward Dam was removed in 1973
- Areas are now capped, maintained, and monitored

Other EPA investigations for the Superfund site are ongoing and are not part of the current five-year review

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Five-Year Review – Team

- EPA invited agency and community representatives to join Five-Year Review team
- Included EPA technical experts, support agencies, members of Community Advisory Group
- Team members provided input to EPA during technical meetings

Team provided input on cleanup implementation and performance based on information that may include, but is not limited to:

- Environmental data
- Document review
- Site inspection (considering current/future land and resource use)
- Interviews

Five-Year Review - Next Steps

- Status of 3rd Five-Year Review
  - Under internal review
  - Expected to be released in July for 90-day public comment period
  - EPA will carefully consider the comments provided and issue a final report
  - EPA will continue its ongoing evaluation of the recovery of the river as data is collected
  - EPA will continue to report to the public about the progress of the cleanup including through the Five-Year Review Process
  - All data/information collected as well as EPA's analysis of the project is made available to the public
  - EPA appreciates the public interest in the project

Hudson River PCBs SUPERFUND SITE

Hudson River PCBs Superfund Site – Looking Ahead

- GE remains obligated to carry out long-term monitoring of water, sediment and fish and maintain caps and plantings
  - Data collection will continue for many decades to come
- EPA will continue to issue Five-Year Review reports
- GE currently performing study of Upper Hudson River floodplain
- EPA continuing oversight of Powerhouse/Allen Mill deconstruction
- EPA evaluating PCBs in the Lower Hudson (from Troy to NYC)
  - GE remains legally responsible for its PCBs that migrated to Lower Hudson
  - EPA is continuing to evaluate whether other parties may also be responsible for PCBs, as well as other contamination in the Lower Hudson

Project Contacts

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Hudson River PCBs SUPERFUND SITE

Project Glossary of Terms

Potentially Responsible Party (PRP): From the time the site is discovered, EPA tries to identify the generators and transporters of the hazardous waste and the owners and operators of a site. These people/companies/municipalities are considered PRP(s) under Superfund and are asked to conduct and/or pay for cleanup studies and activities. If the PRP(s) refuse to participate, EPA will clean up the site and sue the party or parties to recover costs.

Monitored natural attenuation (MNA): Natural attenuation relies on natural processes to decrease or "attenuate" concentrations of contaminants in soil and groundwater. Scientists monitor these conditions to make sure natural attenuation is working. Monitoring typically involves collecting soil and groundwater samples to analyze them for the presence of contaminants and other site characteristics. The entire process is called "monitored natural attenuation" or "MNA."

Remedial Investigation/Feasibility Study (RI/FS): The RI/FS phase of the Superfund process determines the nature and extent of contamination at the site, tests whether certain technologies are capable of treating the contamination and evaluates the cost and performance of technologies that could be used to clean up the site.

Project Glossary of Terms

Total PCB: Represents the sum of all 209 PCB congeners.

Tri+ PCB: Represents the sum of PCB congeners containing three or more chlorine atoms. These are the primary PCBs that accumulate in fish and what the ROD criteria are based on.

Species weighted average: Represents common species of fish collected from several locations in the river that a typical angler likely would catch and take from the river.