

celebrate the hudson river

ESTUARY



©1993 Helen Buttfield

August 17, 1996 • 12 pm - 8 pm
Pier 26 • Hudson River • Laight St.
5 blocks south of Canal St.

Visit a research vessel • See displays of live river fish
Create your own fish print • Participate in hands-on activities

FREE ADMISSION



celebrate the hudson river

ESTUARY

Celebrate the Hudson River Estuary

August 17, 1996

12pm - 8pm

Pier 26 Hudson River

Sponsored by:

The River Project
Marine Sciences Research Center,
SUNY Stony Brook
The Aquarium for Wildlife Conservation,
Wildlife Conservation Society

and
Manhattan Borough President,
Ruth W. Messinger

in cooperation with
Community Board #1
and
The Hudson River Park Conservancy,
which as the managing agent
for the New York State Department of
Transportation, sponsors environmental,
recreational, and cultural programs along the
waterfront throughout the summer.

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Event Activities Schedule



Fishing – 1:30, 3:30, 5:30

- Check and bait traps
- Identify, measure and record catch
- Install fish in aquaria

Danny Torres, The River Project

"Fishes of the Hudson River Estuary" – 2:00, 3:30, 5:00

Slide presentation and
talk, questions

*Nancy Steinberg,
Hudson River Foundation*

Estuarium Exhibit – Tours throughout the day

The River Project Estuarium at Pier 26 is a living exhibit and interpretive display of the fish and other animals of the Hudson Estuary, their habitats, and the ecosystem that supports us.

- Hudson River aquaria
- Microscopy station
- Fish physiology and systematics workshop

Shuttle to tour R/V Onrust – All day

Onrust is the most completely equipped coastal oceanographic research vessel in the region. Displays and demonstrations of oceanographic sampling equipment as well as bridge equipment necessary for navigation and position-finding.

Marine Sciences Research Center



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(Events continued)

Music by "Jazzpora"

Food by Jane's

Crafts for Kids – All day

• **Fish Printing** – paint a rubber fish, cover it up with paper and x rub –Presto! You have a beautiful print of a river flounder

• **Color your own "CITY FISH" button** – use markers and your imagination to create a one-of-a-kind button celebrating the marine life of the Hudson River Estuary.

New York's Aquarium at Coney Island

Touch Tank – All day

Meet invertebrates of the estuary up close and personal. Let a sea star crawl on your hand, hold a horseshoe crab, experience a sea urchin, all on Hudson River's Pier 26.

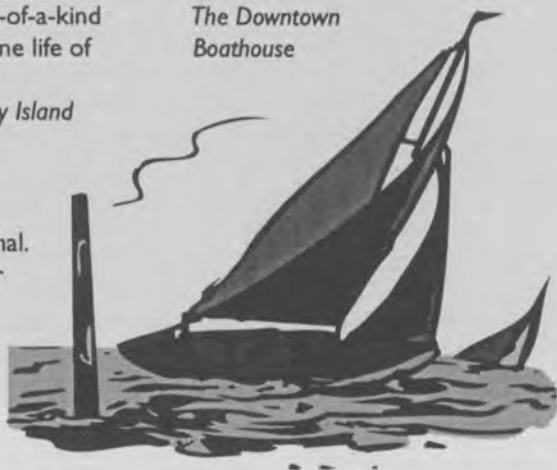
*New York's Aquarium
at Coney Island*

17th Annual Harrison Street Regatta –

Registration at 5:00

Race begins at 6:00
at Pier 25

*The Downtown
Boathouse*



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ESTUARY

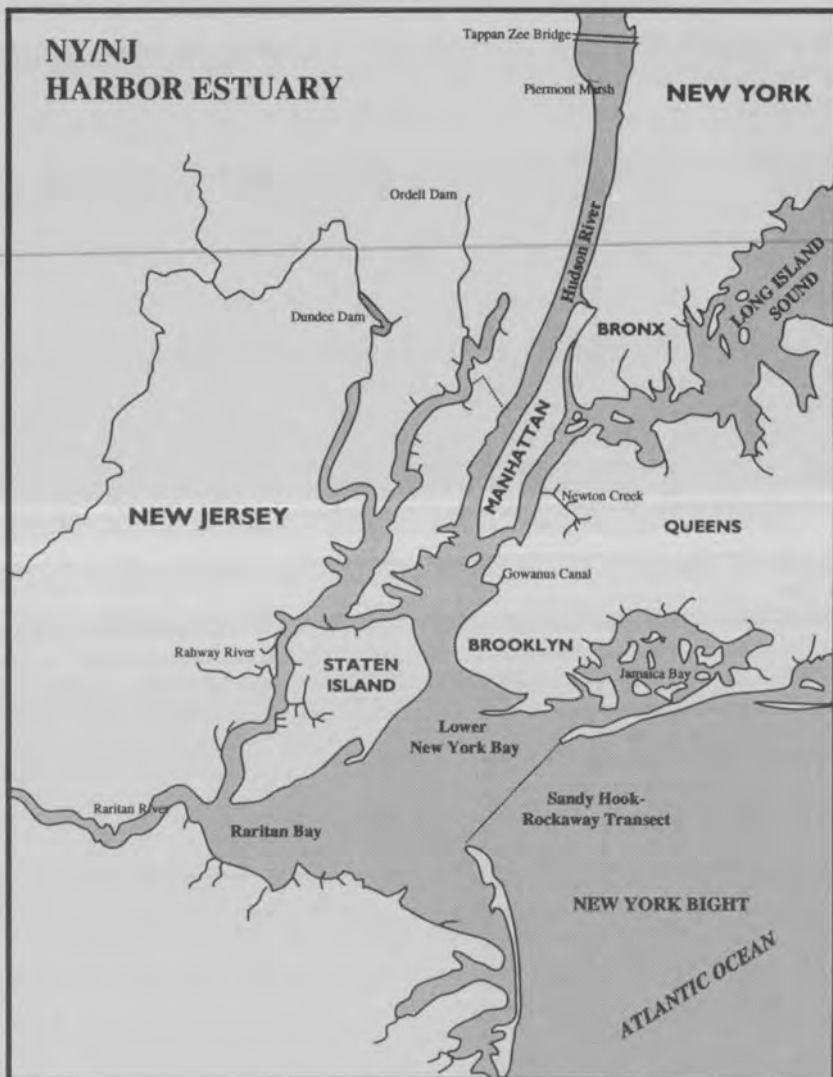
What is an Estuary?

An estuary is an area where fresh river water mixes with the salt water from the ocean. Estuaries are very productive ecosystems — as productive as rain forests and coral reefs! Many species of fish and shellfish use the estuary as a nursery ground (live there for the early stages of their lives), taking advantage of the estuary's abundant food sources and the protection it provides from predators. Estuaries are also changing constantly — salinity, temperature, nutrients, and water movement, among other things, change with the seasons and with the tides. Sometimes humans also influence the functioning of the estuary by dredging the bottom, developing the shoreline, and disposing our waste into the estuary's waters.

The Chesapeake Bay is an estuary. So is Long Island Sound. And New York Harbor is part of our very own estuary, the Hudson-Raritan Estuary, also called the New York-New Jersey Harbor Estuary. The rivers that contribute fresh water to this estuary are the Hudson, Raritan, Passaic, Hackensack, Rahway, Shrewsbury, and Navesink. In addition, many other smaller rivers and streams run into those larger rivers. All together, running water from more than 16,000 square miles (the estuary's watershed) ends up in our estuary.

Some people think that the Hudson-Raritan estuary is essentially dead, choked to death by pollution and development. Nothing could be further from the truth. Thanks to the Clean Water Act and other legislation, as well as the actions of concerned citizens, the estuary and its rivers are infinitely cleaner now than they were 30 years ago. Striped bass, shad, and sturgeon migrate past Manhattan every spring as they have done for thousands of years. Peregrine falcons, an endangered species, nest high on the building ledges and bridges of New York City, while many other species of aquatic birds are finding good homes in the Arthur Kill. And not very far up the Hudson River, the bald eagle is once again soaring over the Hudson Highlands.

However, we cannot yet afford to simply sit back and enjoy the view. Threats to our estuary, a national treasure, remain. Possibly the largest threat is loss of wetland and watershed habitat to development.



Toxic materials are still released by industrial and municipal sources. Excess nutrients are introduced via sewage treatment plants and other sources, causing excessive plankton blooms and low oxygen in the water. We cannot harvest shellfish from the harbor area because they are contaminated with unsafe levels of

bacteria. And during when it rains, Combined Sewer Overflows (CSOs) discharge untreated wastewater and sewage directly into the estuary's waters.

Read further in this book to learn more about the estuary's wildlife, its problems, and what you can do to help. ■

Sponsor Focus

Our Part in Today's Events

Tour of R/V ONRUST

Anchored in the interpier area immediately south of the event pier is the Research Vessel ONRUST. Owned and operated by the Marine Sciences Research Center since 1974, ONRUST is the most completely equipped coastal oceanographic research vessel in the region. Participants are invited to shuttle out to tour the ship. On display and to be demonstrated are various pieces of oceanographic sampling equipment as well as bridge equipment necessary for navigation and position-finding.

Demonstration of Remotely-Operated Vehicle (ROV)

Oceanographers are increasingly turning to remotely-operated vehicles (ROV's) to explore and sample the oceans. Such vehicles typically have much greater endurance and depth capability than human divers and cost only a fraction of a manned submersible. Their use obviates any human diver safety concerns associated with exploration of the sea. The revolution in miniaturized electronics and computer-based microcontrol technology allows very sophisticated controls and capabilities to be designed and built into these units. An ROV designed and built in MSRC's Electronics and Ocean Instrument Laboratory will be demonstrated in a large tank.

MARINE SCIENCES



RESEARCH CENTER

State University of New York, Stony Brook

The Marine Sciences Research Center (MSRC) is the center for graduate study and research in the marine sciences for the entire, 64-campus State University of New York (SUNY) system. The Center conducts research into the fundamental processes of coastal ecosystems around the globe. In the past two decades, MSRC scientists have studied many aspects of the Hudson River estuary, including the physical movement and transport of water, biological communities such as phytoplankton, zooplankton, fishes, and benthos (bottom-dwellers), chemistry and water quality, and various issues relating to dredging and dredged material disposal. Much of this research has been done aboard the Center's research vessel, R/V ONRUST, which is available for today's event.

For more information about MSRC please feel free to contact us at:

*Marine Sciences Research Center
SUNY Stony Brook*

*Stony Brook, NY 11794-5000
(516) 632-8700*

*or visit our World Wide Web Page
<http://www.msrc.sunysb.edu/>*

Capsouto Frères

RESTAURANT



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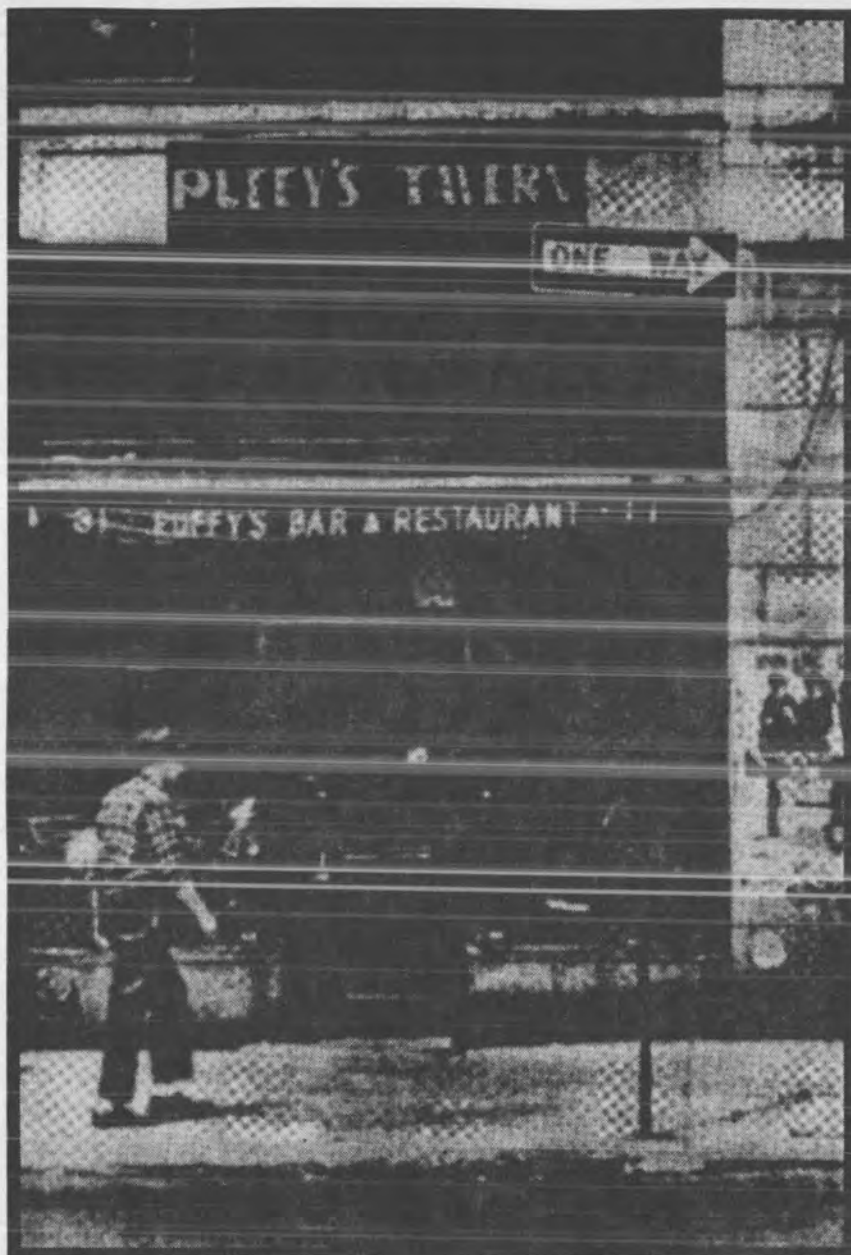
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Inventory of Species Recorded in the Harbor Estuary, 1979-1989

Compiled by Peter J. Woodhead
Marine Sciences Research Center, SUNY Stony Brook, 1991.

*Inventory and Assessment of Habitat and Fish Resources and Assessment of
Information on Toxic Effects in the New York-New Jersey Harbor Estuary.
A Report to the New York-New Jersey Harbor Estuary Program.*

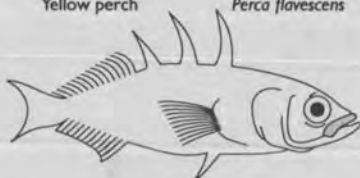
Species Name	Scientific Name	Species Name	Scientific Name
Threespine stickleback	<i>Gasterosteus aculeatus</i>	Atlantic cod	<i>Gadus morhua</i>
Fourspot flounder	<i>Paralichthys oblongus</i>	Conger eel	<i>Conger oceanicus</i>
Fourbeard rockling	<i>Enchelyopus cimbrius</i>	Bluespotted cornetfish	<i>Fistularia tabacaria</i>
Fourspine stickleback	<i>Apeltes quadricus</i>	Crevalle jack	<i>Caranx hippos</i>
Alewife	<i>Alosa pseudoharengus</i>	Cunner	<i>Tautoglabrus adspersus</i>
American eel	<i>Anguilla rostrata</i>	Summer flounder	<i>Paralichthys dentatus</i>
American sand lance	<i>Ammodytes americanus</i>	Fawn cuskeel	<i>Lepophidium cervinum</i>
American shad	<i>Alosa sapidissima</i>	Goosefish	<i>Lophius americanus</i>
Atlantic croaker	<i>Micropogonias undulatus</i>	Grubby sculpin	<i>Myoxocephalus aeneus</i>
Atlantic herring	<i>Clupea harengus harengus</i>	Grey snapper	<i>Lutjanus griseus</i>
Atlantic mackerel	<i>Scomber scombrus</i>	Gizzard shad	<i>Dorosoma cepedianum</i>
Atlantic menhaden	<i>Brevoortia tyrannus</i>	Hickory shad	<i>Alosa mediocris</i>
Atlantic moonfish	<i>Selene setapinnis</i>	Hogchoker	<i>Trinectes maculatus</i>
Atlantic sturgeon	<i>Acipenser oxyrinchus</i>	Hardtail	<i>Caranx crysos</i>
Atlantic silverside	<i>Menidia menidia</i>	Inland silversides	<i>Menidia beryllina</i>
Bay anchovy	<i>Anchoa mitchilli</i>	Sea lamprey	<i>Petromyzon marinus</i>
Blueback herring	<i>Alosa aestivalis</i>	Inshore lizardfish	<i>Synodus foetens</i>
Bigeye	<i>Priacanthus arenatus</i>	Little skate	<i>Raja erinacea</i>
Blackfish	<i>Tautoga onitis</i>	Longhorn sculpin	<i>Myoxocephalus octodecemspinosus</i>
Bluefish	<i>Pomatomus saltatrix</i>	Lookdown	<i>Selene vomer</i>
Bluegill	<i>Lepomis macrochirus</i>	Mummichog	<i>Fundulus heteroclitus</i>
Black sea bass	<i>Centropristis striata</i>	Naked goby	<i>Gobiosoma boscii</i>
Brown bullhead	<i>Ictalurus nebulosus</i>	Northern kingfish	<i>Menticirrhus saxatilis</i>
Butterfish	<i>Pepilius tricanthus</i>	Northern puffer	<i>Sphoeroides maculatus</i>
Carp	<i>Cyprinus carpio</i>	Northern searobin	<i>Priodonotus carolinus</i>
Clearnose skate	<i>Raja eglanteria</i>		

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Species Name	Scientific Name	Species Name	Scientific Name
Northern sennet	<i>Sphyraena borealis</i>	Spot	<i>Leiostomus xanthurus</i>
Northern stargazer	<i>Astroscopus guttatus</i>	Spotted hake	<i>Urophycis regia</i>
Ocean pout	<i>Macrozoarces americanus</i>	Spotfin butterflyfish	<i>Chaetodon ocellatus</i>
Orange filefish	<i>Alutera shoepfii</i>	Spiny dogfish	<i>Squalus acanthias</i>
Pinfish	<i>Logodon rhomboides</i>	Striped anchovy	<i>Anchoa hepsetus</i>
Northern pipefish	<i>Syngnathus fuscus</i>	Striped bass	<i>Morone saxatilis</i>
Planehead filefish	<i>Monacanthus hispidus</i>	Striped killifish	<i>Fundulus majalis</i>
Pollock	<i>Pollachius virens</i>	Striped searobin	<i>Prionotus evolans</i>
Pumpkinseed	<i>Lepomis gibbosus</i>	Striped cusk-eel	<i>Ophidion marginatum</i>
Rock gunnel	<i>Pholis gunnellus</i>	Striped mullet	<i>Mugil cephalus</i>
Red hake	<i>Urophycis chuss</i>	Tessellated darter	<i>Etheostoma olmsted</i>
Redfin pickerel	<i>Esox americanus americanus</i>	Thornback skate	<i>Raja radiata</i>
Rough scad	<i>Trachurus lathami</i>	Toadfish	<i>Opsanus tau</i>
Round herring	<i>Etrumeus teres</i>	Atlantic tomcod	<i>Microgadus tomcod</i>
Rosette skate	<i>Raja garmani</i>	Tidewater silverside	<i>Menidia peninsulae</i>
Rainbow smelt	<i>Osmerus mordax</i>	Weakfish	<i>Cynoscion regalis</i>
Scup	<i>Stenotomus chrysops</i>	White mullet	<i>Mugil curema</i>
Lined seahorse	<i>Hippocampus erectus</i>	Windowpane flounder	<i>Scopelogadus aequosus</i>
Seaboard goby	<i>Gobiosoma ginsburgi</i>	Winter flounder	<i>Pseudopleuronectes americanus</i>
Sea raven	<i>Hemitripterus americanus</i>	White catfish	<i>Ictalurus catus</i>
Silver hake	<i>Merluccius bilinearis</i>	White hake	<i>Urophycis tenuis</i>
Smallmouth flounder	<i>Etopus microstomus</i>	White perch	<i>Morone americana</i>
Smooth flounder	<i>Liopsetta putnami</i>	Winter skate	<i>Raja ocellata</i>
Smooth dogfish	<i>Mustelus mustelus</i>	Yellow perch	<i>Perca flavescens</i>
Shortnose sturgeon	<i>Acipenser brevirostrum</i>		
Spottail shiner	<i>Notropis hudsonius</i>		



It's Your Call . . .



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This program is made possible by: The NYC Department of Mental Health, Mental Retardation and Alcoholism Services; The Manhattan Borough President's Office; NatWest Bank; The Scherman Foundation; Marks & Spencer; The United Way; and Liquid I studio.

**LOWER
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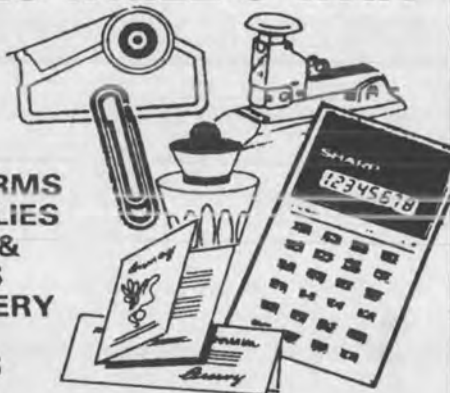
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Pollution in the Harbor Estuary

(modified from the NY/NJ Harbor Estuary Program publication, Pollution in the Harbor Estuary)

Despite improvements in the environmental quality of our estuary, many problems remain. One of the most serious is that of toxic materials that find their way into our waterways or remain in the sediments at the bottom of the harbor — the legacy of historical pollution. Some of the pollutants of concern in the Hudson-Raritan Estuary are described here.

Toxic Metals

Many metals are found in high concentrations in the Harbor Estuary's waters and bottoms sediments, including copper, lead, mercury, silver, arsenic, cadmium, nickel, zinc and others. Most toxic metals arrive in the Harbor Estuary from municipal treatment plants and from tributaries. Tributaries contribute some metals, such as copper, found naturally at high levels. Some metals from industry, municipal water pipes (a source of copper) and household products poured down drains (solvents, cleaners) may end up in the estuary after passing through treatment plants.

Organic Chemicals

Organic compounds, called hydrocarbons, are present as petroleum-based fuels, oils, grease and a myriad of other industrial and consumer products. Many of them are highly toxic. Although more research is needed on the sources of organic chemicals in the Estuary, there are a variety of ways they can end up in our harbor's waters. Even though the production and use of PCBs, dioxin and certain other organic chemicals has been banned or severely curtailed, these chemicals are present in the Estuary's sediments and water, resulting from industrial discharges in the past (over a 20-year period, a General Electric capacitor plant in Fort Edward, New York, dumped 300,000 pounds of PCBs into the Hudson River). Oil, grease and gasoline that drip from cars or are improperly discarded can deposit organic toxins in the harbor. Pesticides introduce organic compounds into the harbor when they wash off agricultural land, lawns and roadsides during storms. Organic compounds in household products like paint thinners and glues find their way into the Estuary through household drains, toilets or outdoor spills.

Organic Matter and Nutrients

Organic matter, such as leaves and feces, can pollute harbor waters as it

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decomposes, using up available oxygen dissolved in the water. As dissolved oxygen (DO) is consumed, fish and other aquatic creatures may die because of the low level of oxygen (hypoxia). Nutrients such as nitrogen contained in human waste can over-enrich the harbor waters, encourage the rapid growth of algae, and lead to algal blooms that can be destructive to estuarine life. Biochemical oxygen demand (BOD) is a measure of pollution: a high BOD means there is a large amount of organic matter in the water, and a lot of dissolved oxygen is consumed in its decomposition.

Most organic matter and nutrients in the Harbor Estuary's waters come from sewage treatment plants.

Impacts of Pollution: Effects on Health of Species

The waters of the New York/New Jersey Harbor Estuary have historically supported rich, diverse populations of fish and shellfish and have sustained active commercial and recreational fisheries. Declines that have occurred in the abundance of fish, shellfish and fish-eating birds in the harbor are due to a variety of factors — overfishing, pollution and habitat loss. Research has suggested that the abundance of shad, hard clams and oysters has declined as a result of water pollution,

although overharvesting plays an important role as well. Some species, such as bottom-dwelling flatfishes, have had fin rot, possibly associated with chemical pollution. Hudson River tomcod have had tumors and a toxic organic chemical is the suspected pollutant. Osprey populations suffered a decline and research suggested a link between reduced eggshell thickness and PCB, DDE and mercury concentrations in osprey eggs. Since the use of pesticides has been curtailed, the osprey populations have begun to rebound.

Low dissolved oxygen levels can also affect species in areas of the Harbor Estuary, particularly non-mobile species which cannot escape to more oxygenated waters.

Human Health Concerns

In addition to bacterial contamination, there is also concern over the public's consumption of fish contaminated by toxic chemicals. Since 1976, New York State has restricted the sale of striped bass from the Hudson River and Upper New York Bay. Because of PCB contamination from other chemicals such as dioxin, both New York State and New Jersey have issued fishing advisories for some fish and shellfish species, applying to all parts of the Harbor Estuary. ■

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Recipes

Christopher Letts' **Pickled Shad**

Fillet and skin one or two shad.
Cut into bite-sized pieces.
Soak the shad in ice water for
15 minutes. Drain well.

Prepare the pickling brine:
1/2 gallon distilled white vinegar,
1 1/4 cups salt,
1 cup sugar.

Heat to dissolve sugar.
Place cooled brine in a stainless
steel or non-metallic container.
Add shad in a loose pack.
Agitate gently every few hours
for the first day so that all sides
of fish contact the brine. After
the third day, drain and rinse in
cold water. Bones will have
dissolved and shad is edible.

Store the fish in a packing
solution made of:
1/2 cup sugar,
2 Tbsp. pickling spices,
2 bay leaves, 4 cloves.
Cover and simmer for 15 minutes.
Cool before adding shad.
Keep refrigerated.



Tom Lake's Hudson River Blue Crab Cakes

1 Pound crab meat
1 tsp OLD BAY seasoning
1/4 tsp salt
1 Tbs mayonnaise
1 tsp worcestershire sauce
1 Tbs chopped parsley
1 Tbs baking powder
1 egg, beaten
2 slices of bread with crusts
removed, broken into small
pieces and moistened with milk

Mix all ingredients and shape
into small cakes. Fry quickly
until brown on both sides.



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► Everyone should eat no more than one meal per week of striped bass from Long Island Sound east of Wading River, Peconic and Gardiners Bays, Block Island Sound, Long Island south shore waters and Jamaica Bay.

► Eat no more than one meal per month of striped bass from Long Island Sound west of Wading River and the Lower Bay of New York Harbor.

► Everyone should eat no more than one meal per week of American eel and bluefish from any of these waters.

Which Fish are Safer to Eat?

You can limit your exposure to chemical contaminants in these ways:

► Choose fish not mentioned in the advisory. Those fish generally have lower contaminant levels.

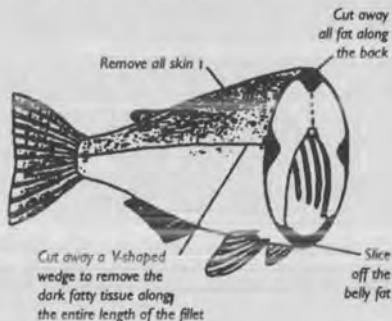
► Choose smaller fish (of legal size) to eat. Smaller fish are younger and generally have lower contaminant levels than larger, older fish

► Fish from the south shore of Long Island and eastern Long Island Sound generally have lower contaminant levels than fish from the Hudson River and the Upper Bay of New York Harbor.

Can I Clean My Fish to Reduce Contaminants?

You can reduce your exposure to chemical contaminants by the way you prepare the fish. Many chemicals concentrate in the fatty parts of fish. By cleaning or cooking fish to reduce fat, you can also reduce the amount of contaminants you eat.

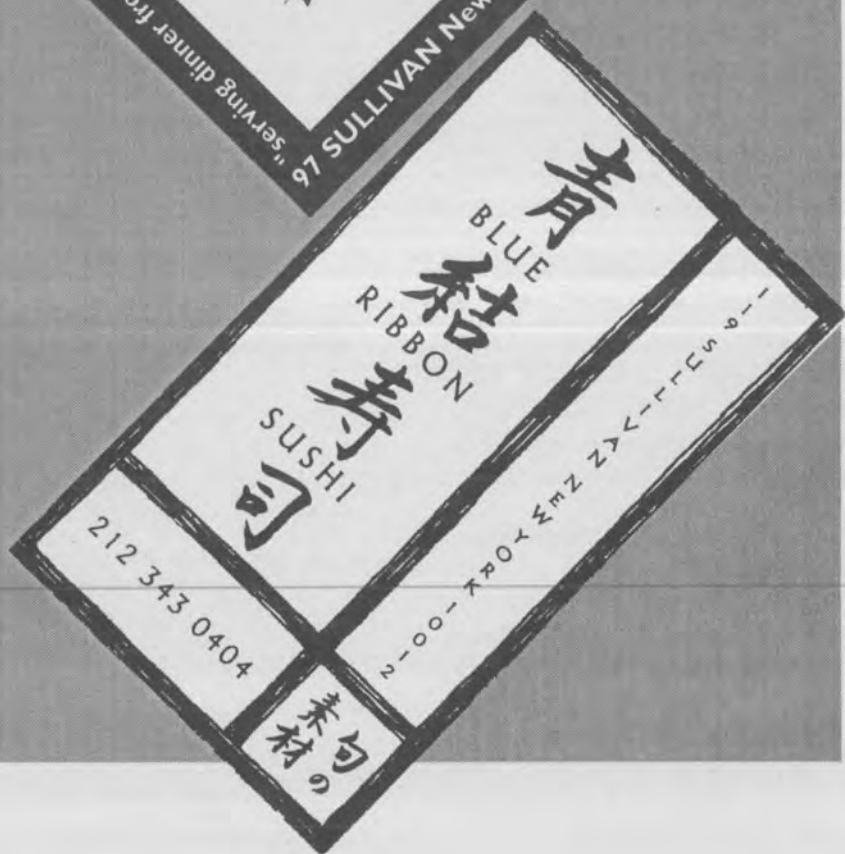
1. Remove the skin and trim all the fat from the areas shown below



2. Don't pan or deep fry. Broil, bake, poach or boil your fish so the fatty juices drip away.

3. Don't eat the hepatopancreas (tomalley, mustard, or liver) or consume the cooking liquids.

For more details about these and other fish consumption advisories, call the NYS Department of Health at 1-800-458-1158 X 409. ■



Children's Programs

Game Shack / Piers 62 & 25 – Free

Wednesday – Sunday

July 10 – August 24, 1 – 6 pm

Kiosks offer free outdoor games for children: jump ropes, water twister, four square, hoola hoops, swoosh ball, knock hockey, connect four, checkers, chess, and the like!!!

Art Shack / Piers 62 & 25 – Free

Wednesday – Sunday

July 10 – August 24, 4 – 6 pm

Weekly arts & crafts projects: drawing, birdhouse building, collages, face painting, and more!!!

Football Sports Camp Pier 25 – Free

Saturday, July 13 – August 24, 4:30 – 6pm

Hands-on learning experience for girls and boys ages 7-14. Instruction provided by players from the United Football League. Pre-registration is required. Call 212-353-0366

Explore the Waterfront Environment

Pier 62 & 25 – Free

Thursday & Friday,

July 10 – August 24, 2 – 6 pm – Pier 61

Friday, Saturday & Sunday, – Pier 25

Join our naturalist in studying the elements and wildlife that make the Hudson River Estuary unique. Set fish traps, test water quality and monitor the habit of nesting birds.



Hudson River Park
CONSERVANCY

Directions Pier 62 Chelsea Waterside Park at 23rd Street:
the closest subway stop is the 23rd Street station for the C & E trains. Or, take the M23 bus right to us!

Directions Pier 25 at N. Moore Street:
the closest subway stop is Chambers Street. Walk west on Chambers Street and cross the West Side Highway. Then walk north on the bikeway / walkway, and turn left on to Pier 25.

CALL 533-PARK

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Hon. Rudolph W. Giuliani
Mayor, City of New York

Hon. Fran Reiter
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City of New York

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Development Corporation

Peter K. Keogh
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Hudson River Park Conservancy

Aquarium

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WILDLIFE CONSERVATION SOCIETY

Our Part in Today's Events

Crafts for Kids

• **Fish Printing** – paint a rubber fish, cover it up with paper and rub –Presto! You have a beautiful print of a river flounder

• **Color your own "CITY FISH" button** – use markers and your imagination to create a one-of-a-kind button celebrating the marine life of the Hudson River Estuary.

Touch Tank – All day

Meet invertebrate of the estuary up close and personal. Let a sea star crawl on your hand, hold a horse-shoe crab, experience a sea urchin, all on Hudson River's Pier 26.

Who We Are

Up-close encounters with aquatic life, exciting hands-on interactives, and informative exhibits have combined to make the Aquarium for Wildlife Conservation in New York a unique visitor experience now in its 100th year.

Operated by the Wildlife Conservation Society, the Aquarium supports the Society's mission of preserving species and their habitats through conservation, education, and science. Comprehensive educational programs offer students a diverse curriculum, and a facility-based laboratory allows scientists a rare opportunity to conduct research on site.

These elements support the visitor's experience where aquatic life can be seen in naturalistic settings. Open every day of the year, the "New York Aquarium" is truly an institution of wonder and excitement.

celebrate the hudson river

ESTUARY

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