RIVERKEEPER®
NY's clean water advocate

HOW'S THE WATER?

Hudson River Water Quality and Water Infrastructure

The Hudson River Estuary is an engine of life for the coastal ecosystem, the source of drinking water for more than 100,000 people, home to the longest open water swim event in the world, and the central feature supporting the quality of life and $4.4 billion tourism economy for the region.

This report focuses on one important aspect of protecting and improving Hudson River Estuary water quality – sewage-related contamination and water infrastructure. Untreated sewage puts drinking water and recreational users at risk.

Water quality data presented here are based on analysis of more than 8,200 samples taken since 2008 from the Hudson River Estuary by Riverkeeper, CUNY Queens College, Columbia University's Lamont-Doherty Earth Observatory; and from its tributaries by dozens of partner organizations and individual community scientists. Water infrastructure information presented here is based on data from the Department of Environmental Conservation and Environmental Facilities Corporation, which administers State Revolving Funds.

While the Hudson River is safe for swimming at most locations on most days sampled, raw sewage overflows and leaks from aging and failing infrastructure too often make waters unsafe. The Hudson's tributaries – the smaller creeks and rivers that feed it – are often sources of contamination.

To improve water quality, action is needed at the federal, state and local levels to increase and prioritize infrastructure investments.

21%
Hudson River Estuary samples that failed to meet federal safe swimming guidelines

44
Municipally owned wastewater treatment plants that discharge to the Estuary

$4.8 Billion
Investment needed in wastewater infrastructure in the Hudson River Watershed

ABOUT THE DATA

The main focus of Riverkeeper's monitoring studies is *Enterococcus* (Entero), a group of fecal indicator bacteria with well established protocols for measurement, and federal criteria that allow the data to be related to water quality. While Entero are themselves not usually harmful, they indicate that disease-causing pathogens associated with fecal contamination are likely present. Sewage-related pathogens are the leading cause of illness from swimming and other recreational use of the water. A range of other pollutants, ranging from nutrients to pharmaceuticals, may also be present.

Why Entero?

New York State's Water Quality Standards use an outdated group of fecal indicator bacteria, Fecal Coliforms, that haven't been recommended for use by the Environmental Protection Agency (EPA) since 1986. New York State is updating its standards, and based on the EPA's 2012 Recreational Water Quality Criteria, must use Entero in saline waters and either Entero or *E. coli* (another type of fecal indicator bacteria) in fresh waters. Riverkeeper, based on advice and consultation with our science partners at CUNY Queens College and Columbia University's Lamont-Doherty Earth Observatory, uses Entero and assesses water quality using EPA's criteria for these reasons:

1. Entero is the only fecal indicator bacteria recommended for use in both fresh and saline waters. The Hudson, as an estuary, has both fresh and saline waters.
2. Entero is a more sensitive indicator than *E. coli* across the range of conditions found in the estuary, and should therefore better protect public health and the environment.
3. The EPA criteria for Entero are based on analysis of decades of science. While there is more to learn, and we participate actively in scientific exploration of additional water quality monitoring techniques, there is robust science underlying the assessment of water quality based on Entero.

How Does Entero enter the Water?

Entero is normally found in the guts of warm-blooded animals, including humans. Thus, its presence in a natural waterway indicates that the water may be contaminated with fecal matter. Sources of Entero may include untreated or partially-treated sewage, as well as the other sources listed below. For a more detailed discussion, see Riverkeeper's 2015 *How's the Water?* report.

- Combined sewage overflows (CSOs) that discharge stormwater and sewage when it rains;
- other leaks or overflows from aging sewer pipes, pump stations and wastewater treatment plants;
- illicit connections between sanitary and stormwater sewers;
- failing septic systems;
- urban stormwater contaminated with pet waste, wildlife waste and other sources;
- runoff from agriculture, including livestock farms or farms where manure or sewer sludge is spread as fertilizer;
- wildlife;
- contaminated sediment and biofilms.

Our Partners

The data in this report have been gathered, analyzed and communicated by a large number of partners, and our program is funded by diverse sources. In addition to our longtime partners, **CUNY Queens College and Columbia University's Lamont-Doherty Earth Observatory, and the Riverkeeper members** who make our work possible, we wish to acknowledge and thank our Water Quality Program partners, including those listed here who have worked with us since our last publication in 2015:

Ancram Conservation Advisory Council, Ashokan Center, Bard Water Lab, Batten Kill Conservancy, Brooklyn College, Bronx River Alliance, Butler Conservation Fund, Catskill Creek Awareness Project, Columbia-Greene Trout Unlimited, Cornell University, U.S. Environmental Protection Agency, Environmental Protection Fund, Eppeley Foundation, Fluid-Screen, Gardiner Environmental Conservation Commission, U.S. Geological Survey, Groundwork Hudson Valley, Hoosic River Watershed Association, HSBC Water Programme, Hudson Basin River Watch, Hudson

Crossing Park, DEC Hudson River Estuary Program, Hudson River Improvement Fund of the Hudson River Foundation, Hudson River Maritime Museum, IDEXX, Jarrett Engineers, John Jay College, JPB Foundation, JSA Financial, LaGuardia Community College, Leo S. Walsh Foundation, Leon Lowenstein Foundation, Manhattan Community Award Program, Middleburgh Central School, Montgomery Conservation Advisory Council, New Paltz Kayaking Tours, New York City Water Trail Association, New York Sea Grant, New York State Water Resources Institute, DEC Mohawk River Basin Program, Ossining High School, Park Foundation, Philipp Family Foundation, Pleasantville Conservation Advisory Council, Pocantico River Watershed Alliance, Prime Print Shop, Quassaick Creek Watershed Alliance, Rensselaer Land Trust, Rhinebeck Rotary Club, Rochester Environmental Conservation Commission, Rocking the Boat, Roe Jan Watershed Community, Rosendale Commission for the Conservation of the Environment, Sarah Lawrence College Center for the Urban River at Beczak, Saunders Technical School, Saw Kill Watershed Community, Saw Mill River Coalition, Skidmore College, Sparkill Creek Watershed Alliance, SUNY Cobleskill, SUNY Poly, SUNY Rockland, The River Project, Wallkill River Watershed Alliance, Watershed Assessment Associates, Wawarsing Environmental Conservation Commission, Westchester Community Foundation, Yonkers Paddling and Rowing Club.

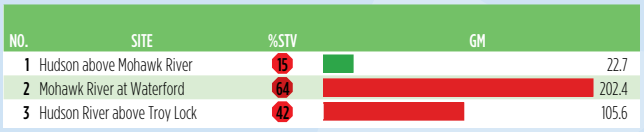
HOW TO READ THE DATA CHARTS

The EPA's Recreational Water Quality Criteria define thresholds of Entero per 100 ml of water ("Entero count"). Based on epidemiological studies of people who became ill at beaches, the EPA set thresholds for Entero in water that are designed to prevent an elevated risk of illness to people engaged in activities where ingestion of water or full immersion of the body is likely. Such activities, known as "primary contact recreation," include swimming, bathing, surfing, water skiing, tubing, skin diving, and water play by children.

Throughout our report, red indicates an exceedance of EPA guidelines for safe swimming. The EPA criteria includes three ways to measure water quality, and each is reflected in this report:

1. **Beach Action Value:** If a single sample exceeds an Entero count of 60, swimming is not recommended. We illustrate the percentage of samples that exceeded the Beach Action Value with bar charts.

2. **Geometric Mean:** A geometric mean (GM) is a weighted average of multiple samples. If the GM exceeds 30, water is not considered safe for swimming. We illustrate the GM with proportional colored bars to show which sites have the greatest and least "average" levels of contamination.



3. **Statistical Threshold Value:** If 10% or more of samples exceed 110, water is not considered safe for swimming due the frequency of contamination events, even if "average" levels are low. We illustrate the Statistical Threshold Value (STV) with numerals inside colored icons to indicate the percentage of samples that exceeded this threshold.

Note: EPA criteria call for calculating the GM and STV based on a rolling monthly basis, with weekly sampling. Our sampling occurs monthly, but over time should reveal similar patterns.

HUDSON RIVER ESTUARY:
DATA BY SAMPLING SITE

Beach Action Value. If a single sample exceeds an Entero count of 60, swimming is not recommended. The bars show the percentage of samples at each site that exceeded the Beach Action Value.

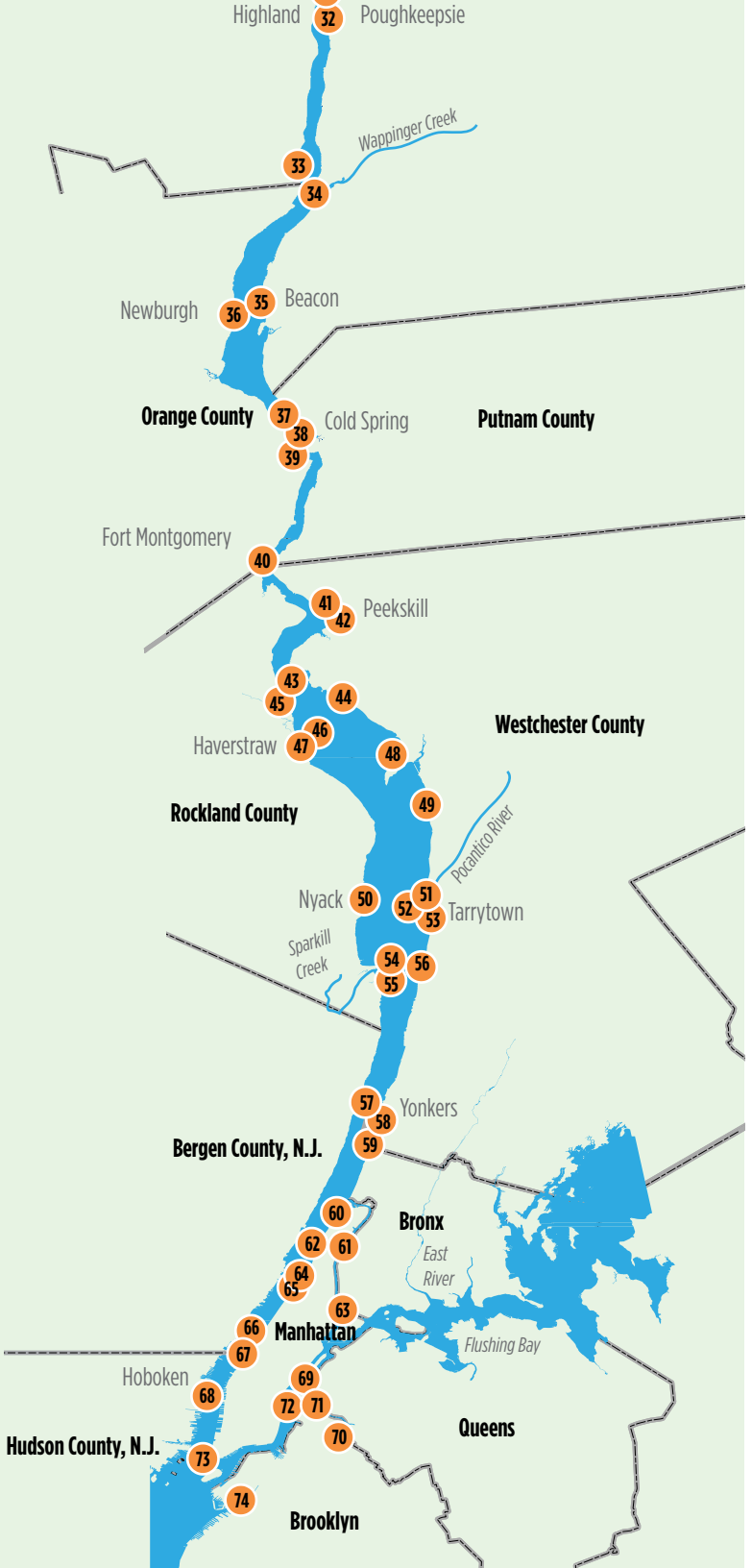
NO.	SITE	BAV	MIN	MAX
1	Hudson above Mohawk River	21 / 79	<1	>2420
2	Mohawk River at Waterford	70 / 30	4	>2420
3	Hudson River above Troy Lock	62 / 38	4	>2420
4	Congress St. Bridge – Troy	39 / 61	2	>2420
5	Albany Rowing Dock	41 / 59	3	>2420
6	Dunn Memorial Bridge – Albany	46 / 54	2	>2420
7	Island Creek/Normans Kill	45 / 55	2	>2420
8	Bethlehem Launch Ramp	24 / 76	1	>2420
9	Castleton	26 / 74	<1	1733
10	Coeymans Landing	28 / 72	<1	1986
11	Coxsackie Waterfront Park	21 / 79	<1	2420
12	Gay's Point mid-channel	17 / 73	<1	2420
13	Athens	26 / 74	5	>2420
14	Hudson Landing Ramp	22 / 78	3	>2420
15	Catskill Creek – First Bridge	24 / 76	<1	>2420
16	Catskill Creek – East End	21 / 79	<1	>2420
17	Catskill Launch Ramp	15 / 85	<1	>2420
18	Inbocht Bay	7 / 93	<1	>2420
19	Malden Launch Ramp	11 / 89	<1	1986
20	Esopus Creek West	21 / 79	<1	>2420
21	Esopus Creek Entrance	21 / 79	<1	>2420
22	Tivoli Landing	7 / 93	<1	>2420
23	Ulster Landing Beach	9 / 91	<1	2420
24	Rondout – Eddyville Anchorage	21 / 79	1	>2420
25	Rondout – Kingston Public Dock	37 / 63	4	>2420
26	Kingston STP Outfall	45 / 55	2	>2420
27	Kingston Point Beach	13 / 87	<1	219
28	Port Ewen Drinking Water Intake	5 / 95	<1	1733
29	Norrie Point Yacht Basin	20 / 80	1	>2420
30	Norrie Point mid-channel	6 / 94	<1	1203
31	Poughkeepsie Drinking Water Intake	2 / 98	<1	76
32	Poughkeepsie Launch Ramp	9 / 91	1	236
33	Marlboro Landing	6 / 94	1	>2420
34	Wappingers – New Hamburg	13 / 87	1	411
35	Beacon Harbor	14 / 86	<1	816
36	Newburgh Launch Ramp	55 / 45	1	>2420

One of the important concepts the public should understand is that there is not one answer to the question, "How's the Water?" The answer varies by location and over time.

The percentage of samples exceeding the BAV and the range of contamination levels observed at two locations near to one another, even in the same city, may be very different.

37	Little Stony Point	4	96	<1	166
38	Cold Spring Harbor	8	92	<1	184
39	West Point STP Outfall	13	87	<1	>2420
40	Fort Montgomery	9	91	<1	>2420
41	Annesville Creek	18	82	<10	2098
42	Peekskill Riverfront Green Park	16	84	<10	4352
43	Stony Point mid-channel	2	98	<10	86
44	Furnace Brook	18	82	<10	4106
45	Cedar Pond Brook	18	82	<10	5794
46	Haverstraw Bay mid-channel	4	96	<10	86
47	Emeline Beach- Haverstraw	5	95	<10	10462
48	Croton Point Beach	4	96	<10	241
49	Ossining Beach	14	86	<10	4611
50	Nyack Launch Ramp	20	80	<10	663
51	Kingsland Pt. Park – Pocantico River	20	80	<10	>24196
52	TZ Bridge mid-channel	2	98	<10	142
53	Tarrytown Marina	40	60	<10	>24196
54	Piermont Pier	17	83	<10	3448
55	Orangetown STP Outfall	33	67	<10	24196
56	Irvington Beach	4	96	<10	464
57	Yonkers mid-channel	5	95	<10	1785
58	Saw Mill River	54	46	<10	>24196
59	Yonkers STP Outfall	5	95	<10	98
60	Dyckman Street Beach	13	87	<10	2909
61	Harlem River – Washington Bridge	29	71	<10	1670
62	GW Bridge mid-channel	9	91	<10	1086
63	Harlem River – Willis Ave. Bridge	23	77	<10	5635
64	North River STP @145th	33	67	<10	2987
65	125th St. Pier	22	78	<10	275
66	79th St. mid-channel	7	93	<10	161
67	Pier 96 Kayak Launch	18	82	<10	414
68	Castle Point, NJ	11	89	<10	605
69	East River at Roosevelt Island	18	82	<10	275
70	Newtown Creek–Metropolitan Ave. Bridge	52	48	<10	>24196
71	Newtown Creek – Dutch Kills	37	63	<10	>24196
72	East River mid-channel at 23rd St.	13	87	<10	399
73	The Battery mid-channel	9	91	<10	288
74	Gowanus Canal	48	52	<10	>24196

Acceptable = Passes EPA guidelines for safe swimming. (Single-sample Entero counts 60 or less.)
Beach Advisory = Fails EPA's recommended Beach Advisory Value (BAV), and should result in closure of swimming area. (Single-sample Entero count greater than 60.)



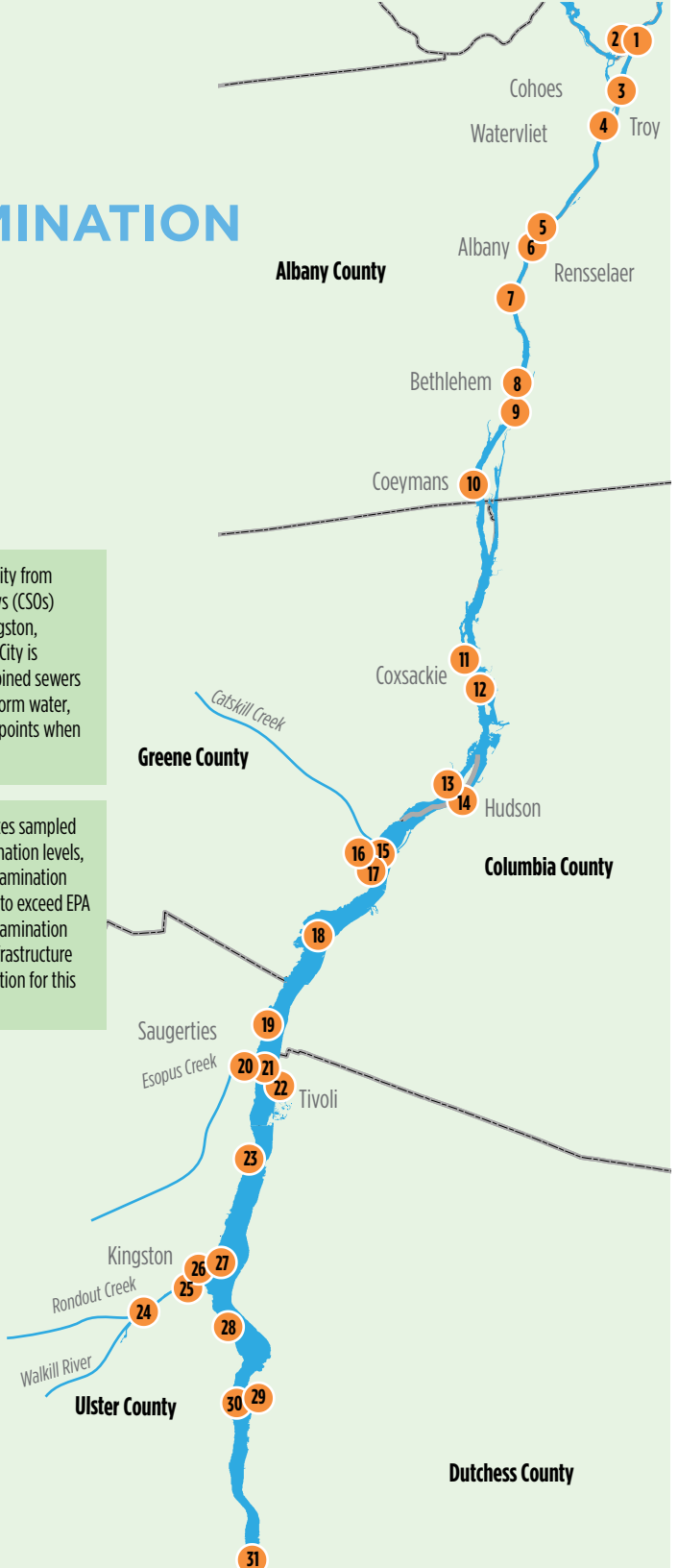
HUDSON RIVER ESTUARY:
FREQUENCY AND DEGREE OF CONTAMINATION

These charts show the frequency and degree of contamination, as they relate to EPA criteria for safe swimming. The bars are colored red if "average" contamination exceeds the EPA-recommended threshold (geometric mean of 30). Each site is marked with a red stop sign if 10% or more of samples exceed the EPA threshold (statistical threshold value of 110).

NO.	SITE	%STV	GM
1	Hudson above Mohawk River	15	22.7
2	Mohawk River at Waterford	64	202.4
3	Hudson River above Troy Lock	42	105.6
4	Congress St. Bridge – Troy	25	64.2
5	Albany Rowing Dock	26	61.8
6	Dunn Memorial Bridge – Albany	36	71.9
7	Island Creek/Normans Kill	38	85.6
8	Bethlehem Launch Ramp	17	29.6
9	Castleton	23	28.3
10	Coeymans Landing	22	21.9
11	Coxsackie Waterfront Park	15	23.9
12	Gay's Point mid-channel	17	12.9
13	Athens	13	36.5
14	Hudson Landing Ramp	13	26.1
15	Catskill Creek – First Bridge	22	19.0
16	Catskill Creek – East End	18	18.9
17	Catskill Launch Ramp	15	13.1
18	Inbocht Bay	7	8.7
19	Malden Launch Ramp	11	13.4
20	Esopus Creek West	16	21.6
21	Esopus Creek Entrance	18	19.6
22	Tivoli Landing	7	5.3
23	Ulster Landing Beach	6	6.9
24	Rondout – Eddyville Anchorage	16	29.1
25	Rondout – Kingston Public Dock	30	55.8
26	Kingston STP Outfall	29	75.7
27	Kingston Point Beach	7	7.3
28	Port Ewen Drinking Water Intake	5	4.3
29	Norrie Point Yacht Basin	19	22.7
30	Norrie Point mid-channel	4	2.9
31	Poughkeepsie Drinking Water Intake	0	3.8
32	Poughkeepsie Launch Ramp	2	9.9
33	Marlboro Landing	4	9.9
34	Wappingers – New Hamburg	6	11.1

The impact on water quality from combined sewer overflows (CSOs) in the Capital District, Kingston, Newburgh and New York City is evident in the data. Combined sewers carry both sewage and storm water, and overflow at multiple points when it rains.

More than one in three sites sampled has low average contamination levels, but episodes of high contamination that are frequent enough to exceed EPA criteria. Rain-related contamination from aging and failing infrastructure is the most likely explanation for this trend in most locations.

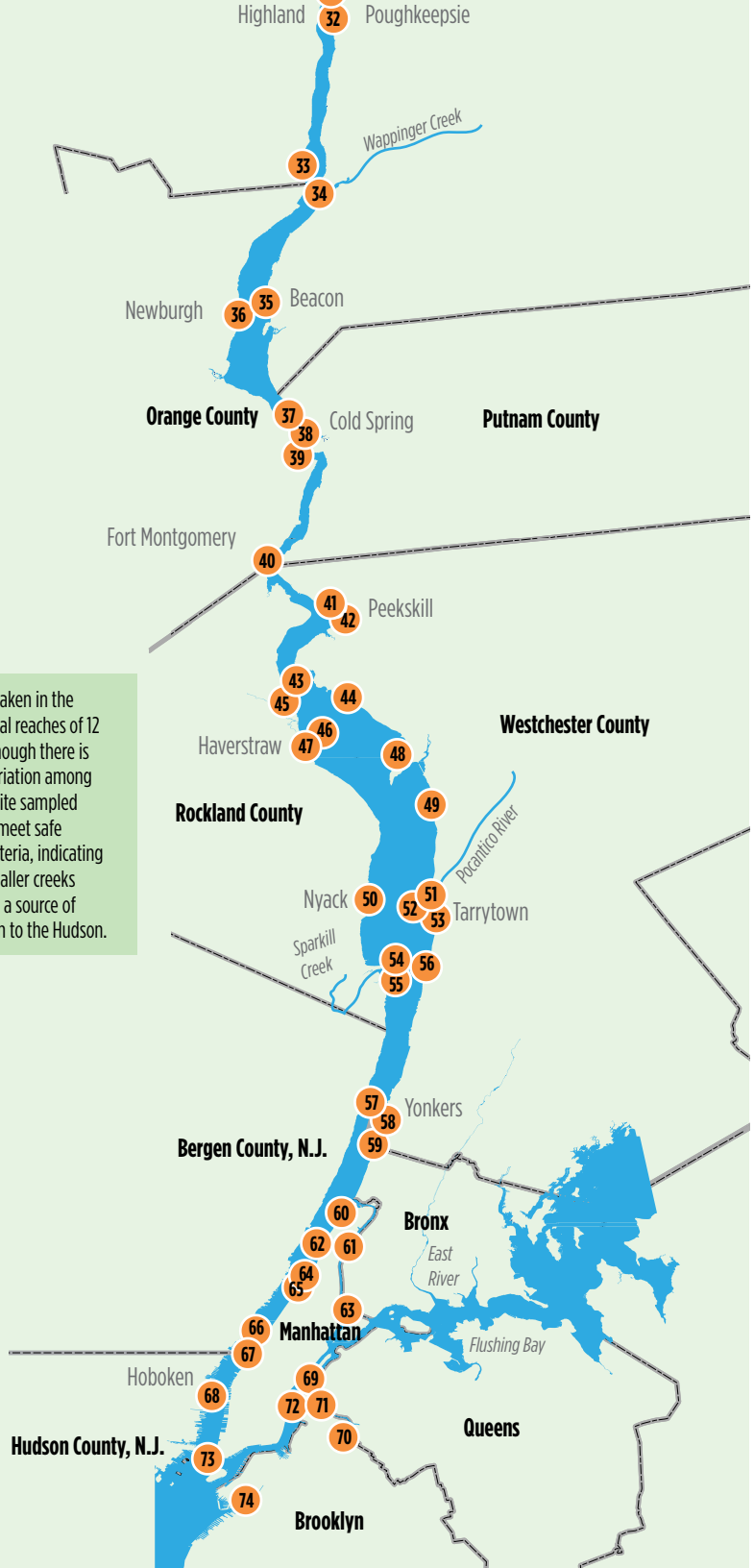


35	Beacon Harbor	7		17.0
36	Newburgh Launch Ramp	45		95.8
37	Little Stony Point	2		7.4
38	Cold Spring Harbor	2		10.8
39	West Point STP Outfall	6		8.8
40	Fort Montgomery	7		12.0
41	Annesville Creek	13		10.3
42	Peekskill Riverfront Green Park	9		11.9
43	Stony Point mid-channel	0		2.8
44	Furnace Brook	13		8.6
45	Cedar Pond Brook	14		10.0
46	Haverstraw Bay mid-channel	0		2.3
47	Emeline Beach – Haverstraw	5		4.8
48	Croton Point Beach	4		2.9
49	Ossining Beach	9		6.7
50	Nyack Launch Ramp	13		8.0
51	Kingsland Pt. Park – Pocantico River	18		9.7
52	TZ Bridge mid-channel	2		1.7
53	Tarrytown Marina	20		35.8
54	Piermont Pier	12		13.7
55	Orangetown STP Outfall	23		28.7
56	Irvington Beach	4		3.3
57	Yonkers mid-channel	4		3.2
58	Saw Mill River	38		82.4
59	Yonkers STP Outfall	0		5.6
60	Dyckman Street Beach	5		8.1
61	Harlem River- Washington Bridge	11		19.8
62	GW Bridge mid-channel	4		4.1
63	Harlem River – Willis Ave. Bridge	18		12.2
64	North River STP @145th	24		20.5
65	125th St. Pier	15		9.3
66	79th St. mid-channel	2		4.1
67	Pier 96 Kayak Launch	5		6.7
68	Castle Point, NJ	9		7.8
69	East River at Roosevelt Island	7		6.0
70	Newtown Creek- Metropolitan Ave. Bridge	41		92.6
71	Newtown Creek – Dutch Kills	29		27.5
72	East River mid-channel at 23rd St.	7		4.5
73	The Battery mid-channel	4		4.1
74	Gowanus Canal	35		66.1

Samples are taken in the mouths or tidal reaches of 12 tributaries. Though there is significant variation among them, every site sampled would fail to meet safe swimming criteria, indicating that these smaller creeks and rivers are a source of contamination to the Hudson.

The Hudson Paradox

Most places, most of the time, water is safe for swimming in the Hudson Estuary. However, most locations tested fail to meet safe swimming criteria. Of nearly 4,000 samples from the Hudson River Estuary analyzed since 2008, 79% met safe-swimming guidelines based on the single-sample BAV threshold. Of 74 sites sampled monthly since 2008, 55% would fail to meet safe-swimming criteria based on high average (GM) and/or very high occasional (STV) contamination.



WATER INFRASTRUCTURE:
HUDSON RIVER ESTUARY

The Hudson River Estuary is the tidal portion of the Hudson River and its tributaries between New York Harbor and the Capital District. There is a documented need for **$558 million** in investments in 44 wastewater treatment facilities that discharge to the Hudson River Estuary - not including New York City, where projects will cost tens of billions. In addition, communities have documented the need for $65 million in drinking water investments in five facilities that rely on the same estuary to supply drinking water to over 100,000 people.

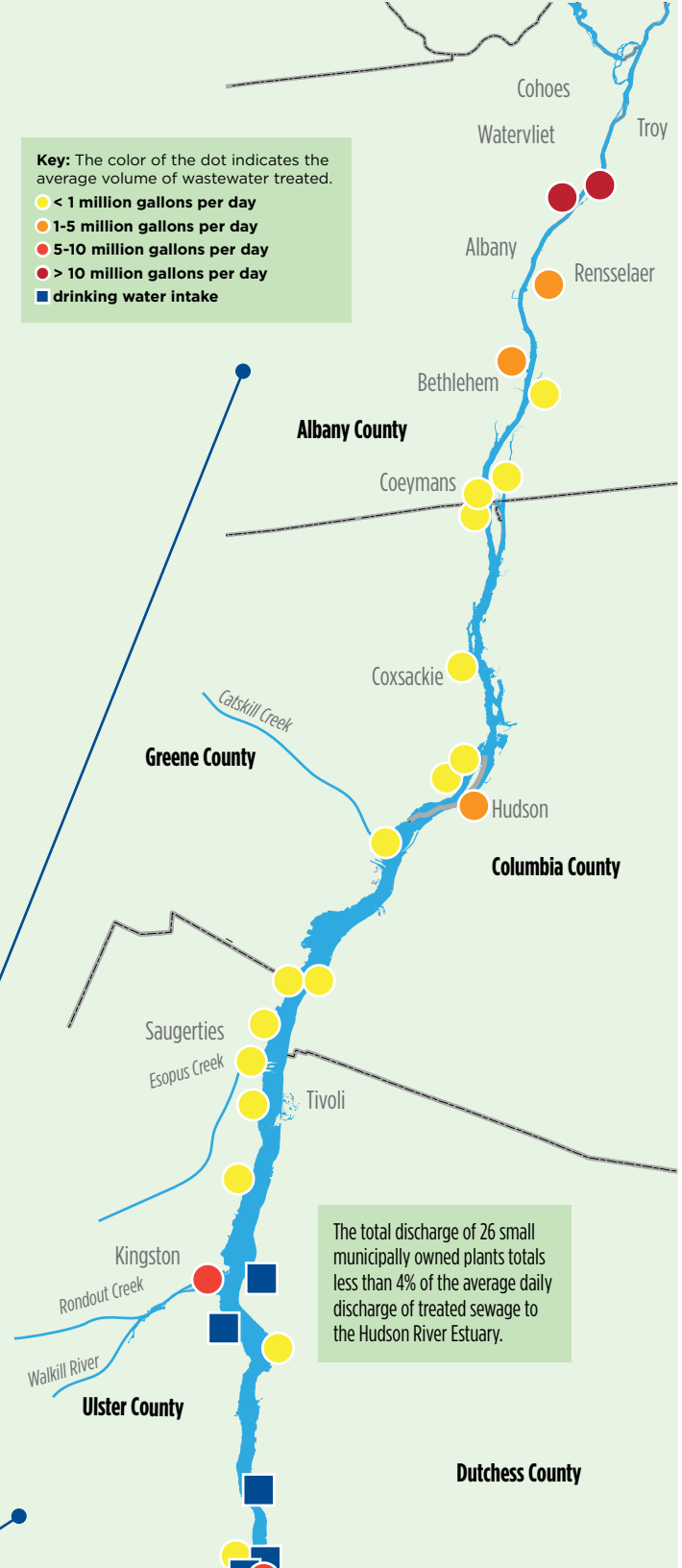
The investments are needed for various projects, including reducing combined sewer overflows, and fixing aging treatment plants, pump stations and pipes. The average age of sewer pipes in the region is over 60 years. Some are well over 100 years old.

This map shows the location of wastewater treatment plants that discharge directly to the Hudson River Estuary, as well as the drinking water treatment plants that draw water from the Hudson River Estuary, with select infrastructure needs highlighted. The Hudson River Watershed covers roughly one-quarter the land area of New York State, as well as portions of Connecticut, Massachusetts, New Jersey and Vermont. Dozens of other municipally owned treatment facilities – not shown here – discharge into the tributaries of the Hudson River and may affect its water quality.

Unless otherwise noted, the infrastructure needs noted here are as listed in the draft 2018 intended use plan for New York's Clean Water and Drinking Water State Revolving Funds. These figures likely underestimate actual needs: Roughly four in 10 communities have not had a project listed in recent years. The "percent of daily discharge" numbers below refer to discharges to the Estuary north of New York City.

Capital Region: $132 Million

Six communities in the Capital District are collaborating on a Clean Water Act-mandated Long Term Control Plan to reduce combined sewer overflows. More than 90 combined sewer overflows (CSOs) that can discharge untreated sewage when it rains are located in these communities. Three large regional treatment plants serving these communities in the Capital District together account for 27% of the total average daily discharge direct to the Hudson River Estuary.



Mid Hudson: $121 Million

Eighteen communities discharge wastewater into the Class A portion of the Hudson River, or one of the tidal tributaries in that reach. Together, these facilities total just under 10% of the average daily discharge of treated sewage to the Hudson River Estuary. The total documented need for wastewater infrastructure investments in these is $56 million. Among these communities are four with combined sewers that can overflow with untreated sewage when it rains: the cities of Hudson, Kingston and Poughkeepsie, and the Village of Catskill.

Under New York State's implementation of the Clean Water Act, the designated "best use" of Class A water is for drinking water. The communities that operate five municipal treatment plants and distribution systems that rely on the Hudson River to serve over 100,000 people with drinking water have defined over $65 million in needs, according to the NYS Drinking Water State Revolving Fund.

City of Newburgh: $33 million

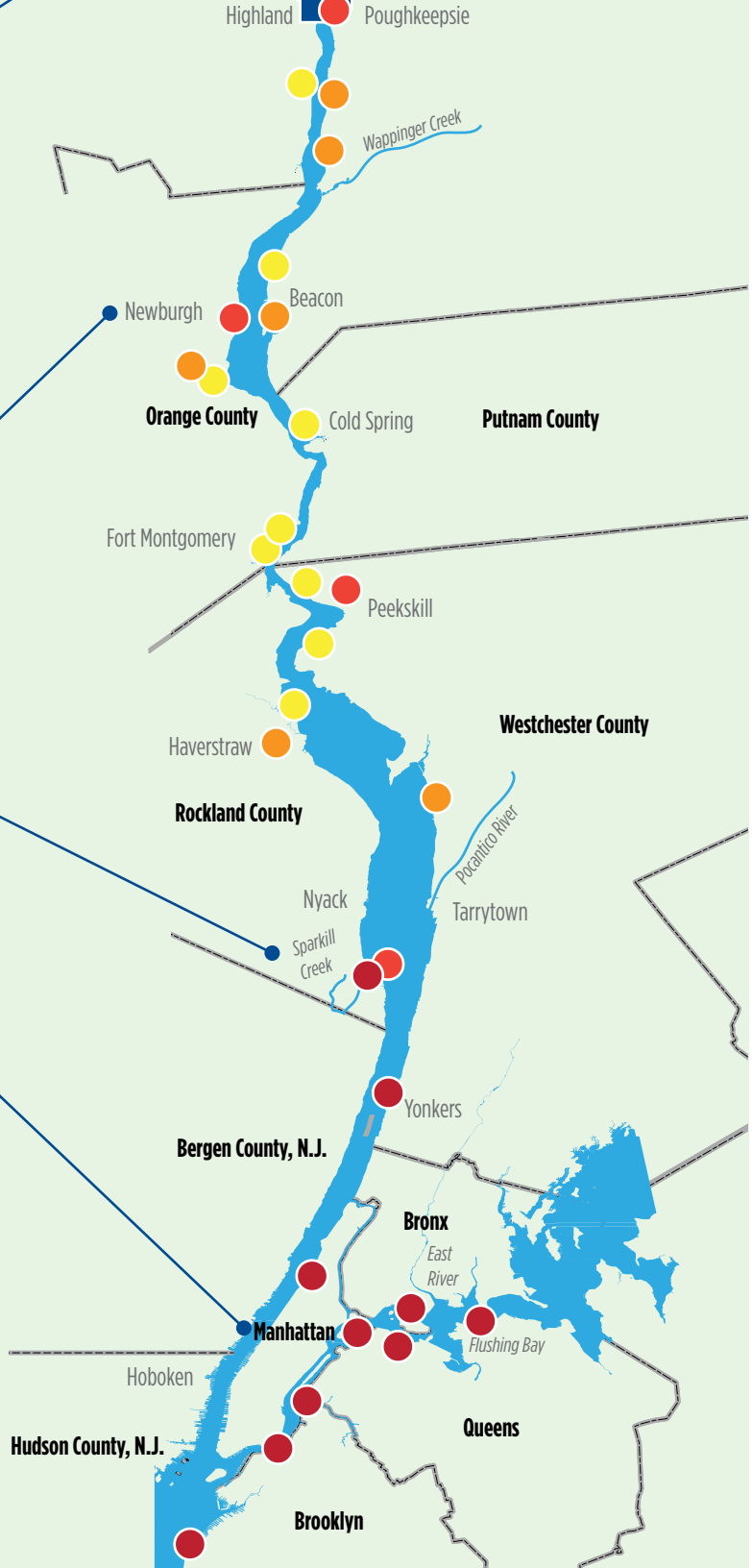
The City of Newburgh, which has a median household income under $34,500, has identified need for $22 million in wastewater and $11 million in drinking water projects. The city of 28,500 also faces a drinking water crisis, the cost of which is unaccounted for in these figures. In 2016, its primary reservoir, Washington Lake, was found to be contaminated with the unregulated contaminant PFOS, resulting from discharges of firefighting foam from the Stewart Air National Guard Base. The incident highlights the need for investments in source water protection for public drinking water supplies throughout New York State. Source water protection project needs have not been documented, in Newburgh or in most other communities.

Lower Hudson: $185 million

The Yonkers Joint Wastewater Treatment Plant serves communities throughout southwestern Westchester County. The Yonkers plant accounts for nearly 35% of the total average daily discharge to the Hudson River Estuary. The regional collection system in Westchester County also includes 10 combined sewer overflows (CSOs) that discharge untreated sewage during rain. Another 11% of the average daily discharge comes from two regional treatment plants in Rockland County.

NYC: $3.4 billion

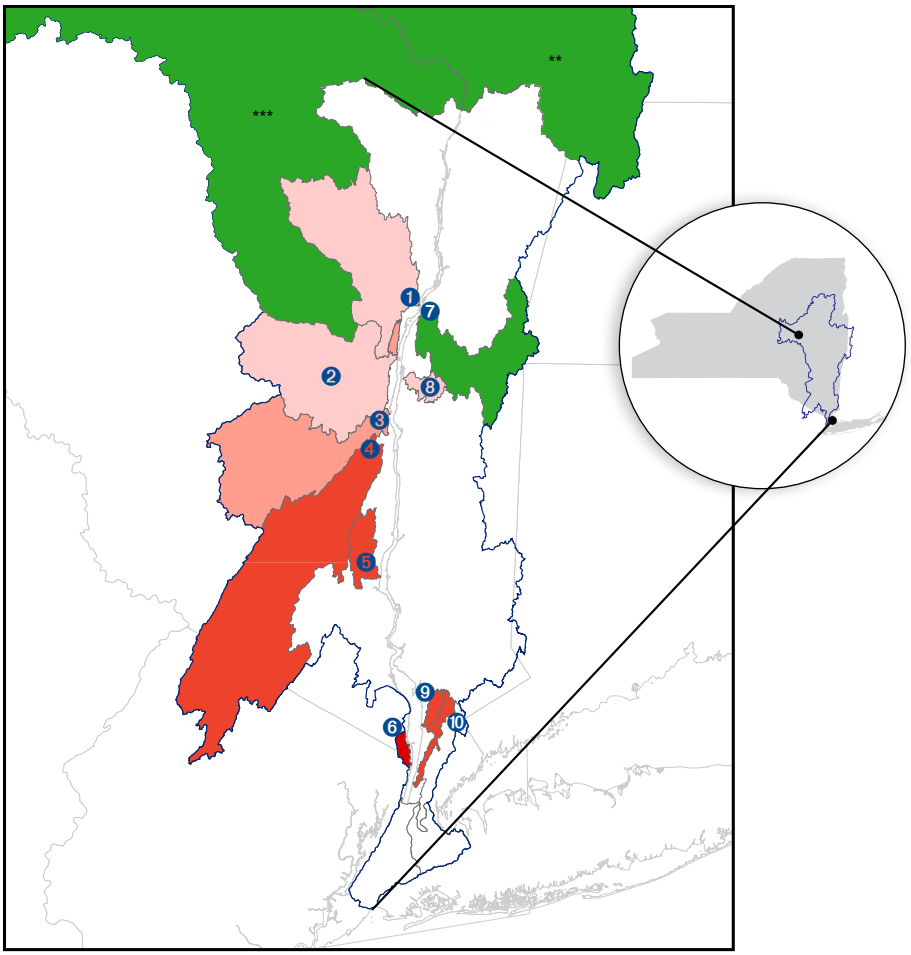
New York City has documented $3.4 billion in potential State Revolving Fund projects. The last national survey of wastewater needs by the U.S. Environmental Protection Agency, in 2012, estimated New York City's wastewater infrastructure cost is nearly 10% of the national total, at almost $25 billion over 20 years. New York City has 14 wastewater treatment plants, roughly 6,400 miles of sewer pipe, and over 450 combined sewer overflows that discharge to New York Harbor, the Hudson River, Long Island Sound and their tributaries.



WATER QUALITY AND WATER INFRASTRUCTURE

HUDSON RIVER TRIBUTARIES

The health the Hudson River depends on the water that reaches it from its watershed – the land area over which smaller creeks and rivers flow before reaching the Hudson. The Hudson River Watershed covers roughly one-quarter of New York State, and includes parts of Connecticut, New Jersey, Massachusetts and Vermont. This map shows the watersheds for several tributaries of the Hudson River Estuary - the tidal reach of the river between New York Harbor and Troy. The highlighted areas are in watersheds where Riverkeeper and our partners have gathered water quality data from local creeks and rivers.



KEY

Needs: Documented cost of wastewater infrastructure projects (NYS CWSRF IUP 2017)
Facilities: Number of municipally owned wastewater treatment facilities (NYS DEC)
Pipes: Miles of sewer pipe (NYS DEC)
Pipe Age: Average age of sewer pipes (NYS DEC)

Note: Data are based on municipal surveys and applications for financial support. The data are known to be incomplete and, in many cases, should be considered under-estimates. Privately owned wastewater infrastructure is not included.

- Hudson River watershed
- Meets safe swimming criteria (GM <30)
- Nearly meets criteria (GM 30-120)
- Exceeds criteria (GM 121-300)
- Exceeds by an order of magnitude (GM 301-600)
- Far exceeds criteria (GM 600+)

The color of each watershed indicates the magnitude of contamination measured over time, as defined by the geometric mean (GM) of fecal indicator bacteria (Enterococci per 100 mL). A geometric mean is a weighted average. The EPA's Recreational Water Criteria defining safe "primary contact" recreation, such as swimming, is a GM of 30 or under. Samples were gathered and analyzed by Riverkeeper and dozens of partners.

More data and analysis for these and other watersheds is available at riverkeeper.org/water-quality

❶ Catskill Creek

The Catskill Creek flows out of the forested Catskill Mountains, and reaches the Hudson River Estuary at the Village of Catskill, which has combined sewers. It is the third-largest tributary to the tidal Hudson River. Based on 431 water samples from 2011-2016, the Catskill Creek likely nearly meets EPA criteria for safe swimming.

$13M Needs	**3** Facilities	**25 miles** Pipes	**60 yrs** Pipe Age

❷ Esopus Creek

The upper Esopus Creek feeds the Ashokan Reservoir, the largest of reservoir in New York City's drinking water supply. The lower Esopus flows out of the Catskill Mountains and reaches the Hudson River Estuary at the Village of Saugerties. It is the fourth-largest tributary to the tidal Hudson River. Based on 402 water samples from 2011-2016, the Lower Esopus Creek nearly meets EPA criteria for safe swimming.

$4M Needs	**7*** Facilities	**135 miles** Pipes	**69 yrs** Pipe Age

❸ Rondout Creek

The upper Rondout Creek feeds the Rondout Reservior, part of the New York City drinking water supply. The lower Rondout Creek flows through a largely agricultural valley with several small communities before reaching the Hudson River at Kingston, which has combined sewers. It is the largest tributary to the tidal Hudson River. Based on 587 water samples from 2012-2016, the lower Rondout Creek likely exceeds EPA criteria for safe swimming.

$15M	8*	163 miles	64 yrs
Needs	Facilities	Pipes	Pipe Age

❹ Wallkill River

The Wallkill River flows out of New Jersey through a largely agricultural valley that is dotted with small communities, several villages and the City of Middletown. It is tributary to the Rondout Creek, and is one arm of the largest tributary to the tidal Hudson River. Based on 685 water samples from 2012-2016, the Wallkill River likely exceeds EPA criteria for safe swimming by an order of magnitude.

$72M	19	308 miles	67 yrs
Needs	Facilities	Pipes	Pipe Age

❺ Quassaick Creek

The Quassaick Creek flows through parts of two counties before reaching the Hudson River at the City of Newburgh, which has combined sewers. Reservoirs in its watershed provide primary drinking water supplies for both the City and Town of Newburgh. Based on 252 water samples from 2014-2015, the Quassaick Creek likely exceeds EPA criteria for safe swimming by an order of magnitude.

$27M	1	75 miles	114 yrs
Needs	Facilities	Pipes	Pipe Age

❻ Sparkill Creek

The Sparkill Creek watershed includes land both in New York and New Jersey. It reaches the Hudson at Piermont Marsh, part of the National Estuarine Research Reserve. Based on 572 water samples from 2011-2016, the Sparkill Creek likely far exceeds EPA criteria for safe swimming.

$44M	2	319 miles	63 yrs
Needs	Facilities	Pipes	Pipe Age

❼ Roeliff Jansen Kill

The Roeliff Jansen Kill ("Roe Jan") headwaters are in the Massachusetts-New York border, and it flows through rural and agricultural communities before reaching the Hudson at Germantown. Based on 84 water samples in 2016, the Roe Jan likely meets EPA criteria for safe swimming. There are few if any sewered areas in the watershed, based on available data.

❽ Saw Kill

The Saw Kill Watershed includes rural and agricultural communities. The creek flows into the Hudson River at Annandale, and is the primary drinking water supply for Bard College. Based on 78 water samples in 2016, the Saw Kill likely nearly meets EPA criteria for safe swimming. Privately owned wastewater infrastructure in the watershed is not captured in the surveys.

❾ Pocantico River

The Pocantico River flows through New York City suburbs and reaches the Hudson River at the Village of Sleepy Hollow. Based on 442 water samples from 2010-2016, the Pocantico River likely exceeds EPA criteria for safe swimming by an order of magnitude. While the watershed includes sewered areas, those data are not captured in the available surveys.

❿ Saw Mill River

The Saw Mill River flows through New York City suburbs and reaches the Hudson River at the City of Yonkers, the fourth most populous city in New York State. Based on 323 water samples taken from 2015-2016, the Saw Mill River likely exceeds EPA criteria for safe swimming by an order of magnitude.

$141M	1	25 miles	60 yrs
Needs	Facilities	Pipes	Pipe Age

**The City of Kingston wastewater infrastructure is counted both in the totals for the Rondout Creek and Esopus Creek watersheds. The facility and the combined sewer overflows are located in Rondout Creek, but pipes extend into the Esopus Creek Watershed.*

**** The Mohawk River and **Upper Hudson River have documented needs for at least $573 million and $100 million, respectively, in investments in wastewater infrastructure. Data about facilities, pipes and pipe age were not available for these watersheds.*

IMPROVING WATER QUALITY
IN THE HUDSON RIVER WATERSHED

While this report focuses on fecal indicator bacteria, it's important to understand that there are many pollutants that are associated with wastewater, including nutrients that can fuel algal blooms, and pharmaceuticals and other unregulated contaminants. Some of these are removed by typical wastewater treatment processes, and some aren't.

The Hudson River Estuary Watershed is one of the nation's oldest and most densely-populated settled areas. Outside of New York City:

- 16 communities rely at least in part on combined sewers that carry both stormwater and sewage, and overflow into the Hudson or its tributaries at more than 210 discharge points when it rains;
- More than half of the 1,500 miles of inventoried pipes are aged 60 years or older;
- About 10% of wastewater treatment plants that discharge directly to the Hudson River are at or above 75% capacity; and,
- Roughly one in four wastewater treatment plants that discharge directly to the Hudson are at risk of inundation from sea-level rise, storm-surge flooding or both.

Based on State Revolving Fund data, the need for wastewater investments in the Hudson River Watershed top $4.8 billion, including:

- $3.4 billion in New York City
- $715 million in the Hudson River Estuary watershed
- $573 million in the Mohawk River watershed
- $100 million in the Upper Hudson River watershed

New York State has made historic commitments to water infrastructure, with the 2012 Sewage Pollution Right to Know Law, the 2015 Water Infrastructure Improvement Act and the 2017 Clean Water Infrastructure Act. The value of Hudson River Watershed wastewater projects funded in 2016 and 2017 by these programs tops $500 million, in combined federal, state and local investments.

To further improve Hudson River water quality, Riverkeeper is advocating for increased funding for:

1. **Water infrastructure**
   Double federal funding for State Revolving Funds, while maintaining current formulas, and increase state funding through New York's landmark water infrastructure improvement programs

2. **Federal and state environmental agencies**
   Reject proposed draconian federal cuts to U.S. Environmental Protection Agency, and remove the crippling budget freeze on the New York State Department of Environmental Conservation

3. **Harbor and estuary programs**
   Increase federal funding for the New York-New Jersey Harbor & Estuary Program, and state funding for the Hudson River Estuary Program

4. **Watershed management programs**
   Increase federal and state funding for Drinking Source Water Protection programs, and strenghten state-level rules and regulations to protect and restore watersheds.

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