

**JAMAICA BAY WATERSHED
PROTECTION PLAN**

Martin P. Schreiber, Ph.D.
Distinguished Professor of Biology and Founding
Director of the Aquatic Research and Environmental
Assessment Center (AREAC) at Brooklyn College

JAMAICA BAY WATERSHED PROTECTION PLAN ADVISORY
COMMITTEE
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AREAC

Brooklyn College
**Aquatic
Research and
Environmental
Assessment
Center**

THE QUESTION (S):

"WHAT IS THE WATER QUALITY LIKE IN
JAMAICA BAY? "

AND HOW CAN IT BE IMPROVED??

Jamaica Bay;
A complex, dynamic urban
estuarine ecosystem
subject to the interplay of
many changing factors.

JAMAICA BAY: THE GOOD

Gateway National Recreational Area (GNRA) was created in 1972; first programs of restoration took place in 1974; science research agenda began in 1980;GNRA receives 7 million visitors a year

GNRA: > 26,000 acres; Jamaica Bay: 13,000

Diversity of organisms

Jamaica Bay is a major spawning and nursery region for many east coast fishes; More than 80 species of fish have been identified in Jamaica Bay

95% of all commercial fin fish in North America have part of their life cycle on the east coast

85% of the people fishing in Jamaica Bay are subsistence fishing

One fifth of all the birds of North America migrate through the flyway in Jamaica Bay (326 species have been recorded)

Nationally designated Jamaica Bay Wildlife Refuge (only one managed by NPS not US Fish and Wildlife Service)

Diversity of activities: fishing, boating, swimming, horseback riding, cultural events, culinary events, running, bicycling, bird watching, hiking, picnicking, love making

JAMAICA BAY: THE BAD

Diversity of problems

Overpopulation: 25 million people live in and around New York City; 2-3 million people live in around Jamaica Bay (positive feedback?)

Major housing complexes exist and more are in the planning

The completion of a mega mall

By 2010 90% population of the United States will live within 1 hours drive to the coast-

JFK International Airport; challenges to air and water and flying birds (laughing gulls and flying planes)

Three sanitation landfills (all are capped)

Four major water treatment plants; Jamaica Bay receives 320 million gallons of treated waste water every day (unable to handle minor [0.1 inch] rain fall)

A "dumping ground" for dredged material.

Several major borrow pits


Disappearing salt marsh islands

One thousand oil spills in New York Harbor annually (most are small-but cumulative effects?)

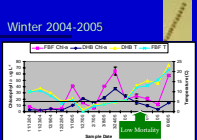


HOW DO YOU ANSWER THIS QUESTION??

- WHERE?
Location? depth?
- WHEN?
Season? Tide?
- WHAT?

Winter 2004-2005



HOW DOES ONE MEASURE WATER QUALITY?

- Traditional Methods? (pH, salinity, dissolved oxygen, turbidity etc.)
- Specific targets? (coliforms, chlorophylls, metals, PAHs, EDCs, other pollutant substances)
- General "health" of the total ecosystem

Our Studies in Jamaica Bay



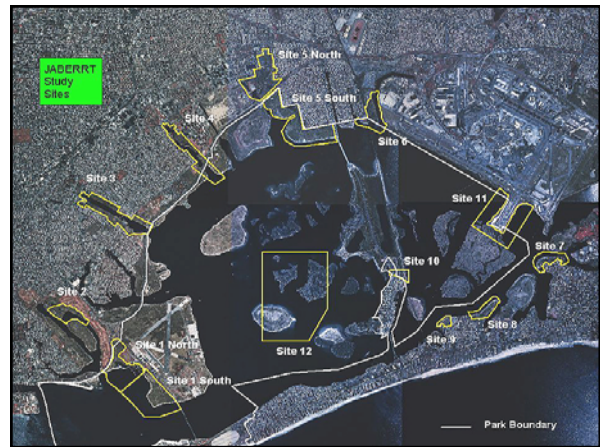
- Flounder population assessment
- Fisheries Assessment
- Horseshoe Crab captive breeding and population evaluation
- Bivalve Studies
- Effects of EDCs
- Water quality
- Wetland loss and restoration
- JABERRT Study



JABERRT

JAMAICA BAY ECOSYSTEM
RESTORATION AND RESEARCH TEAM
2000 - 2002

A MAJOR COMPREHENSIVE,
MULTIDISCIPLINARY INVESTIGATION
OF RESTORATION POTENTIAL OF 12
SITES IN JAMAICA BAY
FUNDED BY USACE, NYDEP AND NPS



Water quality was sampled at one or two stations in each of sites 1 through 10 by GATE's Division Natural Resources.

Sampling began on 15 April 2000, and continued approximately weekly for at least 12 months. Dissolved oxygen, sampled at top and bottom, ranged year-round from 4 to 14 milligrams/liter at Dead Horse Bay, 3 to 12 mg/l at Gerritsen Creek.

Submarine sediment morphology, sediments and soils, circulation and mixing, and water chemistry throughout Jamaica Bay were investigated by Columbia Earth Institute.

Jamaica Bay is an energetic system, with significant transport of coarse sediment in the channels; Grassy Bay serves as a sediment sink. Stratification is highly time-dependent; tidal influences have a profound impact on vertical structure throughout Jamaica Bay. *Flushing times vary for different portions of Jamaica Bay, but estimates from two independent methods yielded a flushing time of about one week for the upper 5 meters of Grassy Bay.* Freshwater enters Jamaica Bay from the Hudson plume, sewage treatment outfalls, and surface runoff. Nitrogenous nutrients remain abundant throughout the summer, with periods of suboxic conditions at the sediment-water interface in Grassy Bay.

Fishes were surveyed monthly by GATE's Division Natural Resources using shoreline seining and by trawling

Both methods combined captured 49 species of fish during the JABERRT survey, although long-term monitoring has recorded more than 80 species. The results, by site, were: (Site 1N) The north half of Dead Horse Bay yielded 12 species during seining on a sandy bottom, with the catch dominated by Atlantic Silversides and Atlantic Menhaden (*Brevoortia tyrannus*); trawling caught mostly Winter Flounder (*Pleuronectes americanus*), Summer Flounder (*Paralichthys dentata*),

Terrestrial plants and vegetation surveyed sampled, described, and mapped, 12 JABERRT sites, by GNRA's Division Natural Resources and St. John's University.

Twenty-four vegetation types were distinguished, each characterized primarily by its physiognomy and percent cover, and secondarily by dominant species. Taken collectively, these vegetation types provide a good generalized description of Jamaica Bay from water edge to several hundred meters inland. Sixteen major types,.....

Surface soils and underwater sediments samples were collected at 29:

GNRA's Division of Natural Resources.

Benthic macroinvertebrates were sampled over the entire vertical shore gradient from the *Spartina alterniflora* low marsh into the subtidal zone by Brooklyn College and the New York Aquarium.

Birds were surveyed at 9 JABERRT sites by the College of Staten Island, resulting in 187 species being recorded overall.

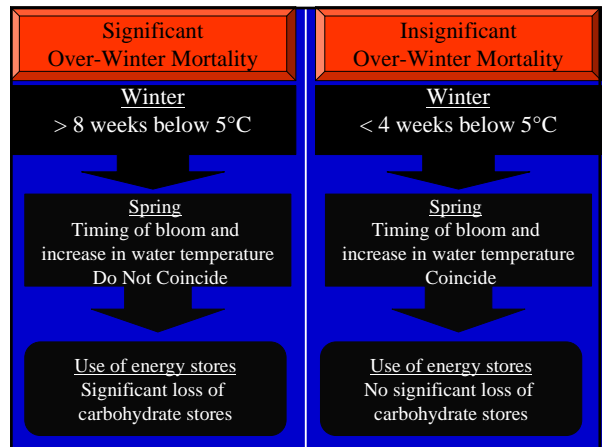
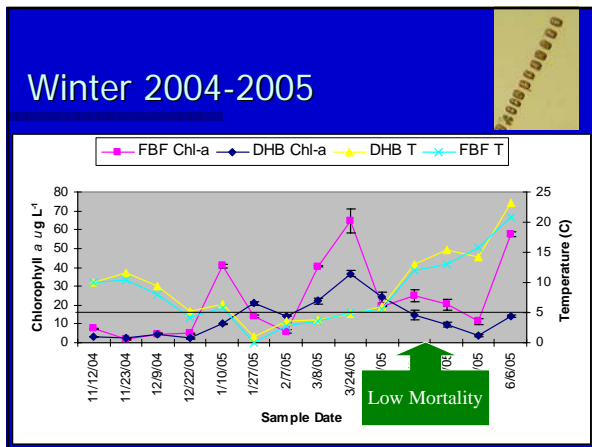
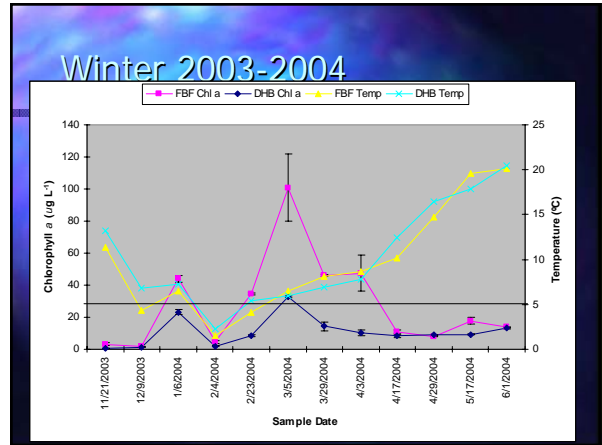
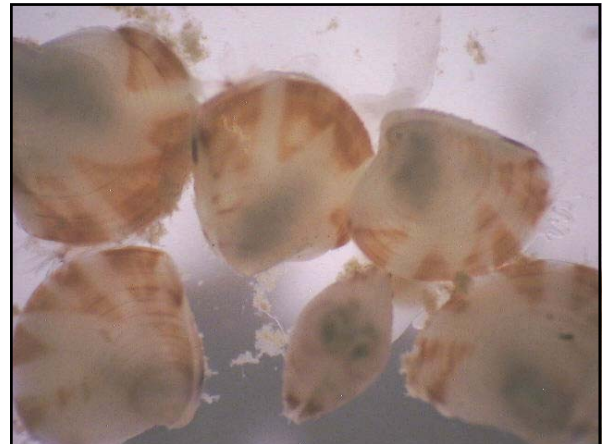
Horseshoe Crabs were surveyed by Fordham College at Lincoln Center in collaboration with Cook College at Rutgers University. Review of the habitat requirements of the American Horseshoe Crab (*Limulus polyphemus*)

Mammals, reptiles, and amphibians were surveyed in all 12 JABERRT sites by Hofstra University and by GATE's Division Natural Resources.

Butterflies and diurnal moths were surveyed at each JABERRT site for at least one hour during several visits in May to August by the New York City Butterfly Club in collaboration with the Jamaica Bay Wildlife Refuge.

Perpetuated "Myths" about Jamaica Bay	JABBERT Results
*Jamaica Bay flushes very slowly thus retaining contaminants/nutrients for up to 35 days or more.	*Jamaica Bay takes <u>only 7 days</u> to flush peripheral channels therefore entire Bay (Lamont-Doherty Columbia University) flowing through Rockaway Inlet creates strong currents that keep entire Bay well mixed.
*JB is basically "eutrophic" contributing to massive stratification of waters due to high temperature during warm months. Water Quality impacted causing hypoxia and anoxia; especially in the deepest parts of JB such as Grassy Bay and the peripheral basins. Hypoxia/anoxia conditions exist in Bay during Summer. DO is limiting factor for the Bay.	*Based upon <u>24 years</u> of WQ monitoring data collected by NPS and placed on USEPA STORET data retrieval system <u>AND</u> monitoring of surface and bottom DO's for the Bay by JABBERT, DO values rarely went hypoxic and never went anoxic in the last <u>14 years of this 24-year monitoring program</u> . WQ of JB is "excellent" today based upon the diversity of marine/estuarine fauna supported. The Bay is NOT stagnant; only a relatively weak stratification occurs infrequently.

Perpetuated "Myths" about Jamaica Bay	JABBERT Results
<p>** The total intertidal marsh acreage is declining at a rate of 50+ acres/year based upon review of aerial photos and navigation maps. NYSDOC "projects" total marsh islands of interior of Bay to be lost by 2024, at present loss rate.</p>	<p>* Preliminary GIS review of total intertidal marsh loss since 1899 reveals a loss no greater (net loss) than "natural" erosion under normal estuarine circumstances subsidence and loss from natural coastal systems associated with sediment load to Jamaica Bay being washed out to sea by strong tidal currents through Rockaway Inlet. Sediment sources have a limited residence time in Bay contributing to sediment starvation.</p>
<p>* The deepening of Grassy Bay (construction materials/fill for JFK airport) over 60 years ago is the root-cause of the "problems" in JB today. It must be recontoured since "only bacterial mats cover its surface - it's a dead zone" filled with benthic materials with a consistency of "black mayonnaise." There are no fish, shellfish; it is considerably degraded.</p>	<p>* Grassy Bay is a unique part of the diverse benthic habitat of JB. There is no doubt it has contributed to periodic yet predictable temperature stratification in JB and is, during extreme conditions (rare) a source of "pollution" concerns. However in the range of "quality influences," it is important as fish habitat, extensive amphipod communities and decomposition substrate SCUBA and video taping Grassy Bay bottom reveal a healthy fishery resource.</p>



SO, Back to the question of water quality in Jamaica ay....

Is it good? Yes

Is it the best? No

Are there problems? You bet

Can we improve? Sure

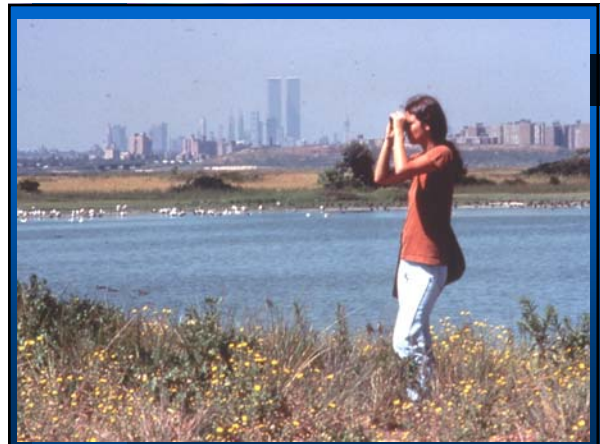
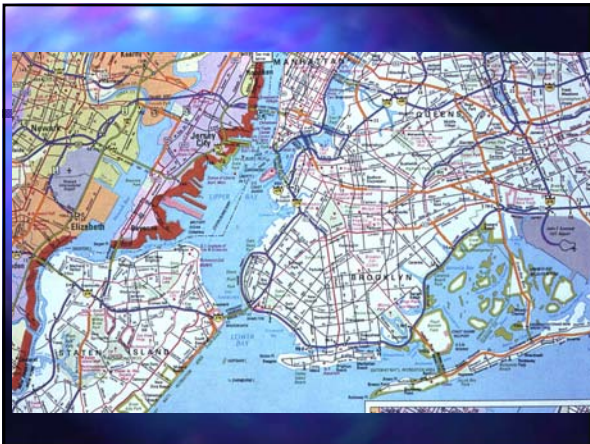
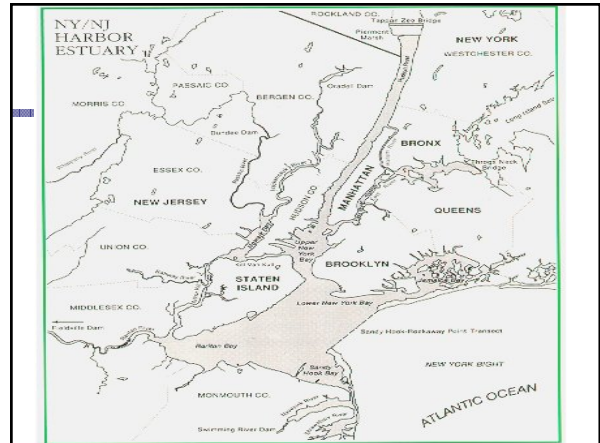
THE PROBLEMS \ THE SOLUTIONS

- Nutrient Overloading: Control at source with recommended CSOs
- Over Development and Misuse of Resources: Better planning and making the hard decisions
- Biases and Agendas: Listen and work with qualified scientists



"UNIQUE TO GATEWAY IS ITS LOCATION, A PLACE WHERE THE OPEN ATLANTIC MEETS THE LAND, WHERE THE SALT WATERS OF THE OCEAN MIX WITH THE BRACKISH WATERS OF BAYS AND FRESH WATERS OF RIVERS AND STREAMS. THE ESTUARINE ECOSYSTEM IS RICH AND COMPLEX, A PLACE BOTH FRAGILE AND RESILIENT."

Dr. John T. Tanacredi in " Gateway, a Visitors Companion" (1995)





Collecting Water Quality Data and Oyster Samples at Floyd Bennett Field



Deploying the Winter Experiment



Jamaica Bay Islands 1985



Jamaica Bay Islands 2024





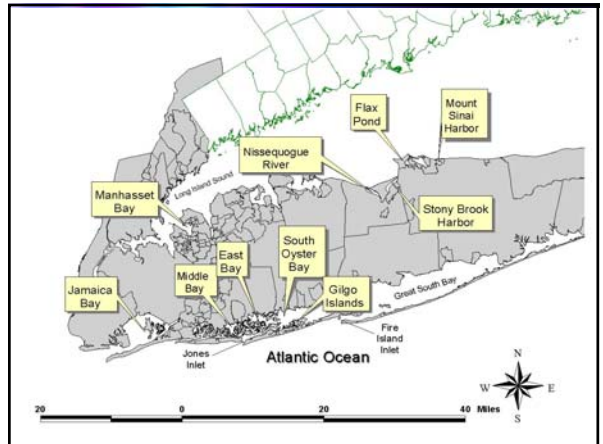
**THE ISSUES IN JAMAICA BAY
WETLAND LOSS**
(DISCUSSION OF BLUE RIBBON PANEL, 2001)

1. SEDIMENT BUDGETS AND SEDIMENT STARVATION
2. SEA LEVEL RISE AND LAND SUBSISTENCE
3. CIRCULATION AND SALINITY CHANGES
4. CHEMICAL AND BIOLOGICAL CONTAMINANTS
5. IMPACTS OF WRACK
6. BIRD 'EAT-OUT'
7. WAVES AND WAKES
8. RIBBED MUSSELS: LOSS AND GAIN

For five weeks, sediment was sprayed over the marsh to create a more suitable elevation for Smooth Cordgrass to grow.

Most of the 20,000 seedlings planted by volunteers showed fresh regrowth by May 2003. In addition, over 200,000 seedlings naturally colonized the site.





AREAC IS:

- An innovative leader that has brought regional and international acclaim to Brooklyn college and CUNY for its achievements in * biological and medical research, * environmental assessment and restoration, * economic development and job training and * educational program development.

Environmental Assessment and Restoration: Activities in NY Harbor

- Biology and physiology of the Hudson river Atlantic tomcod
- Jamaica bay ecosystem research and restoration study (JABBERT)
- Salt marsh island/wet land loss in Jamaica bay
- Endocrine disruption in Jamaica bay: are winter flounder being effected?