



Contaminant Programs in the Great Lakes

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Water Quality Monitoring and Surveillance
Environment Canada



Lake Ontario LaMP Chemical Workshop
Grand Island, NY
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Water Quality Monitoring and Surveillance Programs

- Open Lake Surveillance Program
- Niagara River Upstream/Downstream Program
- Wolfe Island Program
- Tributary Screening Program
- Pesticide Program
- Fish Contaminants Program
- IADN
- CABIN
- AOC Monitoring Program



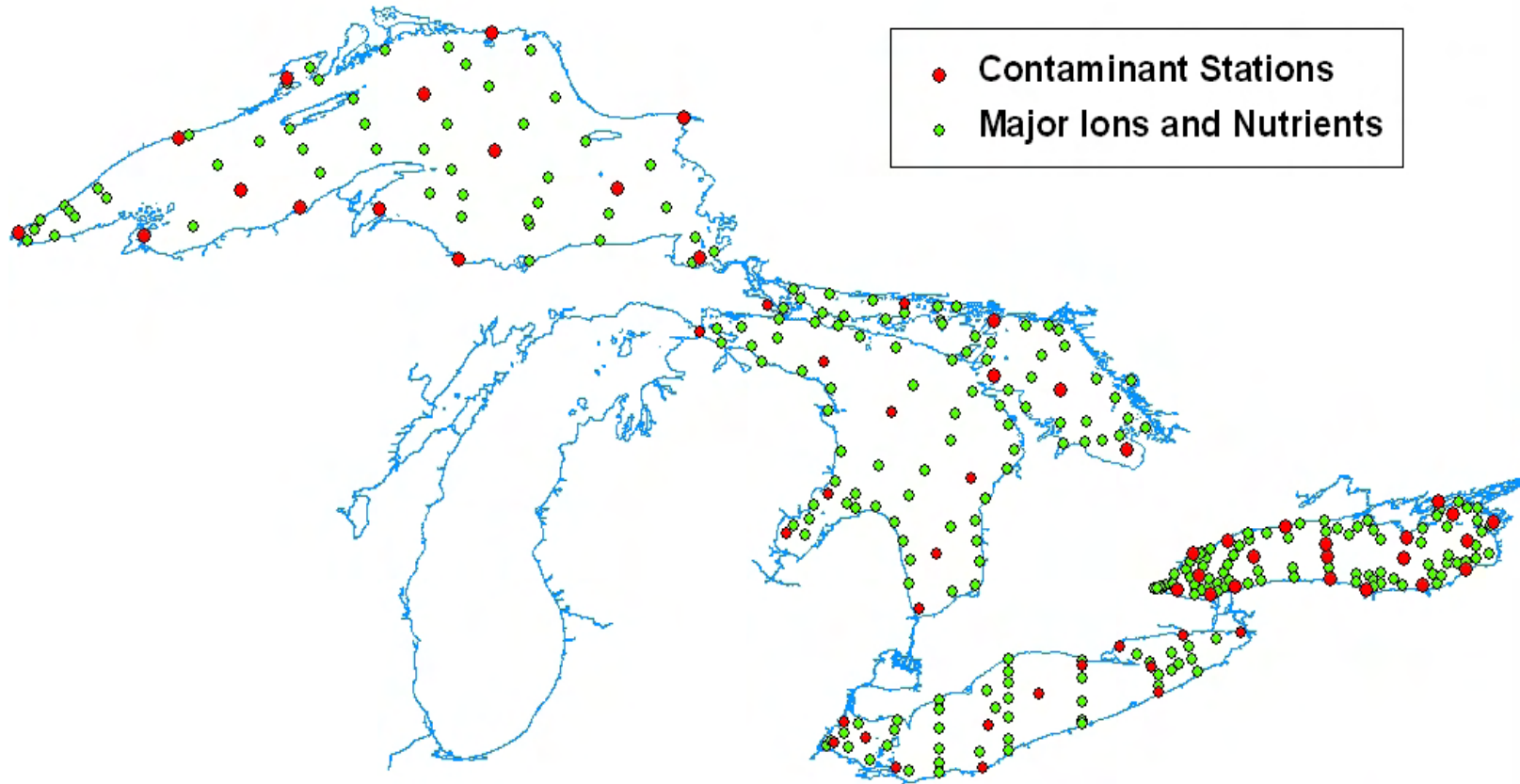
1. Surveillance Program

- Objectives of the program:
 - to ensure compliance with water quality objectives
 - evaluate trends
 - assess transboundary pollution
 - support LaMPs and RAPs
 - identify emerging issues
- Program has been in place since mid- 1960's.
- Current schedule consists of a 2 year rotational cycle
- Sampling consists of nutrients, major ions at all sites
- Organic contaminants, trace metals and mercury at a subset of stations





Great Lakes Surveillance Program



Parameters Monitored – All Sites

- Major ions (Cl, SO₄, SiO₂, Ca, Mg, K, Na) and Alkalinity
- Nutrients (TP, TFP, SRP, TKN, PON, NH₃, NO₃+NO₂)
- Carbon (DIC, DOC, POC)
- Physical Parameters (Temp, Secchi disc, Transmissivity, pH, Conductivity, Diss. O₂)
- Chlorophyll a



Parameters Monitored – Contaminants Stations

Organic compounds in filtered samples:

- PCBs (104 congeners and total PCBs)
- Chlorinated benzenes
- Organochlorine pesticides
- PAHs
- In-use Pesticides (Atrazine and Metolachlor)



Total metals in unfiltered samples

- Trace Metals (suite of 26 metals)
- Mercury



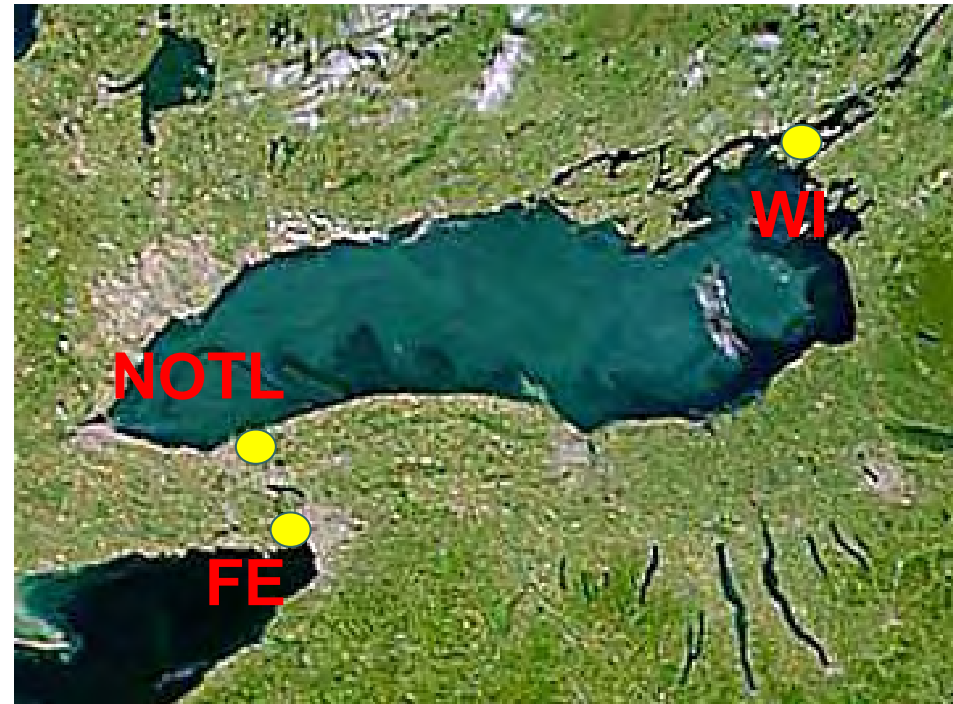
Emerging Compounds – Selected Sites

- Current-Use pesticides (neutral herbicides, acid herbicides, organophosphorus pesticides)
- Acid pharmaceuticals
- Musks and Organophosphorus flame-retardants



2. Niagara River Upstream/ Downstream Program + Wolfe Island

- ▶ Niagara-on-the-Lake (1975)
 - ▶ Fort Erie (1983)
 - ▶ Wolfe Island (1976)
- ▶ Consistent sampling and analytical protocols between stations





Historical Target List

- Conventionals (alkalinity, pH, conductance, turbidity, TKN, NO₃, NO₂, NH₃, Cl, SO₄, Ca, Mg, Na, K, DIC, DOC, SiO₂)
FE-1983, NOTL-1975, WI-1976
- Inorganics (TP, P, C&N_{dissolved}, C&N_{particulate}, trace metals)
FE-1983, NOTL-1975, WI-1976
- Organics (chlorobenzenes, banned and in use pesticides, PAHs, PCBs)
FE-1986, NOTL-1986, WI-1989
(Dissolved phase and Suspended Sediment)



New Compounds

(sampling initiated 2002)

- Mercury (whole water)
- PBDEs
- Toxaphene
- Acid Pharmaceuticals (clofibric acid, ibuprofen, acetaminophen, salicylic acid, gemfibrozil, fenoprofen, naproxen, triclosan, ketoprofen, diclofenac, indomethacin, fenofibrate)





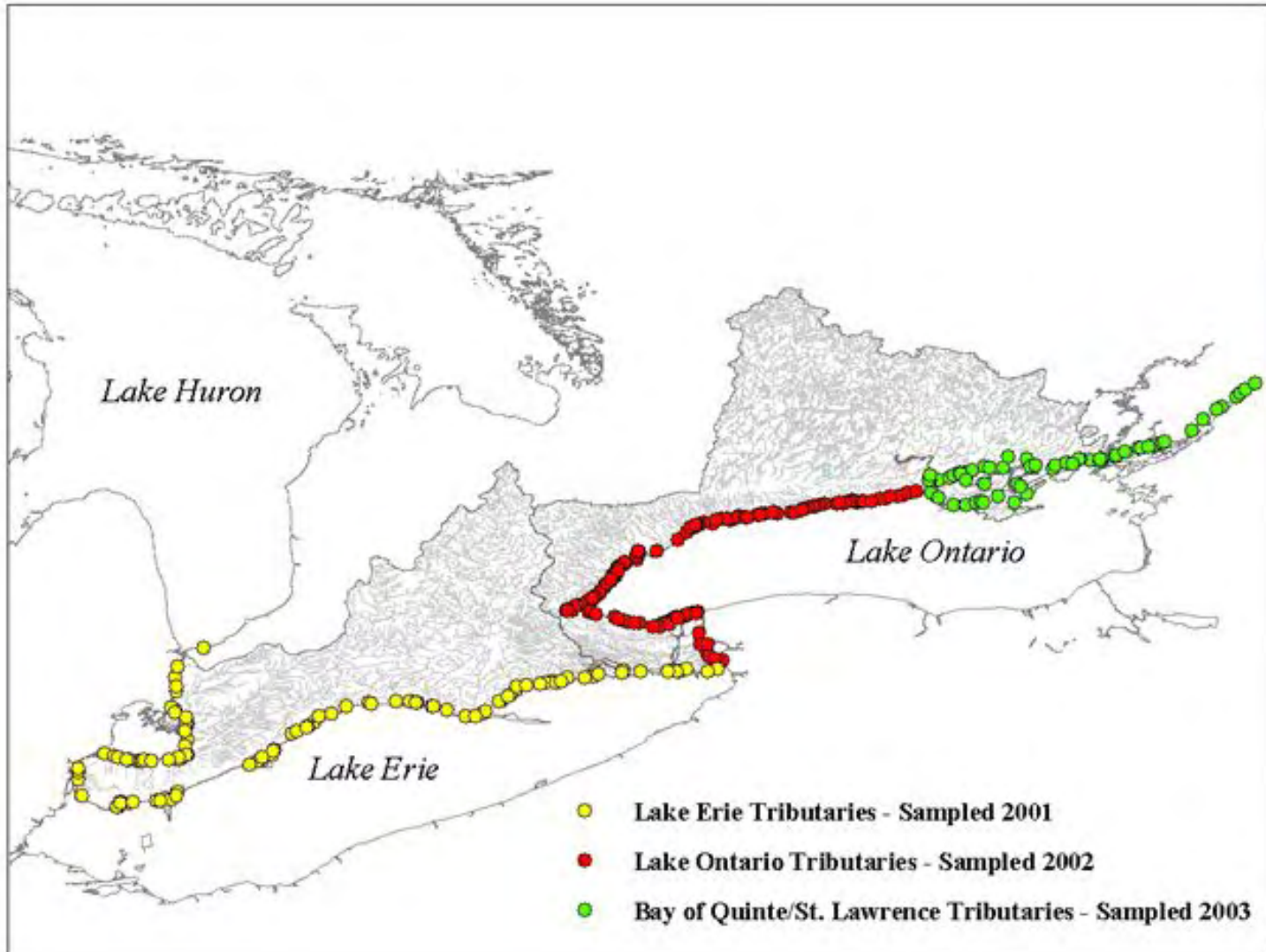
New Compounds

(sampling TBA)

- DSL substances: Antioxidants, other brominated/chlorinated, musks, nitro compounds, pigments and dyes, phthalates, substances with greatest potential for human exposure
- PFOS/PFOA-2005
- PCN-2005
- HAAs
- PCPs
- Expanded Pharmaceuticals
- Expanded In use Pesticides
- Methyl Mercury



3. Tributary Screening Program



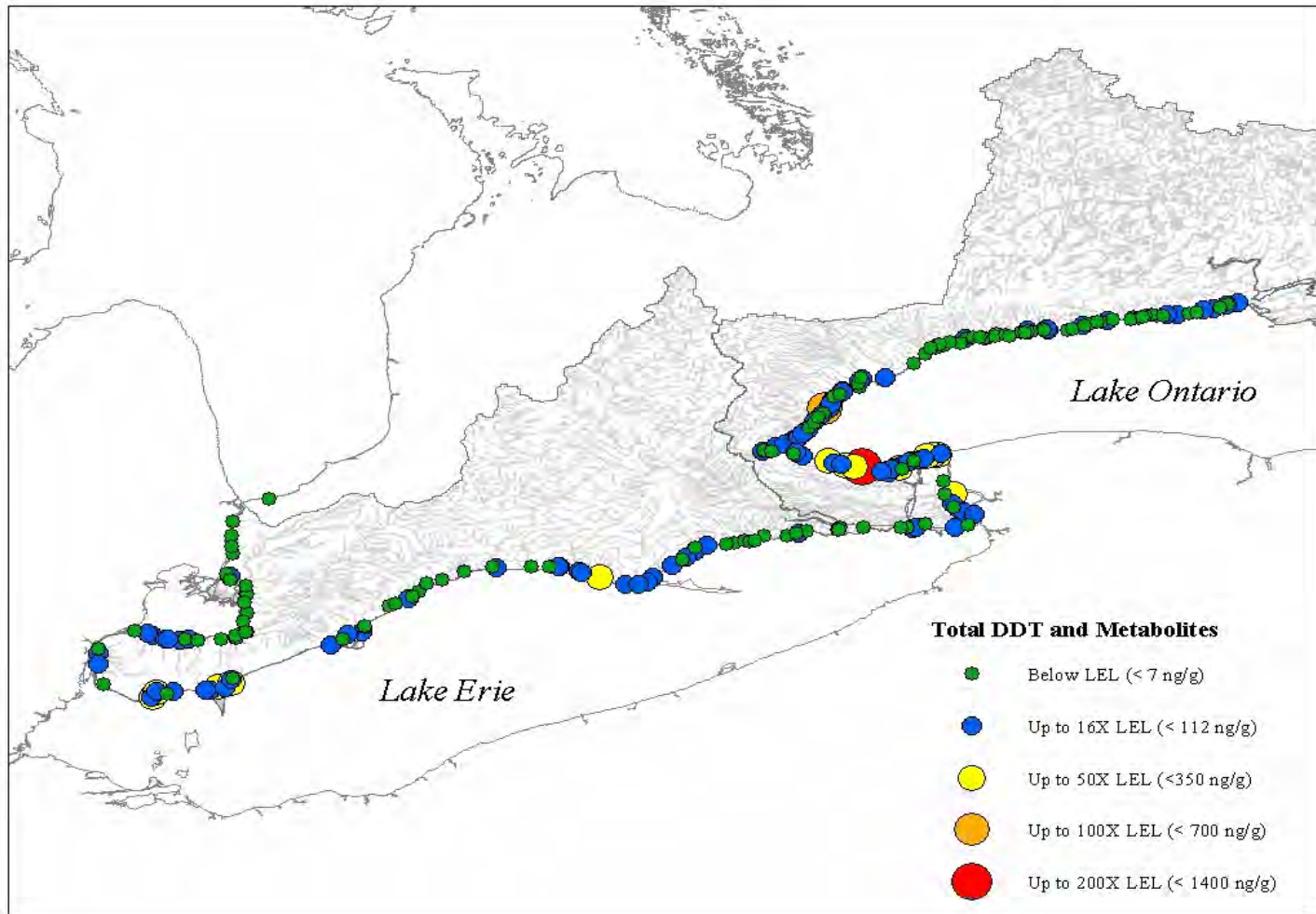


Parameters

- Metals including mercury
- PCBs
- Organochlorine Pesticides
- PAH's
- Total Organic Carbon
- Loss on Ignition
- Sedimentology
- Selected samples for Dioxins/Furans and DL PCBs, PBDE's, PFAS



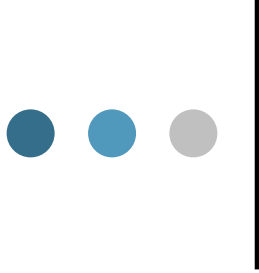
Results.....



4. Pesticides Program

- Triazine herbicides and metolachlor
- Phenoxy acid herbicides
- Organophosphorous insecticides
- Glyphosate and AMPA
- Sulfonyl urea herbicides
- Methoprene
- More to come (method development)

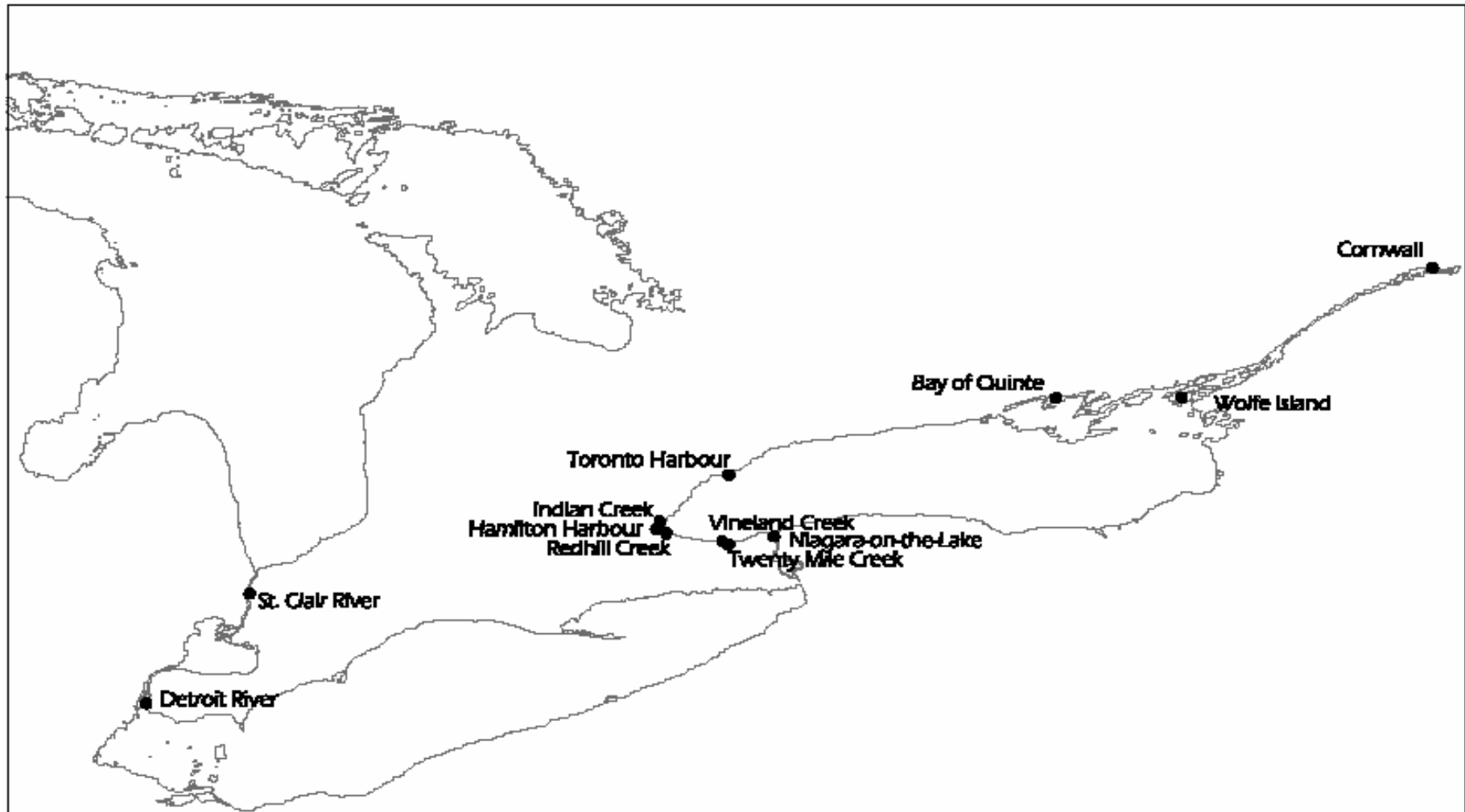




Pharmaceutical and Personal Care Product (PPCP) Monitoring

- Primarily acid pharmaceuticals
- Recent data from Lake Ontario, Wolfe Island, Niagara River, Hamilton Harbour
- Some acid pharms in sediment and suspended sediment from Hamilton Harbour and Niagara River
- Future work 2007-2008?—more PPCP monitoring-antibiotics, neutral pharms, and others in Hamilton Harbour and Niagara River





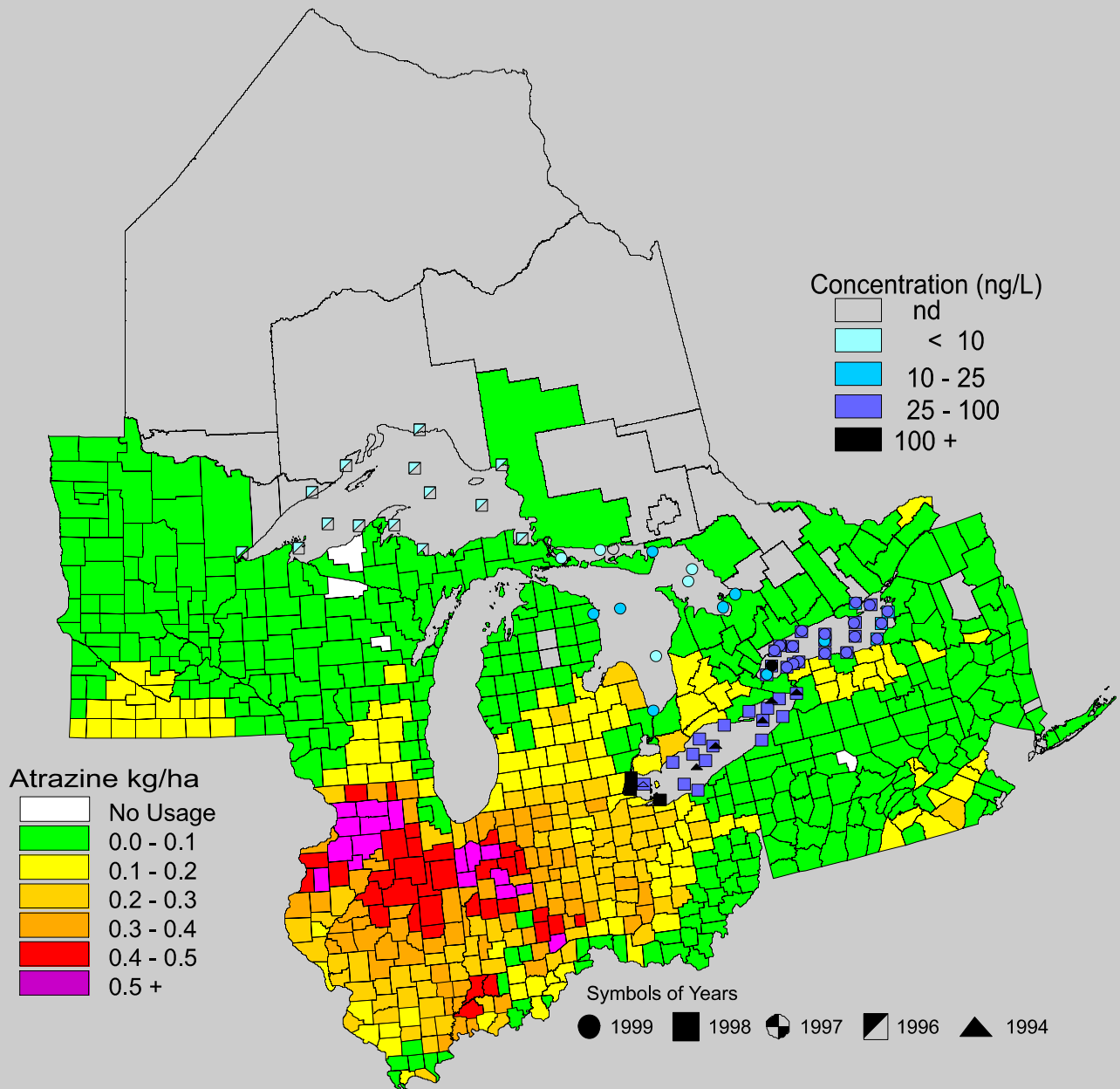
2003 Ontario Region Pesticide Monitoring Sites



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Atrazine usage and Great Lakes concentrations



5. AOC Monitoring Program

- Initiated 2006
- To ensure consistent monitoring across the AOC's by initiating site specific monitoring programs as needed





6. CABIN Program

- Benthic invertebrate community monitoring for identifying impacts of human activity
- Sampling sites on Great Lakes coastline, AOC's and parks
- Also includes sediment toxicity and chemistry (metals)



7. Fish Contaminants and IADN





WQMS & GLNPO

How we coordinate.....

Annual Meetings

- Discuss upcoming workplans
 - Align programs - Intercomparison Studies
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Joint Reporting

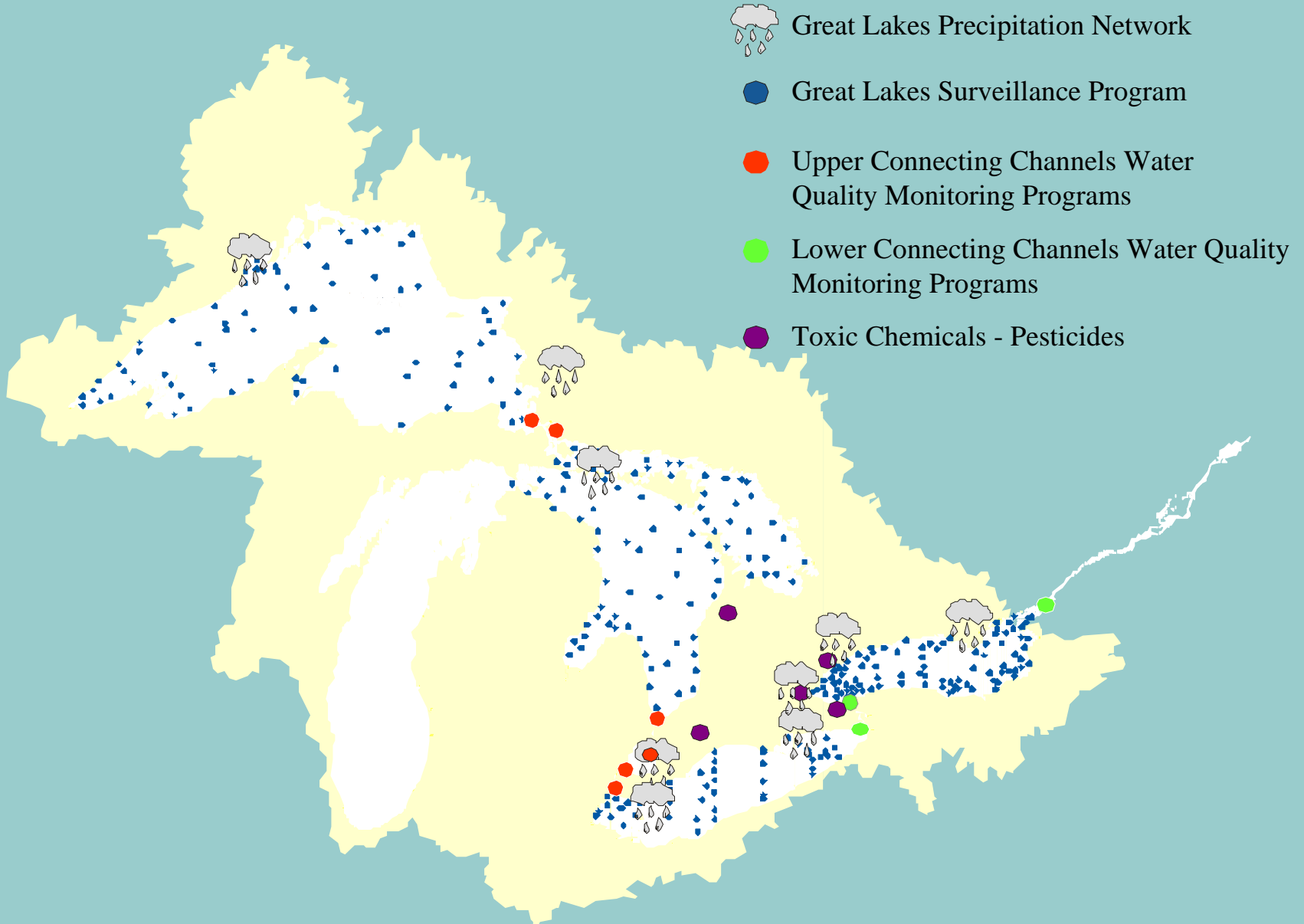
- Coordinate on SOLEC indicators for nutrients and contaminants since 1994
 - Share data and technologies
 - Conduct programs together - IADN
-

Cooperative Monitoring

- Jointly responsible for planning and implementation of Cooperative Monitoring Programs on the Great Lakes
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Overview of WQMS Programs





Thank You !



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