Recent Projects Assessing Urine Diversion for Nutrient Management on Cape Cod

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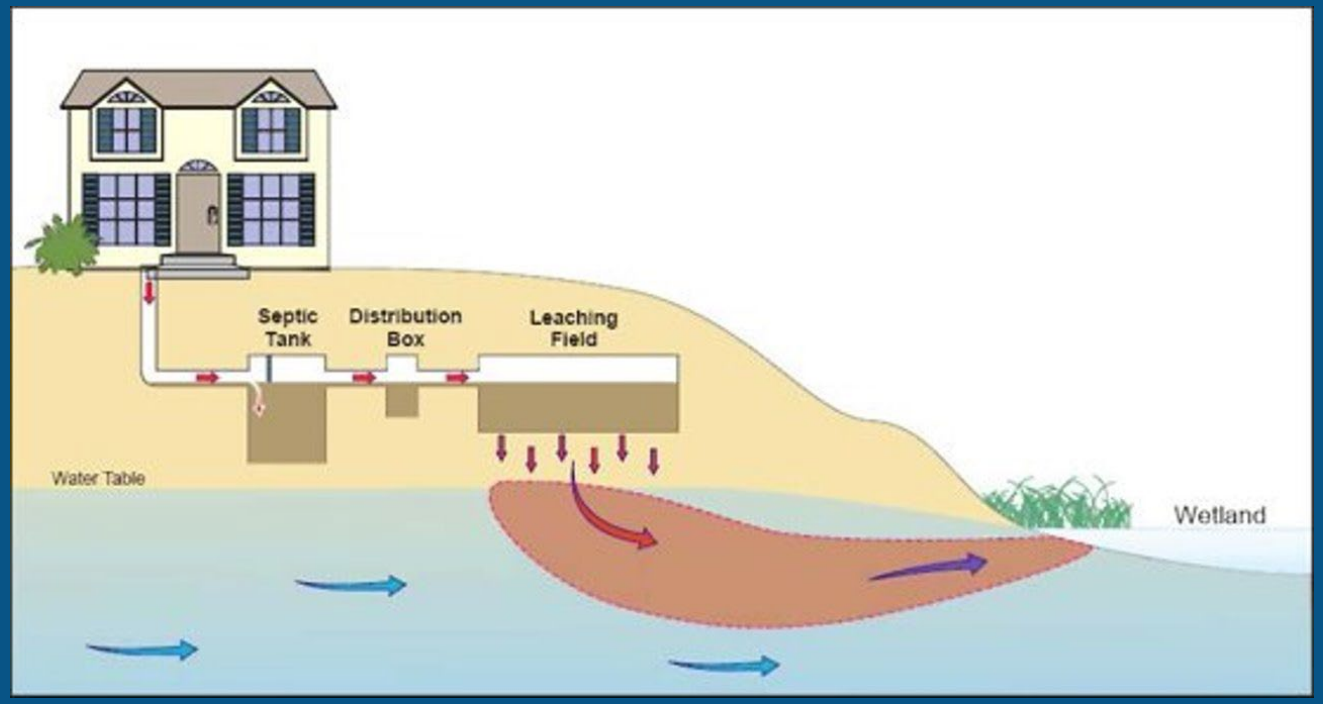
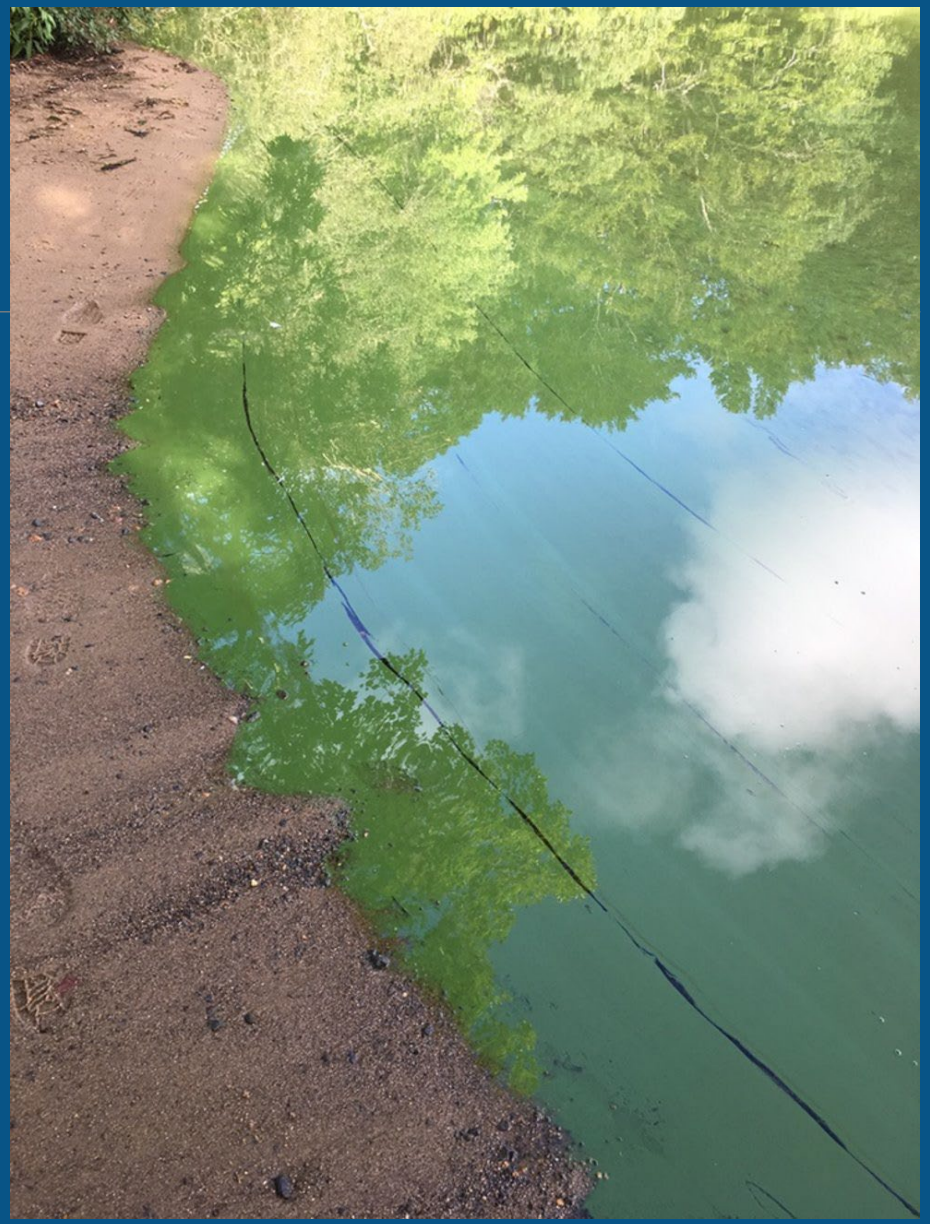
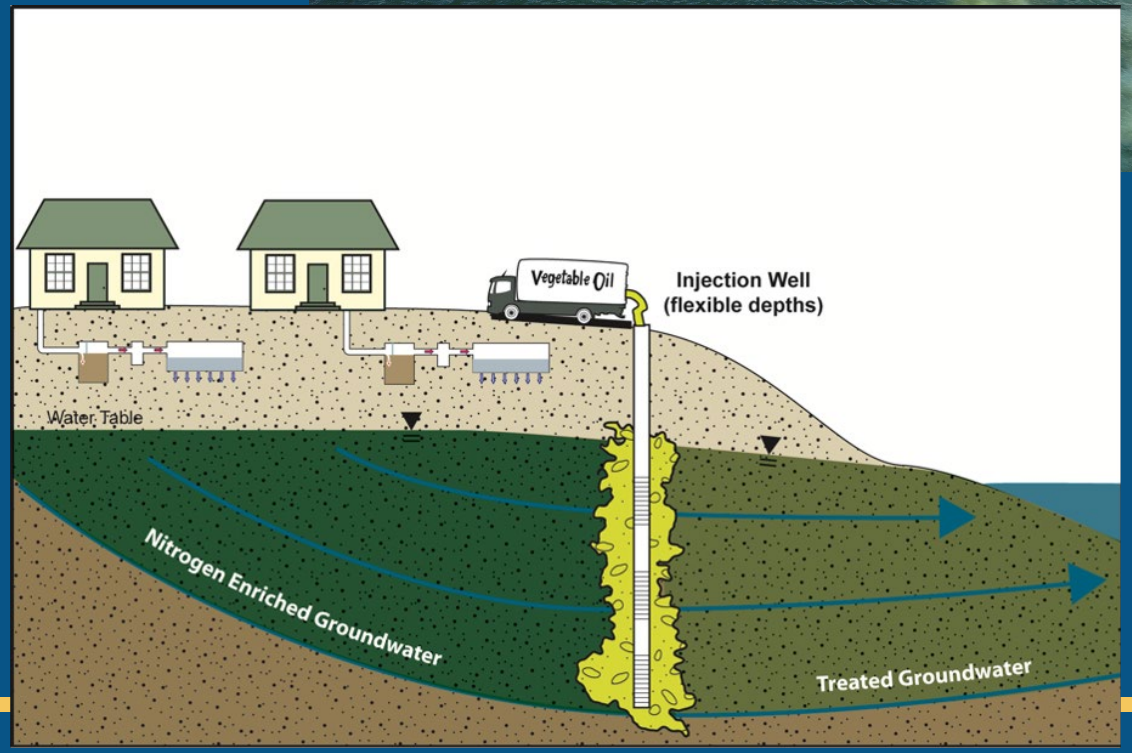
Nutrient pollution





Restoration actions

- Alum treatments
- Permeable Reactive Barriers
- Floating wetlands
- Aquaculture
- Fertigation
- Inlet widening
- Biochar socks

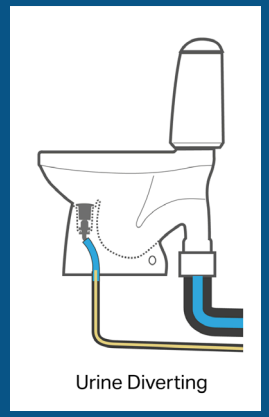


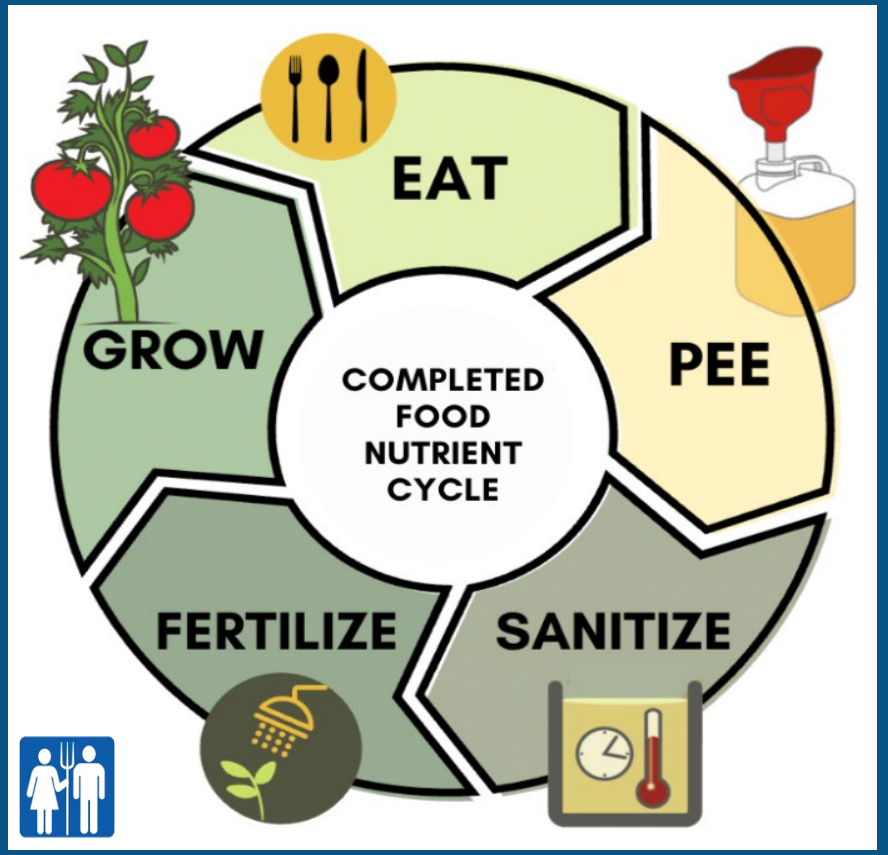
Wastewater management

- Municipal sewer systems connected to central treatment plants
- On-site septic systems converted to enhanced treatment systems

Urine diversion offers a source control

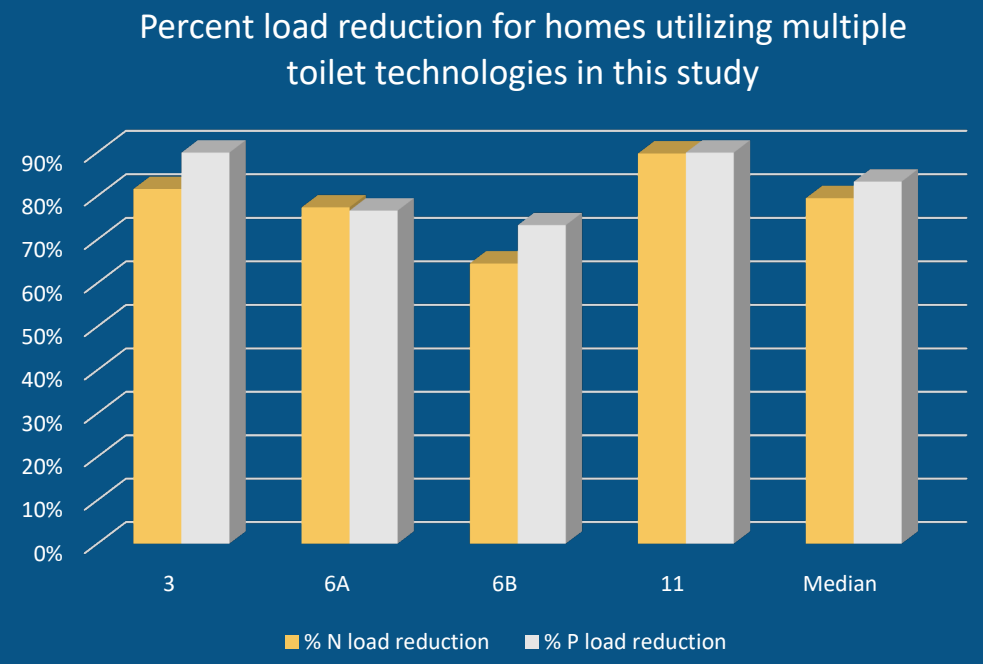
- Divert main source of nutrients in wastewater
- Save water
- Conserve energy





2012 Falmouth Eco-Toilet Project

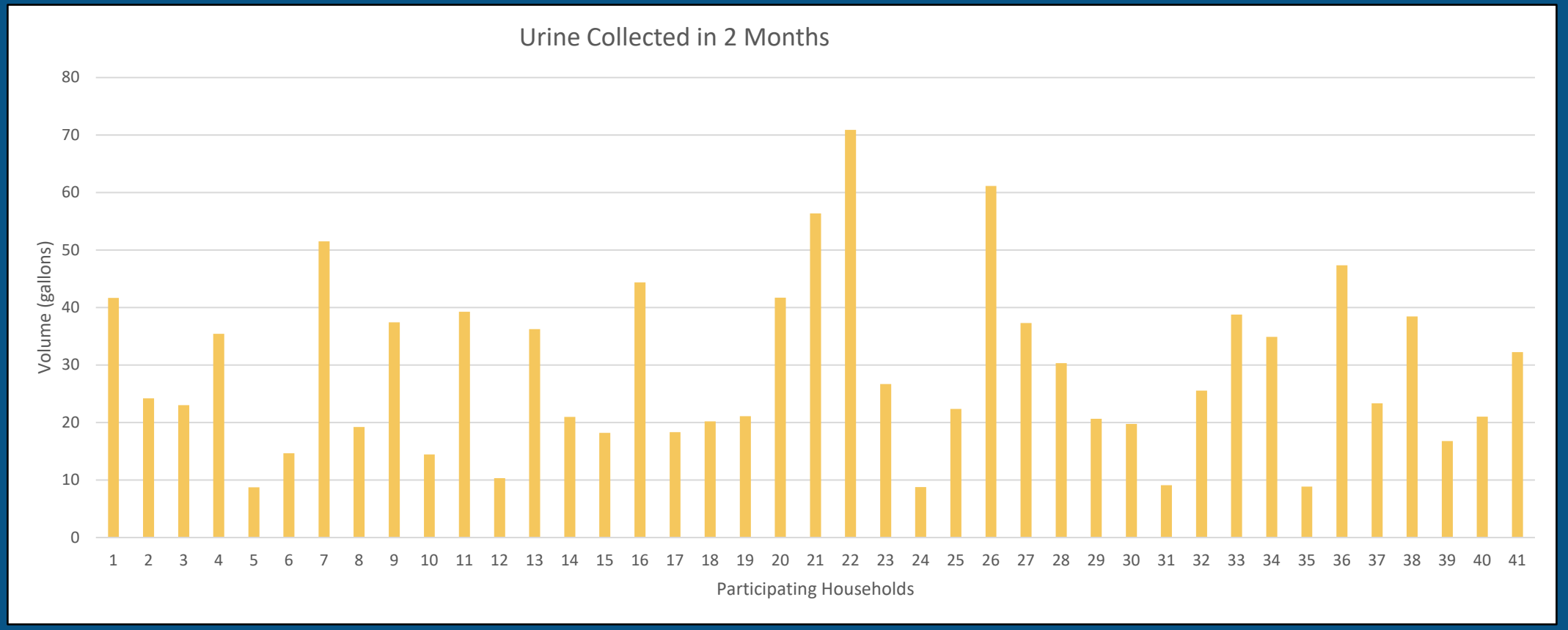
- Installed variety of composting and urine diverting eco-toilets in Falmouth homes.
- Sampled septic tank effluent to measure nutrient levels.
- Low participation and data assumptions (water usage and pre-installation nutrient loads) limited ability to produce significant findings.
- 170 expressed interest, 9 participated
- Found nutrient reductions in the 80% to 90% range!



Green Center UD pilot project

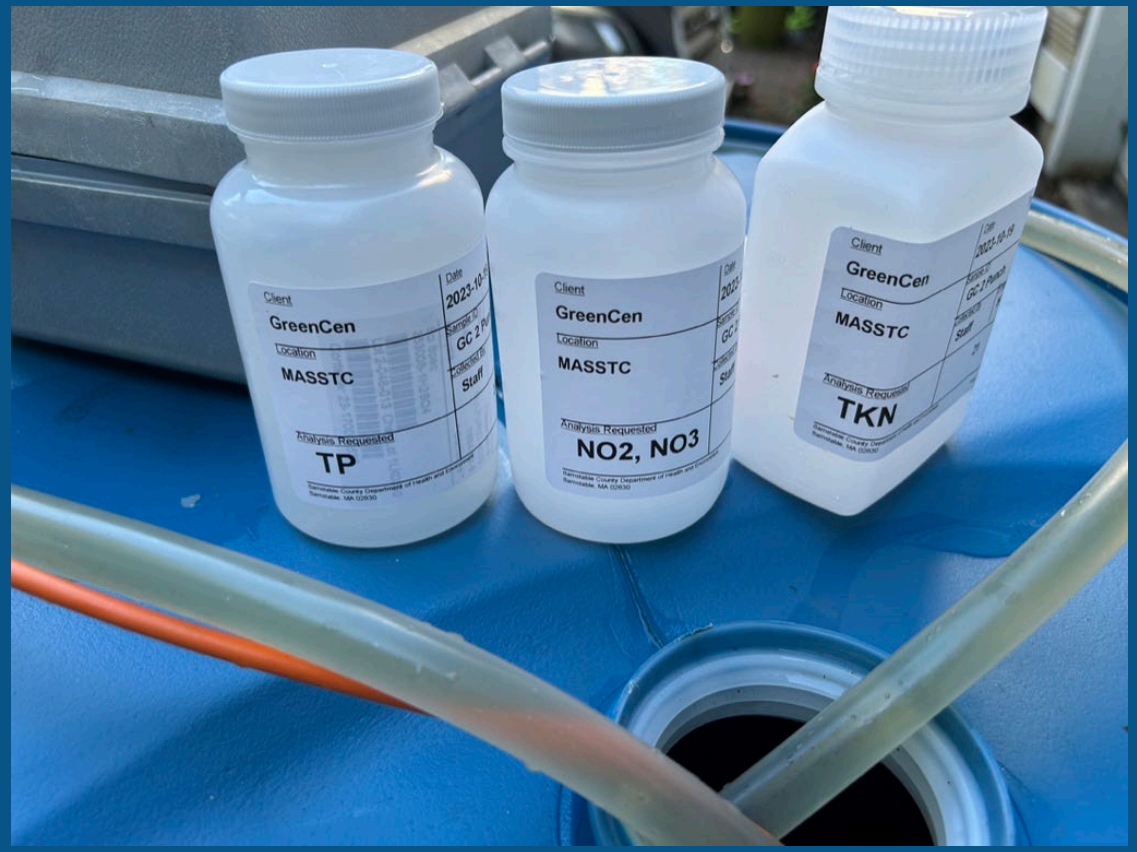
- Completed in 2023
- 41 households (~60 people)
- 2-month collection period
- Used portable collection containers “cubies”
- Measured volume and analyzed nutrients collected
- Collected total of 1,003 gallons (avg. 29 gallons per household)

UD pilot project: volume

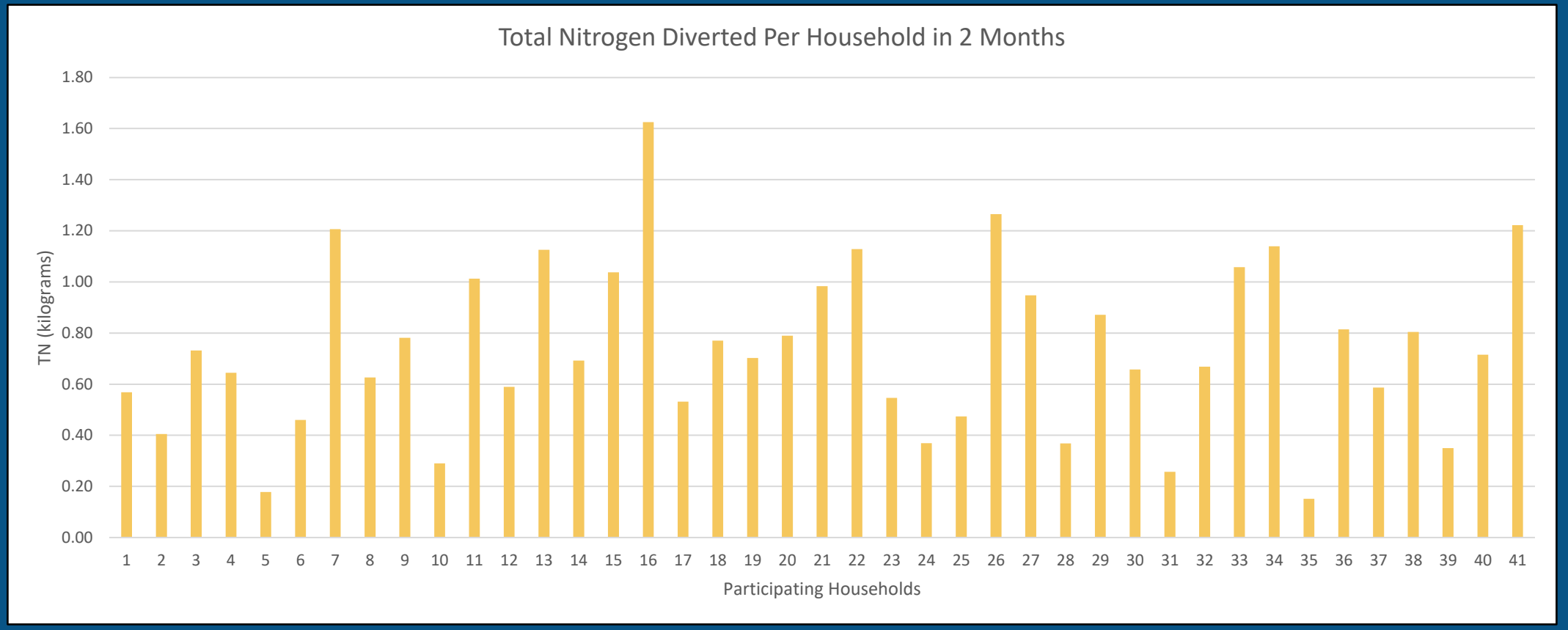


UD pilot project: nutrients

- Average nitrogen concentration 7,267 mg/L
- Average phosphorus concentration 469 mg/L
- Load (kg) = concentration (kg/L) x volume (L)
- Total nitrogen collected 30.2 kg (0.74 kg/household)
- Total phosphorus collected 2.0 kg (0.05 kg/household)

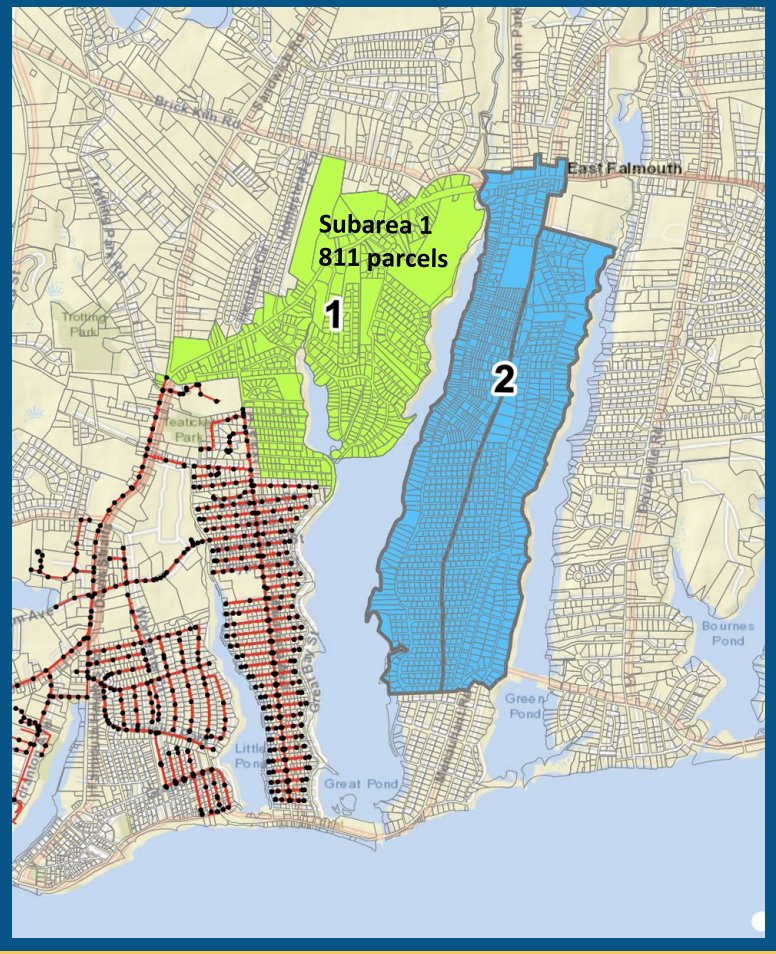


UD pilot project: nitrogen load



UD pilot project: comparative performance

- Great Pond Targeted Watershed Management Plan
- Subarea 1 sewer expansion proposes to connect 811 parcels to remove 2,890 kg-N/year from watershed (3.56kg/parcel)
- UD pilot project found N removal rate at 4.41 kg-N/year per home x 811 homes = 3,578 kg-N/year



Upcoming Falmouth UD Provisional Project

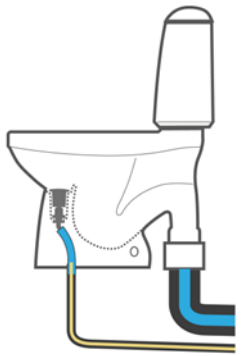
- MASSTC/Town
- Goal: DEP approval of UD as IA system with nutrient credit toward TMDLs
- Need: 50+ formal UD system installations
- 3 years of performance monitoring
- Sample collected urine and septic tanks
- Currently in planning/preparation phase

Upcoming project needs

- Regulatory approvals:
  - toilet fixtures
  - collection and storage systems
  - pump-out
  - transport
  - recycling/disposal
- Monitoring plan that satisfies DEP's nutrient removal performance assessment
- Funding from town or grant sources (including subsidies for participants)
- Committed participants (at least 60 signed up by August 30th!)

MASSTC eco-toilet installations coming soon

- 3 buildings (2 existing, 1 planned)
- Three composting toilets
- 4 waterless urinals
- 1 split bowl UD toilet
- Greywater gardens
- Leachate and urine recycling
- Urine application pilots



Eco-Toilet Options Assessment

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Thank you!

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MASSTC.org