INNOVATIVE ALTERNATIVE ONSITE SEPTIC SYSTEMS FOR THE REMOVAL OF NITROGEN IN BARNSTABLE COUNTY

What role should they play in Comprehensive Wastewater Management Plans?

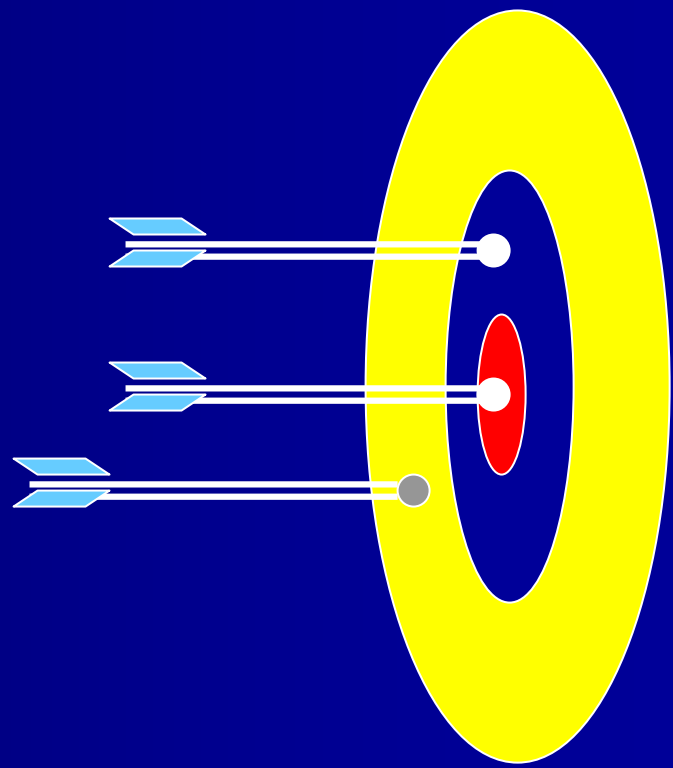
Disclaimer

The mention of any product or company in this paper does not constitute an endorsement by Barnstable County. Data contained herein were reported by various service providers for alternative onsite septic system components. The Barnstable County Department of Health and Environment does not guarantee the data accuracy beyond that point implied by the collection, processing and reporting practices required or implied by the system operator's Wastewater Treatment Plant Operator license.

What level of wastewater treatment do I need ?

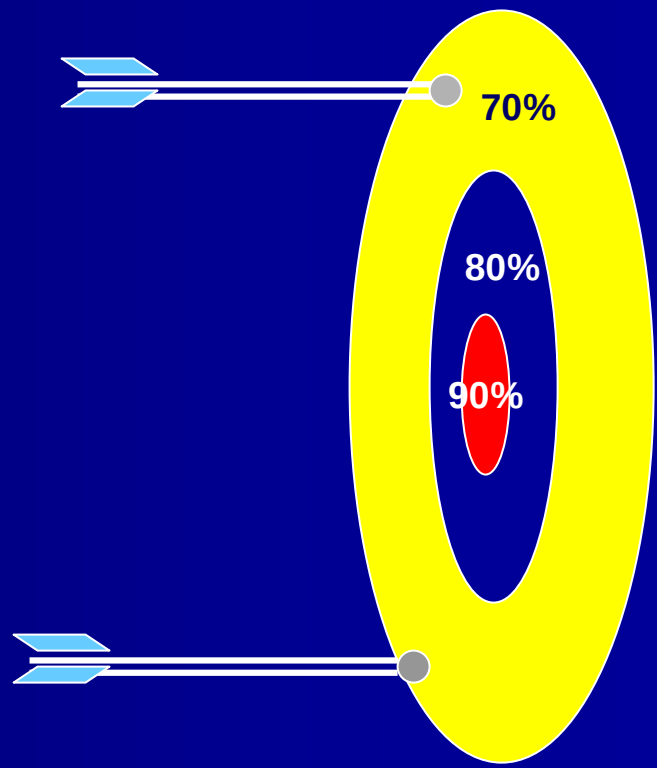
Removal targets are determined by studies conducted under the Massachusetts Estuaries Program and are based on the assimilative capacity of the particular embayment.

(how much it can take before showing undesirable effects)



What level of wastewater treatment do I need ?

Generally, if the target removal rate exceeds 60% the majority of onsite alternatives can not meet that target.

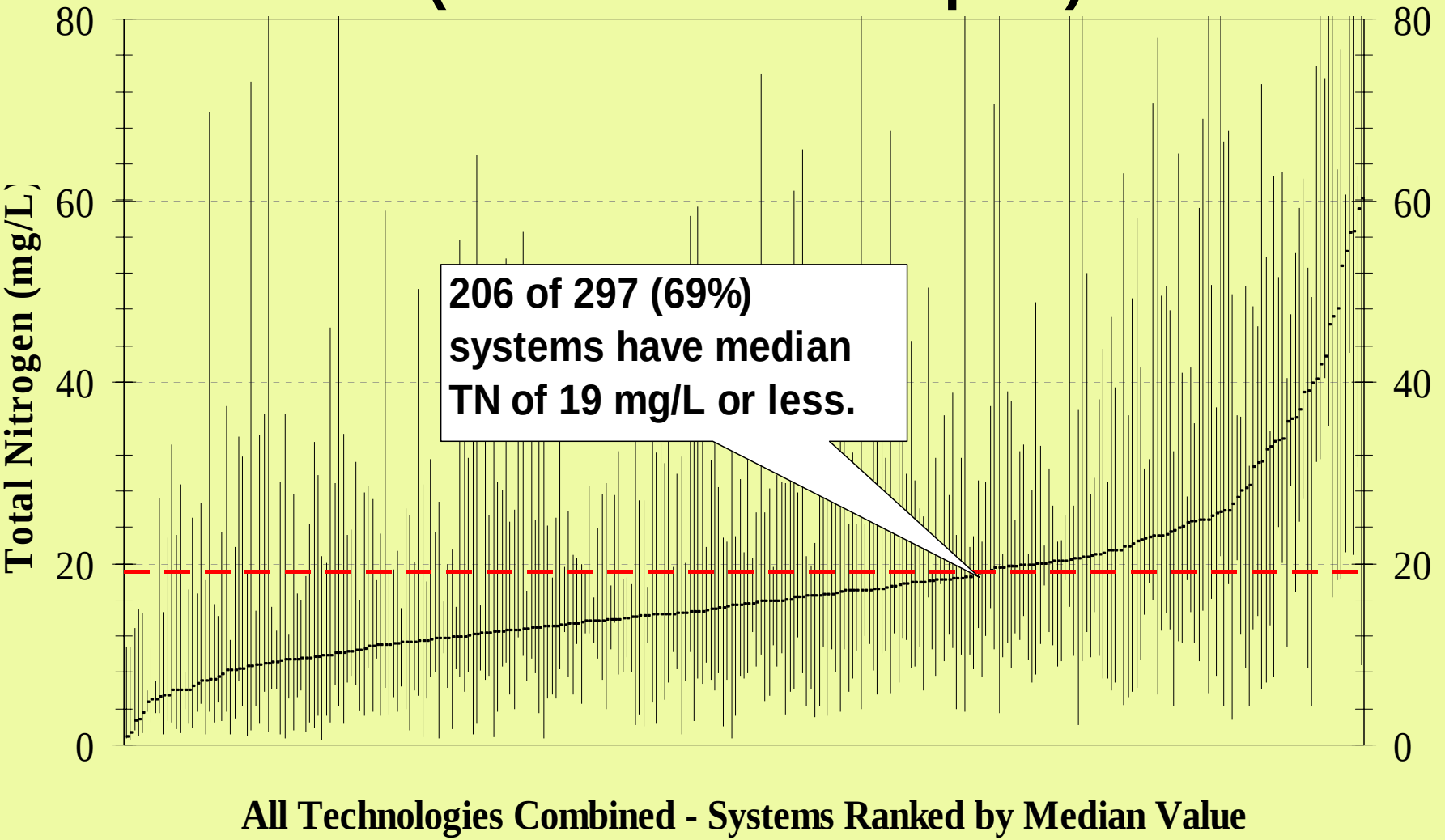


What is that conclusion based on ?

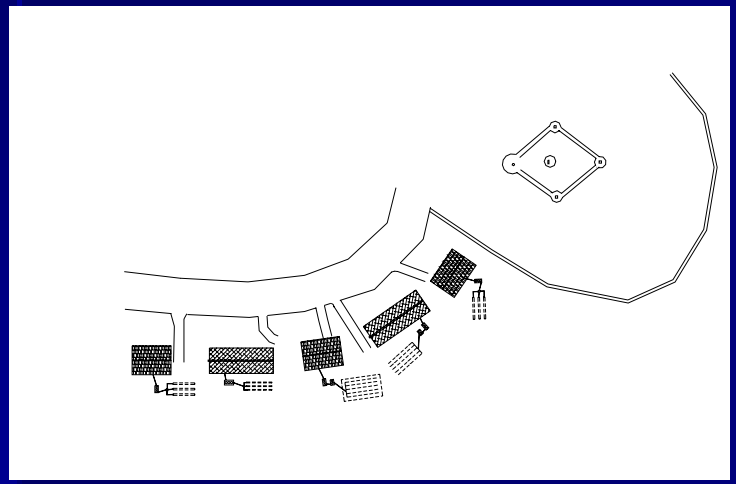
In the absence of other data such as water use, occupancy, use patterns

19 mg/L ~ 50% Nitrogen Removal

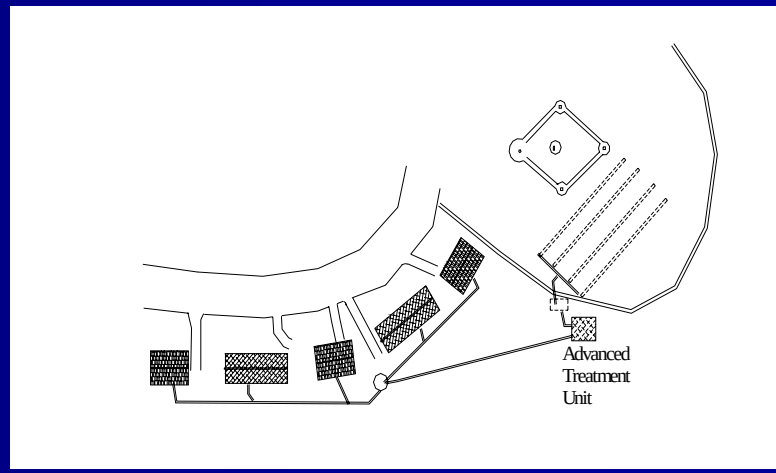
Single Family – All Technologies Combined (four or more samples)



What about Cluster Systems ?

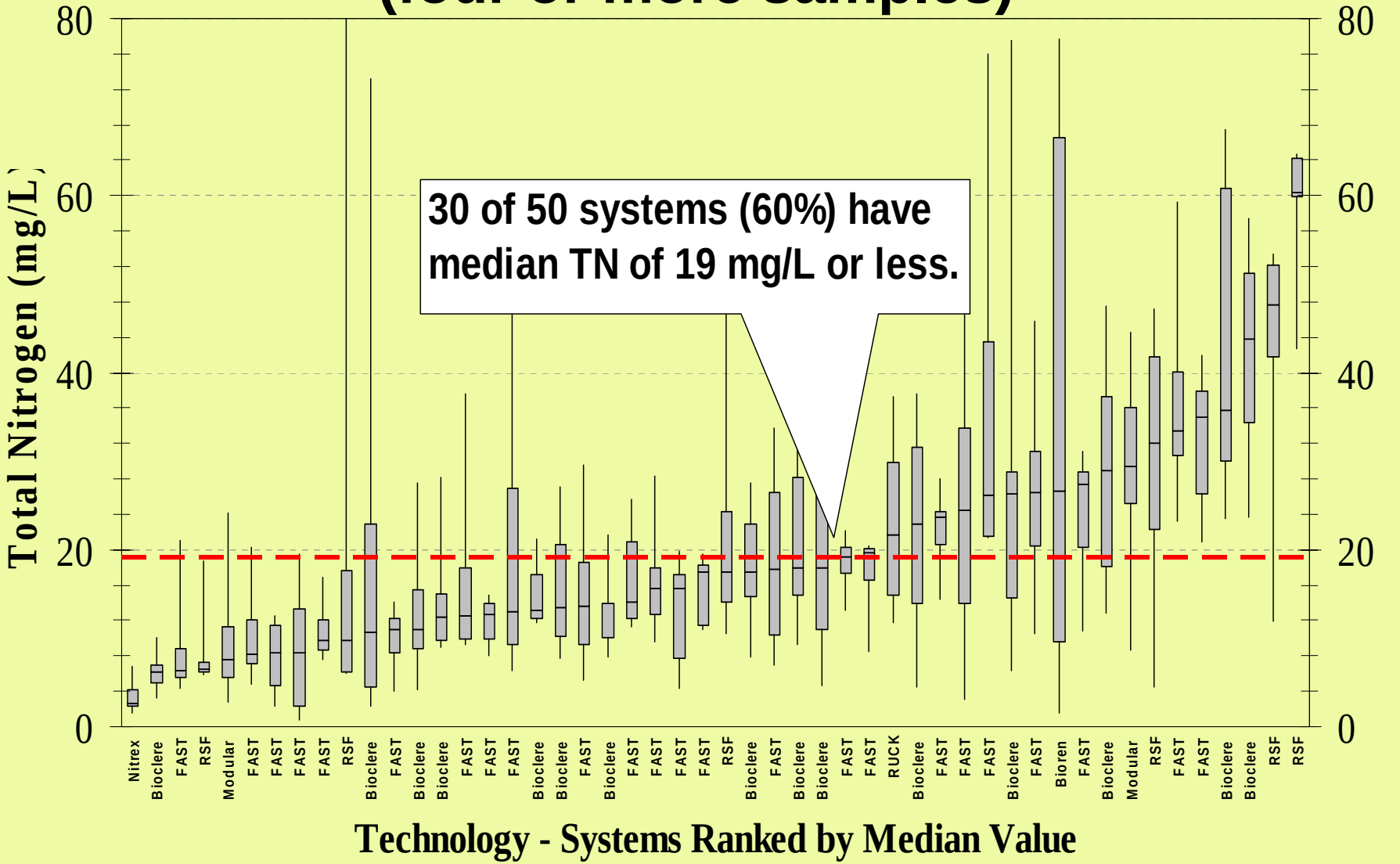


Every residence has their own system



Various numbers of residences share a system

Multi-Family – All Technologies Combined (four or more samples)

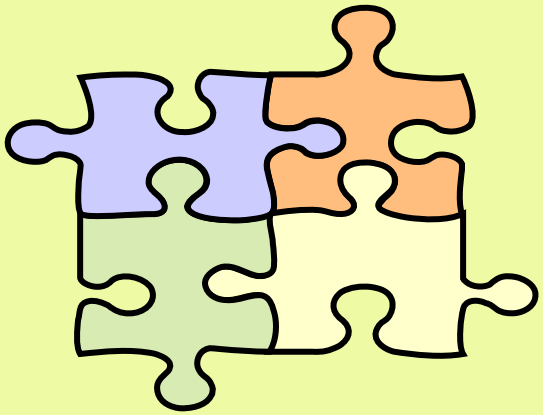


Our Experience in Barnstable County

The data suggest that, for systems less than 10,000 gallons per day only 60% have been meeting the nitrogen removal rate of 50%.

THIS DOES NOT MEAN THAT UNDER A DIFFERENT REGULATORY SCENARIO CLUSTER SYSTEMS COULD NOT DO BETTER (*COSTS* DRIVE PERFORMACE)

(EVIDENCE THE GROUNDWATER DISCHARGE PROGRAM)



Conclusions

- **The data suggest an ability for onsite septic systems to remove 50-60% of the nitrogen, when they are installed in conjunction with an operations, maintenance on monitoring scheme.**
- **Individual systems will vary widely in their performance due to various factors including water use, occupancy, residence use patterns and operator skills.**
- **Cluster systems were not shown to perform as well as individual onsite systems, but this is not due to inherent problems with the cluster system approach.**

Are there promising technologies not yet in common usage?

Nitrex

The data from Nitrex installations in Barnstable County and elsewhere give promise of a technology that an meet a 5 mg/L discharge.

The not-so-hidden costs of using onsite solutions

- Operation costs including electricity (many units use 5-6 KwH/day)
- Monitoring costs (you must monitor systems to confirm removal levels)
- Maintenance – Every system MUST be on a maintenance contract.
- Regulatory oversight (we estimate 1 FTE per 1500 onsite systems)
- Residuals must be more aggressively managed.

I/A Systems: Economics

- Individual I/A on-sites are not inexpensive
- Installation cost: $10,000 above cost of Title 5 system
- Significant Annual Costs
  - Operation and Maintenance contract ($1200)
  - Electricity costs ($350)
  - Effluent Sampling ($400, included in cost of O&M)
  - Total annual cost to operate= $1550

I/A Systems: Economics
Present value cost of I/A system

- Present value analysis brings all costs associated with system installation, maintenance and operation of the system, over the entire life of the system, into present dollars

  i.e. How much money would I have to set aside today to cover all costs associated with the system over it's life span?

I/A Systems: Economics
Present value cost of I/A system

- Assumptions:
  - Installation cost $10,000 (I/A treatment unit only)
  - Annual O&M contract $1200/yr
  - Electricity to operate $350/yr
  - Quarterly inspection and effluent sampling
  - 20 year life of system
  - 5% interest rate

Yields present value of roughly $35,000.

General conclusions from the onsite perspective

- Innovative alternative septic systems offer a viable technology option to communities in areas where the required total removal of nitrogen from wastewater in a watershed is 50-60%.
- When innovative alternative septic systems are being considered, the costs of monitoring, maintenance, regulatory oversight and management of residuals must be factored in.
- There are some promising technologies which may change the analyses by proving higher levels of treatment for nitrogen.
- Communities should at least consider the viability of diversion strategies (composting and urine diversion).

Questions ?