



Tracking the Performance of Innovative/Alternative Septic Systems in Town

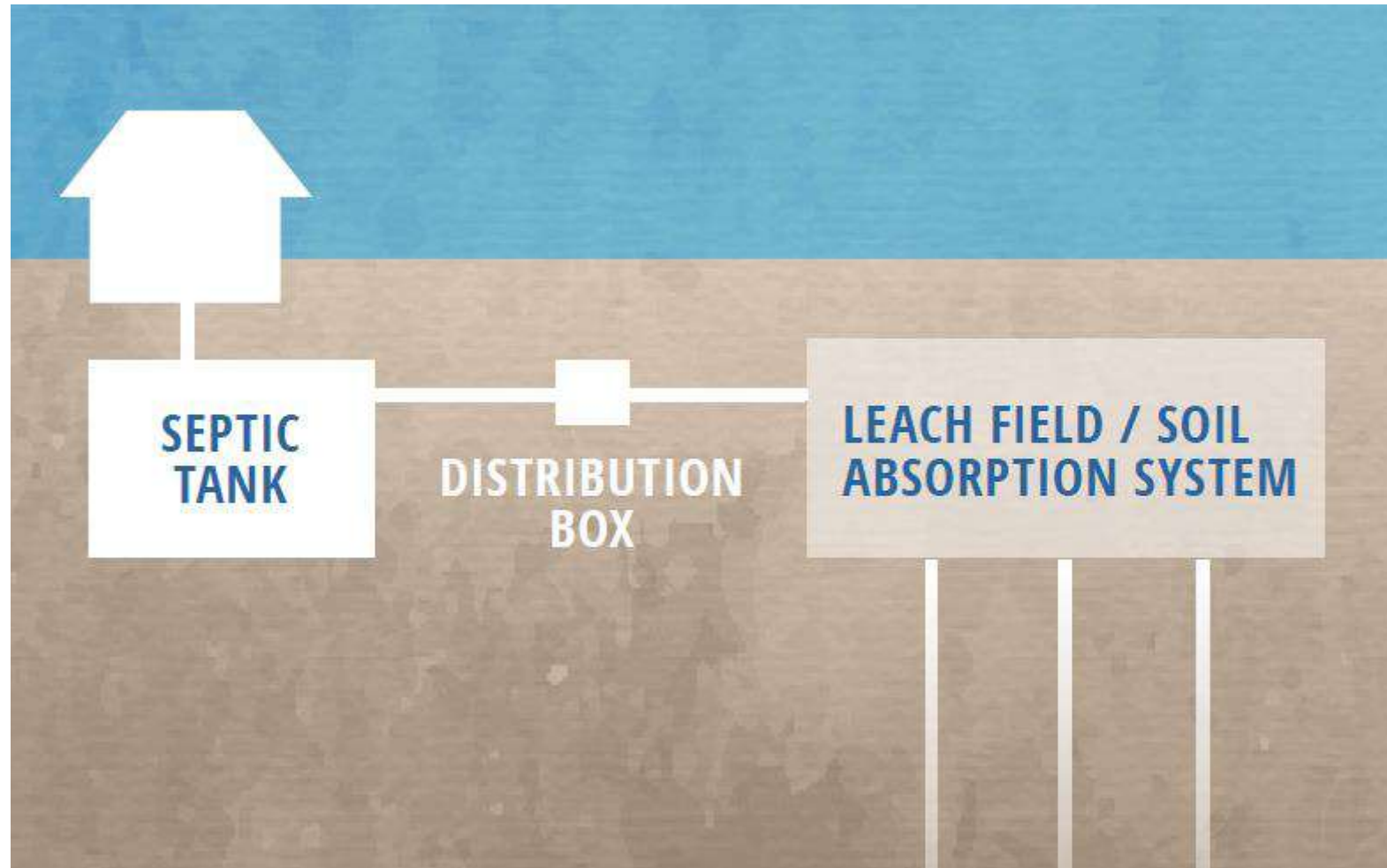
Given February 6, 2019 at MEHA Title 5 Seminar

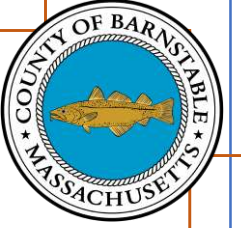
Emily Michele Olmsted
Environmental Project Assistant
Innovative/Alternative Tracking Program
Barnstable County Department of Health and Environment

What is wastewater?

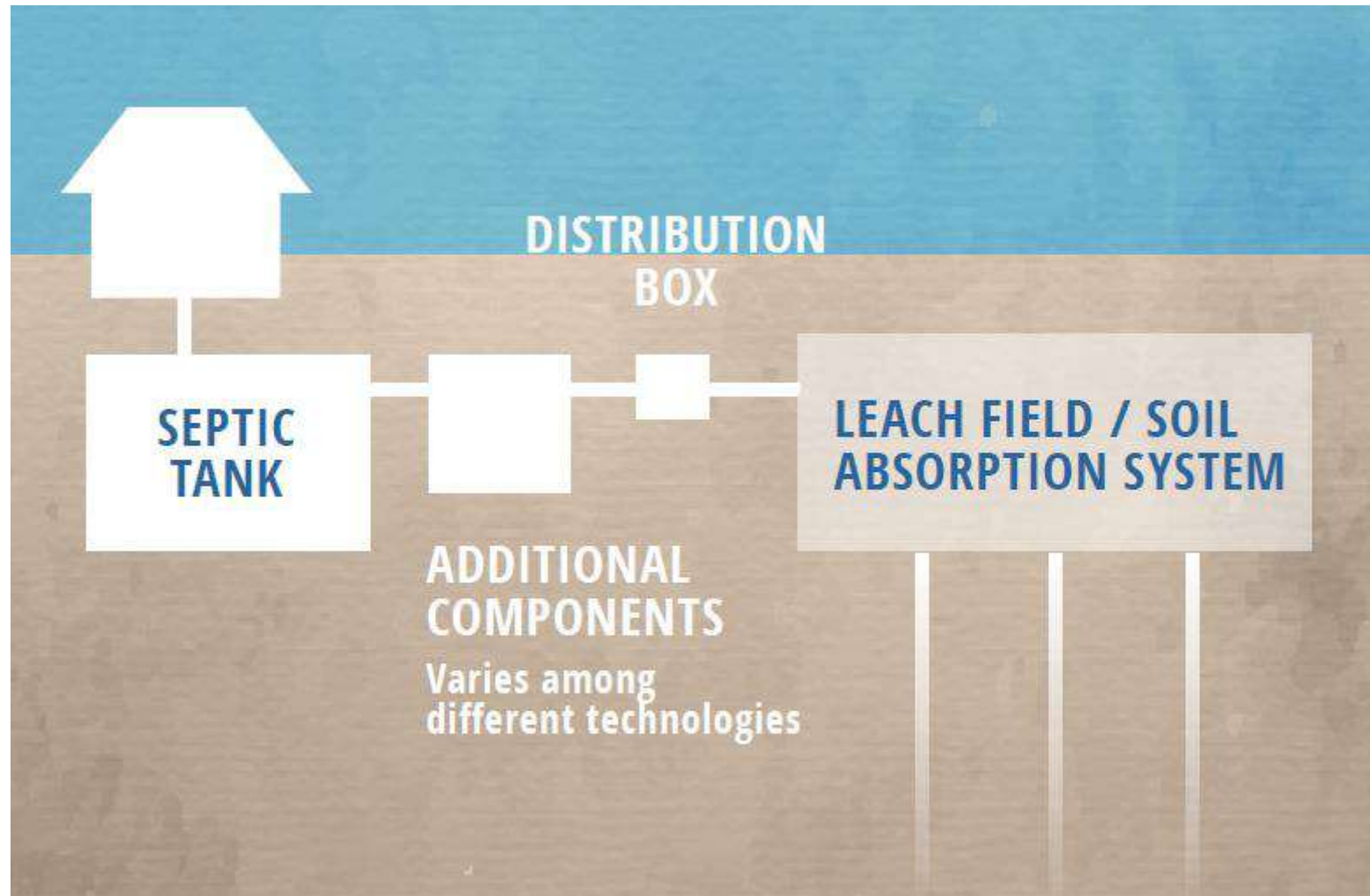


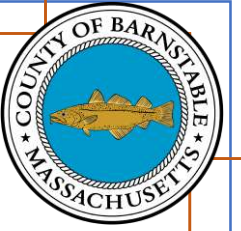
Septic System





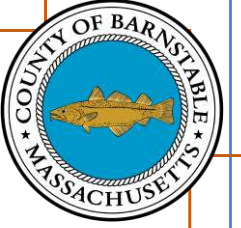
Innovative/Alternative septic system





Title 5 Definition

Alternative Systems - Systems designed to provide or enhance on site sewage disposal which either do not contain all of the components of an on site disposal system constructed in accordance with 310 CMR 15.100 through 15.255 or which contain components in addition to those specified in 310 CMR 15.100 through 15.255 and which are proposed to the Local Approving Authority and/or the Department, or an agent authorized by the Department, for remedial, pilot, provisional, or general use approval pursuant to 310 CMR 15.280 through 15.289.



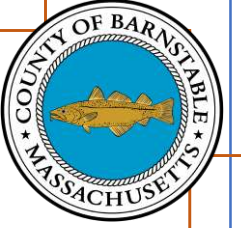
Approval Levels

- Different approval levels for each I/A technology in Massachusetts
 - General Use
 - Remedial Use
 - Provisional Use
 - Pilot Use
 - *There's a difference between approval for secondary treatment and for nitrogen and/or phosphorus removal*

What is an Operation and Maintenance Contract?



- 310 CMR 15.287
- (9) The system owner shall maintain an operation and maintenance contract with a Massachusetts certified operator where one is required by 257 CMR 2.00: Certification of Operators of Wastewater Treatment Facilities, or otherwise with a person qualified to operate and maintain the system in accordance with the Department's written approval.

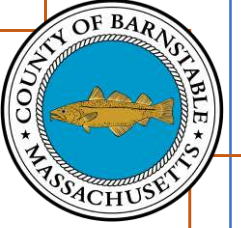


What is an Operation and Maintenance Contract?

- III. Operation and Maintenance
- 1. To ensure proper operation and maintenance (O&M) of the System, the System Owner shall enter into an O&M Agreement with a qualified Service Contractor whose name appears on the Company's current list of Service Contractors and has been certified, at a minimum, at Grade Level II (two) by the Board of Registration of Operators of Wastewater Treatment Facilities, in accordance with Massachusetts regulations 257 CMR 2.00. Prior to commencement of construction of the System, **the System Owner shall provide to the local Approving Authority a copy of a signed O&M Agreement.**

Source: Standard Conditions for Secondary Treatment Units Certified for General Use

<https://www.mass.gov/files/documents/2016/08/xf/scstugu.pdf>

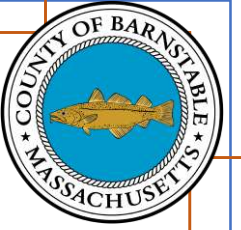


What is an Operation and Maintenance Contract?

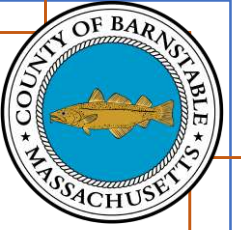
- IV. Additional System Owner and Service Contractor Requirements
- 5. The System Owner and the Service Contractor shall maintain an O&M Agreement at all times. The duration of the O & M Agreement shall be at least one year and shall include the following provisions:
 - c) The Service Contractor shall be responsible for obtaining lab analyses and submitting the monitoring results to the System Owner and the local Approving Authority in accordance with the reporting requirements;

Source: Standard Conditions for Secondary Treatment Units Certified for General Use

<https://www.mass.gov/files/documents/2016/08/xf/scstugu.pdf>



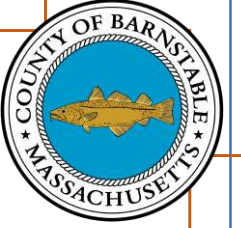
- Each technology has its own DEP approval letter referencing specific requirements



Impositions for Sampling and/or Inspecting

- State
 - Massachusetts Department of Environmental Protection
 - Depends on approval level
- Local
 - Conservation Commission
 - Board of Health
 - Could be town regulation, site-specific approval

Where do we fit in?





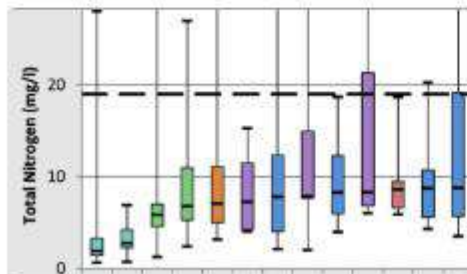
Licensed I/A Operators

Need an operator? Check out the of list of licensed wastewater treatment operators for one near you.

[View list](#)

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Data and Statistics



In order to provide information on innovative/alternative (I/A) septic systems to the public and to wastewater decision makers, the

I/A Owners Guide



I/A system owners have the responsibility of keeping their system operating correctly at all times in order to be in compliance with state and

Presentations



We have a standing offer to present updated I/A performance data to town Boards of Health. [View past presentations here.](#)

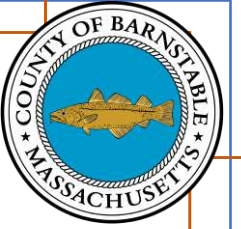
List of Operators



Barnstable County Department of Health and Environment
P.O. Box 427, Barnstable, MA 02630

Company Name	Phone Number	City	State
ACCU Sepcheck	508-385-5891	South Dennis	MA
All Cape Environmental Inc	508-776-6219	Yarmouth Port	MA
Aquapoint .3 LLC	508-985-9050	New Bedford	MA
Atlantic Solutions	401-293-0176	Portsmouth	RI
Bennett Environmental Associates, Inc.	508-896-1706	Brewster	MA
Bridgewater Pump, Inc.	508-697-9943	Bridgewater	MA
BSC Services	401-556-0427	Fall River	MA
Cape Clear Water	508-603-8771	Marstons Mills	MA
Cape Septic Inspections	508-280-3356	Mashpee	MA
CHA Consulting	781-820-5386	Norwell	MA
Clear Water Industries LLC	978-356-0779	Ipswich	MA
Clearwater Recovery	781-878-3849	Rockland	MA
Clivus New England, Inc.	978-794-9400	North Andover	MA
Coastal Engineering, Co. Inc.	508-255-6511	Orleans	MA
Effluent Technologies, Inc.	401-293-0108	Tiverton	RI
F.R. Mahony & Associates, Inc.	508-765-0051	Rockland	MA
Green Wastewater Solutions	401-737-7600	Warwick	RI
Holmes and McGrath, Inc.	508-548-3564	Falmouth	MA
Island Environmental Services	508-498-2482	Nantucket	MA
Island I&A	508 560 1208	West Tisbury	MA
J.M. O'Reilly and Associates, Inc.	508-896-6601	Brewster	MA
Lightship Engineering	508-830-3344	Plymouth	MA
Lombardo Associates	617-964-2924	Newton	MA
Luis Coelho	508 991 9951	New Bedford	MA

Access for Town



I/A System Town Summary

Town of Barnstable, Massachusetts

Barnstable County Department of Health and Environment
P.O. Box 427, Barnstable, MA 02630

General Permit Information

Counts by DEP Approval

Type	Count
General	73
Remedial	20
Provisional	12
Pilot	5
Unknown	3

Counts by Property Type

Type	Count
Single Family	83
Multi-Family	15
Commercial	7
Unknown	0

Counts by Component Type

Technology	Count
Advantex	1
Amphidrome	3
Bioclere	7
Disinfection Unit	1
FAST	49
Geoflow Drip Dispersal	1
OMNI Recirculating Sand Filter	1
Perc-Rite Drip Dispersal	1
RUCK	1
Septitech Treatment System	1
Singulair Bio-Kinetic WWT System	1
Sludgehammer Bio-Kinetic WWT System	1
TOTAL	77

Counts by Inspection Frequency

Frequency
None Required
Quarterly
Bi-Annually
Yearly
Other

Number of Permits with Sample Parameter Type

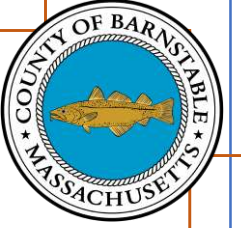
Parameter	Count
Alkalinity	16
Ammonia	13
BOD5	40
CBOD	10
DO	1
Nitrate	63
Nitrite	62
No Parameters	40
TKN	65
TSS	49
Temperature	1
Total N	62
Turbidity	1
Water Use	1
pH	48
TOTAL	472



Site Visits and Results

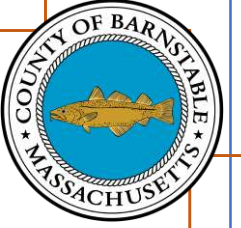
Events from the last | Views/Edits

User	Event Type	Comments
ineering, Co. Inc.	Inspection	Conducted O&M. Influent and Effluent Field Testing and Sampling. System...
ineering, Co. Inc.	Inspection	Conducted O&M and Effluent Field Testing. System is operational. No equi...
ineering, Co. Inc.	Sample	Field tested pH. Test results show good treatment of the system.
ineering, Co. Inc.	Inspection	Conducted O&M. Influent and Effluent Field Testing and Sampling. System...
ineering, Co. Inc.	Inspection	Conducted O&M and Effluent Field Testing. System is operational. No equi...
ineering, Co. Inc.	Inspection	O&M conducted. Weekly Field Testing performed. No equipment has been ...
ineering, Co. Inc.	Sample	Field tested pH. Test results show good treatment of the system.
ineering, Co. Inc.	Inspection	Conducted O&M and Effluent Field Testing. System is operational. No equi...
ineering, Co. Inc.	Inspection	Conducted O&M and Effluent Field Testing and Sampling. System is operati...
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ineering, Co. Inc.	Sample	Field tested pH. Test results show good treatment of the system.
ineering, Co. Inc.	Inspection	Conducted O&M and Effluent Field Testing. System is operational. No equi...
ineering, Co. Inc.	Inspection	Conducted O&M and Effluent Field Testing. System is operational. No equi...
ineering, Co. Inc.	Inspection	Conducted O&M and Effluent Field Testing. System is operational. No equi...
ineering, Co. Inc.	Inspection	O&M Conducted. Field Test and Sample Influent and Effluent. No equipme...
ineering, Co. Inc.	Sample	Field tested pH. Test results show high levels of Total Nitrogen that ex...
ineering, Co. Inc.	Inspection	Operation & maintenance conducted. Biocleres are operating properly. Rec...
ineering, Co. Inc.	Inspection	Operation & Maintenance conducted. Effluent & field tests indicate good ...
ineering, Co. Inc.	Sample	Field tested pH. Results show good treatment.



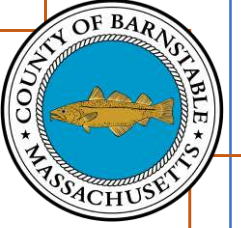
How has each town joined us?

- Board of Health passed regulation
 - Any person or entity that owns, operates, inspects or monitors an alternative onsite septic system in the Town of _____ shall provide the results of all monitoring and inspections to the Board of Health, or an entity designated by the Board of Health, in a format designated by the Health Agent. All reports regarding maintenance, monitoring or inspections of alternative septic systems shall be submitted within ___ days of the time when the maintenance, inspection or monitoring was initiated.
- Permits added to the database
- Operators alerted

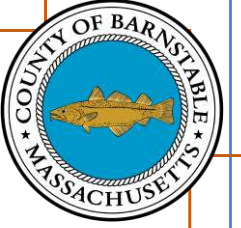


Costs

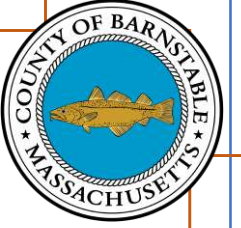
- Every site homeowner pays a \$50 per year fee to their operator
- Our office collects this fee from the operators on a yearly basis
- No direct cost to Board of Health



- Our office attempts at least two communications with a homeowner (usually a letter via standard mail and a letter via certified mail) when we learn of a lack of an O&M contract



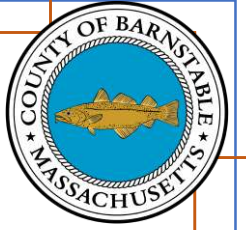
- If the homeowner is not compliant, we refer to the local Board of Health
- Our office does not have enforcement authority

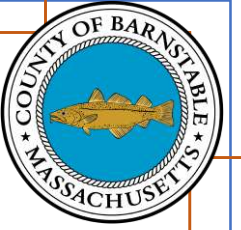


98 % of resolved issues were not sent to the
Board of Health



Less than 1% of communications regarding I/A systems were referrals to the local Boards of Health

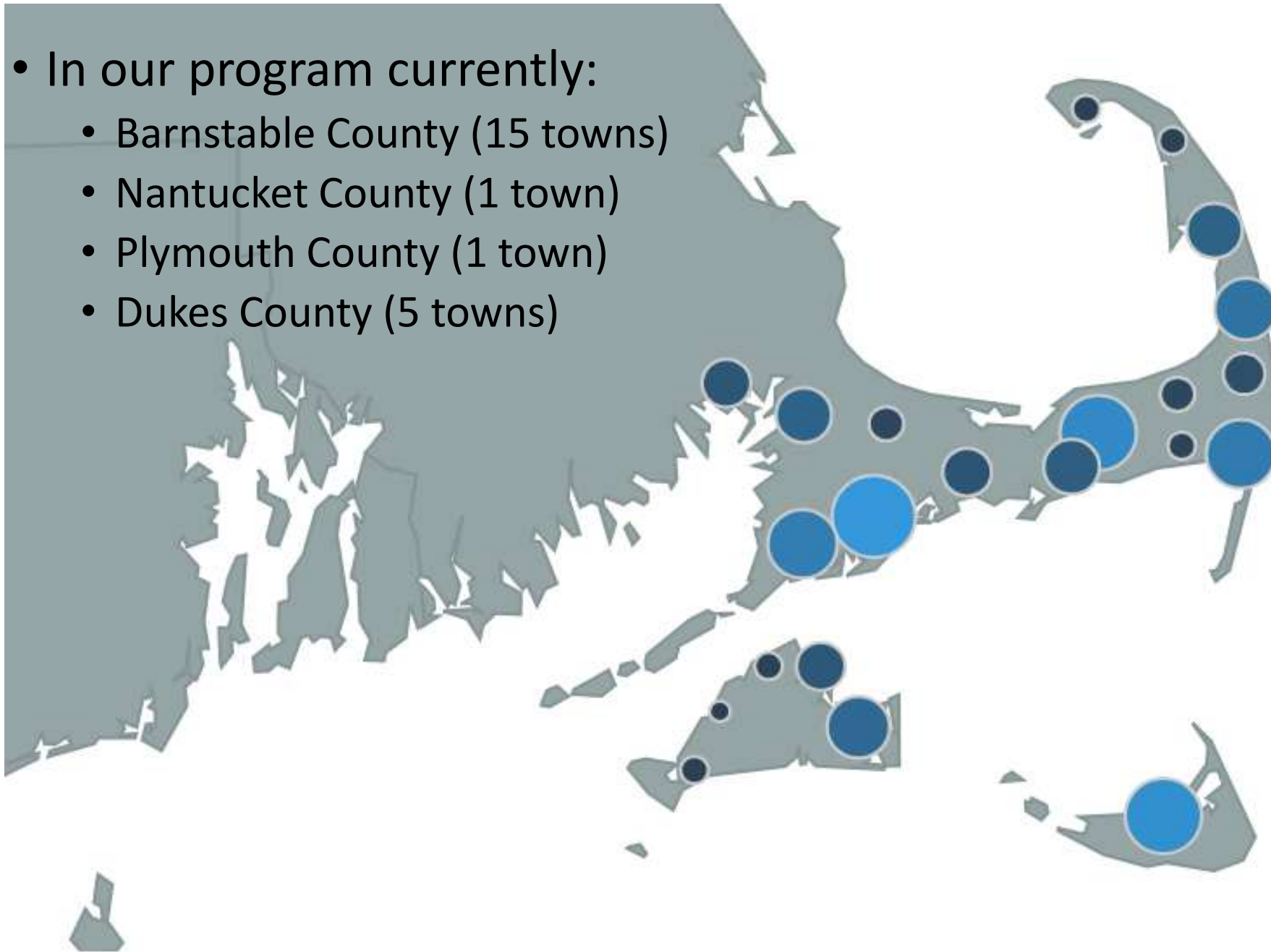


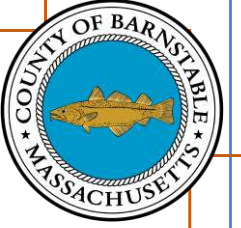


- Terms of Service
- The data you are about to review derive from a self-reporting system for alternative onsite septic systems located in the towns in Barnstable County Massachusetts and other participating towns maintained by the Barnstable County Department of Health and Environment. The mention of any product on this website does not constitute an endorsement by Barnstable County. The validity of the data is qualified only by the licenses and integrity of Licensed Wastewater Treatment Operator who collected the sample and the Massachusetts Certified Laboratory that performed the analyses. This dataset includes samples taken at seasonally-occupied as well as full-time-occupied residences. Data during start up of the systems are also included. The reader/user is cautioned to understand the limits of these data in regard to assessing the performance of any technology and agrees that any re-representation or copying of these data will include the above qualification.
- **By clicking continue, you accept these terms of service and understand the previous statements made regarding these data and hereby agree that any copying and re-presentation of the data from this website shall contain the above stated qualifications.**
- If you have any questions regarding the data collection or representations derived from this website, please [contact us](#).

- Our website disclaimer; septic.barnstablecountyhealth.org

- In our program currently:
 - Barnstable County (15 towns)
 - Nantucket County (1 town)
 - Plymouth County (1 town)
 - Dukes County (5 towns)





Number of Permits

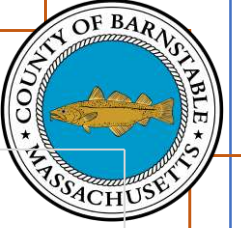
- November 28, 2012

<div>Municipality</div> <div>Technology</div>	Barnstable	Bourne	Brewster	Chatham	Dennis	Eastham	Falmouth	Harwich	Mashpee	Orleans	P-town	Sandwich***	Truro	Wellfleet	Yarmouth	Total
FAST*	31	76	9	106	127	56	80	13	187	23	18	11	5	37	42	821
Bioclere	3	7	4	10	7	14	10	12	20	8	1	9	1	16	26	148
Singulair	1	1	5	10	66	6	14	0	14	2	0	2	0	4	15	140
OMNI Sand Filter	6	8	0	0	0	0	31	0	47	0	0	0	0	0	0	92
Septitech	1	9	0	4	9	22	0	0	0	1	0	1	1	8	1	57
Advantex	2	1	1	2	2	26	0	1	0	2	1	2	2	11	3	56
RUCK	13	6	0	1	1	0	28	0	5	0	0	1	0	0	0	55
Generic Sand Filter	9	2	0	0	1	4	5	0	1	2	0	1	1	7	0	33
Pressure Dose**	0	2	16	0	3	0	1	0	0	0	0	0	5	0	0	27
Waterloo Biofilter	0	0	1	0	0	12	2	0	0	0	0	0	1	5	1	22
Amphidrome	4	0	1	0	1	1	1	0	2	0	0	0	0	3	2	15
SludgeHammer	1	0	1	0	0	0	0	0	5	0	0	0	0	0	1	8
Clivus	0	2	0	0	0	2	0	0	0	1	0	0	0	2	0	7
White Knight	0	0	2	1	0	0	0	0	0	1	1	0	0	1	0	6
Modular FAST	0	0	0	1	0	0	0	1	1	0	0	1	0	0	1	5
Orenco	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5
Presby	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	4
Puraflo	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	4
Nitrex	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	3
Totals	71	118	40	136	218	145	173	27	285	40	21	28	16	101	93	1522

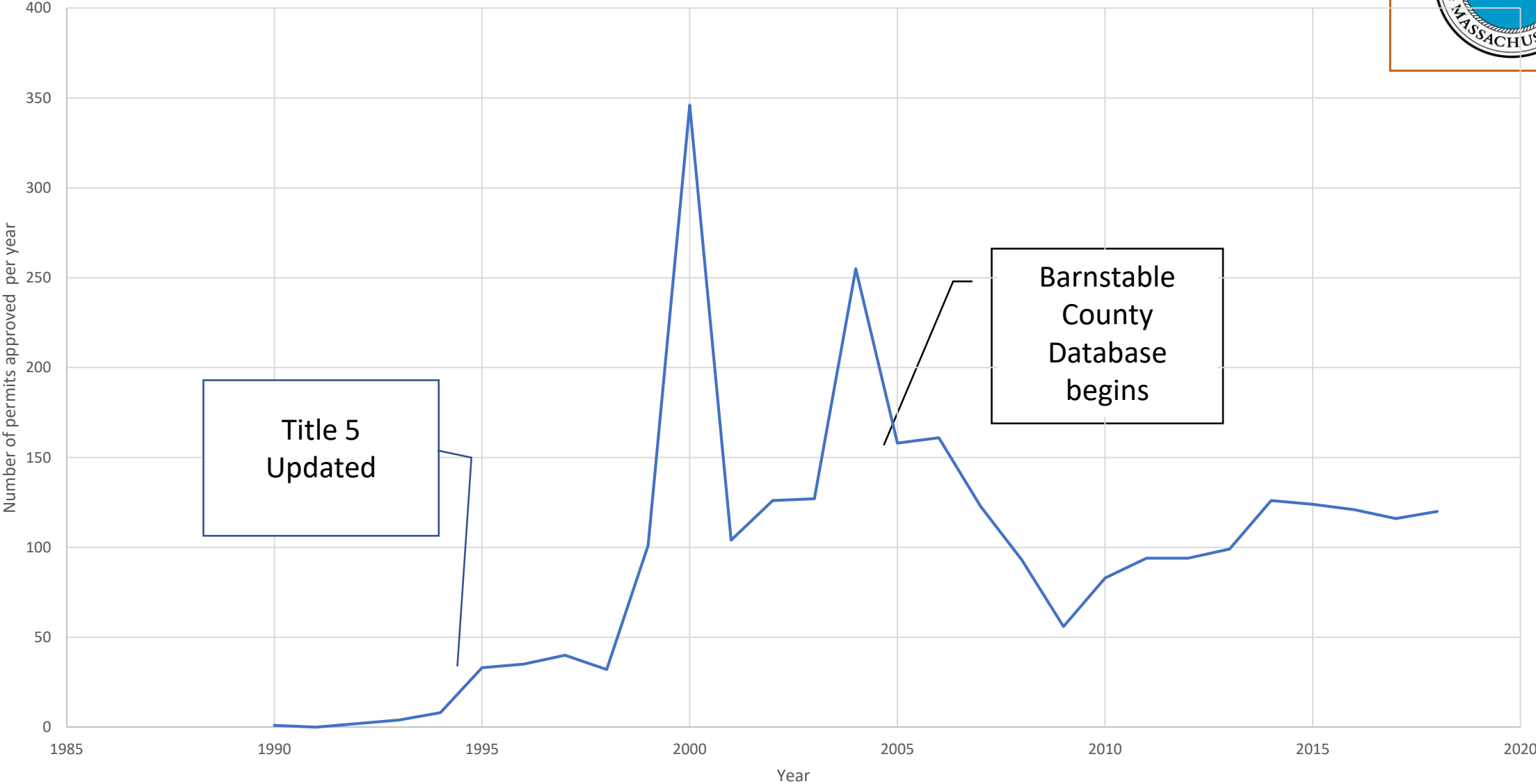
Numbers Today (as of January 2019) for the Barnstable County Innovative/Alternative Tracking Database



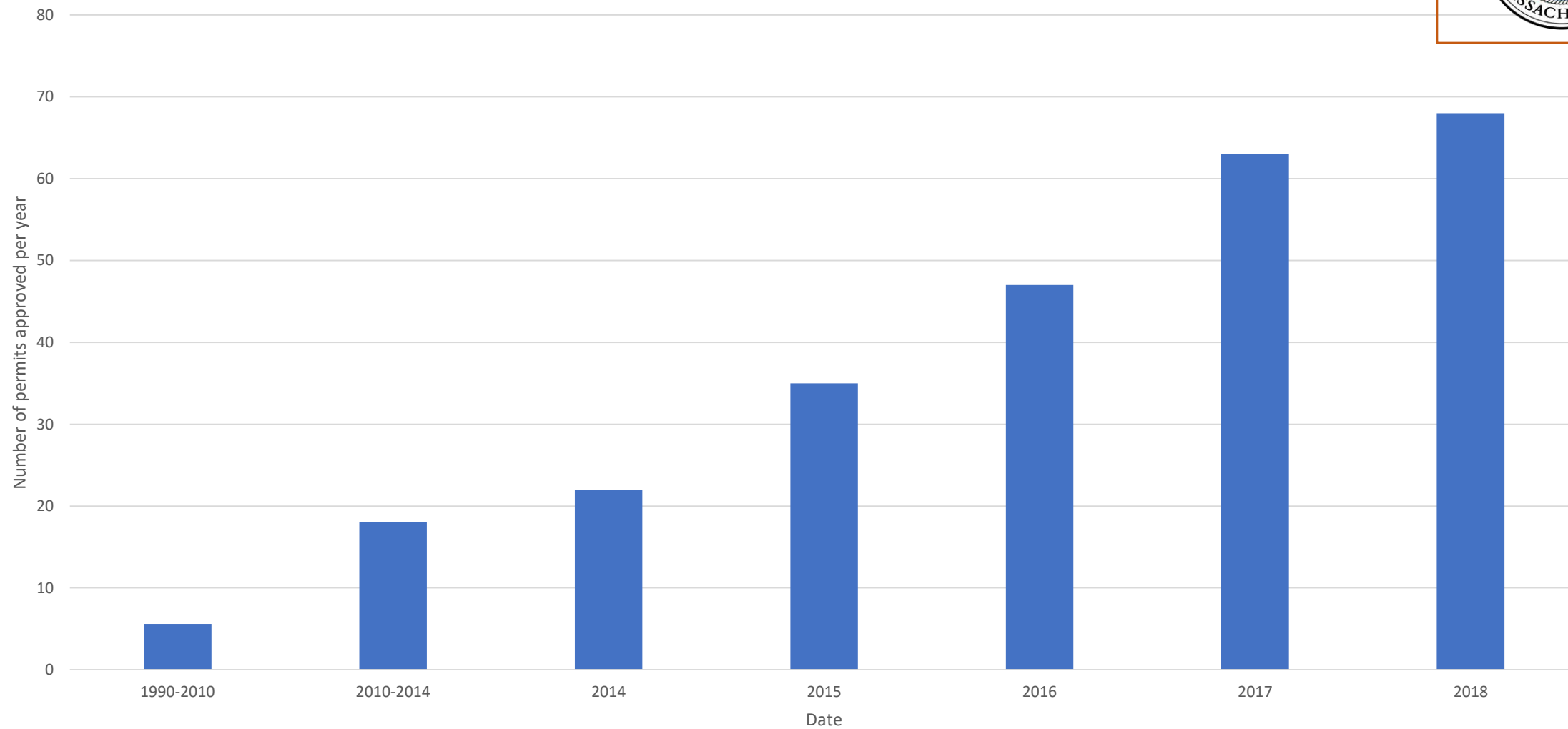
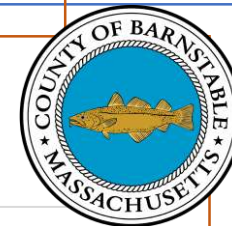
- 2800+ active permits
- 3100+total permits
(not started up, not yet installed)
- 23,000+ samples
- 37,000+ inspections

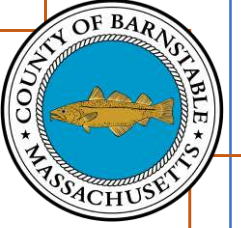


Number of I/A Systems Approved on Cape Cod per year



Nantucket Permits Issued per Year
1990-2018

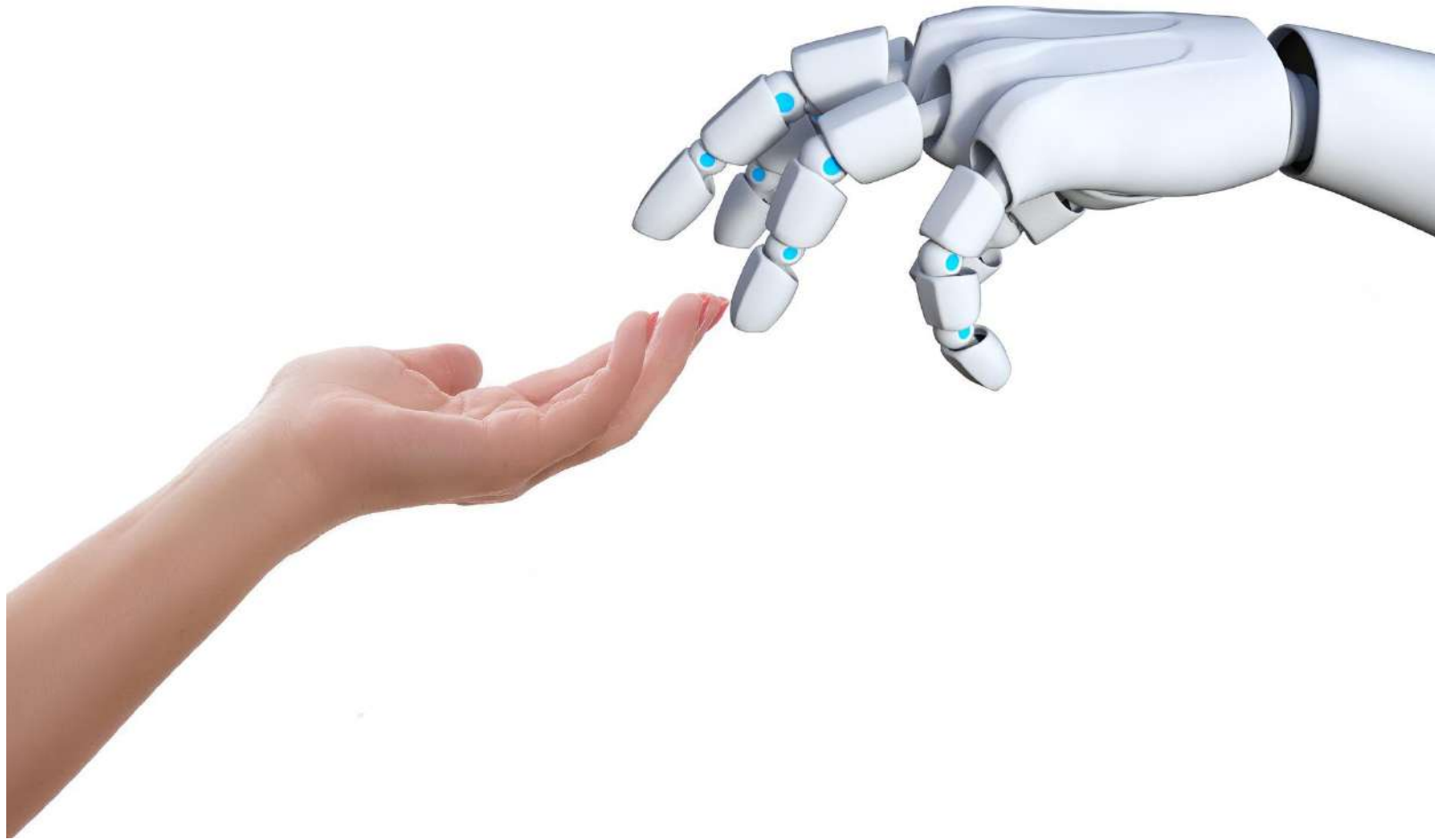




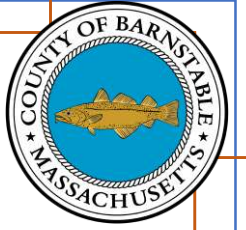
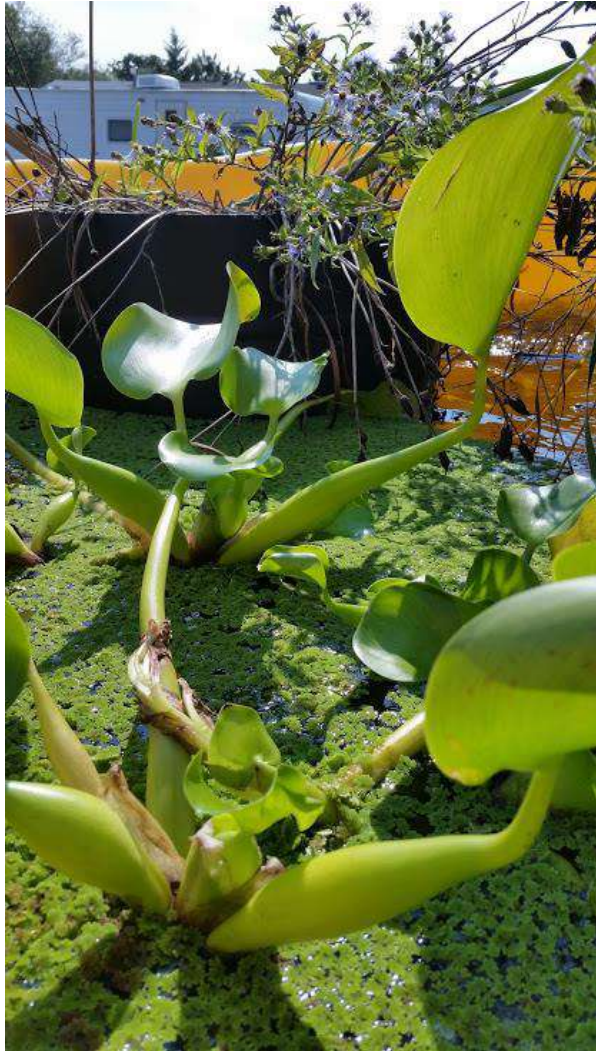
Benefits to Digital Data

- Provide data to Board of Health to affect future systems
- Evaluate technology based on results in other towns
- Share information to operators about a system's previous performance more easily
- 24/7 online access to database

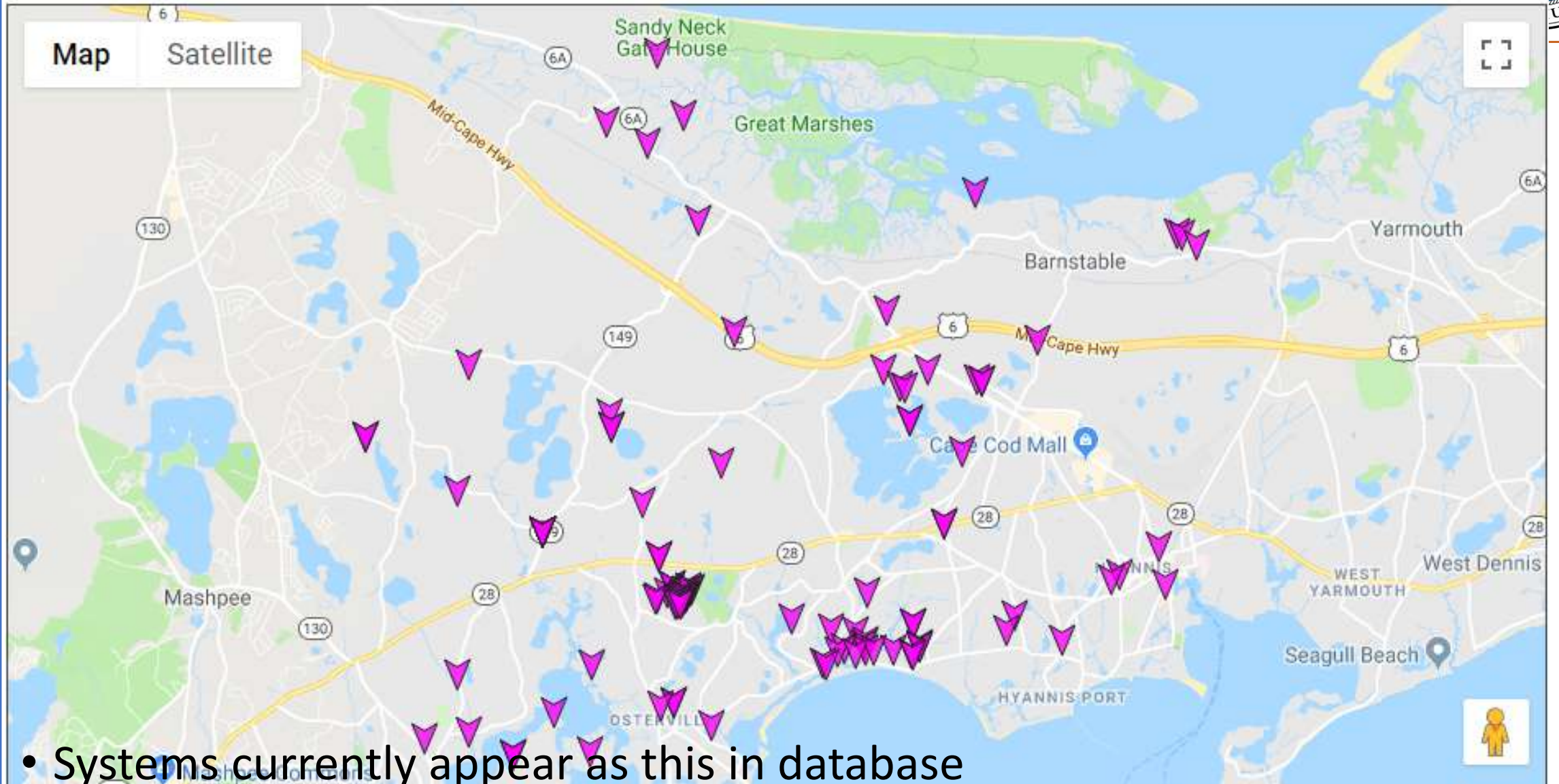
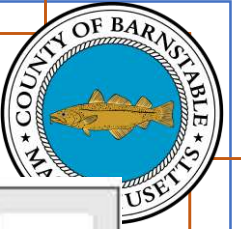
Make the robot do the work



Oh the Possibilities



Barnstable County Septic Database

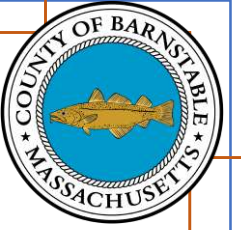


15.215: Designation of Nitrogen Sensitive Areas



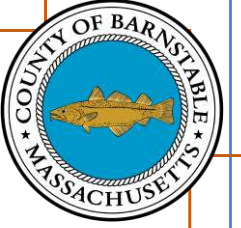
The following areas have been determined by the Department to be particularly sensitive to the discharge of pollutants from on-site sewage disposal systems and are therefore designated nitrogen sensitive. The necessity of providing increased treatment of pollutants and reduction in nutrients discharged from on-site sewage disposal systems, including nitrogen, nitrogen as nitrate, phosphorous and pathogens in these areas warrants the imposition of the loading restrictions set forth in 310 CMR 15.214.

- (1) Interim Wellhead Protection Areas and Department approved Zone IIs of public water supplies;
- (2) Nitrogen sensitive embayments or other areas which are designated as nitrogen sensitive for purposes of 310 CMR 15.000 shall be mapped based on scientific evaluations of the affected water body and adopted through parallel public processes pursuant to both 310 CMR 15.000 and 314 CMR 4.00: Massachusetts Surface Water Quality Standards.



Title 5 Definitions

- Zone II: That area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can realistically be anticipated, as defined in Massachusetts Drinking Water Regulations, 310 CMR 22.02: Definitions
- Interim Wellhead Protection Area (IWPA): An interim well-head protection area, as defined in Massachusetts drinking water regulations, 310 CMR 22.02. Generally, this is a ½-mile radius for sources whose approved pumping rate is 100,000 gallons per day or greater. For smaller sources, the radius in feet is determined by multiplying the approved pumping rate in gallons per minute by 32, and adding 400.



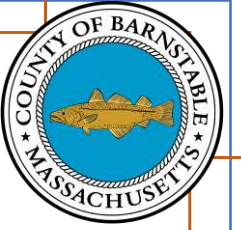
15.214: Nitrogen Loading Limitations

- (1) No system serving new construction in Nitrogen Sensitive Areas designated in 310 CMR 15.215 shall be designed to receive or shall receive more than 440 gallons of design flow per day per acre except as set forth at 310 CMR 15.216 (aggregate flows) or 15.217 (enhanced nitrogen removal).
- (2) No system serving new construction in areas where the use of both on-site systems and drinking water supply wells is proposed to serve the facility shall be designed to receive or shall receive more than 440 gallons of design flow per day per acre from residential uses except as set forth at 310 CMR 15.216 (aggregate flows) or 15.217 (enhanced nitrogen removal).

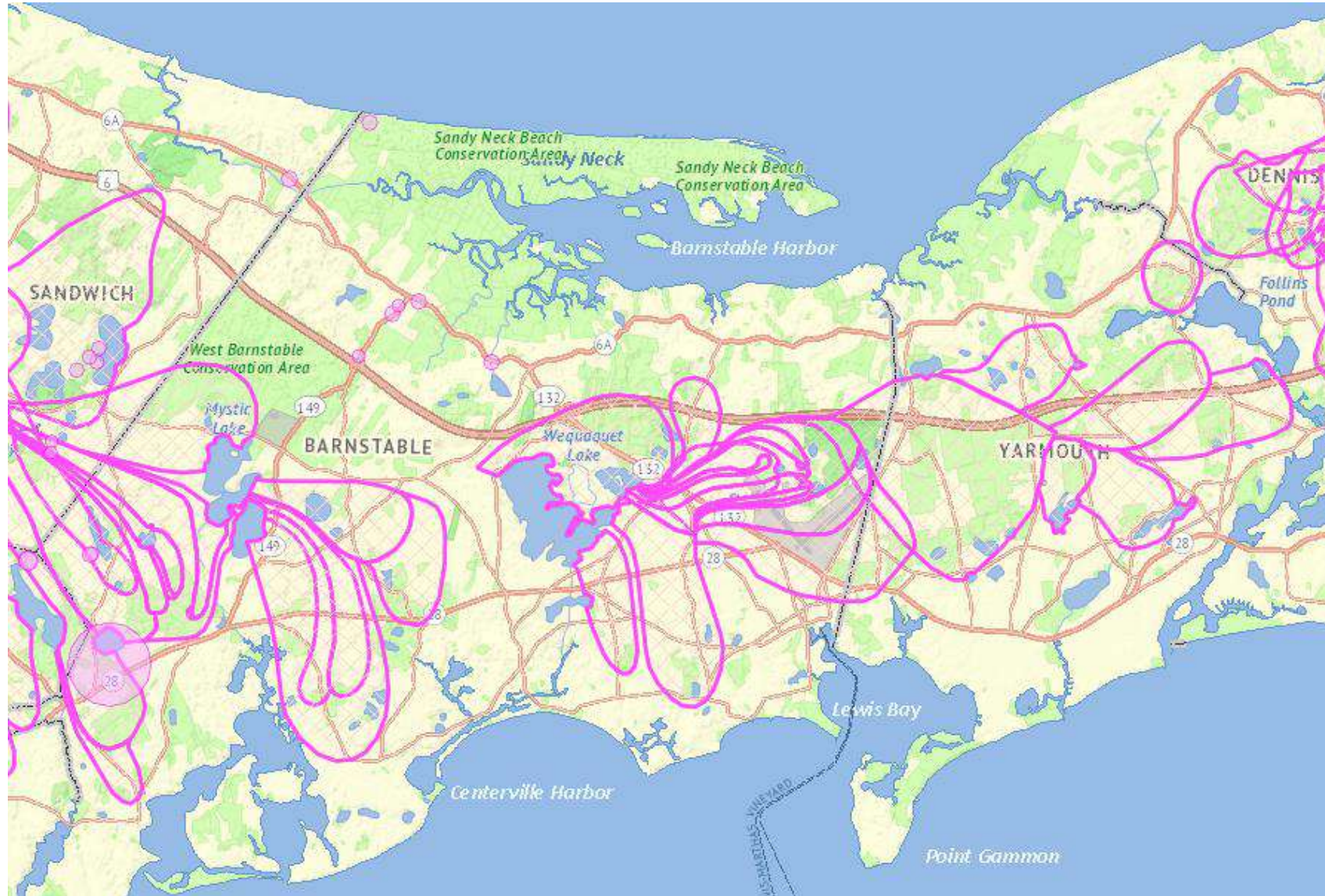
15.217: Systems with Enhanced Nitrogen Removal



- (1) The nitrogen loading limitations established in 310 CMR 15.214 shall not apply to discharge of an effluent meeting the federal Safe Drinking Water Act nitrate standard of 10 ppm through either an approved alternative system or a treatment works with a groundwater discharge permit issued pursuant to 314 CMR 5.00: Ground Water Discharge Permit Program.
- (2) An increase in calculated allowable nutrient loading per acre may be allowed with the use of a technology approved for enhanced nutrient removal pursuant to either the piloting, provisional or general use certification provisions in 310 CMR 15.281 through 15.288 as illustrated by the following example:



- MassGIS OLIVER can show us some Title 5 Nitrogen Sensitive Areas



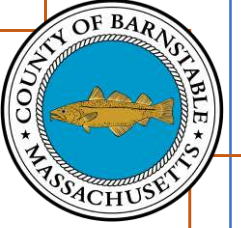
Legend

IWPAs

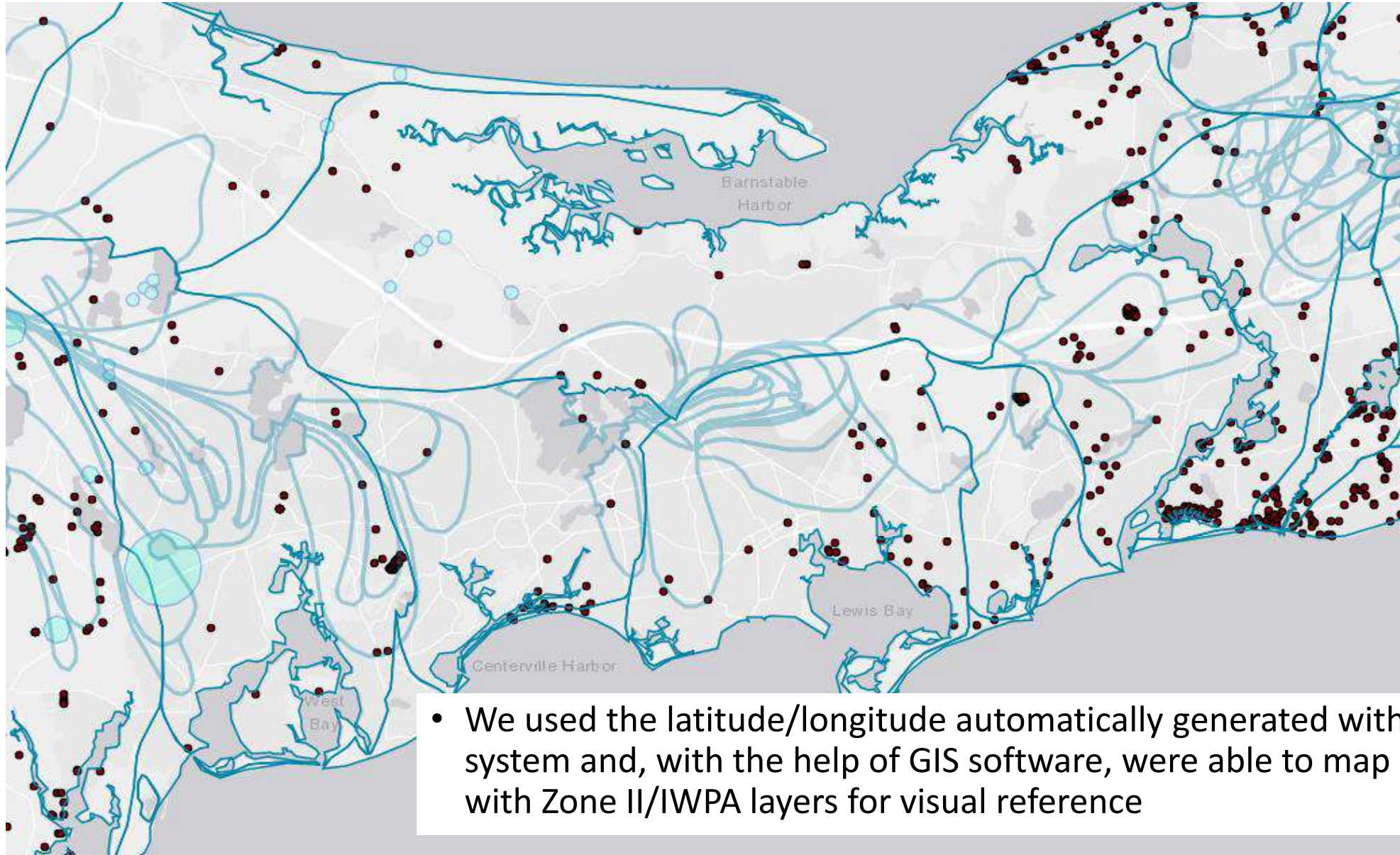


Zone IIs

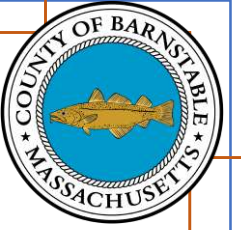




- Put it all together

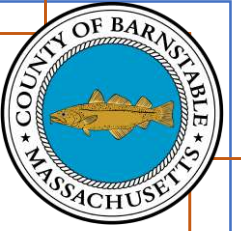


- We used the latitude/longitude automatically generated with our online system and, with the help of GIS software, were able to map I/A systems with Zone II/IWPA layers for visual reference



Median

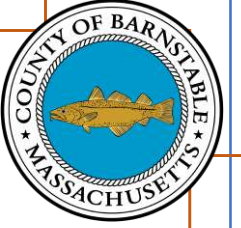
- The middle number in a set of numbers
- More skew-resistant



Median

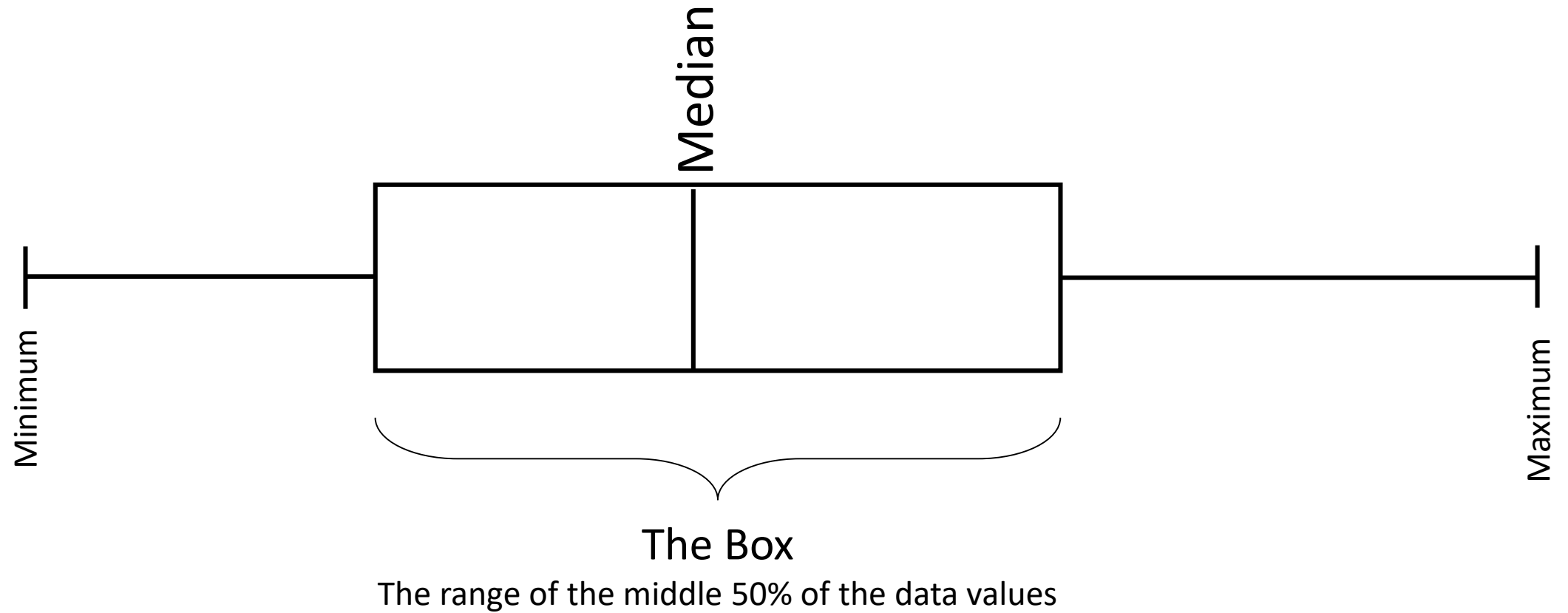
- The middle number in a set of numbers
- More skew-resistant

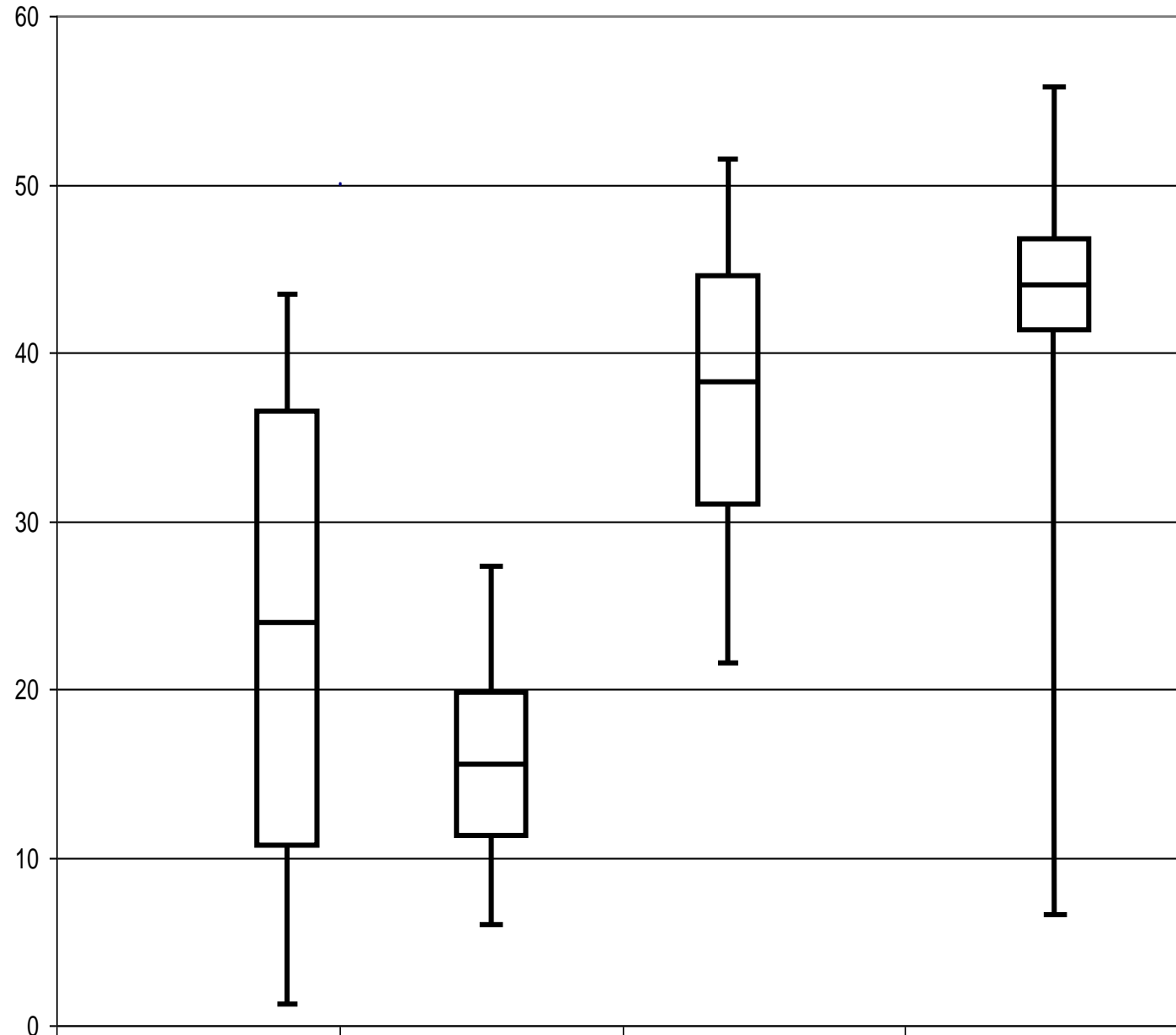
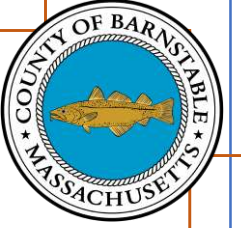
#	Data Set	Average	Median
1	{1, 3, 5, 9, 12}	6	5
2	{10, 16, 18, 25, 67}	27.2	18
3	{1, 24, 27, 34, 35}	24.2	27
4	{2, 6, 7, 45, 48}	21.6	7



Box and Whisker plots

- We often use data on the median to represent performance





Interpretations

- The smaller the box, the more consistently the system performs
- Longer whiskers could mean atypical values
- Larger box could mean sample values all over the place

What is Total Nitrogen?



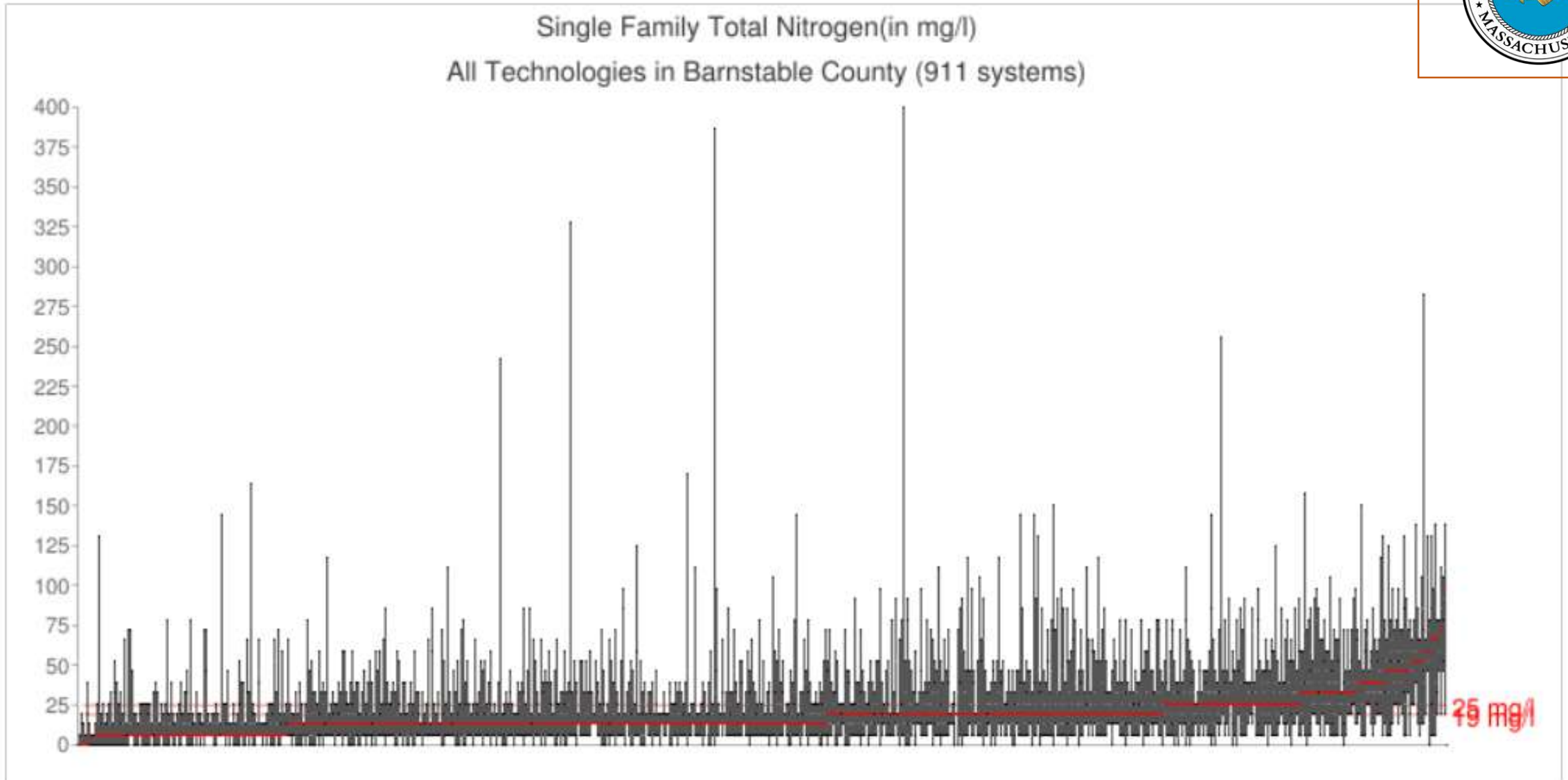
$$TN = TKN + NO_3 + NO_2$$

Total Nitrogen = Total Kjeldahl Nitrogen + Nitrate
Nitrogen + Nitrite Nitrogen

Where does this data come from?



- Data input by operators to online septic database
- For the following data
 - Only for systems recorded as Single Family Homes
 - Only for Systems with 3 or more TN values
 - Data points may be removed if there are zeroes/values not reported
 - Automatically generated/updated by database

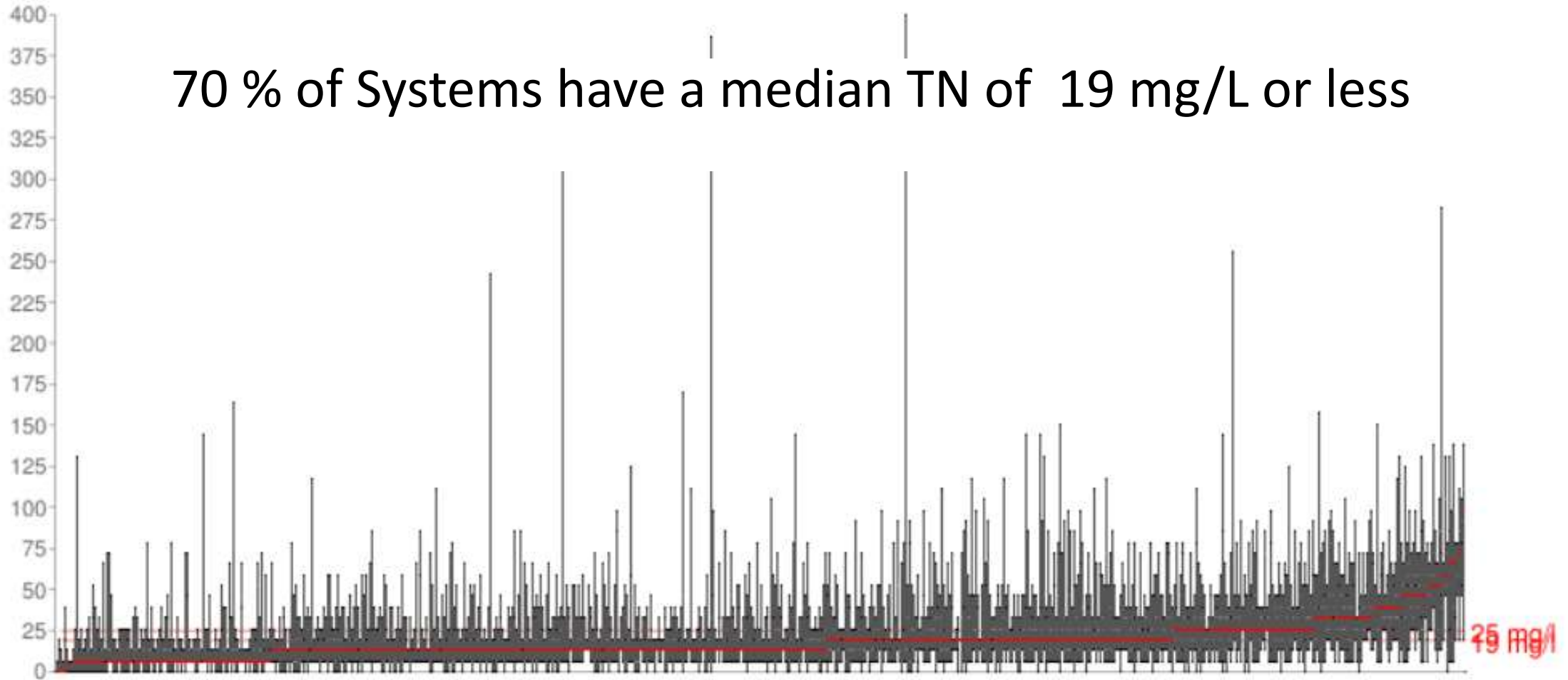


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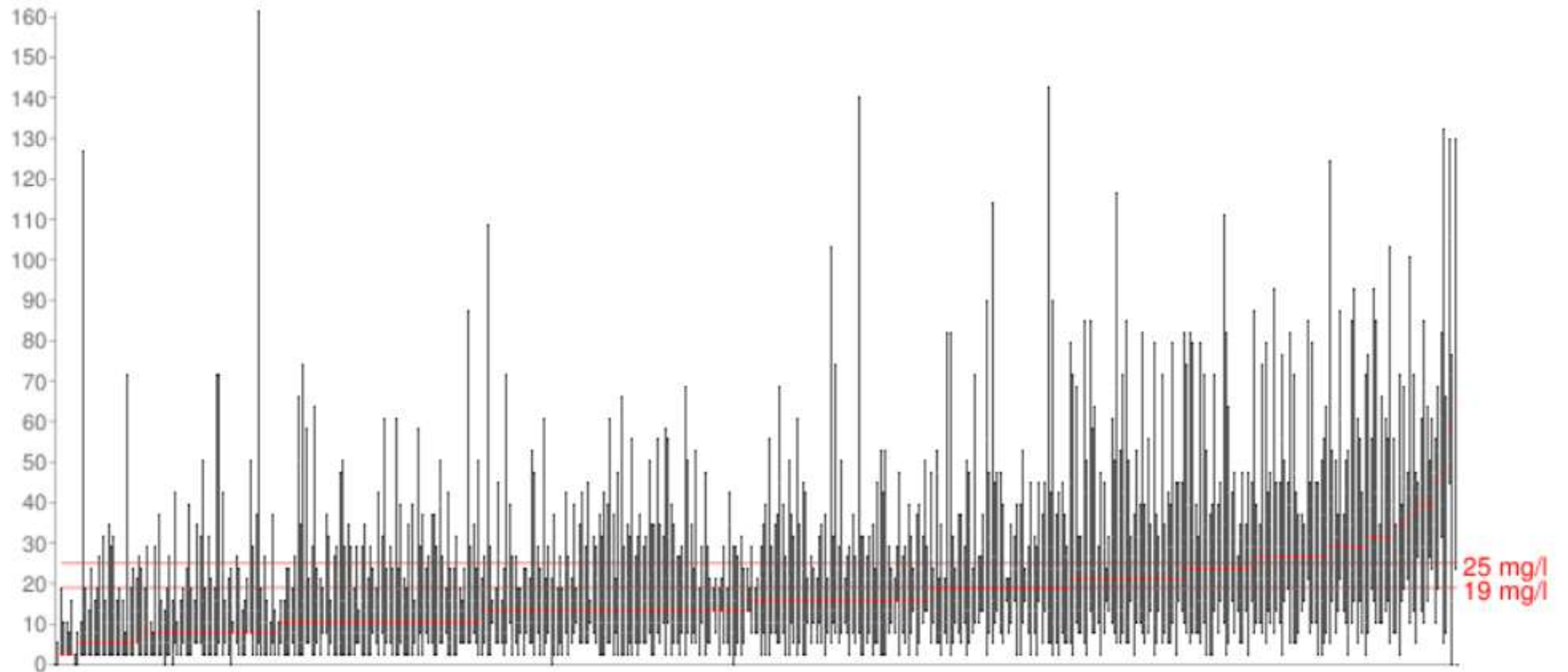
Single Family Total Nitrogen(in mg/l)
All Technologies in Barnstable County (911 systems)

70 % of Systems have a median TN of 19 mg/L or less





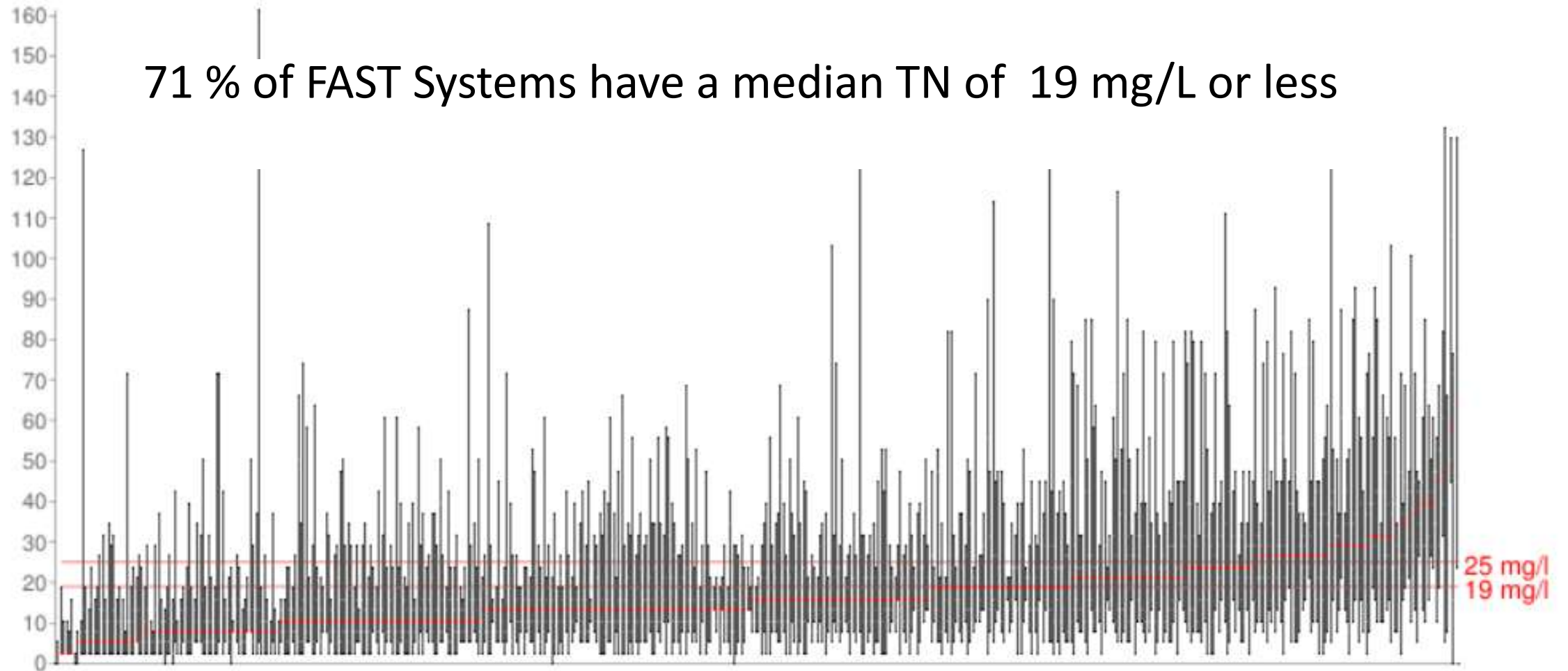
Single Family Total Nitrogen(in mg/l)
FAST Systems in Barnstable County (504 systems)





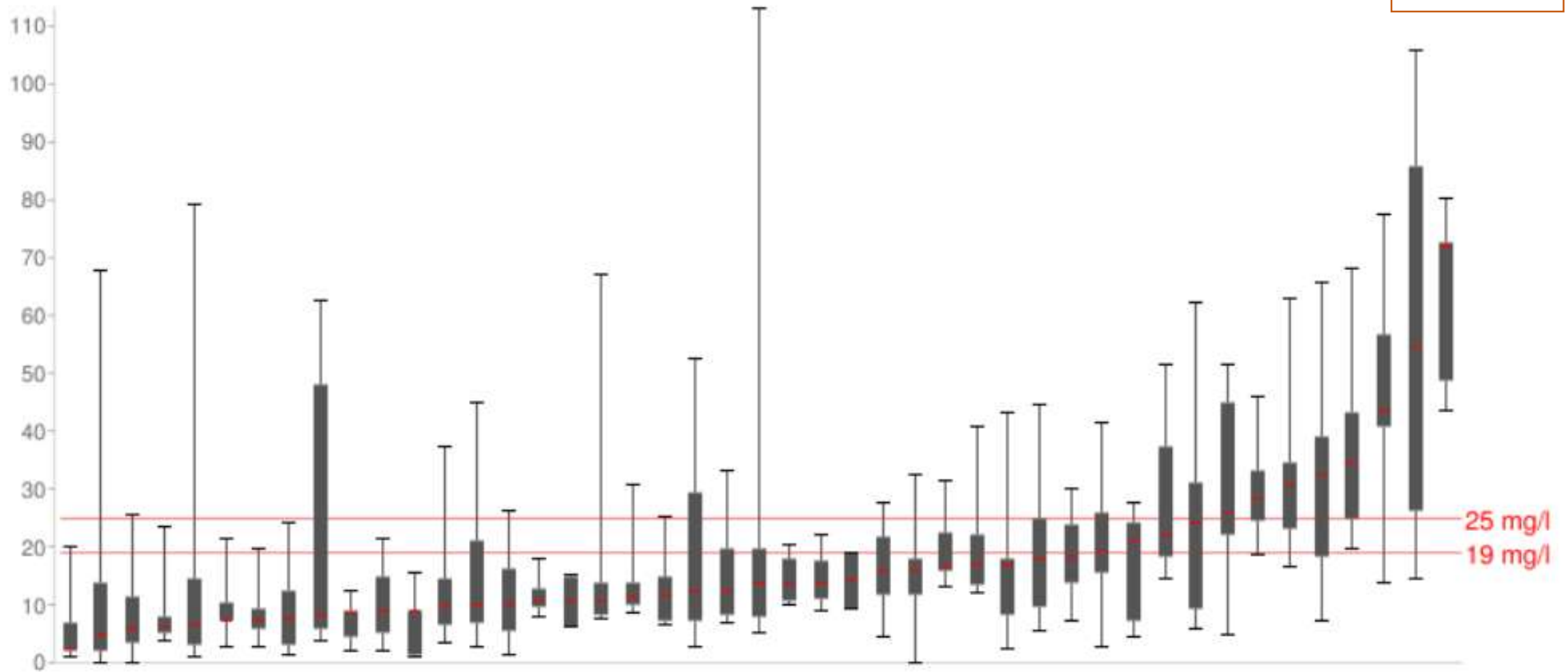
Single Family Total Nitrogen(in mg/l)
FAST Systems in Barnstable County (504 systems)

71 % of FAST Systems have a median TN of 19 mg/L or less





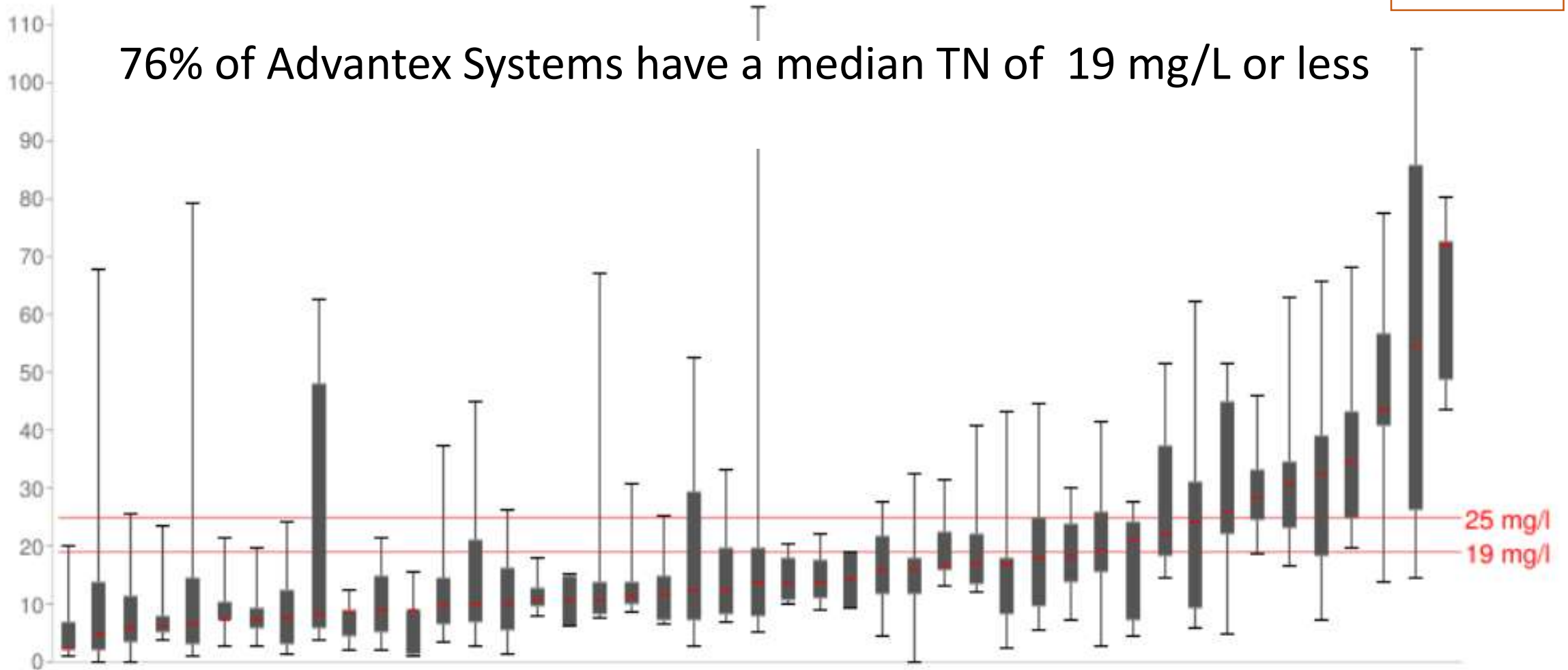
Single Family Total Nitrogen(in mg/l)
Advantex Systems in Barnstable County (45 systems)





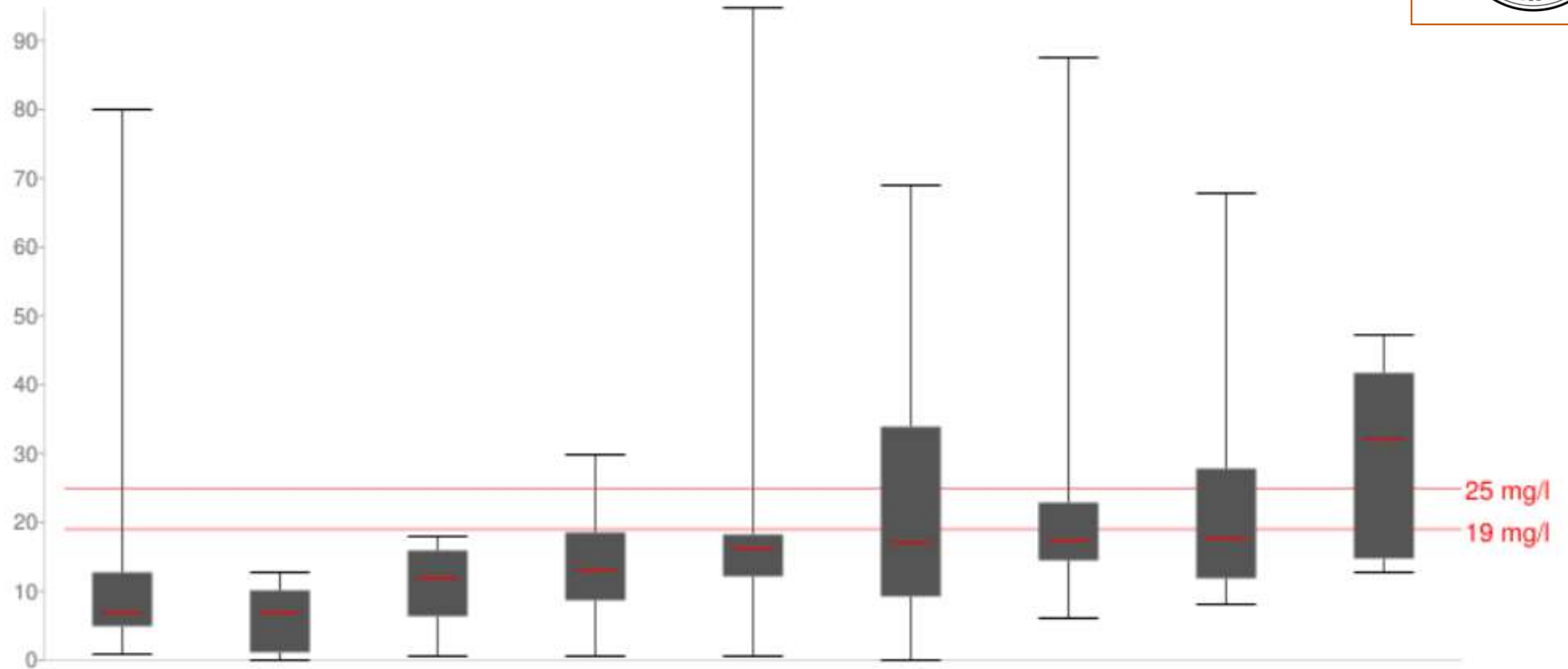
Single Family Total Nitrogen(in mg/l)
Advantex Systems in Barnstable County (45 systems)

76% of Advantex Systems have a median TN of 19 mg/L or less





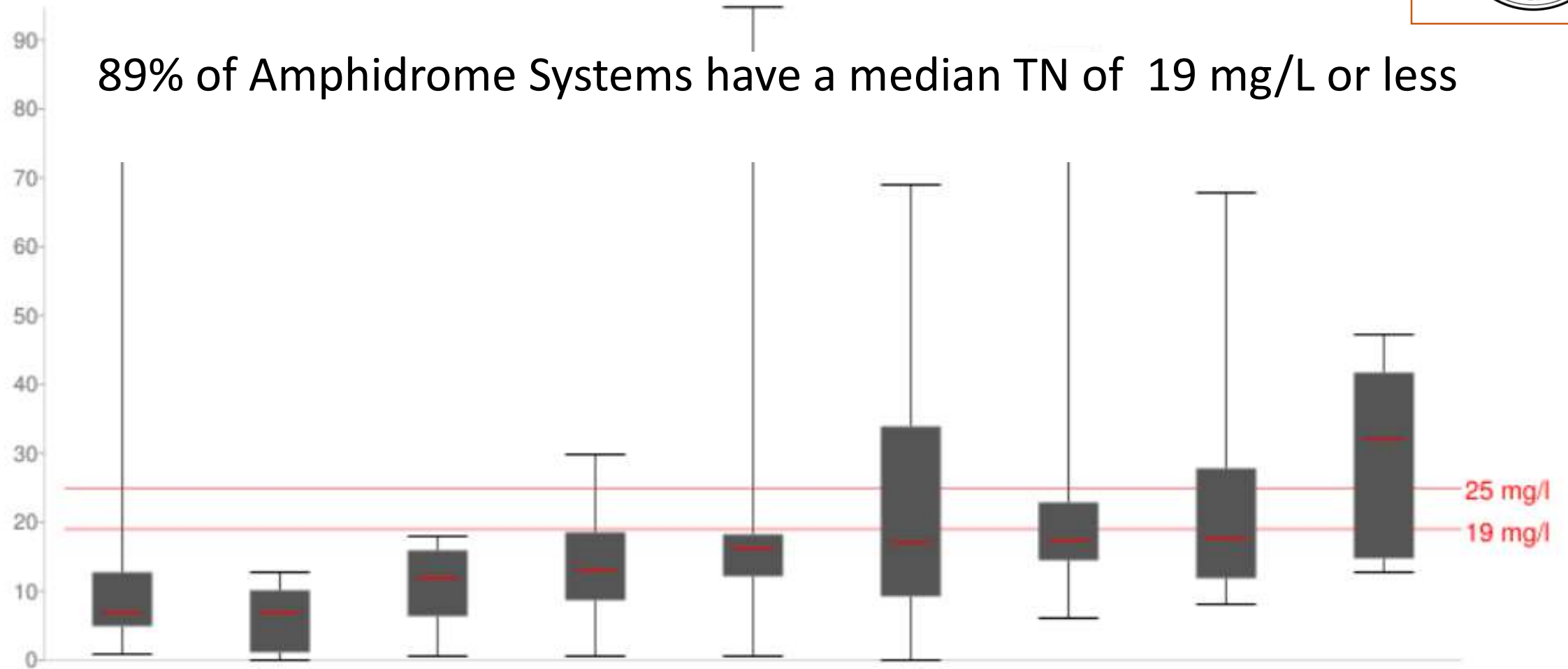
Single Family Total Nitrogen(in mg/l)
Amphidrome Systems in Barnstable County (9 systems)





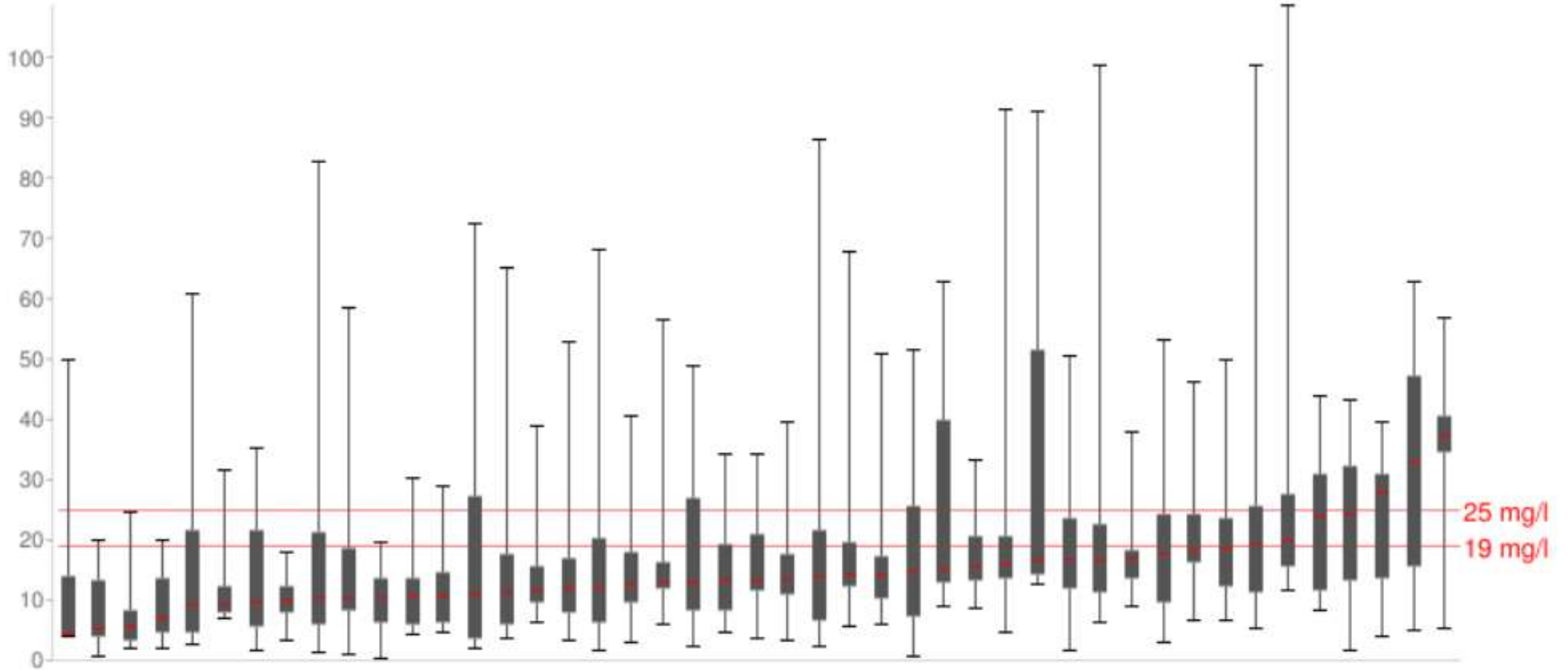
Single Family Total Nitrogen(in mg/l)
Amphidrome Systems in Barnstable County (9 systems)

89% of Amphidrome Systems have a median TN of 19 mg/L or less





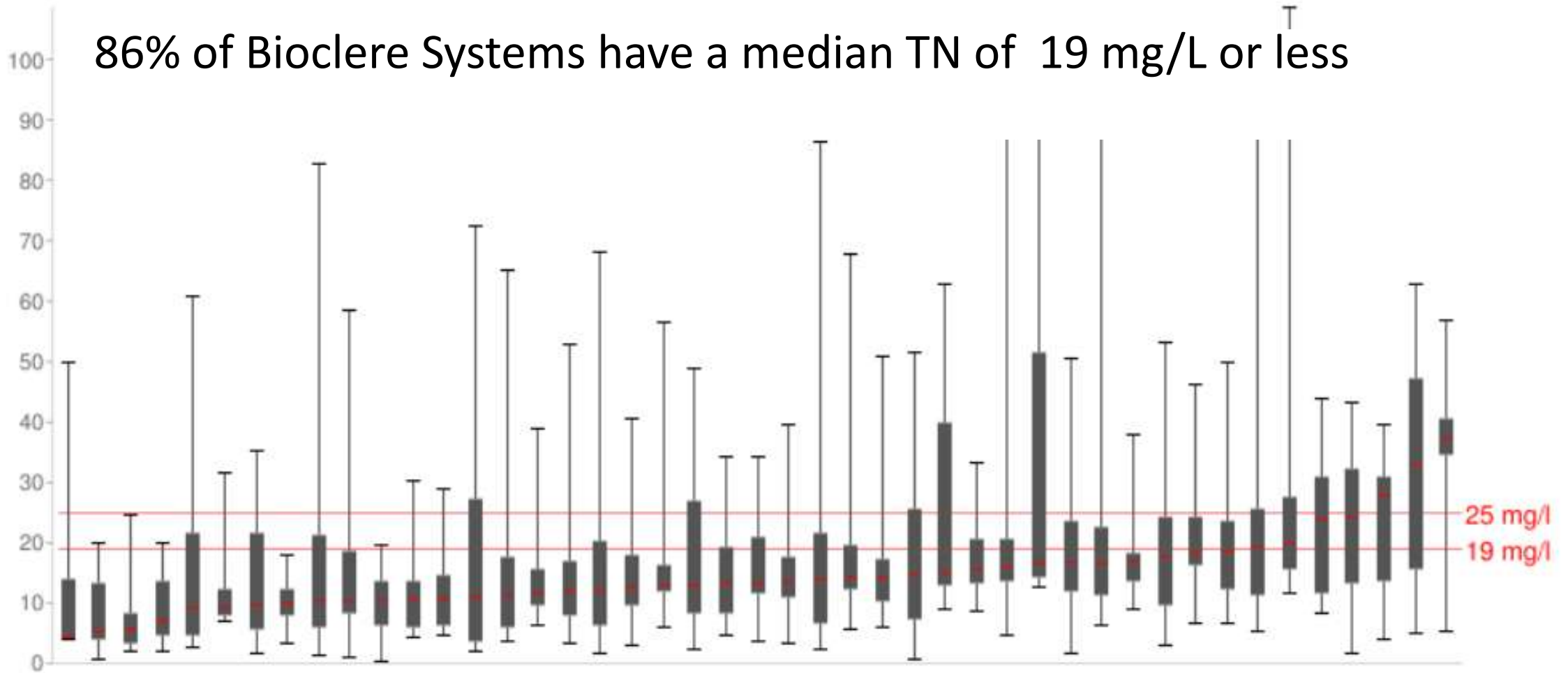
Single Family Total Nitrogen(in mg/l)
Bioclere Systems in Barnstable County (45 systems)





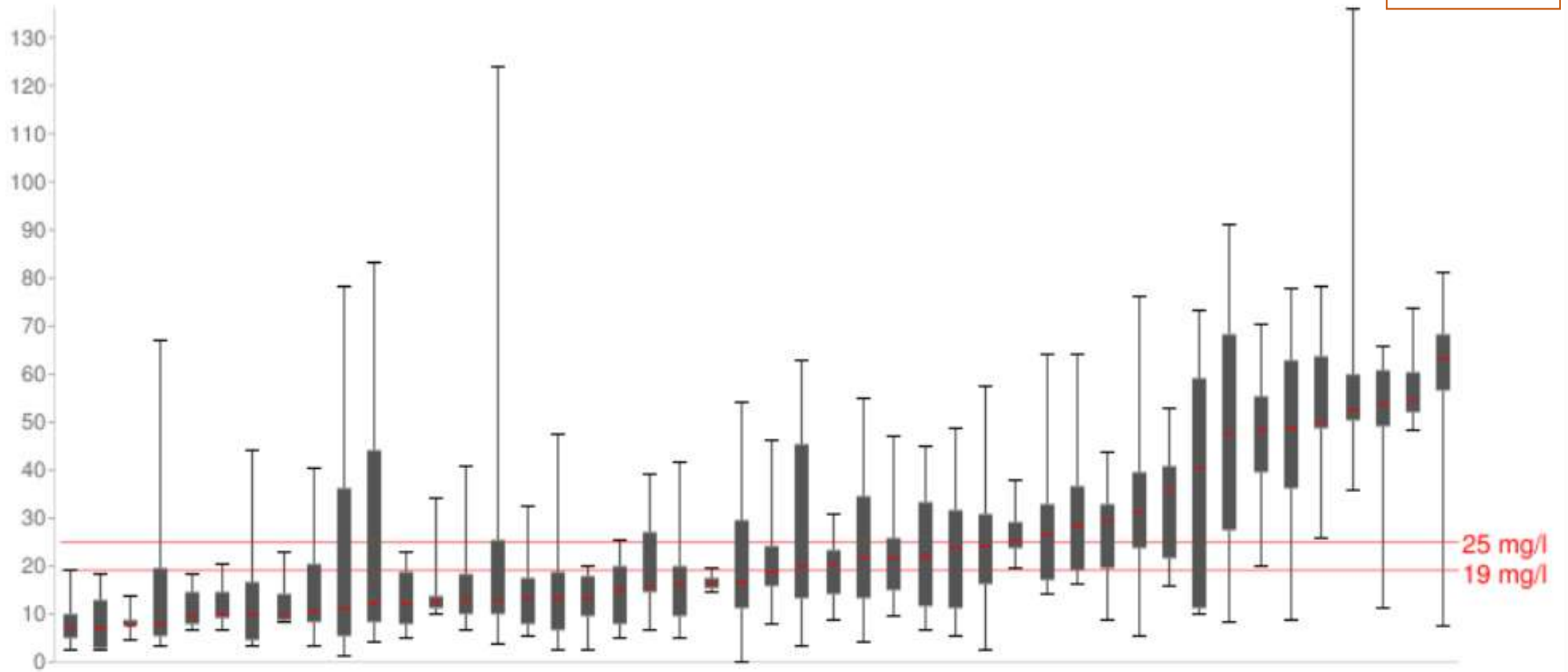
Single Family Total Nitrogen(in mg/l)
Bioclere Systems in Barnstable County (45 systems)

86% of Bioclere Systems have a median TN of 19 mg/L or less





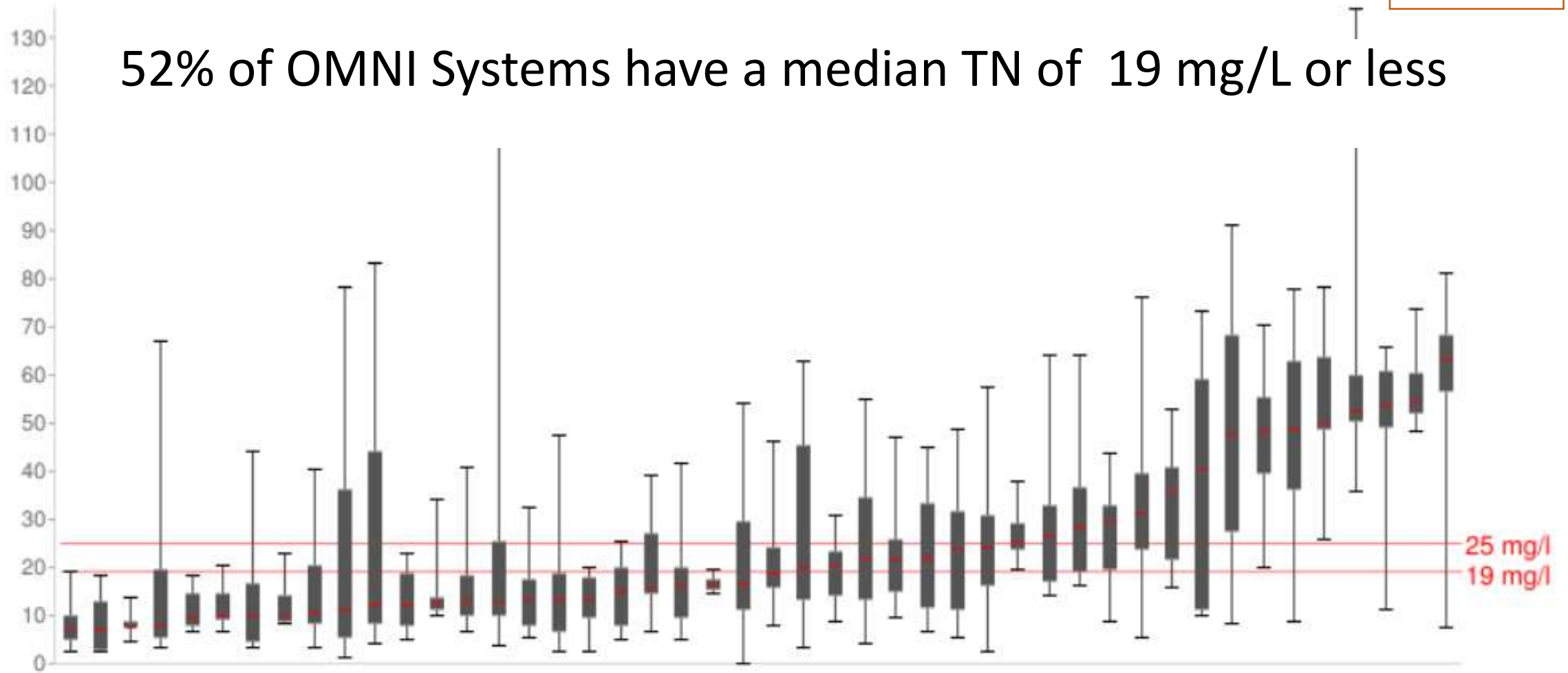
Single Family Total Nitrogen(in mg/l)
OMNI Recirculating Sand Filter Systems in Barnstable County (46 systems)





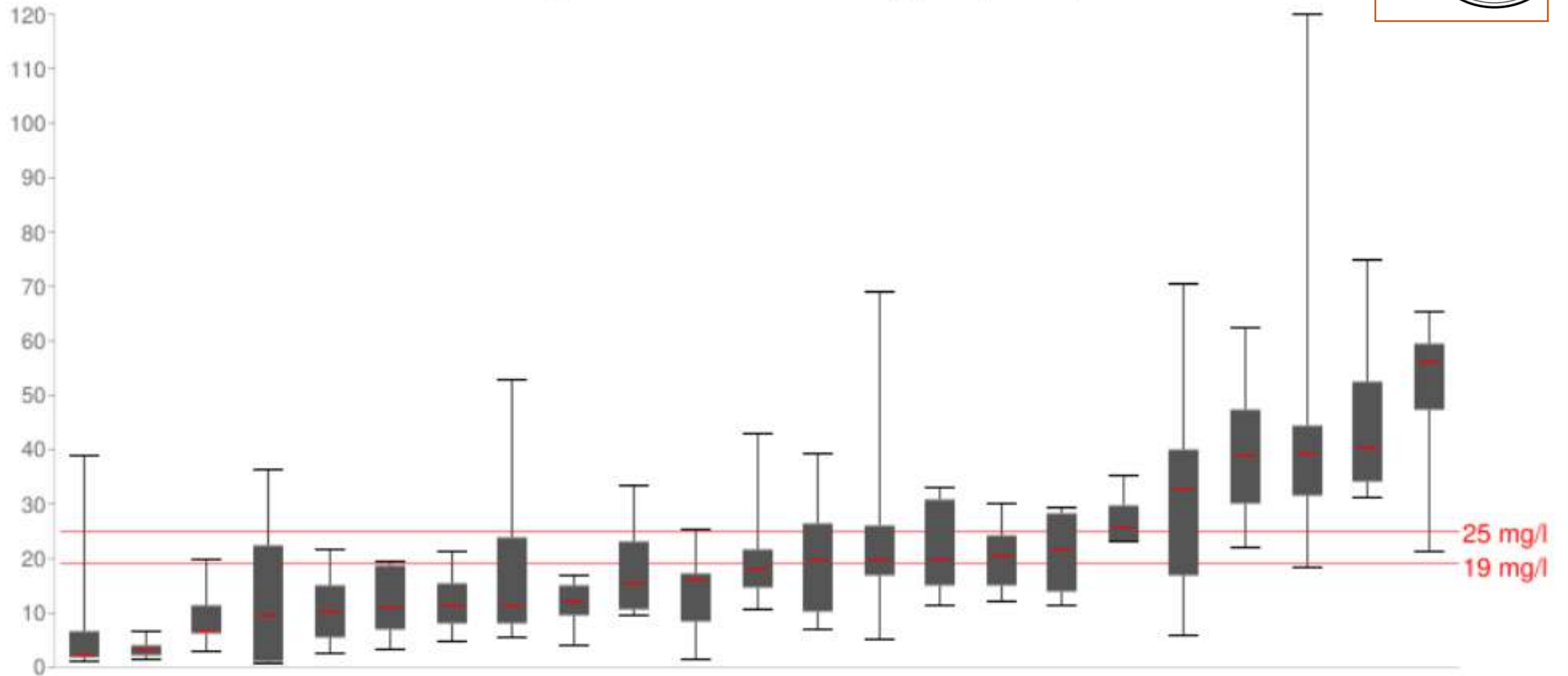
Single Family Total Nitrogen(in mg/l)
OMNI Recirculating Sand Filter Systems in Barnstable County (46 systems)

52% of OMNI Systems have a median TN of 19 mg/L or less





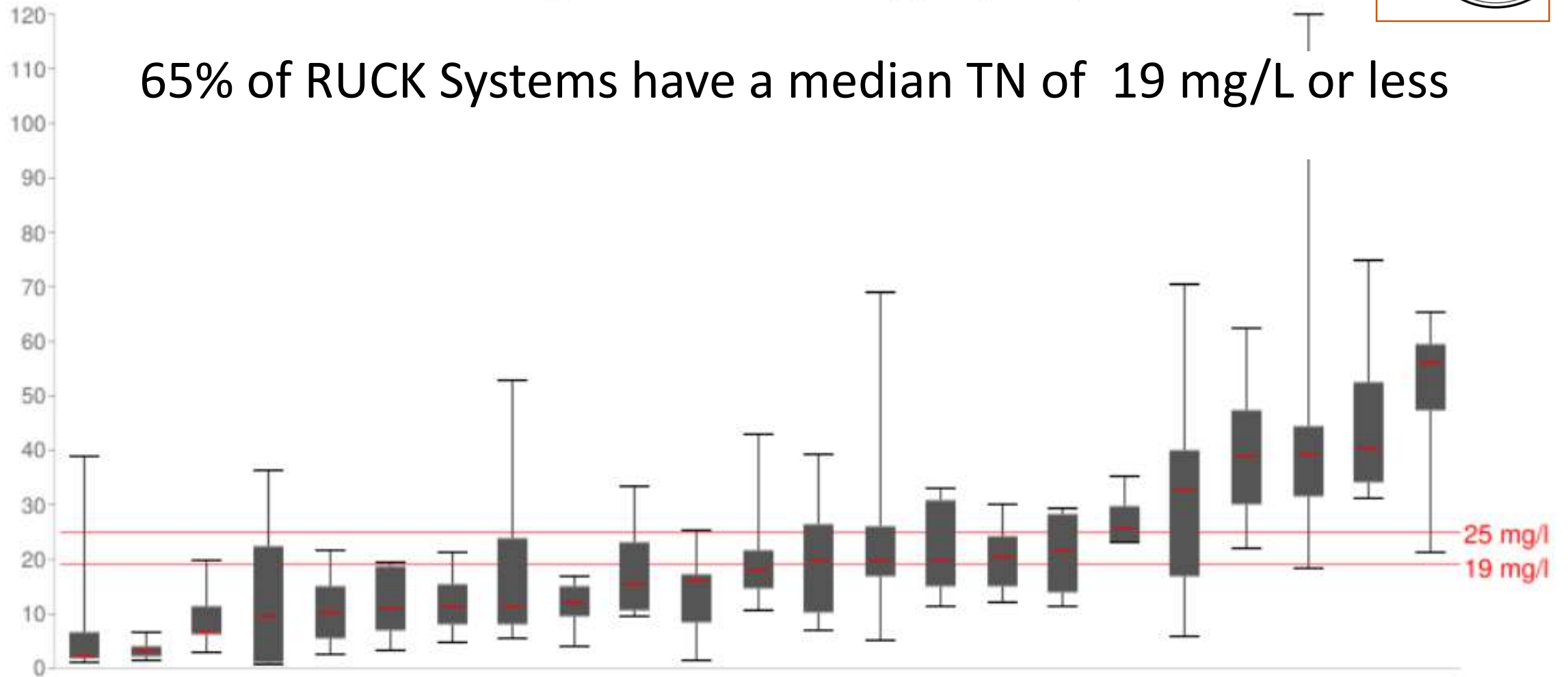
Single Family Total Nitrogen(in mg/l)
RUCK Systems in Barnstable County (23 systems)





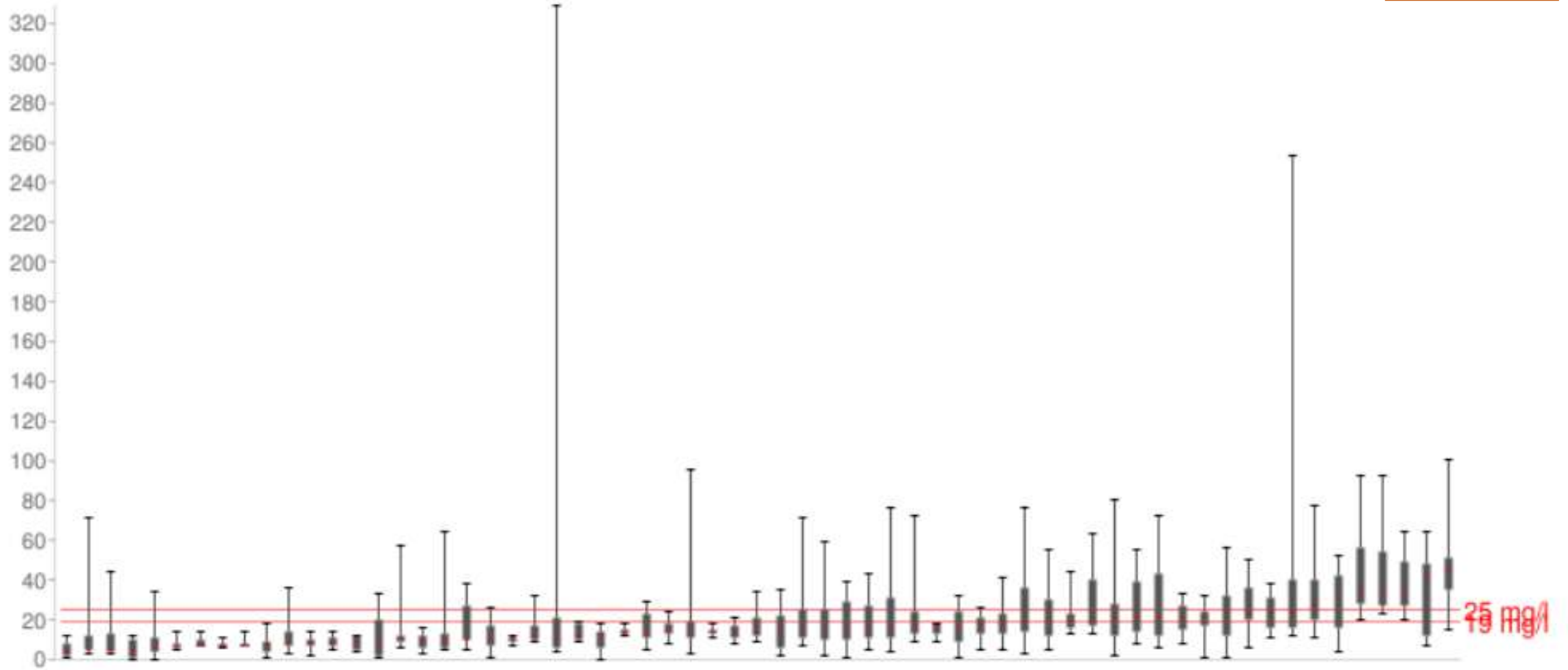
Single Family Total Nitrogen(in mg/l)
RUCK Systems in Barnstable County (23 systems)

65% of RUCK Systems have a median TN of 19 mg/L or less





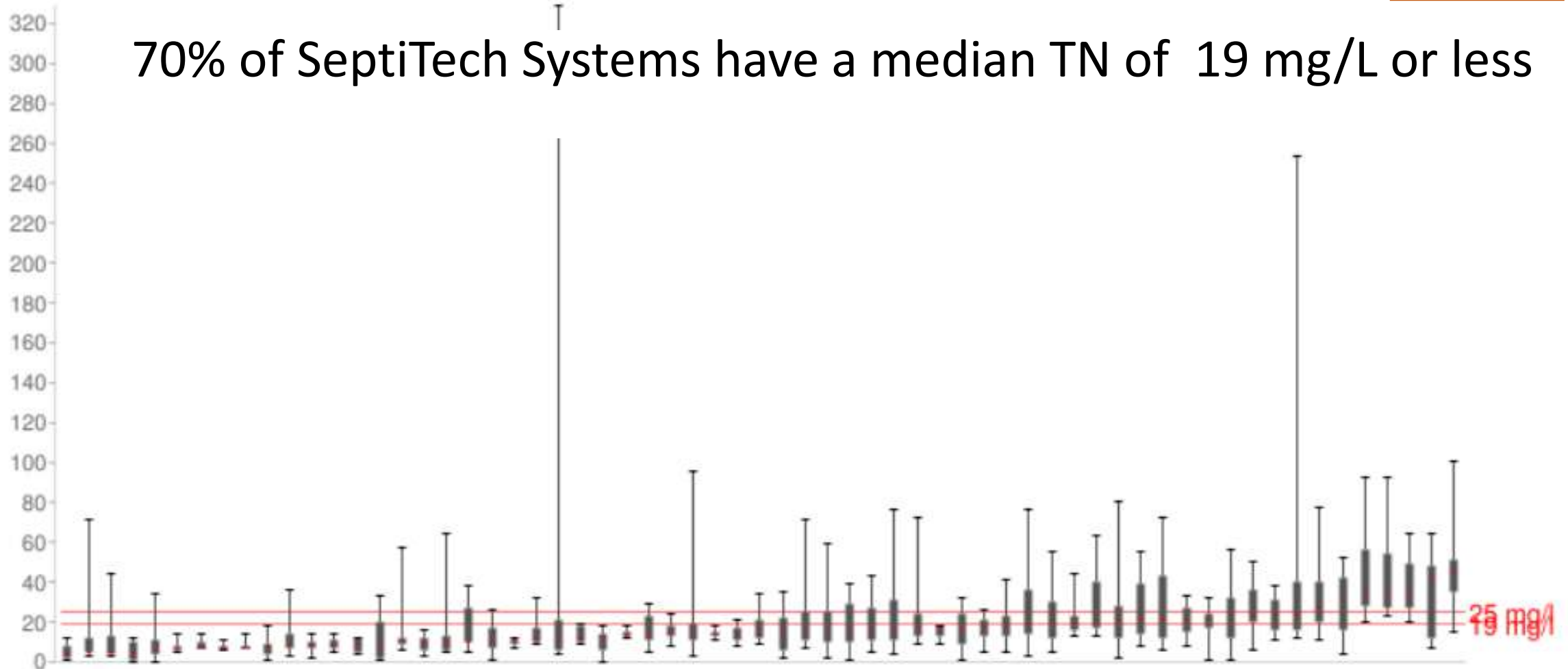
Single Family Total Nitrogen(in mg/l)
Septitech Treatment System Systems in Barnstable County (63 systems)

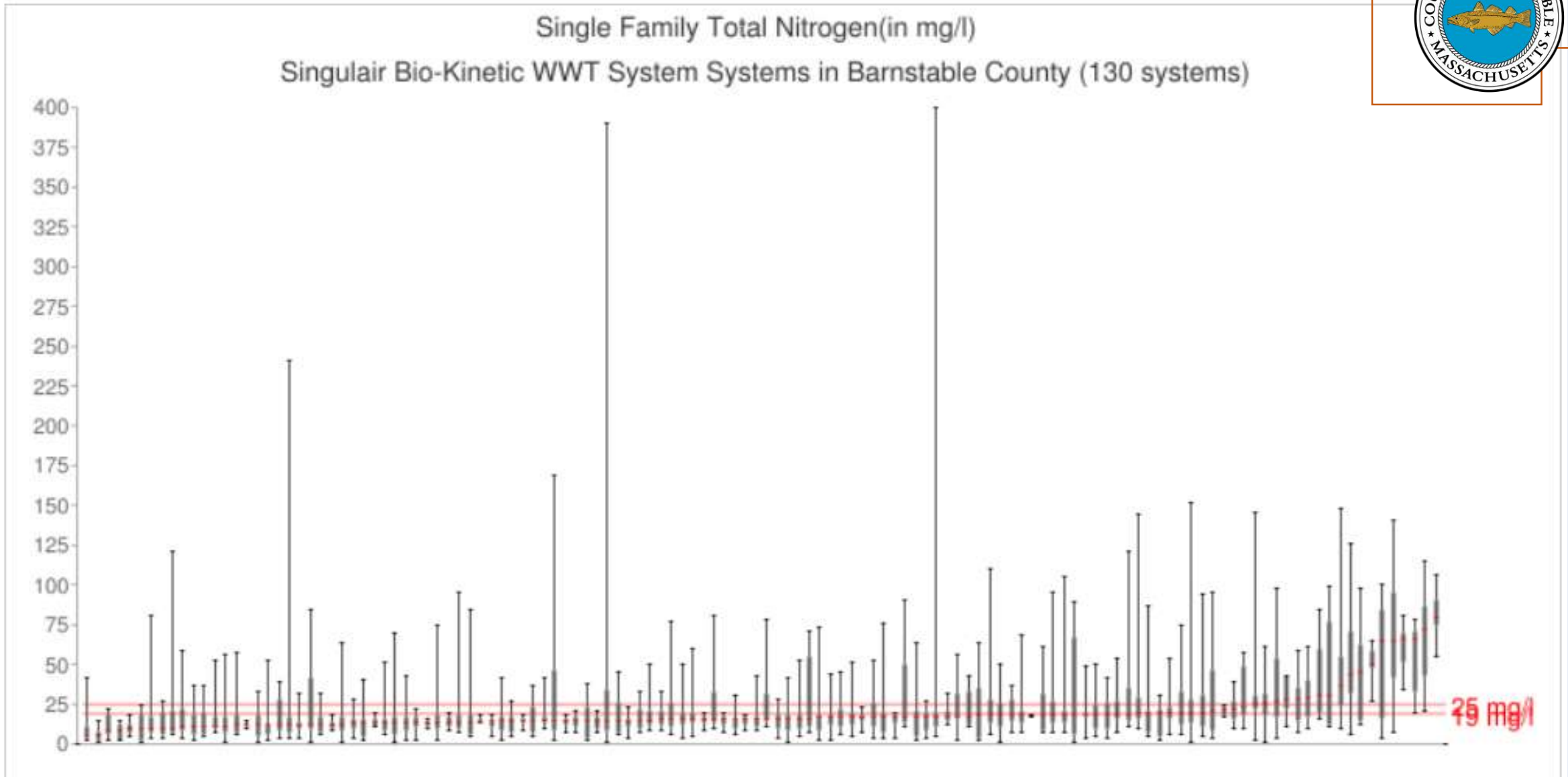




Single Family Total Nitrogen(in mg/l)
Septitech Treatment System Systems in Barnstable County (63 systems)

70% of SeptiTech Systems have a median TN of 19 mg/L or less

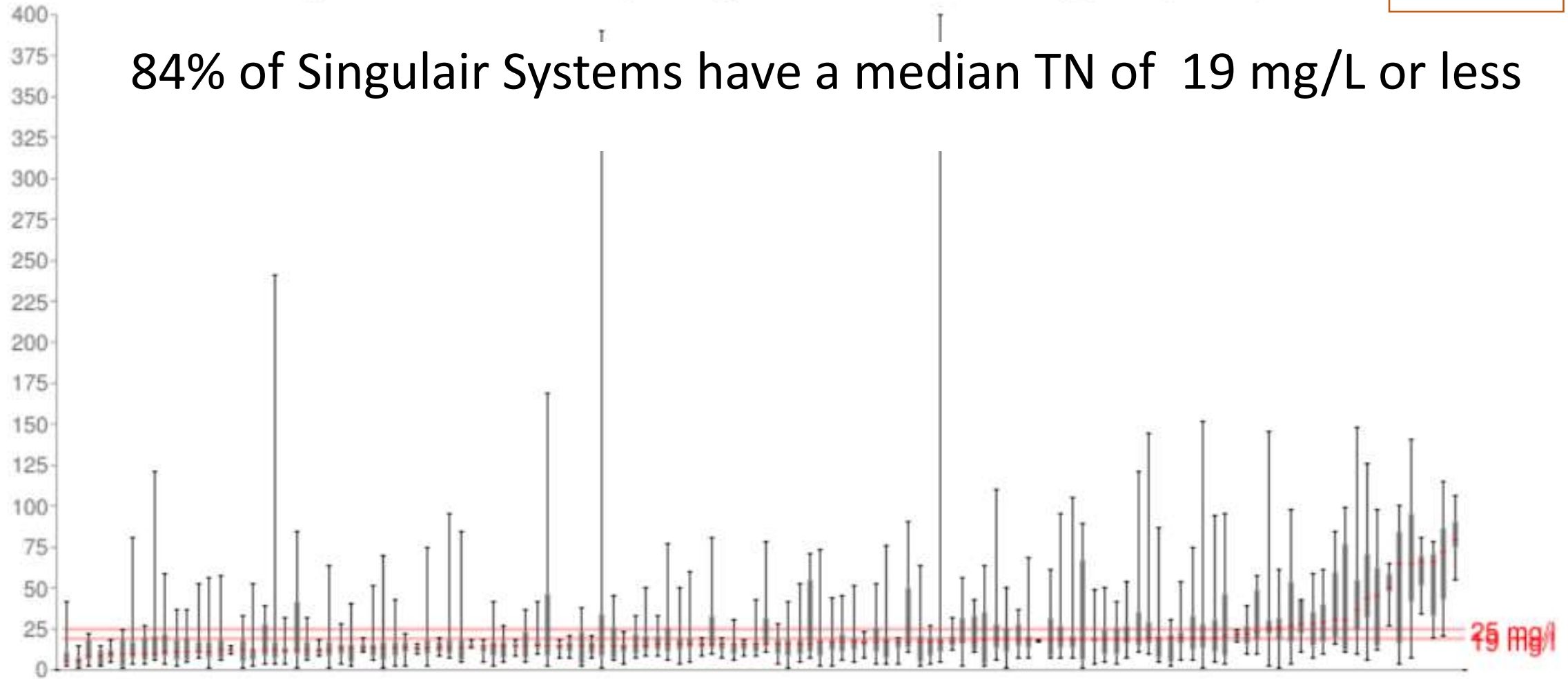






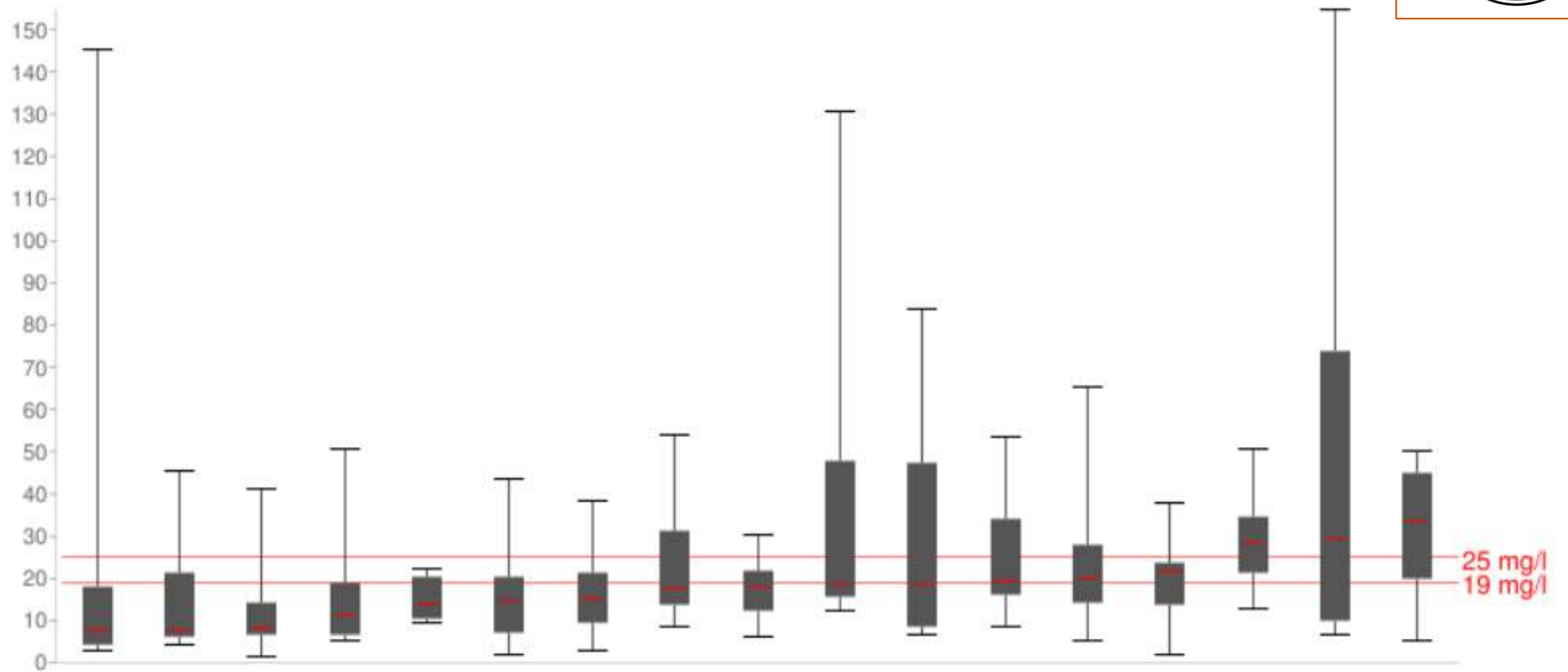
Single Family Total Nitrogen(in mg/l)
Singular Bio-Kinetic WWT System Systems in Barnstable County (130 systems)

84% of Singular Systems have a median TN of 19 mg/L or less





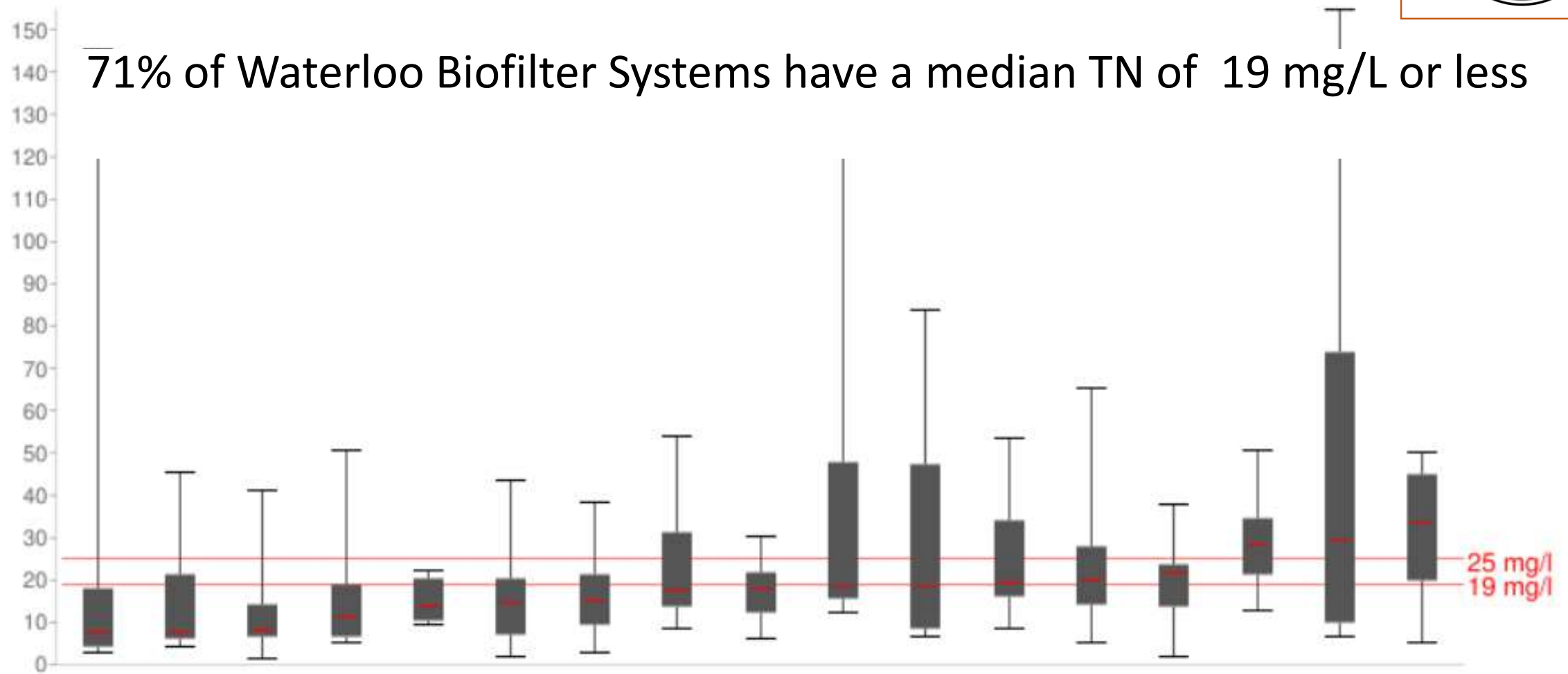
Single Family Total Nitrogen(in mg/l)
Waterloo Biofilter Systems in Barnstable County (17 systems)





Single Family Total Nitrogen(in mg/l)
Waterloo Biofilter Systems in Barnstable County (17 systems)

71% of Waterloo Biofilter Systems have a median TN of 19 mg/L or less

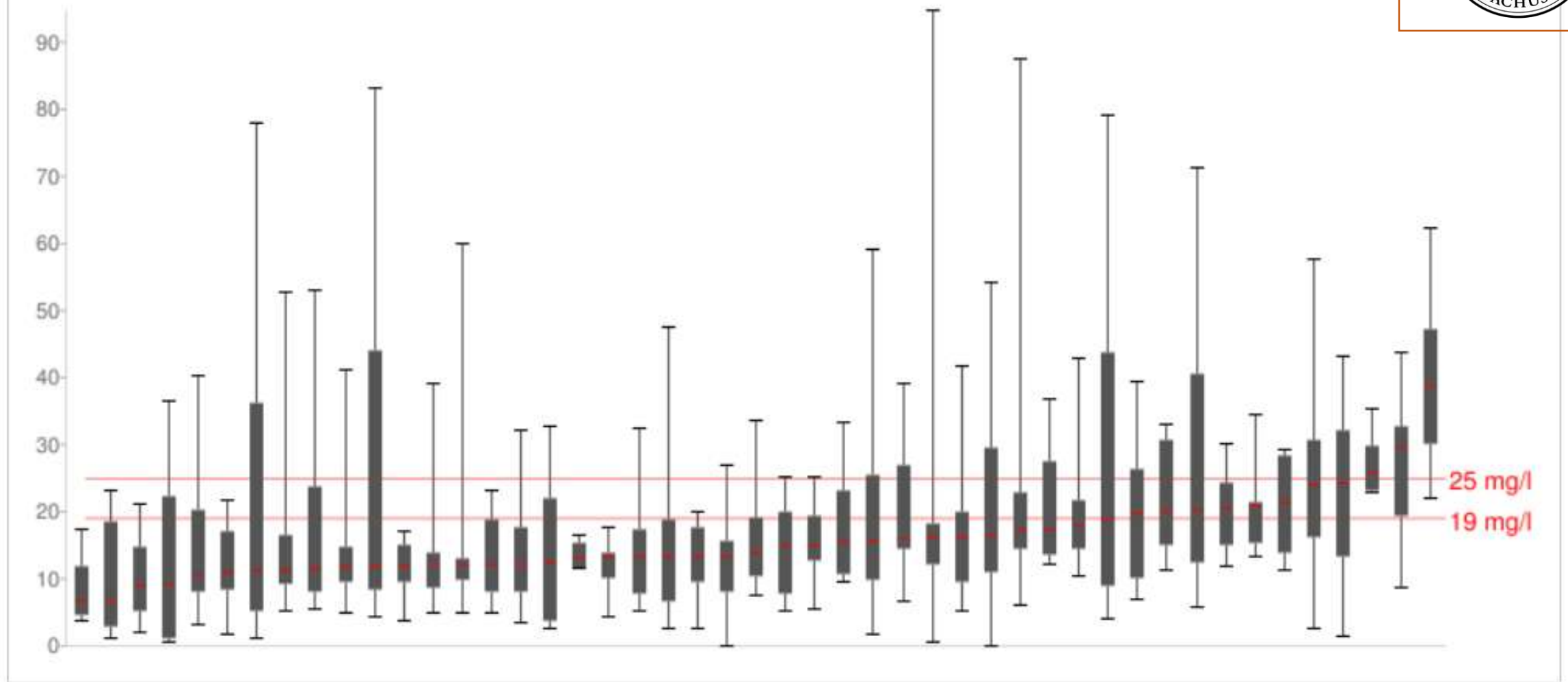




Can sort based on town performance



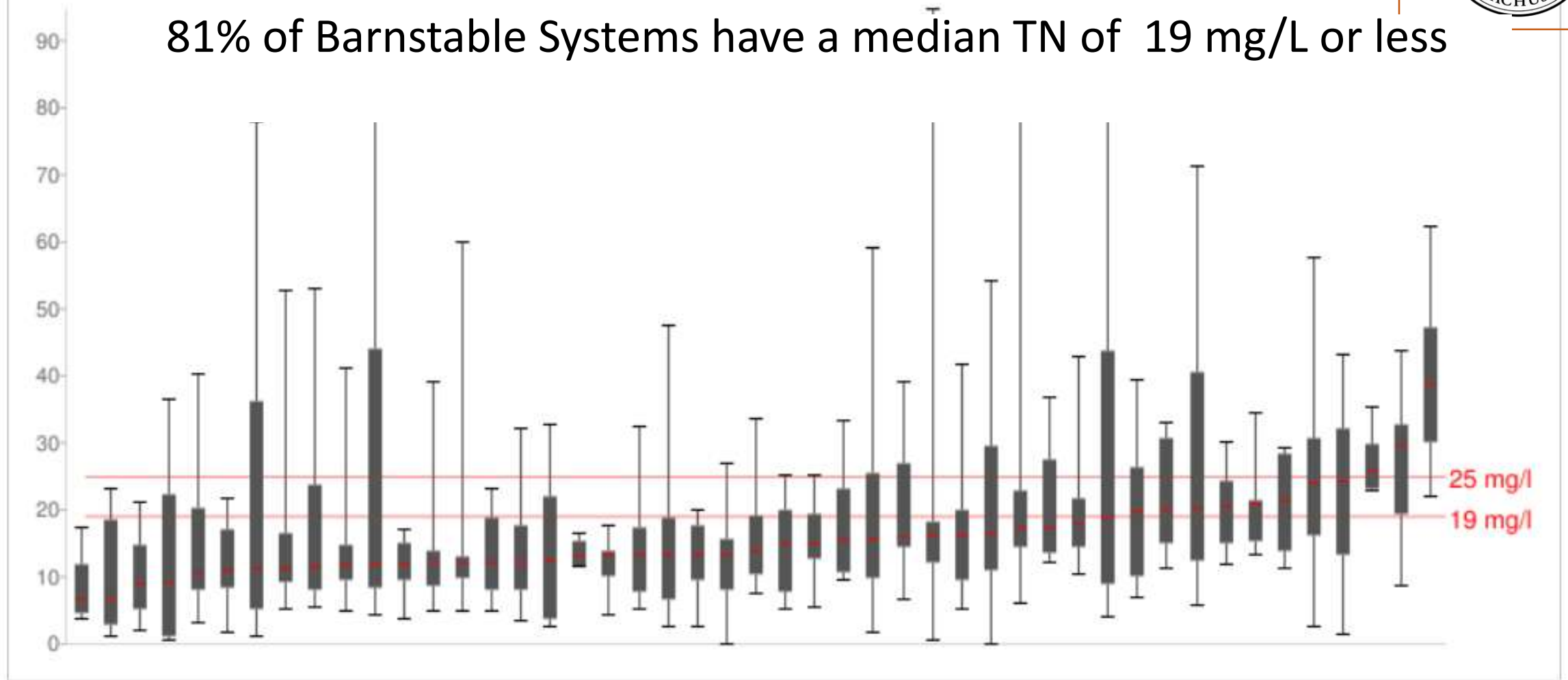
Single Family Total Nitrogen(in mg/l)
All Technologies in the town of Barnstable (47 systems)





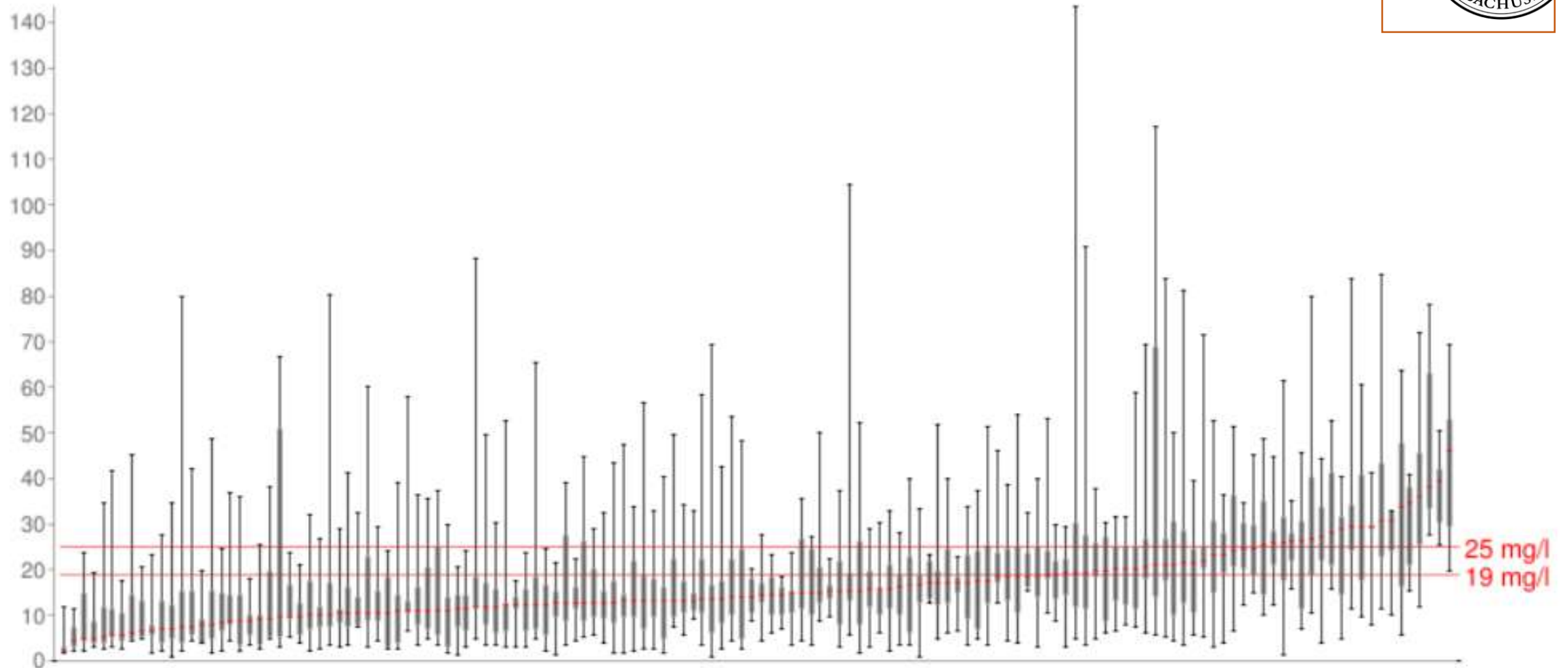
Single Family Total Nitrogen(in mg/l)
All Technologies in the town of Barnstable (47 systems)

81% of Barnstable Systems have a median TN of 19 mg/L or less





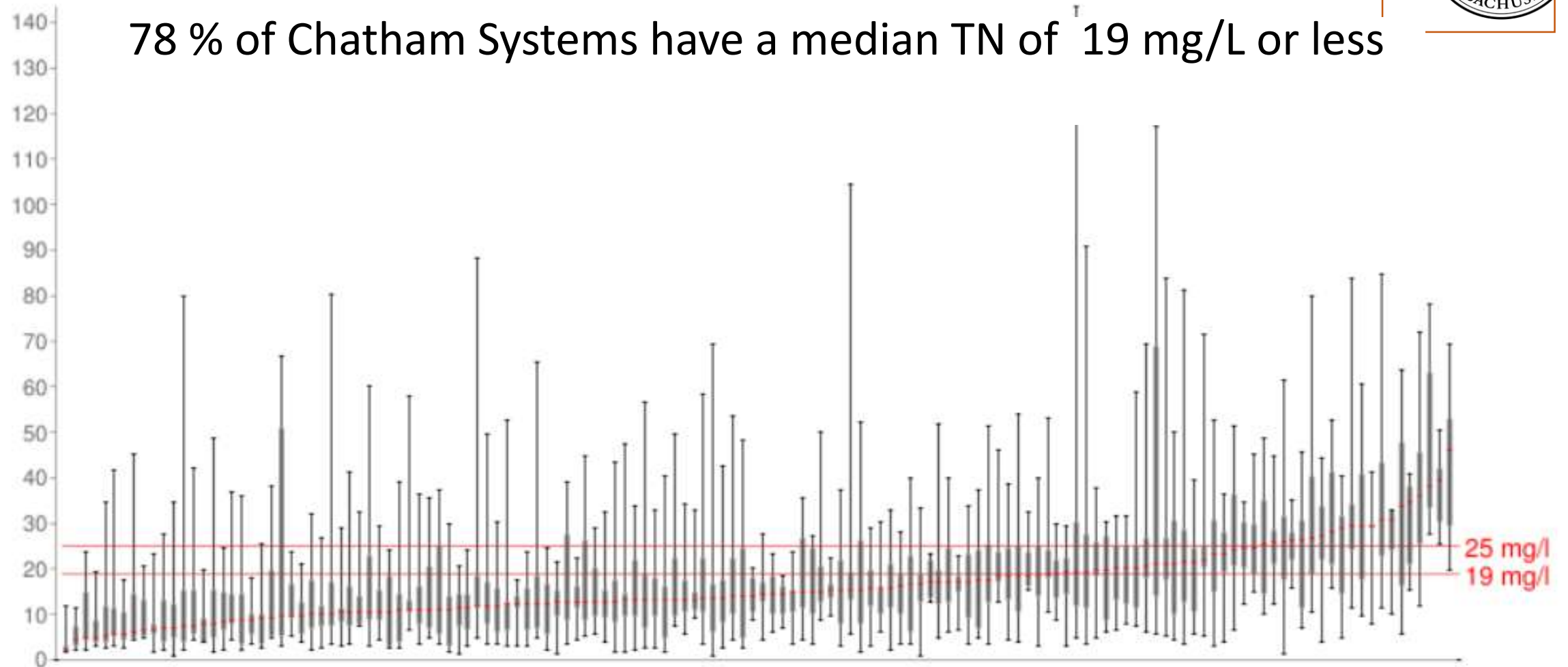
Single Family Total Nitrogen(in mg/l)
All Technologies in the town of Chatham (144 systems)

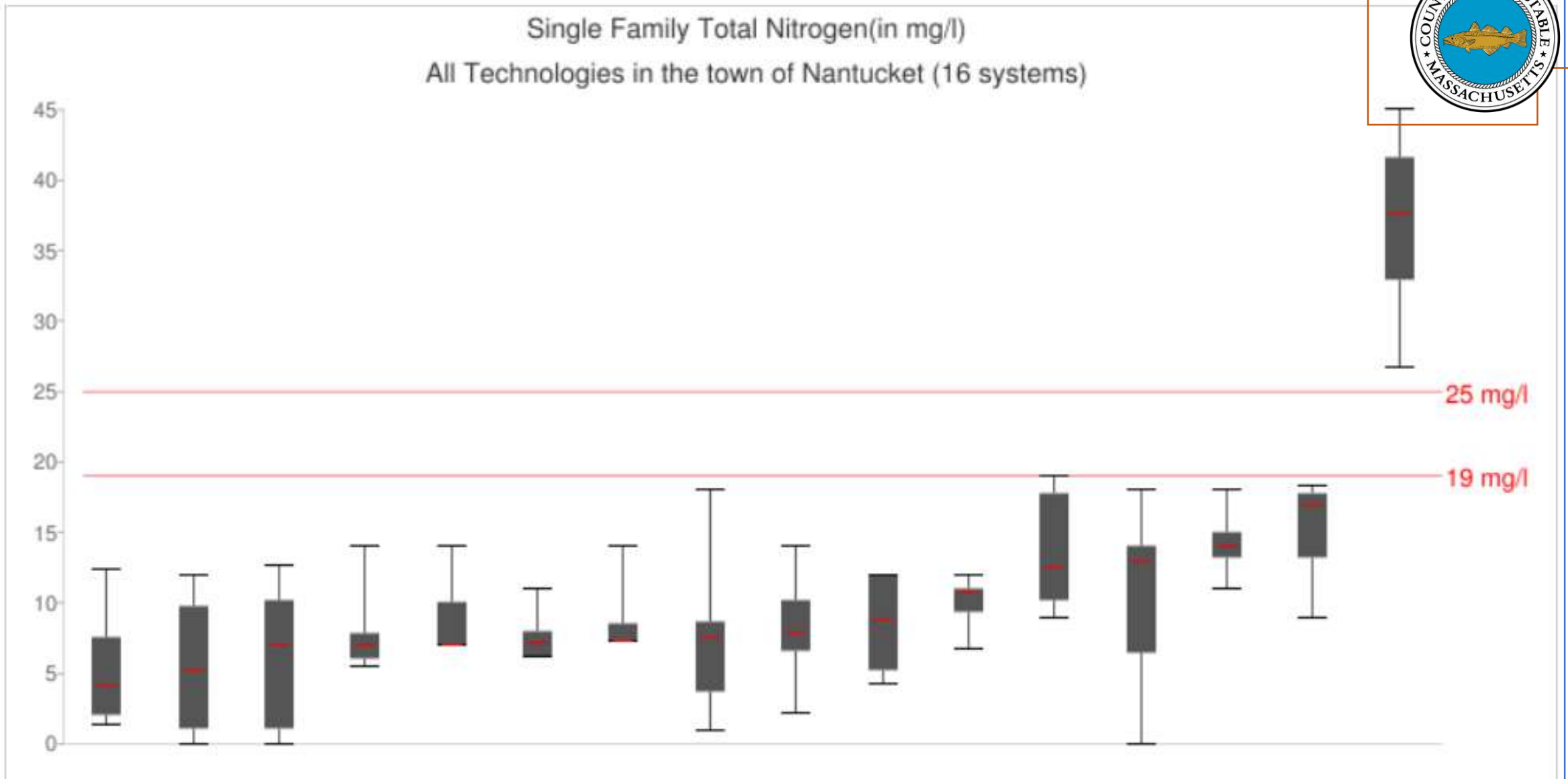




Single Family Total Nitrogen(in mg/l)
All Technologies in the town of Chatham (144 systems)

78 % of Chatham Systems have a median TN of 19 mg/L or less

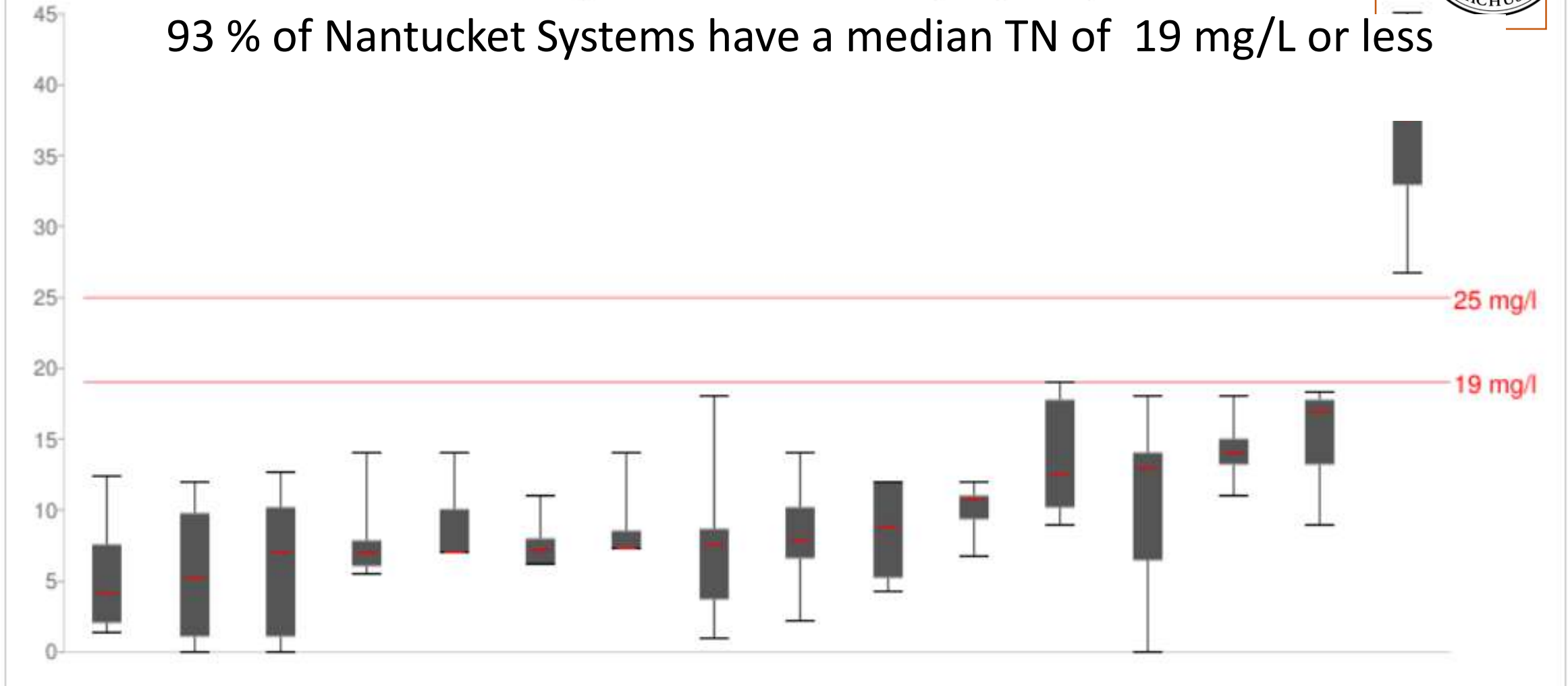






Single Family Total Nitrogen(in mg/l)
All Technologies in the town of Nantucket (16 systems)

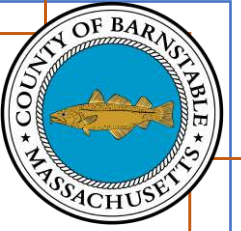
93 % of Nantucket Systems have a median TN of 19 mg/L or less





Cautions about looking at this data:

While we can look at this data, there may be differences in homeowner use, seasonal use, operator action, etc. that would be hard to see in looking at the numbers alone.



Let the Board of Health focus on what really matters

4:05 p.m. 89 Edgewater Drive, Isabelle Signorn- Order to Correct

A complaint was received regarding chickens on the property located at 89 Edgewater Drive. Complaint states the chickens continue to roam off the premises onto neighboring properties. Neighbors complained property is a mess and chickens are not housed properly. Homeowner, Beth Signorn appeared before the Board to report she has a tenant on the property who owns the chickens. Ms. Signorn reported the tenant has been notified of the Rules & Regulations regarding Restriction to Premises: All poultry shall be kept in an approved building, run or enclosure of adequate size. Poultry shall not be permitted to roam unrestricted. Any animal shall be deemed to be at-large; when it is off the premises. Code Enforcement Officer John Viveiros re- inspected the property and reported the property is clean and housing is now suitable for chickens. Ms. Signorn reported the chickens will not be allowed to roam off property.

Board of Health - Semi-public pool guidance request-Lochstead Association pool: The issue is that the fence for this pool is 80" high and not chain link. The representative agreed to cut the fence to the required 5'. **Stephen Rafferty moved that if the fence is cut to 5', the Board of Health accepts the fence. John Waterbury seconded. All in favor; motion passed.**

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Environmental Project Assistant
Innovative/Alternative Tracking Program
Barnstable County Department of Health and Environment

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