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219-2022-CV-00224

EXHIBIT 2

8. Recently, Map-a-Thon used the same methodology in Exhibit B and updated Map-a-Thon's proposed maps to take account of late local redistricting that occurred later than normal in certain municipalities. I understand certain municipalities needed additional time to review and, to the extent necessary, update their internal wards to ensure proportionality of populations in light of the 2020 census data. A true and accurate copy of Map-a-Thon's updated proposed New Hampshire House maps and accompanying analyses is attached as Exhibit G.
9. As part of updating the Map-a-Thon maps, and as shown in Exhibit G, I also reviewed the population deviation and other data from the map enacted by the State of New Hampshire, originally House Bill 50 but which is now Laws 2022, 9:1. I had to review and determine population deviation myself, because House Bill 50 evolved during the legislative process but neither the House Special Committee on Redistricting (who makes its materials available at this website[1]) nor the Senate Special Committee on Redistricting (who makes its materials available at this website[2]) published final population deviation statistics for Laws 2022, 9:1. My review and analysis of the data as well as the enacted map, taking account of final redistricting in municipalities like Dover who redistricted late, shows the population deviation of Laws 2022, 9:1 is 10.13%, as set forth in Exhibit G along with further county-by-county explanation. A true and accurate summary of the enacted maps (Laws 2022, 9:1) and related data is also attached as Exhibit H.

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[1] http://gencourt.state.nh.us/house/committees/committee_websites/Redistricting_2021/default.aspx

[2] http://gencourt.state.nh.us/Senate/committees/Redistricting/

I swear and declare under penalty of perjury that the foregoing is true and correct.

David Andrews

STATE OF NEW HAMPSHIRE

COUNTY OF Strafford

On May 3, 2022, the above named David Andrews personally appeared before me and declared, and made oath, that the foregoing statements are true and accurate.

PATRICIA A. MONIELLO
NOTARY PUBLIC
STATE OF NEW HAMPSHIRE
-MY-
COMMISSION EXPIRES
JUNE 16, 2026

Patricia A. Moniello

Justice of the Peace/Notary Public

My commission expires: 6/16/2026

EXHIBIT A

DAVID ANDREWS

104 Burnt Hill Rd Chichester, NH 03258 · (603)724-4048
DavidAndrewsNH@gmail.com · https://www.linkedin.com/in/david-andrews-925a1528/

EDUCATION

JUNE 2011
B.S. ELECTRICAL ENGINEERING, UNIVERSITY OF NEW HAMPSHIRE
UNH Dean's scholarship and Pembroke Academy Trustees Scholarship recipient, 2006-2009

JUNE 2011
BUSINESS ADMINISTRATION MINOR, UNIVERSITY OF NEW HAMPSHIRE

SKILLS

- Microsoft Office(Excel, Word, PowerPoint)
- Python
- Mapping Software(DRA, QGIS, District Builder)
- Python Libraries(PyQt5, Pandas, Matplotlib, Numpy, Geopandas)
- Labview

EXPERIENCE

05/2021 – CURRENT
DATA ANALYST, REDISTRICTING DATA HUB
- Conducted data validation of election results and shapefiles.
- Conducted data analysis of various data sets related to redistricting.

06/2021 – CURRENT
MAP-A-THON, TECHNICAL TEAM LEAD
- Lead team of technical experts in drawing and analyzing maps for NH
- Lead community educational sessions
- Testified and submitted testimony on NH maps

08/2011 – 09/2019
TEST ENGINEER TEAM LEAD, AIRMAR TECHNOLOGY
- Lead a test engineering team of 4 engineers and 5 technicians.
- Lead team meetings and assigned and assisted with tasks and projects.
- Wrote and developed new testing programs in LabVIEW.
- Developed and performed data analysis for product testing.
- Provided testing support to a manufacturing floor.

EXHIBIT B

Map-a-Thon NH House Redistricting Methodology

The Map-a-Thon project was put together to create and submit fair maps to the NH Legislature as part of the 2020 census redistricting cycle. The Map-a-Thon is supported by a coalition of NH groups who work for fair voting maps, including Granite State Progress, the League of Women Voters of NH, Open Democracy, Open Democracy Teams, and the Kent Street Coalition.

Map-a-Thon's process of creating NH House maps started with collecting and determining criteria that should be used in creating these maps. First, we ensured that our criteria would lead to maps that complied with state and national constitutional law, current statutes, as well as prevailing court precedents. These legal criteria are listed in the following table:

NH House Criteria			
1	Population(<10%)		N.H. Constitution Rule
2	Preservation of towns/wards		By State Statute
3	Contiguity		
4	Preservation of Counties		
5	Each town in one non-floterial district		
6	Dedicated districts for eligible towns		
7	Preservation of COI's		

Due to the use of floterial and multi-member districts in the NH House, population deviation for the NH House cannot be calculated in the same way as it is for single-seat representative districts such as the United States Congress. We explored multiple methodologies for calculating population deviation in our proposed districts but eventually settled on using the relative deviation for single-member districts, the relative deviation using the "aggregate method" for multimember districts, and the "component method" for floterial districts. These methods were outlined in the NH Supreme Court case "Burling v. Chandler, 148 N.H. 143 (2002)" as acceptable ways to calculate deviations including those for floterial districts. These are the same methods used by the NH legislature in the currently enacted maps. Further explanation of the component method can be found in Appendix A.

The 6th criteria was a major focus of our mapping of the NH House. The other criteria are very straightforward once you have a way to calculate deviations of floterial districts. Once you establish that, the first five criteria are either met or they are not. The 6th criteria is where the maps proposed by Map-a-Thon and the enacted maps diverge. In accordance with NH Constitution part 2 article 11 "When the population of any town or ward, according to the last federal census, is within a reasonable deviation from the ideal population for one or more representative seats, the town or ward shall have its own district of one or more representative seats", we also worked to produce maps that yielded dedicated districts where population allowed. When a town/ward qualified for, but did not receive, its own district, we categorized it as a 'violation' in our analysis, and we worked to produce NH House district maps that reduced the number of these violations.

Our NH House maps were originally created manually in the free online mapping tool Dave' s Redistricting App (DRA) using a 'homemade' tool to perform the component method calculations needed to determine the deviations of towns/wards in floterial districts. We created maps for all 10 counties, but we were unhappy with the number of violations of our 6th criterion and set out to optimize the maps accordingly.

One of our Map-a-Thon technical team members developed a program to automatically generate NH House district maps by county. This program took inputs of: number of representatives assigned to the county, town/ward populations, and towns/wards with adjacent towns/wards, along with two parameters used to limit the size of districts, to generate a list of possible maps. These maps considered all 6 of the divided criteria. We then filtered the list of possible maps to find those that had the fewest violations for each county. Further explanation of the program can be found in Appendix B.

Once lists of possible maps for each county with the lowest violations were established, we then took another pass through the maps to find those which preserved the largest number of "Communities of Interest" (COIs) and yielded the largest number of small districts (theoretically better representation) to ultimately choose the best possible map for each county. We then submitted our set of optimal county maps to the NH House Special Committee on Redistricting on 2 November 2021.

We analyzed maps proposed by the minority and majority parties in the NH House Special Committee on Redistricting as they became available to determine if any better satisfied the defined criteria. We found that several of the maps had fewer violations than our own maps, as well as contained some unique district combinations that would contribute to fewer violations if used in our maps. Through this collective, holistic analysis we identified our preferred map for each county. Also, after seeing the majority propose a map for Sullivan County that had deviations outside of the +/-5% allowable range we were using we also submitted maps for Carroll, Strafford, and Sullivan county that all used deviations going from 5% to -10%. After the majority chose to not go forward with their map, we followed suit sticking to maps that stayed within the +/- 5% range. This analysis was submitted to the NH House Special Committee on Redistricting on 9 November 2021.

After maps passed the NH House Special Committee on Redistricting and the full NH House, they went to the NH Senate Election Law Committee. We submitted our preferred maps to that committee on 1 February 2022. Our currently proposed maps differ slightly from this submission as they account for ward changes from cities across NH that were not finalized at the time of our February submission.

Populations used in our calculations are based exclusively on the 2020 decennial census data and updated ward populations were gathered from the necessary cities in NH. In our deviation calculations we used the ideal district size of (Total NH Population/# of Reps) or (1,377,529/400). Sources for populations can be found in Appendix C.

In our final analysis we determined that the enacted maps had 55 violations vs. 41 violations in our proposed maps. The total map deviation for the enacted maps is 10.13% vs 9.94% in our proposed maps. In our proposed maps the towns/wards of Barrington, Bow, Canaan, Chesterfield, Dover Ward 4, Hanover, Hinsdale, Hooksett, Milton, New Ipswich, Newton, Lee, Plaistow, Rochester Ward 5, and Wilton would gain their own districts. The town of Durham would lose its own district in our proposed maps.

APPENDIX

Appendix A.

Component Method

The Component Method calculates a deviation value for each town under consideration separately, and then the aggregate deviation is found by taking the difference of the max and min among the towns. This is the method that was used in the 2010 and 2020 NH House redistricting process. This was also the method that was used in the Map-a-Thon's proposed maps.

Variables

P_A = Population of district A

P_T = Population total $(P_A + P_B + P_C \ldots)$

S_A = Seats assigned to district A

S_F = Seats assigned to float district

IP_S = Ideal population per seat

AS_A = Adjusted seats of district A area

D_A = Deviation of district A area

Equations

$$AS_A = S_A + \left(\frac{P_A}{P_T} \times S_F\right)$$

$$D_A = \frac{\frac{P_A}{IP_S} - AS_A}{AS_A} \times 100$$

Appendix B.

Automatically Generating NH House Maps

Phil Hatcher

October 2021

Lightly edited in April 2022 for release outside of the Map-A-Thon tech team

Background

Drawing electoral maps for the NH House is challenging due to the large number of representatives and the need to construct districts with roughly the same population per representative. To find a district map with acceptable population deviations requires sifting through the very large number of possible ways to combine towns and city wards into districts. This document describes the algorithm I developed and implemented to automatically perform the mapping process.

Input

NH House district maps are developed on a per-county basis, since NH House districts cannot cross county lines. One run of the program implementing the algorithm will construct a map for one particular county. The only input to the program is a tab-separated-value file. The first line in this file contains the number of representatives that are allocated to the county. The rest of the file contains a line for each town and city ward in the county, giving its name, its population and a list of the towns and wards that it is adjacent to. In this document I will refer to towns and city wards as *precincts,* with districts being built from adjacent precincts.

The program also has a few parameters that are embedded in the text of the program:

- Two parameters are used to limit the size of the districts. They are called *N* and *M* and are described in detail below.
- A parameter specifies the ideal population for one representative. This is calculated by dividing the total population of the state by 400, the total number of representatives.
- A parameter specifies the maximum allowable population deviation.

Overview

As well as ensuring that districts are built from adjacent precincts and have acceptable population deviations, the algorithm minimizes the number of precincts that are eligible for dedicated representatives but do not get them. In addition, all precincts are placed into a non-floterial district, which may or may not be incorporated into an encompassing floterial district. And, of course, the algorithm does not subdivide precincts in the mapping process. Districts are always built from precincts, and never from pieces of precincts.

Those requirements (population deviation, dedicated representation, non-floterial district membership) are explicitly dictated by the NH constitution. The algorithm also attempts to build small districts. The size of districts is not discussed in the constitution, but small districts are widely seen as providing better representation to the residents of the districts. Also, focusing

only on small districts makes the exploration of the large space of possible districts more computationally feasible.

The algorithm performs two phases. First, a set of possible districts are constructed. Second, subsets of the possible districts are identified such that the districts of a subset do not have any common precincts (i.e. each district is distinct), the districts in a subset together include all the precincts in the county, and the number of violations, where eligible towns do not receive dedicated representatives, is minimized.

Phase 1: Identifying Possible Districts

Possible districts are constructed by first building sets of precincts. Each set is initialized to contain a *root* precinct. Then precincts are added to the set if they are adjacent to the root or to another precinct already in the set. However, a precinct can only be added if it can be reached from the root precinct by crossing no more than *N* precinct boundaries, where *N* is a parameter to the algorithm.

Once the set of precincts for a given root is complete, then all subsets of that set of size *M* or less and that contain the root precinct are evaluated to see if they might be a potential district. *M* is another parameter to the algorithm. A subset is accepted as a potential district if, first, the precincts in the subset are all connected (meaning any precinct can reach any other precinct by only traversing other precincts in the subset), and if, second, the sum of the populations of the precincts in the subset is within a small deviation of an even multiple of the ideal population for one representative. (The ideal population for one representative is computed by taking the total population of the state and dividing by the total number of representatives.) The first test ensures that the precincts in the subset are contiguous. The second test ensures that the subset could become a multi-precinct district (or a single-precinct district if the subset contains only one precinct), even if it will not work as a floterial district encompassing a set of “inner” districts. If both tests pass then the subset is added to a set of potential districts to be considered in the second phase of the algorithm.

Note that the two parameters *N* and *M* are used to limit the size of the potential districts and to try to make them geographically compact.

The ideal population for one representative is also a parameter to the program.

All precincts in the county are considered in turn as the root of a subset of precincts that is used to generate potential districts. Often a potential district can be generated from more than one root precinct, but these duplicates are weeded out as potential districts are gathered together into one set.

As a potential district is added to the set of potential districts, it is evaluated to see if it could be a floterial district. This requires that all possible groupings of the precincts be considered as inner districts. The component method is used to evaluate the population deviations for a particular grouping of the precincts into inner districts. If no grouping can be found that satisfies the component method, the potential district will simply be a multi-precinct district, as mentioned above.

In addition, when the potential district is added to the set of potential districts, its cost is computed. The cost is the total number of eligible precincts in the district that did not receive dedicated representatives. Remember that the goal of the algorithm is to minimize this cost.

Phase 2: Generating Minimum Cost DIstrict Maps

The set of potential districts is searched to find valid maps, which contain districts that will include all the precincts of the county exactly once. Maps are constructed one district at a time and the algorithm can have a large set of maps under construction at once. Each map under construction has a cost, which is the sum of the costs for the districts in the map.

The algorithm starts with an arbitrary precinct, and initiates a map for each district in the set of potential districts that includes the precinct. These partial maps are processed in turn by arbitrarily choosing a precinct not already in a district in the map and considering all the potential districts that include the chosen precinct and do not conflict with districts already in the map. (Two districts conflict if a precinct is included in both districts.) For each such district, a new map is created by adding the district to the map being worked on. When all such new maps have been constructed, they are added to the queue of partial maps to be processed, and the old map just processed is discarded.

If a complete map is found, one that includes all the precincts in the county, then it is not put into the queue for further processing, but is instead compared to any other complete maps that have been found. If it has a higher cost than the maps found earlier, it is simply discarded. If it has the same cost as the maps found earlier, then it is added to the list of the minimum cost complete maps. If it has a lower cost than the maps found earlier, then the old list of complete maps is discarded, and the new complete map becomes a list of length one of minimum cost complete maps. Of course, to be accepted, a completed map must assign the exact number of representatives allocated to the county.

Once a complete map is found, its cost can be used to bound the search. Any partial map that has a cost greater than the cost of a completed map can be discarded. This is because the cost of a map under construction only stays the same or grows larger as we add a district to a partial map.

Eventually the queue of partial maps to be processed will become empty. At that point the list of minimum cost complete maps is output.

Outputs

The program outputs the minimum cost complete maps in a text file, using a compact format to represent each map. Here is an example of the output of a map:

```
Map 3 (cost 2)

  [1 viol, 13228 pop, F]((Middleton,NewDurham,Strafford*):2,Milton:1):4

  [0 viol, 6722 pop, SP](Farmington):2

  [0 viol, 10830 pop, F](Rochester1:1,Rochester2:1):3

  [0 viol, 10830 pop, F](Rochester3:1,Rochester4:1):3

  [0 viol, 10832 pop, F](Rochester5:1,Rochester6:1):3

  [0 viol, 13846 pop, F](Barrington:2,Lee:1):4

  [0 viol, 14452 pop, MP](Somersworth1,Somersworth2,Somersworth3,Somersworth4,Somersworth5,Rollinsford):4

  [0 viol, 16370 pop, F](Dover1:1,Dover5:1,Dover6:1):5
```

```
  [0 viol, 16371 pop, F](Dover2:1,Dover3:1,Dover4:1):5

  [1 viol, 17408 pop, MP](Madbury,Durham*):5

[overall deviation is 9.9% (-4.9%,4.9%)
```

The first line gives the map a number in the list of maps generated by this run of the program, which was for Strafford County. There were actually 266 maps generated by this run, all with only 2 violations of the requirement for dedicated representatives, and appearing one after the other in the text file. The cost figure given on this line is the total number of violations in the map.

The following lines describe districts:

- Each line begins with the violation count for this district, as well as its total population and a code for the type of the district (F for floterial, SP for single precinct, MP for multi-precinct, but not floterial).
- Then the towns in the district are provided. For a floterial they may be grouped within parentheses, indicating "inner" districts from which the floterial is built. Also towns in a floterial may be followed by a colon and a number indicating the number of dedicated representatives assigned to the town. If the inner district is a multi-precinct district, then its towns will not be assigned representatives, but the whole inner district will be assigned representatives.
- Finally, each line ends with a colon followed by a number, which is the total number of representatives in the district.
- For example, the second line above describes a floterial district with:
    - an inner multi-precinct district with Middleton, New Durham and Strafford, with two at-large representatives for the three towns;
    - Milton receives a dedicated representative;
    - and the whole district is assigned four representatives, meaning there is one rep assigned to all four towns (since two representatives were assigned to the three towns in the inner district and one was assigned to Milton, leaving one to serve all the towns).
    - By the way, the asterisk after Strafford indicates a violation. Strafford is eligible for a dedicated representative but did not receive one in this map. (Durham is the other violation, which you can see on the second to last line. It is joined with Madbury as a multi-precinct district.)

The last line gives the spread of the population deviations for the districts. In this case, the spread is from -4.9% to +4.9%, meaning the total deviation is less than 10%.

The program has two other output files. They are both comma-separated-value files. The first is a list of all the potential districts identified in Phase 1. The second is a list of the minimum cost complete maps found in Phase 2. Each map is described using internal district numbers, as shown in the other CSV file. These two files are primarily used by me for debugging purposes.

Notes

The population deviation for a district must be within ±*D*%, where D is a parameter to the algorithm. My runs have been done with *D = 5*. Would this preclude an acceptable deviation range of (-2%, +8%)?

The maximum number of precincts I support in a district (i.e. *M*) is only 7. The problem is that I do not have a good algorithm for generating all possible groupings of precincts for larger districts. Right now I explicitly delineate in the code the possible groups for each size district, rather than having a general algorithm that would more easily support bigger districts.

I ran all counties but one, Rockingham, using *N = 3* and *M = 7*. For Rockingham I used *N = 2* and *M = 5*, because otherwise the running time became prohibitive. I also removed 5 towns from the Rockingham input, and incorporated David's hand solution for those towns. This again was to try to control the running time of the program.

My approach to limiting the size of districts does not prohibit strangely shaped districts. For instance, with *N = 3* and *M = 7*, a district can be constructed as a long narrow band of precincts, with a root precinct in the middle and three precincts on either side. Also I have seen a district consisting of a loop of precincts that surround and isolate a precinct that is not in the district. More work would be required to force districts to have a reasonable shape.

I do not have a clear understanding of why Rockingham County took so much more computation than the others. It appears to be more than just the number of precincts in the county. This needs further study.

I have not explored, in general, varying *N* and *M*, and am not sure what effect they have, in general, on finding solutions or running time.

I was not sure how best to represent the many towns in Coos county with a population of zero. I ended up just combining them with neighboring towns, but this might have limited my results by distorting adjacency relationships. In fact, David Andrews found maps for Coos county with zero violations so I did not worry too much about Coos.

Appendix C.

New Hampshire Population – 1,377,529

https://www.nh.gov/osi/data-center/2020-census/index.htm#:~:text=The%20U.S.%20Census%20Bureau%20announced,4.6%25%20since%20the%202010%20census

Concord Ward Populations*

https://www.concordnh.gov/ArchiveCenter/ViewFile/Item/5720

*Ward 5 population listed is incorrect. It should be 4,338

Dover Ward Populations

Via email from Chris Parker, Dover deputy city manager 12/16/21

Keene Ward Populations

http://www.gencourt.state.nh.us/senate/committees/Redistricting/billsandsubmissions/keene%20wards.pdf

Laconia Ward Populations

https://www.laconianh.gov/DocumentCenter/View/7627/2021-Redistricting-Map-PDF?bidId=

Lebanon Ward Populations

https://civicclerk.blob.core.windows.net/stream/LEBANONNH/ff53ae56-2f84-4098-9301-c58efd682822.pdf?sv=2015-12-11&sr=b&sig=gF4tP0hYSvJ59yVbTbaNZUxpJIz3HdutePk%2F9Nvrfzo%3D&st=2022-04-29T14%3A15%3A42Z&se=2023-04-29T14%3A20%3A42Z&sp=r&rscc=no-cache&rsct=application%2Fpdf

Portsmouth Ward Populations

http://www.gencourt.state.nh.us/senate/committees/Redistricting/billsandsubmissions/Portsmouth%20Cover%20Letter.pdf

Rochester Ward Populations

Via email from Kelly Walters, Rochester city clerk 12/17/21

EXHIBIT C

PHILIP J. HATCHER

Education

1985	Ph.D.	Computer Science	Illinois Institute of Technology
1979	M.S.	Computer Science	Purdue University
1978	B.S.	Mathematics	Purdue University

Experience

2019–	Professor Emeritus of Computer Science, University of New Hampshire
2018	Acting Chair of Computer Science, University of New Hampshire
2007–2011	Chair of Computer Science, University of New Hampshire
2003–2006	Chair of Computer Science, University of New Hampshire
1997–1999	Chair of Computer Science, University of New Hampshire
1997–2019	Professor of Computer Science, University of New Hampshire
1997	Professor Invité, École Normale Supérieure de Lyon
1992–1997	Associate Professor of Computer Science, University of New Hampshire
1993	Parallel Programming Tools Consultant, Kendall Square Research Corporation
1992–1993	Technical Languages Consultant, Digital Equipment Corporation
1986–1992	Assistant Professor of Computer Science, University of New Hampshire
1981–1986	Instructor and Laboratory Manager, Illinois Institute of Technology

Honors

2017–2020	Class of 1944 Professorship Award, University of New Hampshire
1996–1998	Waite Professorship, University of New Hampshire
1992	Outstanding Faculty Award, University of New Hampshire
1978	Phi Beta Kappa, Purdue University

Professional Service

2012	Program Committee, 27th IEEE International Parallel and Distributed Processing Symposium
2004	Program Committee, Systems Software, International Conf. on High Performance Computing
2001	Program Committee, workshop on Java in High Performance Computing, HPCN 2001
2000	Guest Editor, *Parallel Computing*, issue on Parallel Computing for Irregular Applications
1998	Vice Chair, Workshop on Parallel Languages, Euro-Par '98
1997	Program Committee, Fifth Annual Workshop on I/O in Parallel and Distributed Systems
1993	Program Committee, Second Annual Symposium on Issues and Obstacles in the Practical Implementation of Parallel Algorithms and the Use of Parallel Machines
1992–1996	Associate Editor, IEEE Parallel and Distributed Technology
1992	Program Committee, First Annual Symposium on Issues and Obstacles in the Practical Implementation of Parallel Algorithms and the Use of Parallel Machines

Grants and Contracts

"XANSation Evaluation," $14,000, Lamprey Networks, Inc., grant funded May 2006 (with S. Valcourt).

"U.S.A.–France Cooperative Research: Implementing a Cluster Version of Java with the PM2 Distributed and Multithreaded Run-Time System," $14,000, National Science Foundation and INRIA (France), grant funded May 2001 (with R. Russell, L. Bougé and R. Namyst).

"U.S.A.–France Cooperative Research: A Parallel Programming Environment for C*," $14,000, National Science Foundation and INRIA (France), grant funded January 1998 (with R. Russell, L. Bougé and R. Namyst).

"Laboratory for Advanced Communication Systems," $475,859, National Science Foundation, grant funded September 1996 (with R.D. Bergeron, J. Bernhard, M. Carter, E. Freuder, B. Reinhold and R. Russell).

"Evaluating the PSR DPCE Compiler," $11,000, Pacific-Sierra Research Corp., grant funded May 1996.

"A High-Bandwidth Network Testbed for Parallel Computation," $121,547, National Science Foundation, grant funded May 1995 (with R.D. Bergeron, E. Freuder, R. Russell and T. Sparr).

"Support for UNH C*," $123,600, MRJ Inc., grant funded June 1995.

"Data-Parallel Compiler Technologies for Future-Generation Multicomputers," $316,000, National Science Foundation, grant funded May 1993 (with M. Quinn).

"High-Performance C," $28,000, Digital Equipment Corporation, grant funded August 1992.

"A Network Version of Dataparallel C," $47,000, Oregon Advanced Computing Institute and IBM Corporation, grant funded May 1992 (with M. Quinn).

"An Extended Dataparallel C Programming Environment on the Intel iWARP," $40,000, Oregon Advanced Computing Institute and Intel Corporation, grant funded September 1991 (with M. Quinn).

"Porting the UNH/OSU C* Compiler to the Intel iPSC/2 and iPSC/860," $20,000, Oregon Advanced Computing Institute and Intel Corporation, grant funded January 1991 (with M. Quinn).

"Data Parallel Programming on Diverse Architectures: Tools and Algorithms," $327,000, National Science Foundation, grant funded August 1989 (with M. Quinn).

"A C* Compiler for Hypercube Multicomputers," $47,000, National Science Foundation, grant funded January 1989 (with M. Quinn).

"Research Experiences for Undergraduates," $40,000, National Science Foundation, grant funded May 1987.

Monograph

P. Hatcher and M. Quinn. *Data-Parallel Programming on MIMD Computers*, The MIT Press, 1991.

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L. Hamel, P. Hatcher, M. Quinn. "An Optimizing C* Compiler for a Hypercube Multicomputer," in Saltz and Mehrotra, editors, *Languages, Compilers, and Run-Time Environments for Distributed Memory Machines*, Elsevier Science Publishers, 1992.

M. Quinn, P. Hatcher, and B. Seevers. "Implementing a Data Parallel Language on a Tightly Coupled Multiprocessor," in Nicolau, Gelernter, Gross and Padua, editors, *Advances in Languages and Compilers for Parallel Processing*, Pitman/MIT Press, 1991.

Refereed Journal Publications

R. Maddamsetti, P. Hatcher, A. Green, B. Williams, D. Marks, and R. Lenski. "Core Genes Evolve Rapidly in the Long-Term Evolution Experiment with *Escherichia coli*," *Genome Biology and Evolution*, 9(4), 2017.

C. Peeters, V. Cooper, P. Hatcher, B. Verheyde, A. Carlier, and P. Vandamme. "Comparative Genomics of *Burkholderia multivorans*, a Ubiquitous Pathogen with a Highly Conserved Genomic Structure," *PLOS ONE*, 12(4), 2017.

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Refereed Conference Publications

H. Hu, Y. Rzhanov, P. Hatcher and R.D. Bergeron. "Binary Adapted Semi-Global Matching Based on Image Edges," in *Proceedings of the Seventh International Conference on Digital Image Processing*, April 2015.

J. Jackson and P. Hatcher. "Efficient Parallel Execution of Sequence Similarity Analysis Via Dynamic Load Balancing," in *Proceedings of the ISCA 3rd International Conference on Bioinformatics and Computational Biology*, March 2011.

T. Fogal, H. Childs, S. Shankar, J. Kruger, R.D. Bergeron, P. Hatcher. "Large Data Visualization on Distributed Memory Multi-GPU Clusters," in *Proceedings of High Performance Graphics 2010*, June 2010.

G. Antoniu, P. Hatcher, M. Jan and D. Noblet. "Performance Evaluation of JXTA Communication Layers," in *Proceedings of the Fifth International Workshop on Global and Peer-to-Peer Computing*, May 2005.

G. Antoniu and P. Hatcher. "Remote Object Detection in Cluster-Based Java," in *Proceedings of the 3rd Workshop on Java for Parallel and Distributed Computing*, April 2001.

G. Antoniu, L. Bougé, P. Hatcher, M. MacBeth, K. McGuigan, and R. Namyst. "Compiling Multithreaded Java Bytecode for Distributed Execution," in *Proceedings of European Conference on Parallel Computing*, August 2000. (Distinguished paper: one of only five selected from 328 submissions.)

G. Antoniu, L. Bougé, P. Hatcher, M. MacBeth, K. McGuigan, and R. Namyst. "Implementing Java Consistency Using a Generic, Multithreaded DSM Runtime System," in *Proceedings of the International Workshop on Java for Parallel and Distributed Computing*, May 2000.

M. MacBeth, K. McGuigan and P. Hatcher. "Executing Java Threads in Parallel in a Distributed-Memory Environment," in *Proceedings of the IBM Centre for Advanced Studies Conference*, November 1998.

L. Bougé, P. Hatcher, R. Namyst and C. Perez. "A Multithreaded Runtime Environment with Thread Migration for a HPF Data-Parallel Compiler," in *Proceedings of the International Conference on Parallel Architectures and Compilation Techniques*, October 1998.

R. Russell and P. Hatcher. "Efficient Kernel Support for Reliable Communication," in *Proceedings of the ACM Symposium on Applied Computing*, February 1998.

J. Moore, P. Hatcher and M. Quinn. "Efficient Data-Parallel Files via Automatic Mode Detection," in *Fourth Annual Workshop on I/O in Parallel and Distributed Systems*, May 1996.

J. Moore, P. Hatcher and M. Quinn. "Stream*: Fast, Flexible Data-Parallel I/O," in *Proceedings of Parallel Computing '95*, September 1995.

P. Hatcher and M. Quinn. "Supporting Data-Level and Processor-Level Parallelism in Data-Parallel Programming Languages," in *Proceedings of the 26th Hawaii International Conference on Systems Sciences*, January 1993.

P. Hatcher, M. Quinn, A. Lapadula, and R. Anderson. "Compiling Data-Parallel Programs for MIMD Architectures," in *Proceedings of European Workshop on Parallel Computing*, pp. 28–39, March 1992.

P. Hatcher, M. Quinn, R. Anderson, A. Lapadula, B. Seevers, and A. Bennett. "Architecture-Independent Scientific Programming in Dataparallel C: Three Case Studies," in *Proceedings of Supercomputing '91*, pp. 208–217, November 1991.

P. Hatcher, A. Lapadula, R. Jones, M. Quinn, and R. Anderson. "A Production-Quality C* Compiler for a Hypercube Multicomputer," in *Proceedings of the Third SIGPLAN Symposium on Principles and Practice of Parallel Programming*, pp. 73–82, April 1991.

P. Hatcher, M. Quinn, A. Lapadula, R. Anderson, R. Jones. "Dataparallel C: A SIMD Language for Multicomputers," in *Proceedings of the Sixth Distributed Memory Computing Conference*, April 1991.

P. Hatcher and M. Quinn. "C*-Linda: A Programming Environment with Multiple Data Parallel Modules and Parallel I/O," in *Proceedings of the 24th Hawaii International Conference on Systems Sciences*, pp. 382–389, January 1991.

M. Quinn and P. Hatcher. "Compiling SIMD Programs for MIMD Architectures," in *Proceedings of the IEEE International Conference on Computer Languages*, pp. 291–296, March 1990.

P. Hatcher and J. Tuller. "Efficient Retargetable Compiler Code Generation," in *Proceedings of the IEEE International Conference on Computer Languages*, pp.25–30, October 1988.

M. Quinn, P. Hatcher, and K. Jourdenais. "Compiling C* Programs for a Hypercube Multicomputer," in *Proceedings of the ACM/SIGPLAN Parallel Programming: Experience with Applications, Languages, and Systems*, pp. 57–65, July 1988.

P. Hatcher and T. Christopher. "High-Quality Code Generation via Bottom-up Tree Pattern Matching," in *Conference Record of the Thirteenth Annual ACM Symposium on Principles of Programming Languages*, pp. 119–130, January 1986.

T. Christopher, P. Hatcher, and R. Kukuk. "Using Dynamic Programming in a Graham-Glanville Style Code Generator," in *Proceedings of the ACM SIGPLAN Symposium on Compiler Construction*, pp. 25–36, June 1984.

T. Christopher and P. Hatcher. "A Network Computer for Distributed Software Research," in *Proceedings of the 1983 ACM Conference on Personal and Small Computers*, pp. 9–13, December 1983.

Other Publications

P. Hatcher, R. Russell, M. Quinn and S. Kumaran. "Implementing Data-Parallel Programs on Commodity Clusters," in *Proceedings of the Spring School on Data Parallelism*, Les Ménuires (France), March 1996. Published in Perrin and Darte, editors, *The Data Parallel Programming Model: Foundations, HPF Realization, and Scientific Applications*, Springer-Verlag, Lecture Notes in Computer Science, Volume 1132, 1996.

S. Batra, P. Hatcher, and R. Russell. "The Design and Implementation of Data-Parallel Files," presented at the *Workshop on Modeling and Specification of I/O*, October 1995. Publication via the World Wide Web.

P. Hatcher. "The Joy of Data-Parallel Programming," in *Proceedings of the Dartmouth Institute for Advanced Graduate Studies in Parallel Computation Symposium*, pp. 19–30, June 1992.

W. Tichy, M. Philippsen, and P. Hatcher. "A Critique of the Programming Language C*," *Communications of the ACM*, 35(6):21–25, June 1992. Appeared as Technical Correspondence.

P. Hatcher. "NSF-REU Program Helps Computer Science Students and Teachers See Value in Education," *Journal of College Science Teaching* 18(3):168–169, January 1989.

Theses Supervised

Seth Hager, M.S., September 2016
"Migrating Thread-Based Intentional Concurrent Programming to a Task-Based Paradigm"

Nicholas Craycraft, B.S., May 2016
"A System for Intentional, Multithreaded Java"

Han Hu, M.S., June 2015
"Binary Adapted Semi-Global Matching Based on Image Edges"

Chris Hebert, M.S., May 2015
"Inferring Types to Eliminate Ownership Checks in an Intentional Javascript Compiler"

Michaela Tremblay, B.S., May 2015
"Throwing Exceptions for Concurrency Errors"

Niels Widger, M.S., May 2014
"Deterministic Execution in a Java-like Language"

James Jackson, M.S., September 2012
"The Accessibility and Scalability of Gene Family Analysis"

Ben Decato, B.S., May 2012
"Patterns of Evolution in Bacteria"

Brad Larsen, M.S., December 2010
"Compiling an Array Language to a Graphics Processor"

James Jackson, B.S., May 2010
"Load-Balancing Genome Similarity Analysis"

Brad Larsen, B.S., August 2008
"Object Replication in the Large Address Space Virtual Machine"

Lina Faller, B.S., May 2008
"An Investigation of Palindromic Sequences in the *Pseudomonas fluorescens* SBW25 Genome"

Anthony Lapadula, Ph.D., September 2007
"GlySpy: A Software Suite for Assigning Glycan Topologies from Sequential Mass Spectral Data"

Stephen Todd, M.S., December 2006
"Comparing the XAM API with File System Programming"

Kevin Clark, M.S., May 2005
"Evaluating the Performance of Hyperion, a Distributed Shared Memory Implementation of Java"

David Noblet, B.S., December 2004
"JXTA Communication Performance Evaluation"

Matt Reno, M.S., February 2003
"Comparing the Performance of Distributed Shared Memory and Message Passing Programs Using the Hyperion Java Virtual Machine on Clusters"

Joel Daniels, B.S., December 2002
"Improving Wide-Area Network Performance in Computational Grid Applications"

Mark MacBeth, M.S., July 1999
"Compiling Java Bytecode for a Distributed Environment"

Mehul Dholakia, M.S., December 1998
"A Simulator for the UNH DPCE Compiler"

Todd Medlock, M.S., August 1998
"Supporting Internode Communications on Clusters of Commodity SMP Machines"

Keith McGuigan, B.S., May 1998
"A Distributed Java Virtual Machine"

Daniel Luchaup, M.S., December 1997
"A Data-Parallel C Extensions Compiler Front End"

Craig Smith, M.S., August 1997
"CUB: A Debugger for C*"

Dana Cook, M.S., May 1997
"Implementing Data-Parallel Programs for Shared-Memory Multiprocessors"

Steve Chappelow, M.S., January 1996
"Improving Stencil Communications in C* Programs"

Sanjay Batra, M.S., August 1995
"Data-Parallel Files"

James R. Mason, M.S., May 1994
"Optimizing Irregular Communication in C*"

Kathleen P. Herold, M.S., August 1992
"A Retargetable C* Run-time Library for Mesh-Connected MIMD Multicomputers"

Anthony J. Lapadula, M.S., December 1991
"An Optimizing Dataparallel C Cross-Compiler for Hypercube Multicomputers"

Robert R. Jones, M.S., December 1991
"Compiling the New C*"

John L. Donovan, M.S., December 1990
"Compiler Components Generated from High-Level Specifications"

Margaret M. Cawley, M.S., December 1990
"Improvement of a Table-Driven Tree-Rewriting System"

Lutz H. Hamel, M.S., May 1990
"An Optimizing C* Compiler for the NCUBE Multicomputer"

Jose M. Garcia, M.S., May 1990
"An Object Transformation Language"

Gina L. Ross, M.S., December 1989
"An Attribute Grammar Evaluator Via Equational Logic"

Jeffrey W. Tuller, M.S., December 1989
"Designing a User Interface to UNH-CODEGEN"

Invited Talks

Institut de Recherche en Informatique et Systemes Aleatoir, France, June 2004

Vrije Universiteit, Netherlands, October 2003

Institut de Recherche en Informatique et Systemes Aleatoir, France, June 2002

Laboratoire Informatique et Distribution of the Institut d'Informatique et Mathematiques Appliquees de Grenoble, France, June 2001

Vrije Universiteit, Netherlands, June 2001

International Research Center for Computer Science, Germany, August 2000

University of Trier, Germany, August 2000

École Normale Supérieure de Lyon, France, March 2000

First Workshop on Parallel Computing for Irregular Applications, Orlando, Florida, January 1999

Laboratoire d'Informatique Fondamentale de Lille, France, June 1997

École Normale Supérieure de Lyon, France, January 1997

University of Southampton, United Kingdom, May 1996

École Normale Supérieure de Lyon, France, April 1996

Spring School on Data Parallelism, Les Ménuires, France, March 1996

Workshop on Object-Oriented Approaches to Parallel Programming, Southampton, United Kingdom, March 1996

University of Connecticut, March 1996

Supercomputing '95, Tutorial on Data-Parallel C Extensions, December 1995

Supercomputing '93, Panel Session on Parallel C Standardization, November 1993

Dartmouth College, School on Parallel Programming, June 1993

GMD-Berlin, Germany, April 1993

GMD-St. Augustin, Germany, April 1993

Supercomputing ‘92, Workshop on Data-Parallel Languages, November 1992

Dartmouth College, February 1992

Boston College, December 1991

Argonne National Laboratory, October 1991

International Research Center for Computer Science, Germany, May 1991

Williams College, May 1991

University of Southern Maine, March 1991

Michigan State University, May 1990

NASA Institute for Computer Applications in Science and Engineering, May 1990

Oregon State University, December 1989

Oregon Center for Advanced Technology Education, December 1989

Standards Work

Key contributor to the Data Parallel C Extensions (DPCE) technical report approved by the ANSI C committee in December 1994. Primary author of the specification of elemental and nodal functions.

Teaching Experience

Introduction to Scientific Programming

Data Processing and File Management

Systems Programming

Programming Languages

Assembly Language Programming and Machine Organization

Compiler Construction

Advanced Compiler Construction

Operating Systems

Formal Language Theory

Programming Languages for Parallel Computers

Introduction to Parallel Programming

Introduction to Distributed and Parallel Programming

EXHIBIT D

Map-a-Thon

Granite Staters Drawing Fair Voting Maps

Part II

NH House Maps

Released 10/29/2021

Proposed 2020 Voting District Maps for NH House

This NH House maps report is Part II of the Map-a-Thon Project's proposed 2020 voting district maps. This project is supported by Open Democracy Action, the Kent Street Coalition, Granite State Progress and the League of Women Voters New Hampshire. To date, over 250 people have participated in the process, ranging from research and data collection to mapping and analysis.

Our Mapping Process is Fair & Transparent The Map-a-Thon's project is a transparent process, including the software, criteria, data sources, maps, and analysis tools. Interested citizens and legislators can replicate our maps to verify our conclusions. We welcome your efforts to try to make even better maps! Please follow the links in the report to see the maps in our software.

Map-a-Thon maps also use "communities of interest" data when possible to determine what towns should – and should not – be in a district together. These, and other techniques, should be a model for the tools a future independent redistricting commission would use to determine voting districts, replacing the current partisan model. It should be noted that use of communities of interest is limited for House maps because of the hierarchy of constitutional and court rules.

We are disappointed that these constraints make NH representation often less local, personal, and reflective of individual communities. Our 2020 maps do help more Granite Staters get the representation they deserve, but we have a long way to go before our voting districts are truly representational.

Send your comments & corrections to FairVoting@OpenDemocracyNH.org.

Due to many links, this document best viewed as a PDF: OpenDemocracyNH.com/redistricting/mapathonreport2a.pdf

Why NH House Redistricting is Difficult – and Disappointing

Mapping NH House of Representatives districts is constrained by these factors:

- The US and NH Constitutions
- US & NH Supreme Court decisions
- NH statutes
- The high number of state representatives- 400- one of the largest democratic bodies in the world.
- The size and location of our towns
- Traditions which influence deviation from the ideal population, and crossing county boundaries.

These factors often force us to put smaller towns with towns large enough to have their own dedicated voting districts, and sometimes results in larger, multi-town districts.

We hope to make policy recommendations for a better process in 2030.

NH House Map Criteria

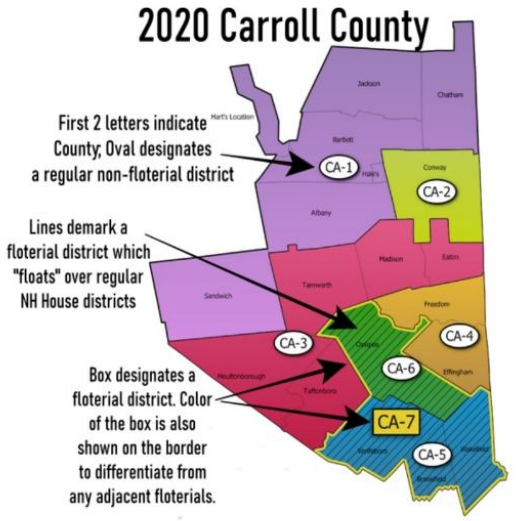
Constraints from the US Constitution, NH Constitution, NH statutes, and court decisions give map makers few options. While it's true that the math drives most of the decisions, we in the Map-a-Thon have worked to find more options within the criteria.

However, where we used Communities of Interest widely in our NH Senate, Executive Council and Congressional districts, we are unable to preserve communities of interest while achieving 1 – 6 on the list. The good news is that we dropped the number of 62 eligible towns which didn't get their own, dedicated NH House districts to 45. But the constraints, in particular the calculation of floterial districts and limits of the 5% deviation above or below the ideal population of 3,444, make dropping that number further much more difficult. The Map-a-Thon team will be studying ways to make improvements and making a recommendation to the legislature for coming redistricting cycles.

	NH House Criteria
1	Population(<9.7%)
2	Preservation of towns/wards
3	Contiguity
4	Preservation of Counties
5	Each town in one non-floterial district
6	Dedicated districts for eligible towns
7	Preservation of COI's
	Possible Criteria
	Preservation of COI's
	Compactness
	Preservation of cores of prior districts
	Avoiding pairing incumbents
	Competitiveness
Key	U.S. Constitution Rule
Key	N.H. Constitution Rule
Key	By State Statute

Important Guidance for Reading Our Maps

There are two types of NH House districts, regular non-floterial districts, and floterial districts which "float" above the regular districts. (Read more at "About NH's Floterial Districts.")



2020 Summary of State House Districts

Map-a-Thon

for Map-a-Thon Project Maps

This summary by county shows the number of state representatives allocated to each county. The "#Violations" refers to a town or city ward which has a population of greater than 3,444, and which is eligible for its own dedicated NH House district as noted in Part II Article 11 in of the NH Constitution, does not receive its exclusive district. In 2011, the number of towns and wards which did not receive a dedicated district was 62 out of 152 eligible. The Map-a-Thon Project has dropped that number from 62 to 45 in its 2020 NH House maps.

County	2020 Pop.	2020 Reps	# Violations
Belknap County	63,705	18	5
Carroll County	50,107	15	3
Cheshire County	76,458	22	4
Coos County	31,268	9	0
Grafton County	91,118	26	3
Hillsborough	422,937	123	6
Merrimack County	153,808	45	6
Rockingham	314,176	91	12
Strafford County	130,889	38	3
Sullivan County	43,063	13	3
Total	1,377,529	400	45

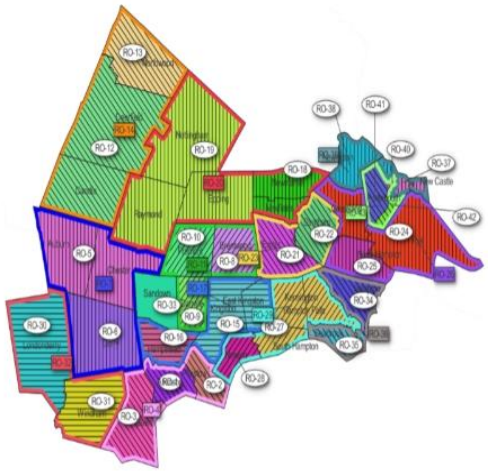
Analysis of Map-a-Thon's House District Competitiveness

The larger Map-a-Thon group decided in May & June of 2021, long before the maps were drawn, that it would not draw maps on the basis of partisan data. We have, however, included an analysis of the Map-a-Thon project's NH House Districts in the interest of transparency, completed after the mapping was complete. Now that it is built, the competitive district analysis can also quickly be applied to non Map-a-Thon maps, such as those being proposed by the NH House Special Committee on Redistricting. To measure competitiveness, we averaged the 2020 NH Executive Council and NH Senate election data to assess our NH House districts.

County NH House Map	Dem	Rep	Competitive	Total	Competitive	Dem	Rep
Belknap non-floterial	0	7	0	7	0.00%	39.60%	60.40%
Belknap floterial	0	1	0	1	0.00%	39.80%	60.20%
Carroll non-floterial	0	4	2	6	33.30%	41.10%	58.90%
Carroll floterial	0	1	0	1	0.00%	35.10%	64.90%
Cheshire non-floterial	7	1	4	12	33.30%	56.20%	43.80%
Cheshire floterial	2	1	2	5	40.00%	56.20%	43.80%
Coos non-floterial	0	4	2	6	33.30%	41.50%	58.50%
Coos floterial	0	0	1	1	100.00%	48.30%	51.70%
Grafton non-floterial	7	3	5	15	33.30%	57.70%	42.30%
Grafton floterial	2	0	2	4	50.00%	61.70%	38.30%
Hillsborough non-floterial	13	6	18	37	48.60%	49.70%	50.30%
Hillsborough floterial	0	3	5	8	62.50%	48.70%	51.30%
Merrimack non-floterial	12	7	3	22	13.60%	50.40%	49.60%
Merrimack floterial	2	2	2	6	33.30%	49.90%	50.10%
Rockingham non-floterial	9	17	4	30	13.30%	46.50%	53.50%
Rockingham floterial	4	7	2	13	15.40%	46.70%	53.30%
Strafford non-floterial	9	4	6	19	31.60%	54.60%	45.40%
Strafford floterial	1	1	4	6	66.70%	52.70%	47.30%
Sullivan non-floterial	1	1	1	3	33.30%	47.20%	52.80%
Total	**69**	**70**	**63**	**202**		**49.30%**	**50.70%**

About New Hampshire's Floterial Districts

New Hampshire's unusual floterial districts – districts which "float" above other districts, are used to apportion remaining population, after the population in multiples of the ideal population (3,444 in 2020 = 1 state rep seat) are assigned. Its use was intended to help for proper representation, but some legal observers suggest that a floterial may be federally unconstitutional. Some floterials may have tens of thousands represented by one or two reps, possibly violating the one person-one vote rule. Bad actors could also employ floterials for gerrymandering. Here's a definition from a 2019 Boston University Law Review article:



Although most district maps are drawn using single-member, multi-member, or at-large districts, a map may also include floterial districts, an infrequently used redistricting device. A floterial is a legislative district "which includes within its boundaries several separate districts or political subdivisions which independently would not be entitled to additional representation but whose conglomerate population entitles the entire area to another seat in the particular legislative body being apportioned. Unlike the more commonly used district types, the Supreme Court has yet to directly rule on the constitutionality of floterials. New Hampshire is the only state that currently uses floterial districts, although several other states have used this redistricting device in the past. "GOBBLEDYGOOK" OR UNCONSTITUTIONAL REDISTRICTING?: FLOTERIAL DISTRICTS AND PARTISAN GERRYMANDERING" by Mikayla Foster, 2019. https://www.bu.edu/bulawreview/files/2019/01/FOSTER-2.pdf

We are now aware that Wyoming, which has a similar rural, low density population, also uses floterials.

Floterials are in our Constitution In 2006, a NH Constitutional Amendment amendment, which NH voters adopted, amended Part 2, Article 11 to say:

[Art.] 11. [Small Towns; Representation by Districts.] When the population of any town or ward, according to the last federal census, is within a reasonable deviation from the ideal population for one or more representative seats, the town or ward shall have its own district of one or more representative seats. The apportionment shall not deny any other town or ward membership in one non-floterial representative district. When any town, ward, or unincorporated place has fewer than the number of inhabitants necessary to entitle it to one representative, the legislature shall form those towns, wards, or unincorporated places into representative districts which contain a sufficient number of inhabitants to entitle each district so formed to one or more representatives for the entire district. In forming the districts, the boundaries of towns, wards, and unincorporated places shall be preserved and contiguous. **The excess number of inhabitants of district may be added to the excess number of inhabitants of other districts to form at-large or floterial districts conforming to acceptable deviations.** The legislature shall form the representative districts at the regular session following every decennial federal census. https://www.nh.gov/glance/house.htm

The Calculation of Floterials Makes Mapping Non-Floterials Districts Complicated A 2002 NH Supreme Court decision, citing the U.S, Constitution's "one person-one vote" provision and threw out the previous "aggregate" method of calculating how the floterial districts are calculated, and recommended a "component" method equation to properly apportion representation. The Map-a-Thon team developed an "Alternative Component Method," but flaws in the math prevented us from moving forward with this approach.

The Map-a-Thon Mapping & Technical Team

Map-a-Thon



David Andrews is a UNH-trained electrical engineer living in Chichester with a passion for data analysis. He is currently a fellow with the Redistricting Data Hub, a national nonprofit assisting governments & organizations with redistricting data. He is lead mapper for the Map-a-Thon project and developed and proposed the Alternative Component Method for calculating floterial districts.



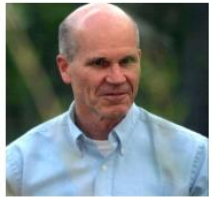
Phil Hatcher retired from UNH after 33 years as a computer science professor, including 10 years as department head. He is a 35-year resident of Dover. He wrote software to aid in the drawing of NH House districts.



Kim Frost is Managing Director of Makana Consulting, a firm that specializes in value-for-money analytics for global health and development organizations. She has an undergraduate degree in philosophy and government from Harvard University and a doctoral degree in epidemiology from University at Buffalo. Kim led the team that collected and analyzed data on communities of interest.



John Cross is an engineer with over 23 years of experience ranging from fundamental physics research to development of complex spacecraft and robot systems for national security missions. He has several advanced and undergraduate degrees in engineering and physics from Johns Hopkins University and Santa Clara University. John led development of the Map-a-Thon map analysis tool.



Bill Brown is a graduate of the US Naval Academy and has his MBA from the Tuck School of Business. Initially serving as a Navy nuclear engineer and nuclear submarine officer he has also worked for companies such as General Electric working performing statistical analysis of large data sets to optimize operations. He holds a Lean Six Sigma Black Belt for business process improvement.



Ian Burke is a research, evaluation, and survey design consultant living in Keene. He grew up in southwestern New Hampshire, and moved back to the region in 2019



Jeffrey Smith spent 30 years as a financial executive with various global information services and software companies in the U.S. and U.K. A New Hampshire resident since 2009, he is a volunteer consultant for area nonprofit organizations, and an adjunct instructor and course designer for Southern New Hampshire University. Jeff has an A.B. in economics from Dartmouth College and a finance MBA from Cornell University. He provided assistance building the Map-a-Thon analysis tool.

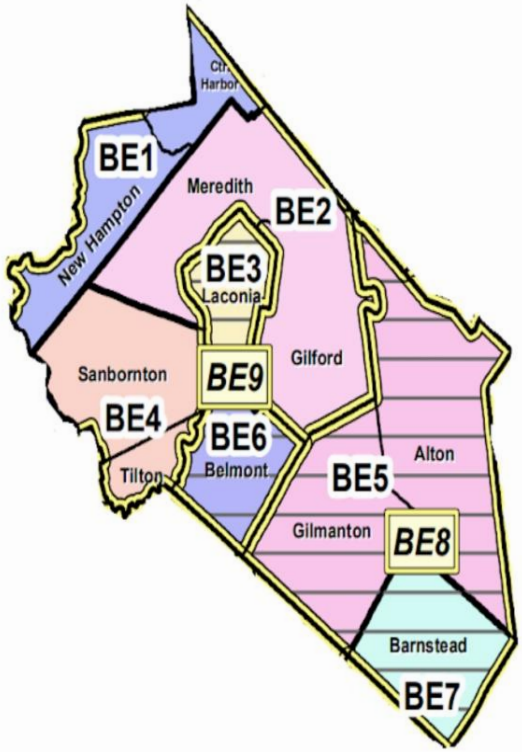
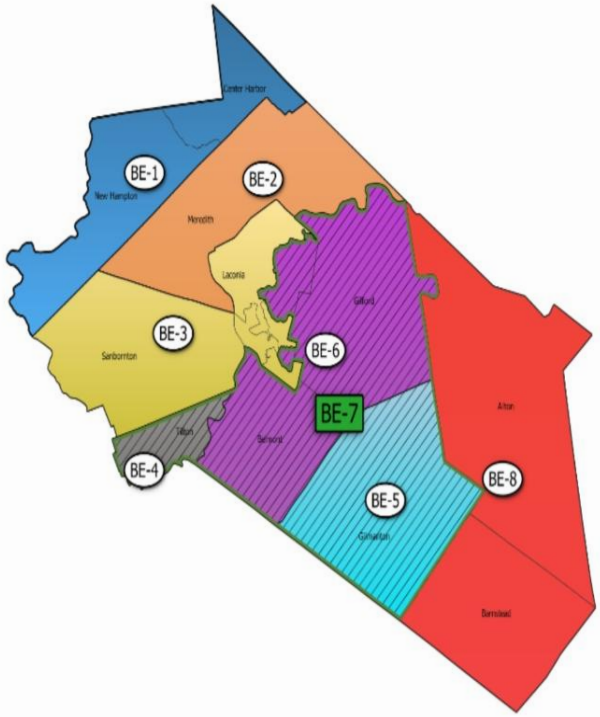
Brian Beihl is deputy director of Open Democracy & Open Democracy Action. He is a 36-year resident of New Hampshire, and recently moved to Alton Bay after decades in the Monadnock Region. He has a degree in Journalism from Michigan State University, and has been responsible for organizing and communications for the Map-a-Thon coalition.



Over 200 Granite Staters participated in the full Map-a-Thon project, helping collect data, making phone calls and assisting in the preparation of surveys, ranking criteria and finally deciding which map options should go forward. We are grateful for everyone's contribution to a fair, nonpartisan and transparent project.

Belknap County

Map-a-Thon

2010 NH House (Current Map)	2020 Map-a-Thon Proposed
	
	Links to M-A-T 2020 maps in DRA 2020 software: Non-Foterial https://davesredistricting.org/join/4d360609-f12a-4a1f-b262-8881687cdc08 Floterial: https://davesredistricting.org/join/bda0702e-c13d-4b6e-b5a9-55886aea57f5

Belknap County Details & Analysis

Belknap County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
BE-1	3,417	1			Center Harbor, New Hampton	-0.78%	
BE-2	6,662	2			Meredith	-3.28%	
BE-3	14,273	4			Sanbornton, Laconia Ward 1*, Laconia Ward 2*, Laconia Ward 3*, Laconia Ward 4*	3.61%	Laconia
BE-4	3,962	1	BE-7	1	Tilton	1.02%	
BE-5	3,945	1			Gilmanton	0.64%	
BE-6	20,637	5			Laconia Ward 5*, Laconia Ward 6*, Belmont, Gilford	4.71%	Belmont, Gilford
BE-8	10,809	3			Alton, Barnstead	4.62%	Alton, Barnstead
Total	63,705	18					5
*Populations used are assumed to be ideal populations for wards							

The small size of Belknap County, the dispersion of towns eligible for their own House districts, and the number of reps to be allocated make the county difficult to map and honor the NH Constitution. The ideal number of reps is 18.498, .002 from having to round to 19, the worst possible scenario. Belknap County also gained population, resulting in a smaller than average window of deviation. Because 8 of 11 towns have a population of greater than 3,444, smaller towns which need to be in districts with other towns often need to be attached to larger towns robbing them of their dedicated House district. Without Constitutional and policy changes, Belknap willl continue to be deprived of proper representation.

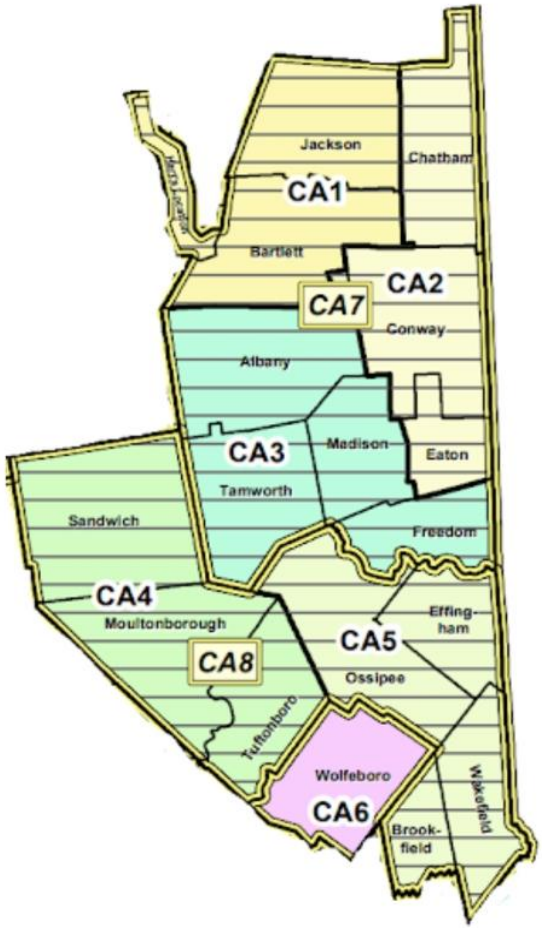
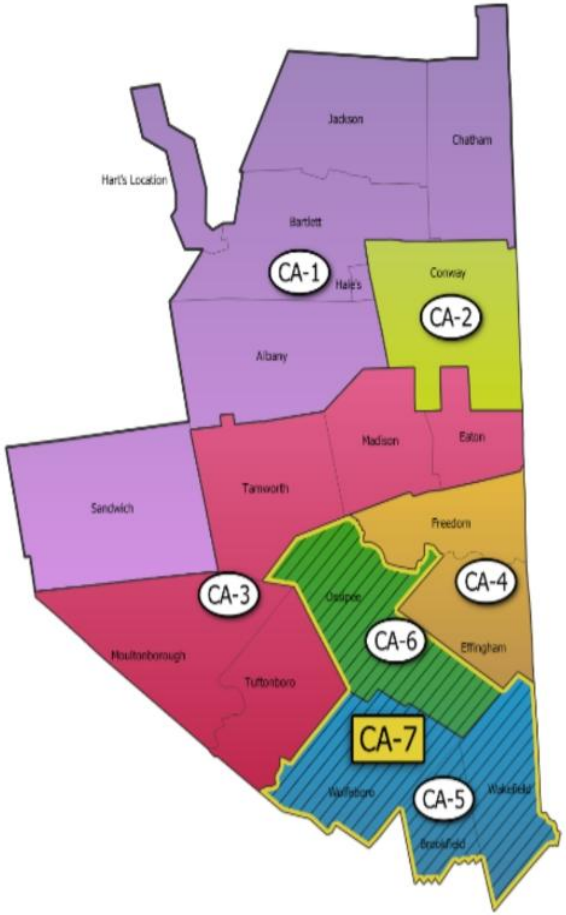
- 3 towns received their own districts - same as in 2010
- Smaller, compact non-floterial districts - not more than 2.5 towns (one ward in Laconia)
- Only one floterial for the county
- Meredith, Gilmanton, Tilton would have their own House districts, but disappointingly, five others would not
- Laconia was not kept intact
- The county's deviations were within +/- 5%, from -3.28 to 4.71%. Total 7.99%

NH House Non-Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	16	0	16	100.0%
Towns/wards in non-floterial district	16	0	16	100.0%
Eligible towns/wards in dedicated district	3	4	7	42.9%
HS SAUs preserved	3	4	7	42.9%
Eligible towns/wards w/ SVI>=5 in dedicated district	0	0	0	#N/A
Competitive districts (averaged 2020 elections)	0	7	7	0.0%
Map Analysis v24 - Belknap Opt1B NF.xlsm				

NH House Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	6	0	6	100.0%
HS SAUs preserved	4	0	4	100.0%
Cities/towns w/ SVI>=5 preserved	0	0	0	#N/A
Competitive districts (averaged 2020 elections)	0	1	1	0.0%
Map Analysis v24 - Belknap Opt1B F.xlsm				

Carroll County

Map-a-Thon

2010 NH House (Current Map)	2020 Map-a-Thon Proposed
	
	Links to M-A-T 2020 maps in DRA 2020 software: Non-Foterial: https://davesredistricting.org/join/15f6618d-f8c7-41d9-85a6-56cf08d482d2 Floterial: https://davesredistricting.org/join/d1dc49d7-7f4e-4be5-adfa-d765c730ee64

Carroll County Details & Analysis

Carroll County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
CA-1	6,994	2			Chatham, Jackson, Bartlett, Hart's Location, Hales Location, Albany, Sandwich	1.54%	
CA-2	9,822	3			Conway	-4.93%	
CA-3	13,167	4			Tuftonboro, Moultonborough, Tamworth, Madison, Eaton	-4.42%	Moultonborough
CA-4	3,380	1			Freedom, Effingham	-1.85%	
CA-5	4,372	1	CA-7	1	Ossipee	0.67%	
CA-6	12,372	3			Wolfeboro, Brookfield, Wakefield	-3.91%	Wolfeboro, Wakefield
Total	50,107	15					3

Some improvements were made in Carroll County vs. 2010, but it is, and will be in the future, challenging. Carroll qualifies for 15 reps (county population divided by 3,444 = 14.55, rounded up to 15). However, the 14.55 adds complexity to the mapping. The southern part of Carroll County has more towns which qualify for their own House districts. The 2010 map districts both Conway and Ossipee in with smaller towns. The 2020 Map-a-Thon gives those towns their own, thus reduces violations of the NH Constitution vs. the 2010 the map, but Wolfeboro loses its own district.

The geography of two towns "force" errors on the map. Brookfield and Tuftonborough are smaller towns surrounded by larger ones. These communities need to be in a district, thus had to be paired with a larger town which should have had its own House district. Freedom and Effingham are now is a smaller district, but Sandwich and Tamworth couldn't be done in our maps, something for which residents have asked.

Two unfortunate results: Sandwich and Albany are technically contiguous, but does not meet our standards for compactness. We also created two large districts out of necessity, but advocate for smaller districts whenever possible.

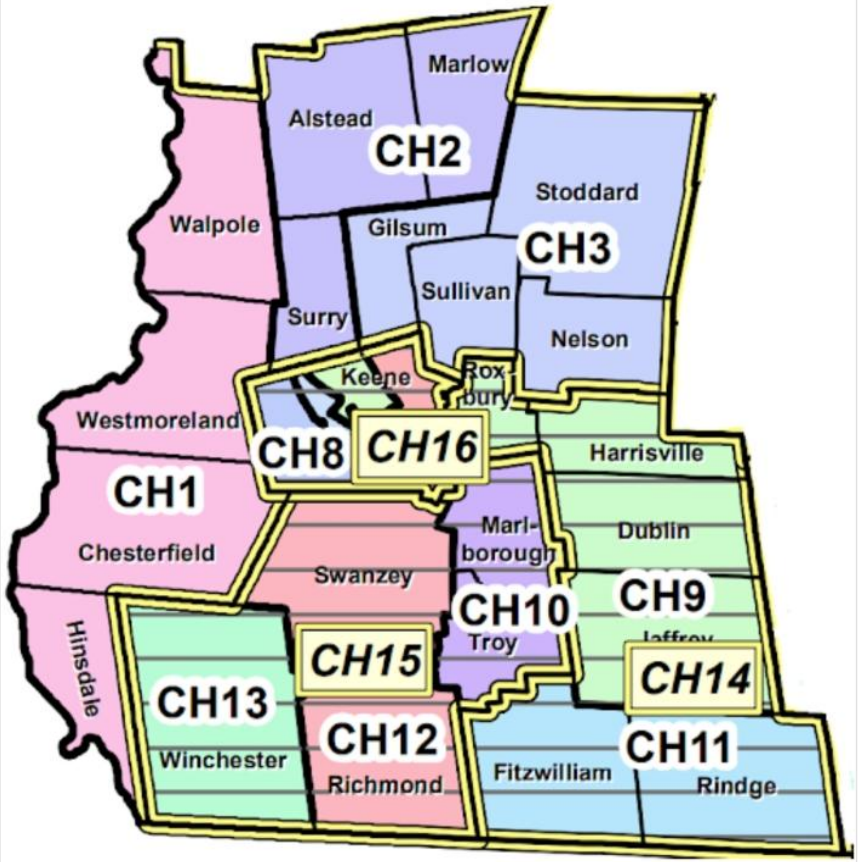
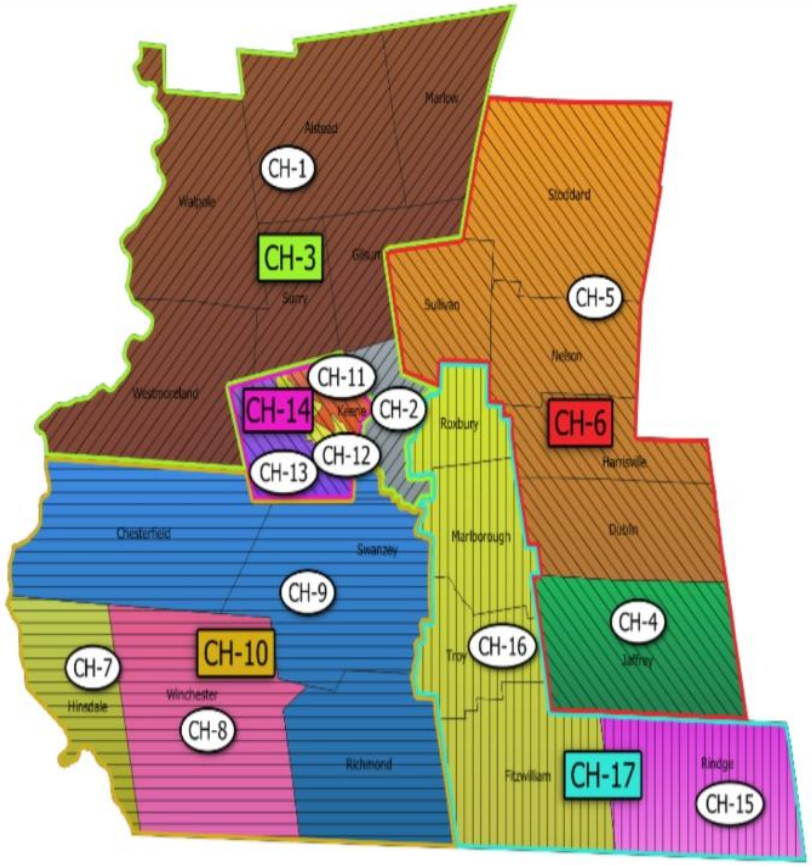
NH House Non-Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	19	0	19	100.0%
Towns/wards in non-floterial district	19	0	19	100.0%
Eligible towns/wards in dedicated district	2	3	5	40.0%
HS SAUs preserved	4	2	6	66.7%
Eligible towns/wards w/ SVI>=5 in dedicated district	0	0	0	#N/A
Competitive districts (averaged 2020 elections)	2	4	6	33.3%
NHHouse-Carroll-2020Opt4NonF-V24-20211026.xlsm				

NH House Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	4	0	4	100.0%
HS SAUs preserved	2	0	2	100.0%
Cities/towns w/ SVI>=5 preserved	0	0	0	#N/A
Competitive districts (averaged 2020 elections)	0	1	1	0.0%
NHHouse-Carroll-2020Opt4Flot-V24-20211026.xlsm				

Deviations for Carroll County ranges from -4.93 to 1.54 % for an overall deviation of +/- 6.47%

Cheshire County

Map-a-Thon

2010 NH House (Current Map)	2020 Map-a-Thon Proposed
	
	Links to M-A-T 2020 maps in DRA 2020 software: Non-Foterial: https://davesredistricting.org/join/e533280a-0033-443a-af7c-1baa97df1691 Floterial: https://davesredistricting.org/join/695414e9-bdec-4382-b4a5-06097c114678

Cheshire County Details & Analysis

Cheshire County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
CH-1	9,524	2	CH-3	1	Walpole, Alstead, Marlow, Westmoreland, Surry, Gilsum	3.43%	Walpole
CH-2	4,609	1			Keene Ward 2*	0.92%	
CH-4	5,320	1	CH-6	1	Jaffrey	2.52%	
CH-5	5,177	1			Sullivan, Stoddard, Nelson, Harrisville, Dublin	0.68%	
CH-7	3,948	1	CH-10	1	Hinsdale	-1.14%	
CH-8	4,150	1			Winchester	3.19%	
CH-9	16,629	4			Chesterfield, Swanzey, Richmond, Keene Ward 1*	3.34%	Chesterfield, Swanzey, Keene
CH-11	4,610	1	CH-14	1	Keene Ward 3*	0.40%	
CH-12	4,610	1			Keene Ward 4*	0.40%	
CH-13	4,609	1			Keene Ward 5*	0.38%	
CH-15	6,476	1	CH-17	2	Rindge	-4.83%	
CH-16	6,797	1			Roxbury,Marlborough,Troy,Fitzwilliam	-2.50%	
Total	32,728	22					4
*Populations used are assumed to be ideal populations for wards							

Cheshire County lost a state representative seat due to a loss of population in the last 10 years, one of the reasons the map needs to be adjusted.

One of the advantages of the Map-a-Thon map includes facilitating four eligible towns to receive their own House districts, vs. two in 2010. This includes Hinsdale, Jaffrey, Ridge & Winchester. But these improvements come with baggage. Some districts are larger than 2010, and all towns are in a floterial. Reducing floterials would have resulted in even larger districts.

Three of Keene's wards were added to a floterial (3,4,5), and Ward 1 connected to other towns. Ward 2 is in a floterial with other towns.

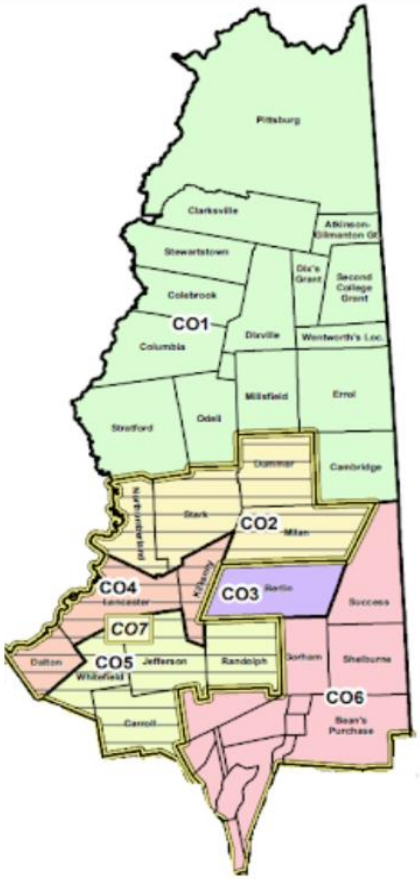
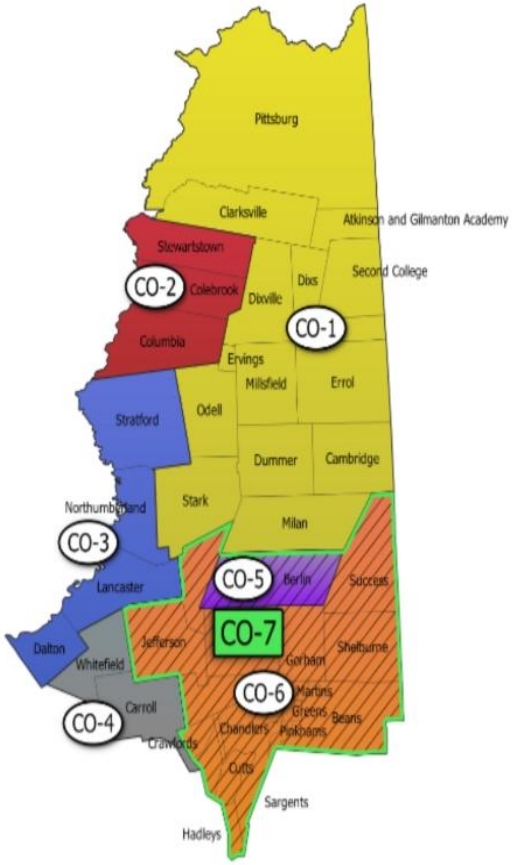
NH House Non-Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	27	0	27	100.0%
Towns/wards in non-floterial district	27	0	27	100.0%
Eligible towns/wards in dedicated district	8	4	12	66.7%
HS SAUs preserved	6	3	9	66.7%
Eligible towns/wards w/ SVI>=5 in dedicated district	1	0	1	100.0%
Competitive districts (averaged 2020 elections)	4	8	12	33.3%
NHHouse-Cheshire-2020Opt1BNonF-V24-20211026.xlsm				

NH House Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	27	0	27	100.0%
HS SAUs preserved	6	3	9	66.7%
Cities/towns w/ SVI>=5 preserved	1	0	1	100.0%
Competitive districts (averaged 2020 elections)	2	3	5	40.0%
NHHouse-Cheshire-2020Opt1BFlot-V24-20211026.xlsm				

2010's Cheshire District 1 is broken up into now in smaller districts, with a smaller in population per district, with eligible Hinsdale receiving its own dedicated House district.

Coos County

Map-a-Thon

2010 NH House (Current Map)	2020 Map-a-Thon Proposed
	
	Links to M-A-T 2020 maps in DRA 2020 software: Non-Foterial: https://davesredistricting.org/join/609e2209-13c6-446e-8fff-09f773bc047c Floterial: https://davesredistricting.org/join/64b2fd8b-a3c6-47fd-aa3b-b4c5a01136d0

Coos County Details & Analysis

Coos County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
CO-1	3,609	1			Pittsburg, Clarksville, Dixville, Odell, Stark, Milan, Dummer, Cambridge, Millsfield, Errol, Wentworth Location, College Grant, Dixs Grant, Atkinson and Gilmanton Grant, Ervings Location,	4.80%	
CO-2	3,556	1			Stewartstown, Colebrook, Columbia	3.26%	
CO-3	6,939	2			Stratford, Northumberland, Lancaster, Dalton	0.75%	
CO-4	3,310	1			Whitefield, Carroll	-3.89%	
CO-5	9,425	2	CO-7	1	Berlin	2.11%	
CO-6	4,429	1			Jefferson, Randolph, Gorham, Shelburne, Success, Kilkenny, Burbanks Grant, Crawfords Purchase, Beans Grant, Cutts Grant, Hadleys Purchase, Sargents Purchase, Thompson and Merserves Purchase, Martins Location, Greens Grant, Pinkhams Grant, Beans Purchase	-2.55%	
Total	31,268	8					0

Map-a-Thon's 2020 proposal for Coos has zero violations of the NH Constitution for towns eligible for their own House district. There had been two towns eligible, but Lancaster lost population since 2010, and no longer qualifies.

Most of the districts now follow the roads, making it easier for legislators to travel their districts, and we have the same number of districts, but Coos did lose a seat because of population loss.

The sparsely-populated North Country unfortunately means large, sprawling districts, no matter who is doing the mapping.

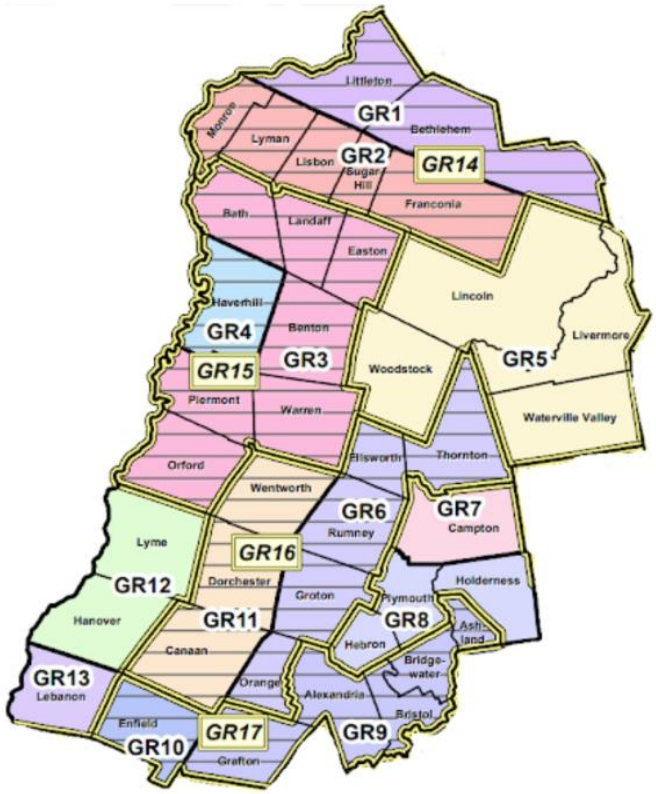
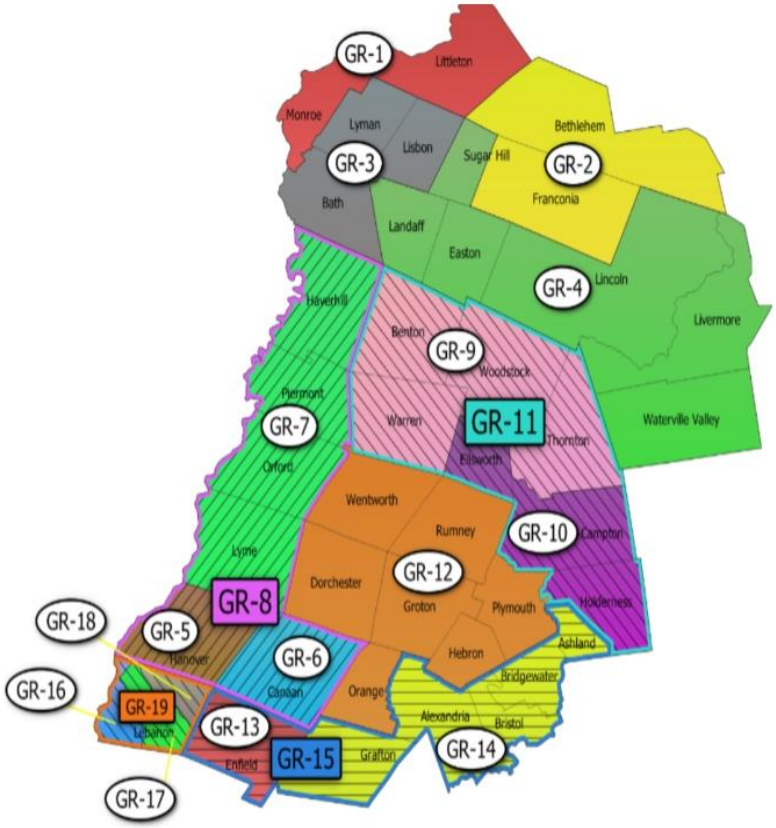
The deviation ranges from -3.89 to 4.80, a total of 8.69%

NH House Non-Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	43	0	43	100.0%
Towns/wards in non-floterial district	43	0	43	100.0%
Eligible towns/wards in dedicated district	1	0	1	100.0%
HS SAUs preserved	0	5	5	0.0%
Eligible towns/wards w/ SVI>=5 in dedicated district	1	0	1	100.0%
Competitive districts (averaged 2020 elections)	2	4	6	33.3%
Map Analysis v24 - Coos Opt1 NF.xlsm				

NH House Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	19	0	19	100.0%
HS SAUs preserved	3	0	3	100.0%
Cities/towns w/ SVI>=5 preserved	1	0	1	100.0%
Competitive districts (averaged 2020 elections)	1	0	1	100.0%
Map Analysis v24 - Coos Opt1 F.xlsm				

Grafton County

Map-a-Thon

2010 NH House (Current Map)	2020 Map-a-Thon Proposed
	
	Links to M-A-T 2020 maps in DRA 2020 software: Non-Foterial: https://davesredistricting.org/join/fc01e1ed-4bcd-4664-8eff-02c39045a57c Floterial: https://davesredistricting.org/join/cb2db4a0-5dd1-45c5-93c5-25849acbdc4b

Grafton County Details & Analysis

Grafton County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
GR-1	6,869	2			Littleton, Monroe	-0.27%	Littleton
GR-2	3,567	1			Bethlehem, Franconia	3.58%	
GR-3	3,283	1			Lyman, Lisbon, Bath	-4.67%	
GR-4	3,526	1			Sugar Hill, Landaff, Easton, Lincoln, Livermore, Waterville Valley	2.39%	
GR-5	11,870	3	GR-8	1	Hanover	-1.37%	
GR-6	3,794	1			Canaan	-4.87%	
GR-7	8,336	2			Haverhill, Piermont, Orford, Lyme	3.12%	Haverhill
GR-9	5,341	1	GR-11	1	Benton, Warren, Woodstock, Thornton	3.71%	
GR-10	5,440	1			Ellsworth, Campton, Holderness	4.99%	
GR-12	10,842	3			Wentworth, Rumney, Dorchester, Groton, Plymouth,Hebron, Orange	4.94%	Plymouth
GR-13	4,465	1	GR-15	1	Enfield	-1.75%	
GR-14	9,503	2			Grafton, Alexandria, Bristol, Bridgewater, Ashland	2.95%	
GR-16	4,761	1	GR-19	1	Lebanon Ward 1*	3.68%	
GR-17	4,761	1			Lebanon Ward 2*	3.68%	
GR-18	4,760	1			Lebanon Ward 3*	3.67%	
Total	91,118	26					3
*Populations used are assumed to be ideal populations for wards							

Our maps do not make significant headway on getting towns their own House districts, with the same number in both the 2010 as with our 2020 maps. Our maps have three violations, with the eligible towns of Littleton, Haverhill and Plymouth included in multi-town districts.

The Map-a-Thon maps have dedicated House districts for Canaan, Enfield .Lebanon & Hanover, and for a total of six out of nine eligible towns.

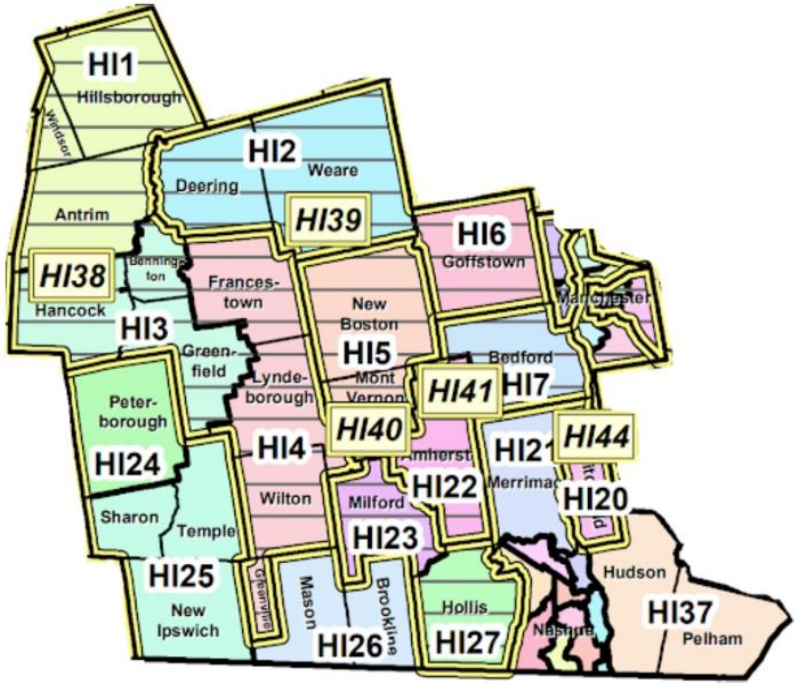
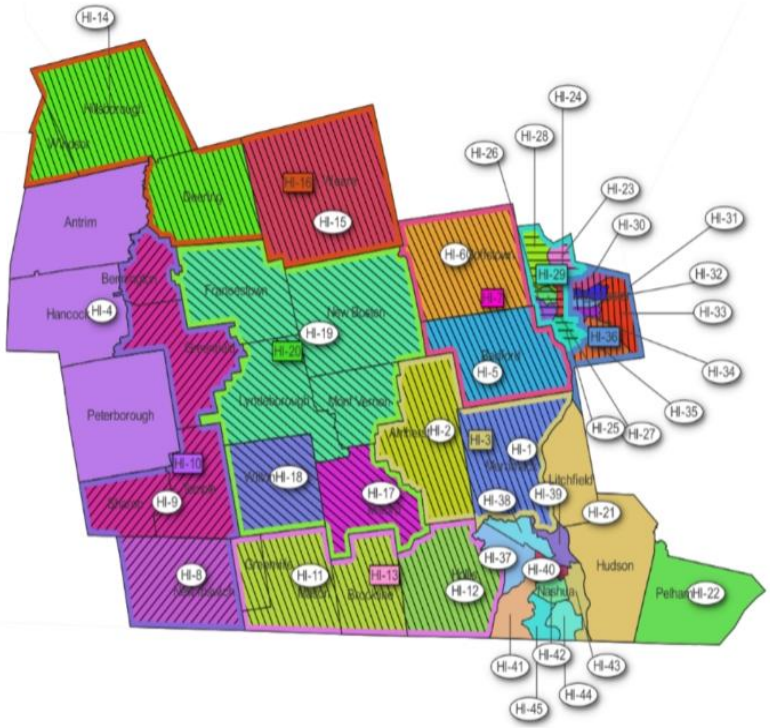
As with some of the other counties, the ideal number of reps was calculated at 26.458, making for somewhat high deviations, from – 4.67% to 4.99%, a total of 9.66% out of a possible range of 10%.

NH House Non-Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	42	0	42	100.0%
Towns/wards in non-floterial district	42	0	42	100.0%
Eligible towns/wards in dedicated district	6	3	9	66.7%
HS SAUs preserved	3	8	11	27.3%
Eligible towns/wards w/ SVI>=5 in dedicated district	0	0	0	#N/A
Competitive districts (averaged 2020 elections)	5	10	15	33.3%
NHHouse-Grafton-2020Opt1NonF-V24-20211026.xlsm				

NH House Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	22	0	22	100.0%
HS SAUs preserved	5	3	8	62.5%
Cities/towns w/ SVI>=5 preserved	0	0	0	#N/A
Competitive districts (averaged 2020 elections)	2	2	4	50.0%
NHHouse-Grafton-2020Opt1Flot-V24-20211026.xlsm				

Hillsborough County

Map-a-Thon

2010 NH House (Current Map)	2020 Map-a-Thon Proposed
	
	Links to M-A-T 2020 maps in DRA 2020 software: Non-Foterial: https://davesredistricting.org/join/31c5ddc0-3a72-4ac1-bac2-57c8a5dc5f0d Floterial: https://davesredistricting.org/join/63bbb716-7f3d-4a6e-9bf6-b4b5832cc4ff

Hillsborough County Details & Analysis

Hillsborough County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
1	26,632	7	HI-3	1	Merrimack	0.51%	
2	11,753	3			Amherst	3.22%	
4	10,800	3			Antrim, Hancock, Peterborough	4.54%	Peterborough
5	23,322	6	HI-6	1	Bedford	3.29%	
6	18,577	5			Goffstown	-0.90%	
8	5,204	1	HI-10	1	New Ipswich	-0.10%	
9	4,949	1			Bennington, Greenfield, Sharon, Temple	-3.39%	
11	9,061	2	HI-13	1	Brookline, Greenville, Mason	4.38%	Brookline
12	8,342	2			Hollis	-2.30%	
14	8,105	2	HI-16	1	Deering, Hillsborough, Windsor	-4.77%	Hillsborough
15	9,092	2			Weare	4.41%	
17	16,131	4	HI-20	1	Milford	4.01%	
18	3,896	1			Wilton	0.87%	
19	12,013	3			Francestown, Lyndeborough, Mont Vernon, New Boston	3.36%	New Boston
21	33,872	10			Hudson, Litchfield	-1.64%	Hudson, Litchfield
22	14,222	4			Pelham	3.24%	
23	9,637	2	HI-29	5	Manchester Ward 1*	-1.23%	
24	9,637	2			Manchester Ward 3*	-1.23%	
25	9,637	2			Manchester Ward 9*	-1.23%	
26	9,637	2			Manchester Ward 10*	-1.23%	
27	9,637	2			Manchester Ward 11*	-1.23%	
28	9,637	2			Manchester Ward 12*	-1.23%	
30	9,637	2	HI-36	5	Manchester Ward 2*	-1.23%	
31	9,637	2			Manchester Ward 4*	-1.23%	
32	9,637	2			Manchester Ward 5*	-1.23%	
33	9,637	2			Manchester Ward 6*	-1.23%	
34	9,637	2			Manchester Ward 7*	-1.23%	
35	9,637	2			Manchester Ward 8*	-1.23%	
37	10,147	3			Nashua Ward 1*	-1.79%	
38	10,147	3			Nashua Ward 2*	-1.79%	
39	10,147	3			Nashua Ward 3*	-1.79%	
40	10,147	3			Nashua Ward 4*	-1.79%	
41	10,147	3			Nashua Ward 5*	-1.79%	
42	10,147	3			Nashua Ward 6*	-1.79%	
43	10,147	3			Nashua Ward 7*	-1.79%	
44	10,147	3			Nashua Ward 8*	-1.79%	
45	10,146	3			Nashua Ward 9*	-1.80%	
Total	422,937	123					6
*Populations used are assumed to be ideal populations for wards							

Our Hillsborough County map made some significant improvements over 2010. There are 37 towns & city wards eligible for their own House districts(s), and the Map-a-Thon maps reduced the violations from eight to six for that Constitutional requirement.

New Hampshire's most populous county receives 122.81 state representatives, rounded up to 123.

Particular challenges for Hillsborough County includes the larger towns in the eastern part of the county sometimes have no choice but to have smaller towns in a district. The western end of the county has many smaller towns less than the 3,444 ideal population which need to be grouped together.

NH House Non-Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	50	0	50	100.0%
Towns/wards in non-floterial district	50	0	50	100.0%
Eligible towns/wards in dedicated district	31	6	37	83.8%
HS SAUs preserved	7	9	16	43.8%
Eligible towns/wards w/ SVI>=5 in dedicated district	21	0	21	100.0%
Competitive districts (averaged 2020 elections)	18	19	37	48.6%
Map Analysis v24 - Hillsborough Opt1 NF.xlsm				

NH House Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	35	0	35	100.0%
HS SAUs preserved	6	6	12	50.0%
Cities/towns w/ SVI>=5 preserved	0	1	1	0.0%
Competitive districts (averaged 2020 elections)	5	3	8	62.5%
Map Analysis v24 - Hillsborough Opt1 F.xlsm				

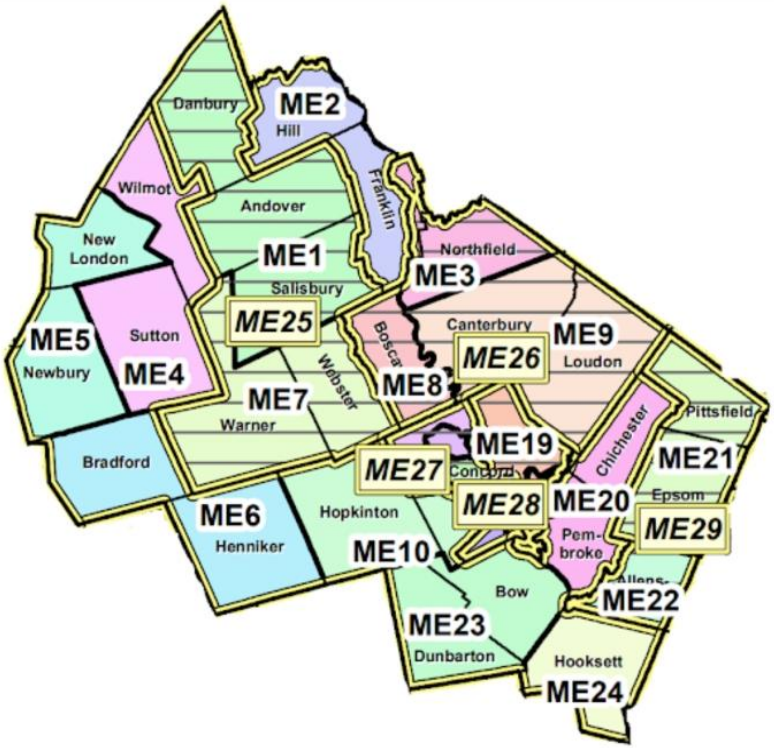
One particular problem on the 2010 map included the incredibly large district of Hudson & Pelham, Hillsborough District 37. Both towns made substantial population gains in the preceding decade, and stand at 25,826 for Hudson and 14,222. Because of its larger number of voters, Hudson candidates dominate the elections, leaving Pelham underrepresented. On the downside, the smaller but still own-district eligible Litchfield was included in a district with Hudson.

Weare, Wilton & New Ipswich, none of which had their own districts in 2010, got them in Map-a-Thon's maps. While Peterborough lost its own House district, it did get included in a district with Hancock & Antrim, all within the same ConVal School District. Antrim had previously been with Windsor and Hillsborough, despite Windsor and Hillsborough being in the Hillsborough-Deering School District. Hillsborough Deering & Most ConVal towns are districted together Although Brookline did not get it's own district, it was put in a district in which it shares communities of interest.

Deviations for Hillsborough County ranged from -4.77 to 4.54%, with a 9.31% total deviation.`

Merrimack County

Map-a-Thon

2010 NH House (Current Map)	2020 Map-a-Thon Proposed
	
	Links to M-A-T 2020 maps in DRA 2020 software: Non-Foterial: https://davesredistricting.org/join/b49443d2-783f-4e82-8e6b-eaf1b3199821 Floterial: https://davesredistricting.org/join/e8237b09-268c-4deb-add8-a7b2fedc5144

Merrimack County Details & Analysis

Merrimack County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
ME-1	4,400	1	ME-3	1	New London	-3.79%	
ME-2	9,017	2			Warner, Andover, Wilmot, Hill, Danbury	-2.01%	
ME-4	8,741	2	ME-6	1	Franklin	-3.93%	
ME-5	4,872	1			Northfield	4.18%	
ME-7	3,335	1			Salisbury, Webster	-3.16%	
ME-8	17,911	5			Sutton, Newbury, Bradford, Hopkinton, Henniker	4.02%	Hopkinton, Henniker
ME-9	3,998	1	ME-12	1	Boscawen	-0.76%	
ME-10	4,075	1			Pittsfield	0.86%	
ME-11	15,464	4			Canterbury, Loudon, Chichester, Epsom	-3.58%	Loudon, Epsom
ME-13	7,207	2	ME-16	1	Pembroke	-4.42%	
ME-14	14,871	4			Hooksett	-1.66%	
ME-15	15,941	4			Allenstown, Bow, Dunbarton	4.74%	Allenstown, Bow
ME-17	4,398	1	ME-25	2	Concord Ward 1*	-0.67%	
ME-18	4,398	1			Concord Ward 2*	-0.67%	
ME-19	4,398	1			Concord Ward 3*	-0.67%	
ME-21	4,398	1			Concord Ward 4*	-0.67%	
ME-22	4,398	1			Concord Ward 5*	-0.67%	
ME-23	4,398	1			Concord Ward 6*	-0.67%	
ME-24	4,397	1			Concord Ward 7*	-0.69%	
ME-26	4,397	1	ME-29	1	Concord Ward 8*	-4.24%	
ME-27	4,397	1			Concord Ward 9*	-4.24%	
ME-28	4,397	1			Concord Ward 10*	-4.24%	
Total	153,808	45					6
*Populations used are assumed to be ideal populations for wards							

One of the biggest improvements for NH House district maps was made in Merrimack County. In 2010, there were 11 violations of the NH Constitution, but in our maps, just six. Three towns, Chichester, Canterbury, Dunbarton, are surrounded by larger, own-district eligible towns, forcing violations. There's nothing we can do without a change in Constitutional rules.

Merrimack receives 44.662 reps and like other counties, the distance from a whole number makes it more challenging.

Good news: Franklin is no longer connected with Northfield (floterial added); Concord is no longer districted with Hopkinton; and New London, Pittsfield, Pembroke, all get their own district. Unfortunately, though, Epson & Allenstown lose their own district

Deviations for Merrimack ranged from -4.42 to 4.74% for a total

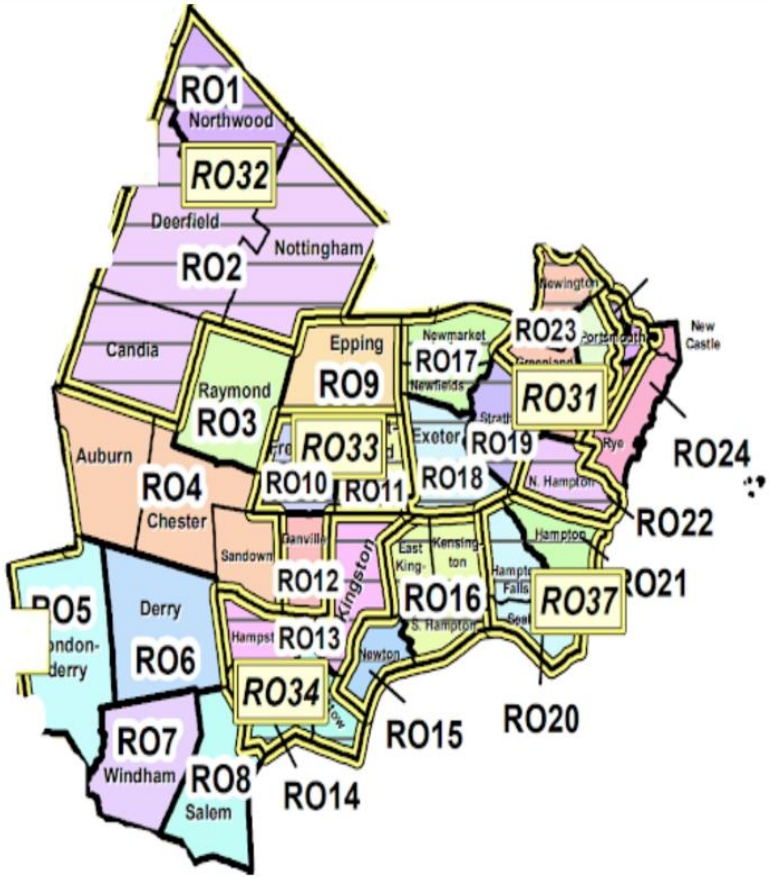
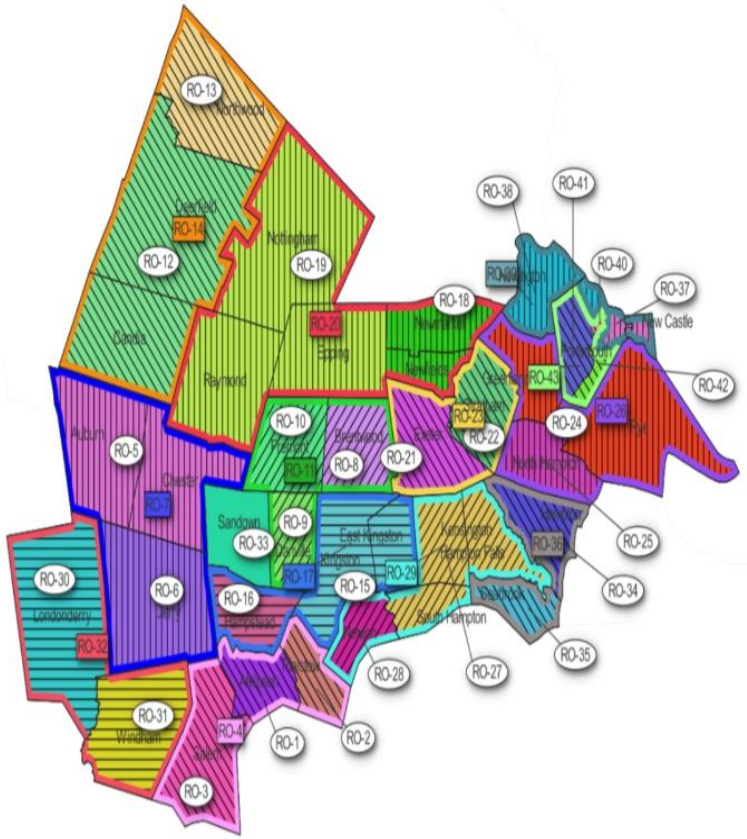
NH House Non-Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	38	0	38	100.0%
Towns/wards in non-floterial district	38	0	38	100.0%
Eligible towns/wards in dedicated district	16	6	22	72.7%
HS SAUs preserved	9	4	13	69.2%
Eligible towns/wards w/ SVI>=5 in dedicated district	10	0	10	100.0%
Competitive districts (averaged 2020 elections)	3	19	22	13.6%
Map Analysis v24 - Merrimack Opt1 NF.xlsm				

NH House Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	31	0	31	100.0%
HS SAUs preserved	8	3	11	72.7%
Cities/towns w/ SVI>=5 preserved	0	1	1	0.0%
Competitive districts (averaged 2020 elections)	2	4	6	33.3%
Map Analysis v24 - Merrimack Opt1 F.xlsm				

range of 9.16%.

Rockingham County

Map-a-Thon

2010 NH House (Current Map)	2020 Map-a-Thon Proposed
	
	Links to M-A-T 2020 maps in DRA 2020 software: Non-Foterial: https://davesredistricting.org/join/04213051-c1e0-4e58-adee-e0a639e29e01 Floterial: https://davesredistricting.org/join/eb3fed9e-5164-48cd-b0e2-db7bf9e255ad

Rockingham County Details & Analysis

Rockingham County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
RO-1	7,087	2	RO-4	1	Atkinson	-4.62%	
RO-2	7,830	2			Plaistow	4.58%	
RO-3	30,089	8			Salem	0.79%	
RO-5	11,178	3	RO-7	1	Auburn, Chester	0.00%	Auburn, Chester
RO-6	34,317	9			Derry	2.16%	
RO-8	4,490	1	RO-11	1	Brentwood	-1.92%	
RO-9	4,408	1			Danville	-3.27%	
RO-10	4,739	1			Fremont	2.12%	
RO-12	8,868	2	RO-14	1	Candia, Deerfield	-3.06%	Candia, Deerfield
RO-13	4,641	1			Northwood	0.30%	
RO-15	8,643	2	RO-17	1	East Kingston, Kingston	0.79%	Kingston
RO-16	8,998	2			Hampstead	4.09%	
RO-18	11,199	3	RO-20	1	Newfields, Newmarket	-2.26%	Newmarket
RO-19	23,038	6			Epping, Nottingham, Raymond	0.25%	Epping, Nottingham, Raymond
RO-21	16,049	4	RO-23	1	Exeter	-0.35%	
RO-22	7,669	2			Stratham	-4.15%	
RO-24	9,610	2	RO-26	1	Greenland, Rye	4.15%	Greenland, Rye
RO-25	4,538	1			North Hampton	-0.23%	
RO-27	5,392	1	RO-29	1	Hampton Falls, Kensington, South Hampton	2.47%	
RO-28	4,820	1			Newton	-4.92%	
RO-30	25,826	7	RO-32	1	Londonderry	-1.59%	
RO-31	15,817	4			Windham	4.86%	
RO-33	6,548	2			Sandown	-4.93%	
RO-34	16,214	4	RO-36	1	Hampton	1.06%	
RO-35	8,401	2			Seabrook	4.19%	
RO-37	5,391	1	RO-39	1	Portsmouth Ward 5*, New Castle	3.74%	Portsmouth
RO-38	5,202	1			Portsmouth Ward 1*, Newington	1.30%	
RO-40	4,391	1	RO-43	1	Portsmouth Ward 2*	-4.37%	
RO-41	4,391	1			Portsmouth Ward 3*	-4.37%	
RO-42	4,392	1			Portsmouth Ward 4*	-4.35%	
Total	314,176	91					12
*Populations used are assumed to be ideal populations for wards							

Rockingham County saw significant growth 2010 to 2020, surging from 295,223 to 314,176, so its maps have shifted significantly in some areas. It now gets 91.228 state reps.

It also has many own-seat eligible towns, plus has the geographic limitations of the seacoast border.

That said, Map-a-Thon maps show a slight improvement of two additional towns getting dedicated House districts. This includes Atkinson, Plaistow, Hampstead, Sandown & Seabrook. In working for the greater good, Epping & Raymond unfortunately lost their own district in our maps.

NH House Non-Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	41	0	41	100.0%
Towns/wards in non-floterial district	41	0	41	100.0%
Eligible towns/wards in dedicated district	21	13	34	61.8%
HS SAUs preserved	10	7	17	58.8%
Eligible towns/wards w/ SVI>=5 in dedicated district	0	0	0	#N/A
Competitive districts (averaged 2020 elections)	4	26	30	13.3%

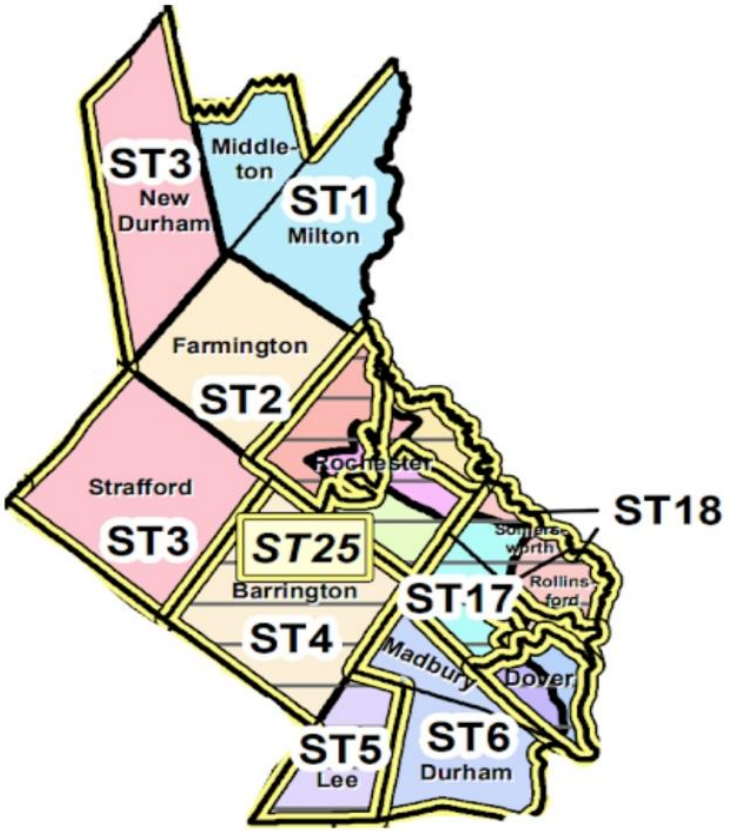
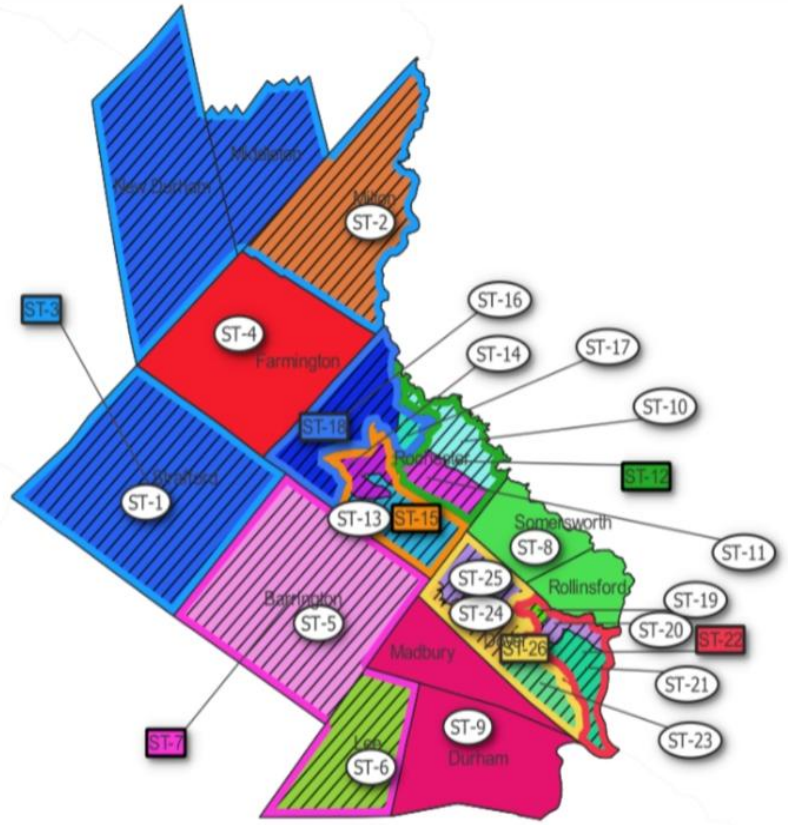
NH House Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	40	0	40	100.0%
HS SAUs preserved	10	7	17	58.8%
Cities/towns w/ SVI>=5 preserved	0	0	0	#N/A
Competitive districts (averaged 2020 elections)	2	11	13	15.4%
NHHouse-Rockingham-2020Opt1BFlot-V24-20211026.xlsm				

Three of Rockingham's violations couldn't be helped under our current Constitutional & court constraints. Newington, Newfields and New Castle are small towns surrounded by larger, own-district eligible towns, and need to be in a district with another town. That creates violations for some of the surrounding towns.

Rockingham County has a deviation range of -4.93 to 4.86%, with a total range of 9.79%.

Stafford County

Map-a-Thon

2010 NH House (Current Map)	2020 Map-a-Thon Proposed
	
	Links to M-A-T 2020 maps in DRA 2020 software: Non-Foterial: https://davesredistricting.org/join/b39e6f9e-fe24-4ebf-99cc-408cd8a8f02a Floterial: https://davesredistricting.org/join/5536f565-ef3e-40f6-8dce-0d540daab858

Strafford County Details & Analysis

Strafford County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
ST-1	8,746	2	ST-3	1	Middleton, New Durham, Strafford	-4.57%	Strafford
ST-2	4,482	1			Milton	-2.79%	
ST-4	6,722	2			Farmington	-2.40%	
ST-5	9,326	2	ST-7	1	Barrington	1.29%	
ST-6	4,520	1			Lee	-1.05%	
ST-8	14,452	4			Somersworth Wards 1-5*, Rollinsford	4.91%	Somersworth
ST-9	17,408	5			Madbury, Durham	1.10%	Durham
ST-10	5,415	1	ST-12	1	Rochester Ward 1*	4.83%	
ST-11	5,415	1			Rochester Ward 2*	4.83%	
ST-13	5,415	1	ST-15	1	Rochester Ward 3*	4.83%	
ST-14	5,415	1			Rochester Ward 4*	4.83%	
ST-16	5,416	1	ST-18	1	Rochester Ward 5*	4.84%	
ST-17	5,416	1			Rochester Ward 6*	4.84%	
ST-19	5,457	1	ST-22	2	Dover Ward 1*	-4.93%	
ST-20	5,457	1			Dover Ward 2*	-4.93%	
ST-21	5,457	1			Dover Ward 3*	-4.93%	
ST-23	5,457	1	ST-26	2	Dover Ward 4*	-4.93%	
ST-24	5,457	1			Dover Ward 5*	-4.93%	
ST-25	5,456	1			Dover Ward 6*	-4.94%	
Total	32,741	38					3
*Populations used are assumed to be ideal populations for wards							

Map-a-Thon succeeded only with a slight improvement of two additional towns getting their own districts. Disappointing was that we had to leave district with Strafford and New Durham, which connects in the middle of the woods.

Two “forced” violations are Rollingsford and Madbury, which need to be districted with surrounding larger towns.

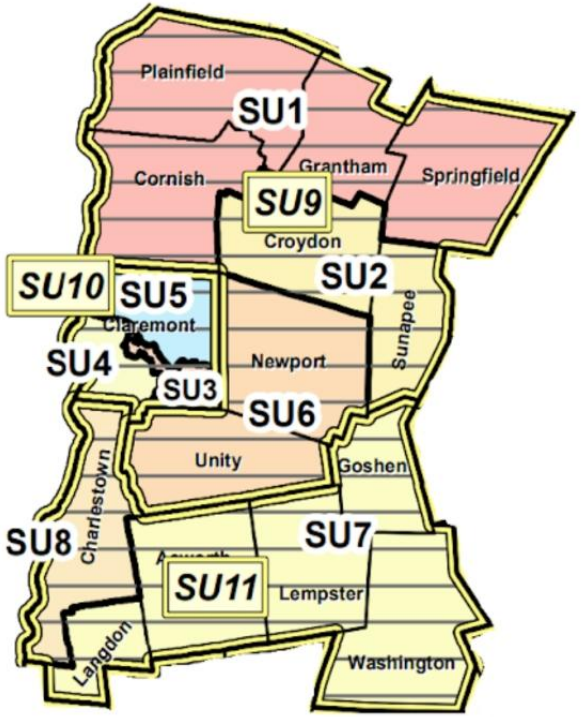
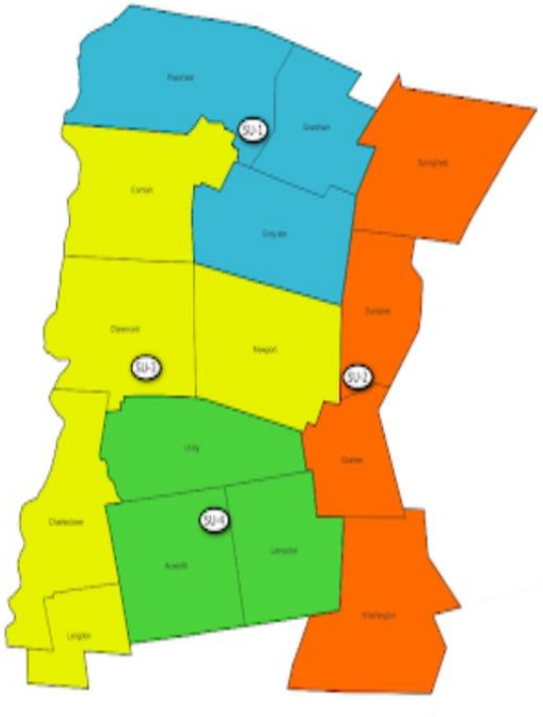
Towns which did get their dedicated districts were Milton & Dover, and Barrington, Lee, Rochester & Farmington kept their districts.
Deviations for Strafford are -4.93 to 4.91%,9.84% Total.

NH House Non-Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	27	0	27	100.0%
Towns/wards in non-floterial district	27	0	27	100.0%
Eligible towns/wards in dedicated district	16	2	18	88.9%
HS SAUs preserved	6	3	9	66.7%
Eligible towns/wards w/ SVI>=5 in dedicated district	0	1	1	0.0%
Competitive districts (averaged 2020 elections)	6	13	19	31.6%
NHHouse-Strafford-2020Opt1NonF-V24-20211026.xlsm				

NH House Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	18	0	18	100.0%
HS SAUs preserved	6	1	7	85.7%
Cities/towns w/ SVI>=5 preserved	0	0	0	#N/A
Competitive districts (averaged 2020 elections)	4	2	6	66.7%

Sullivan County

Map-a-Thon

2010 NH House (Current Map)	2020 Map-a-Thon Proposed
	
	Links to M-A-T 2020 maps in DRA 2020 software: Non-Foterial: Floterial:

Sullivan County Details & Analysis

Sullivan County Proposal					
District	Population	# Reps	Towns/Wards	% Deviation	Violations
1	6,664	2	Plainfield, Grantham, Croydon	-3.25%	
2	6,589	2	Springfield, Sunapee, Goshen, Washington	-4.34%	
3	26,321	8	Cornish, Claremont, Newport, Charlestown, Langdon	-4.46%	Claremont, Newport, Charlestown
4	3,489	1	Unity, Acworth, Lempster	1.31%	
Total	43,063	13			3

We're sorry to report that Sullivan County is the only county which has more violations for 2020 than in 2010.

Population loss led to a reduction to an apportionment of 12.504 reps, which made it measurable harder to allocate the representation over the towns. Floterials can sometimes help, but did not help in Sullivan.

NH House Non-Floterial Map Metrics	# True	# False	Total	% True
Towns/wards preserved	17	0	17	100.0%
Towns/wards in non-floterial district	17	0	17	100.0%
Eligible towns/wards in dedicated district	0	5	5	0.0%
HS SAUs preserved	6	2	8	75.0%
Eligible towns/wards w/ SVI>=5 in dedicated district	0	3	3	0.0%
Competitive districts (averaged 2020 elections)	1	2	3	33.3%
Map Analysis v24 - Sullivan Opt1 NF.xlsm				

Where there were two violations for eligible towns not getting their own House district in 2010, these challenges caused one more violation, AND forced us to make districts that would be larger than we would like.

The Map-a-Thon team regrets that we were not able to offer a better map. We look forward to changes, such as a larger deviation, which would allow for better districts. One scenario the team ran used an 11.9% deviation (1.9% over the norm) and it dropped Sullivan County from three violations to zero.

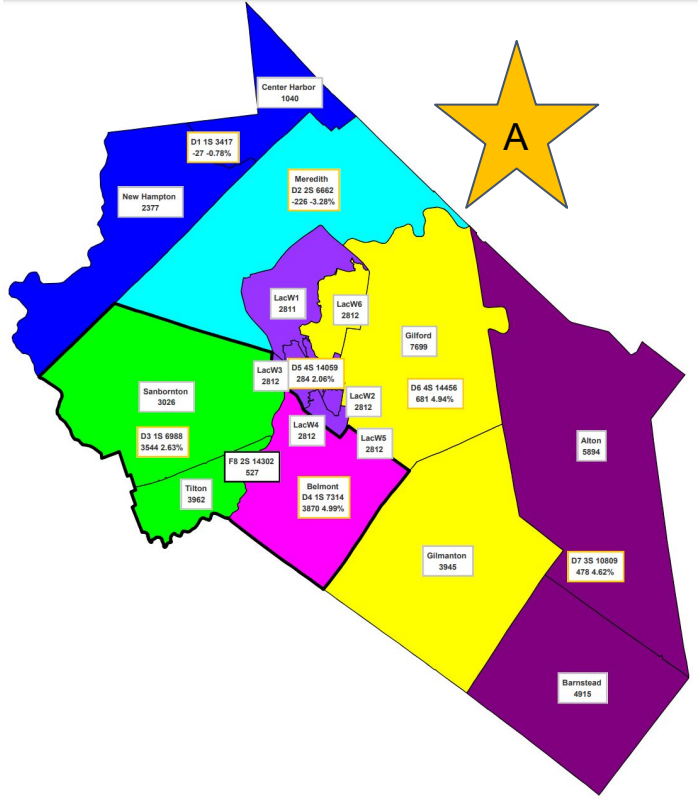
An increase in allowable deviation would help in Sullivan County
Deviations -4.46 to 1.31 for total 5.77.

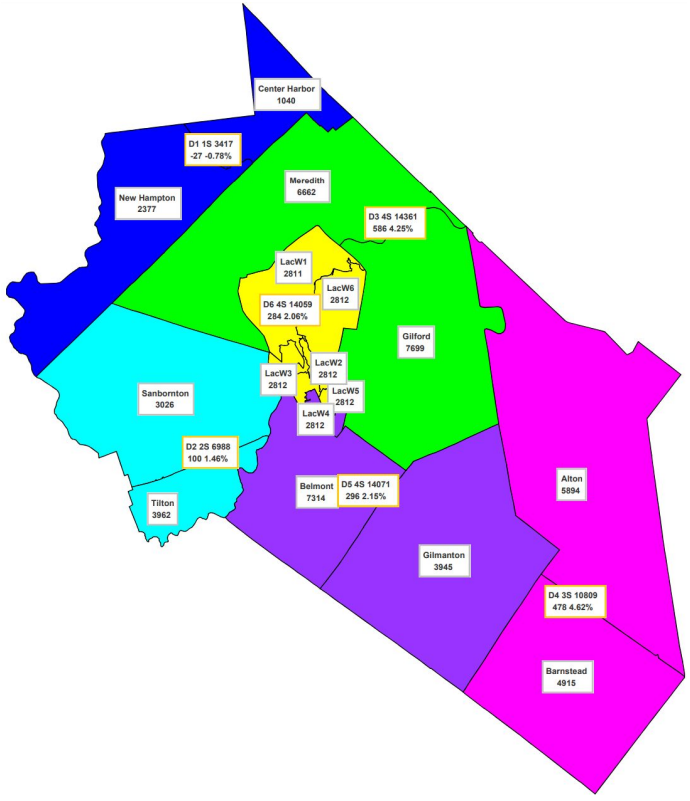
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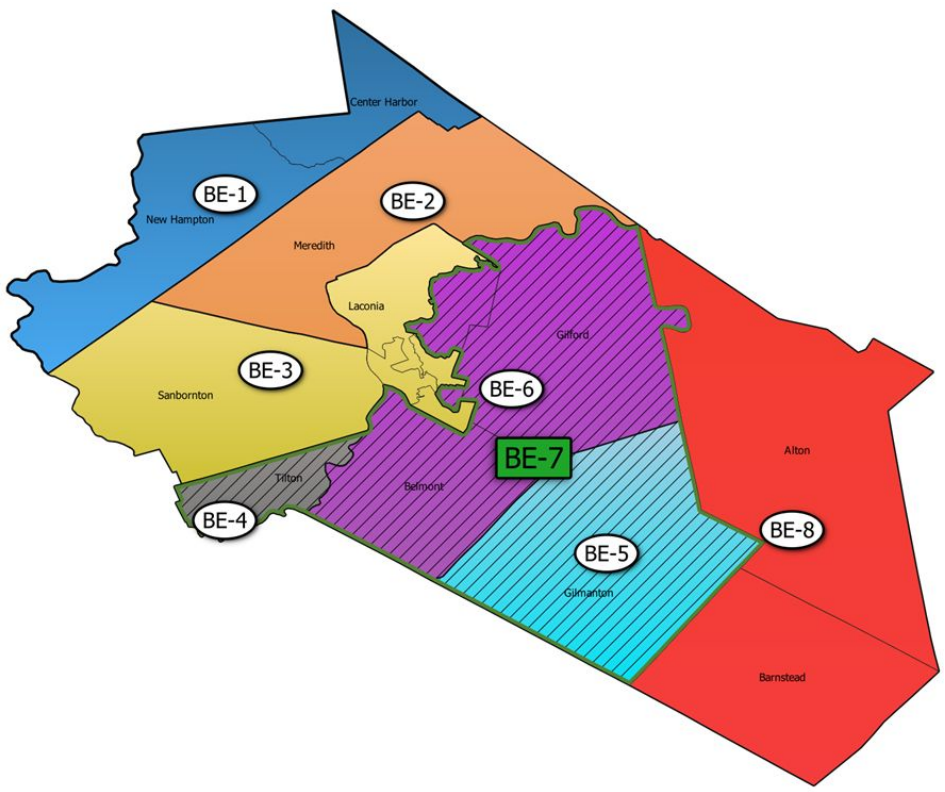


House Special Committee on Redistricting
Analysis of Proposed NH House Maps

November 8, 2021

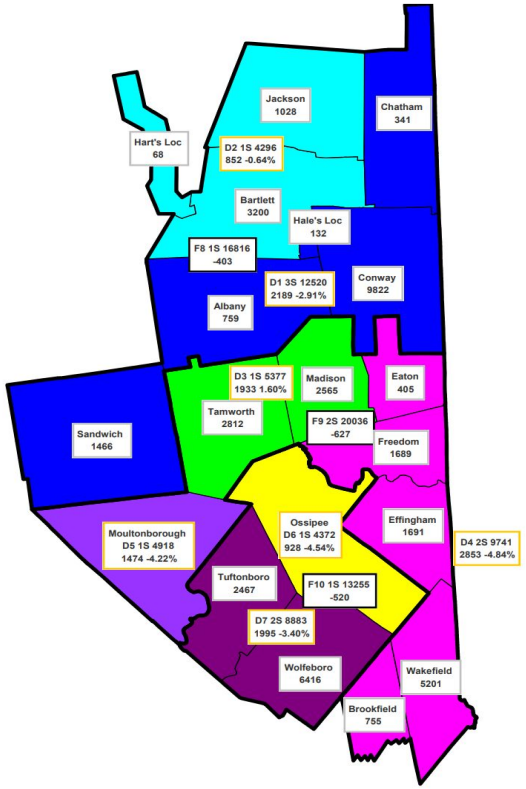


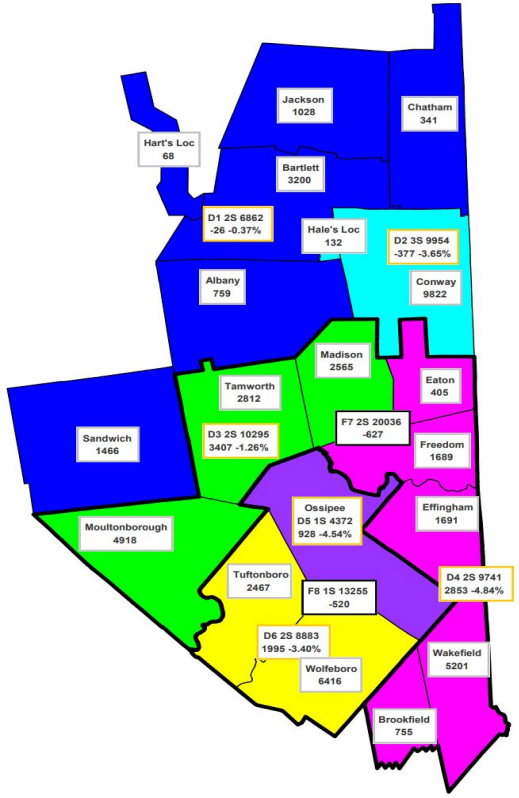


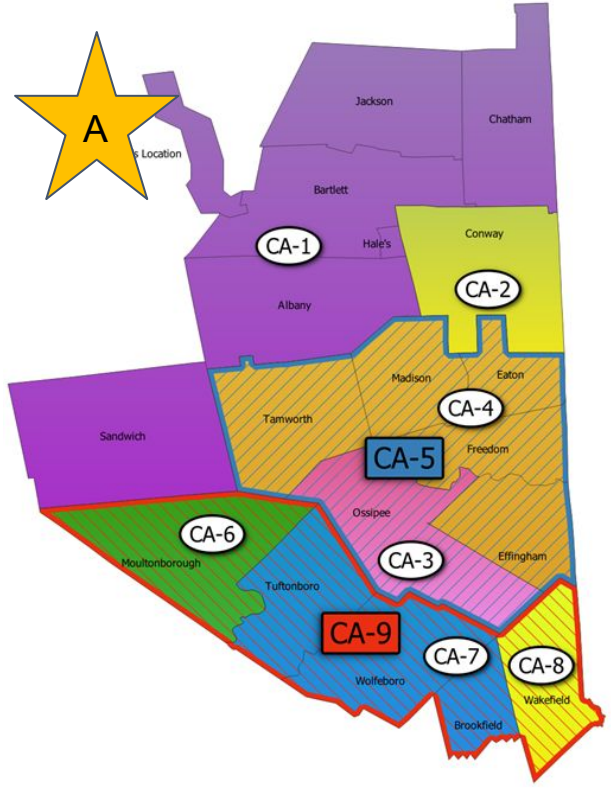


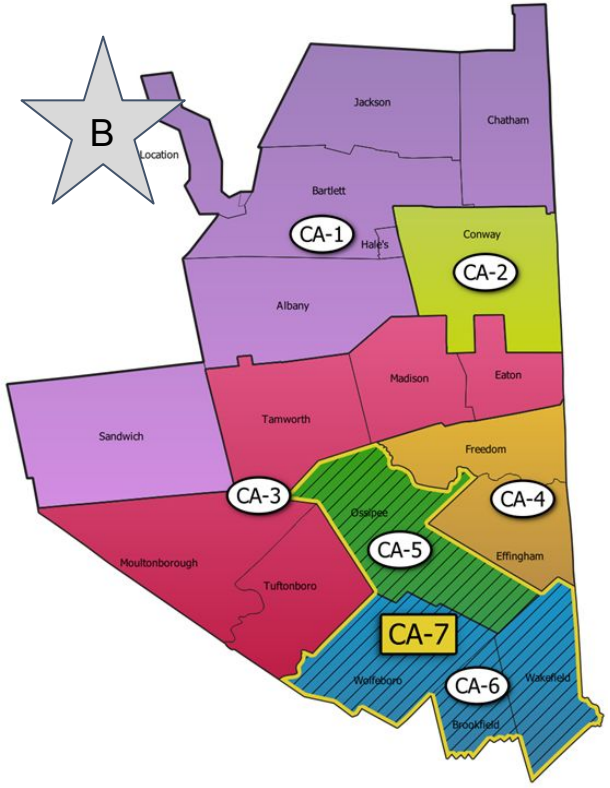
Minority map contains one more violation than M-A-T, but keeps 5 of 6 Laconia wards together. In Majority map, no eligible town gets own district.

Belknap County	Democrats	Republicans	Map-a-Thon
Deviation	-3.28% to 4.99% (8.27%)	-0.78% to 4.62% (5.40%)	-3.28% to 4.71% (7.99%)
# Violations	6	8	5
# Towns/Wards in Largest Non-Floterial District	4	4	5
Largest # Reps in a Non-Floterial District	4	4	5
# Towns/Wards in Largest Floterial District	3	N/A	6
Largest # Reps in a Floterial District	2	N/A	1
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	0/14/4	0/18/0	0/18/0



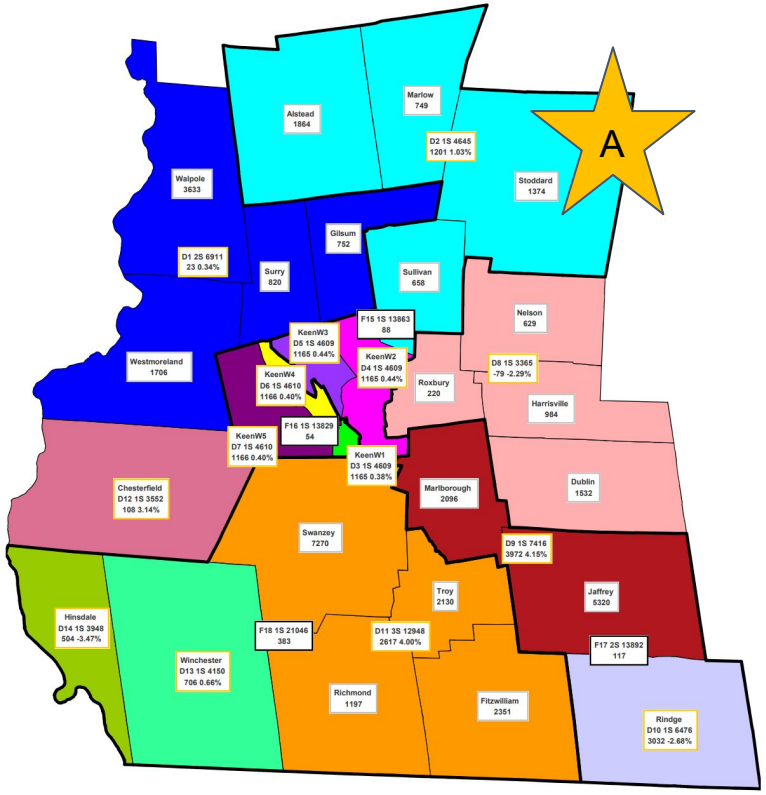


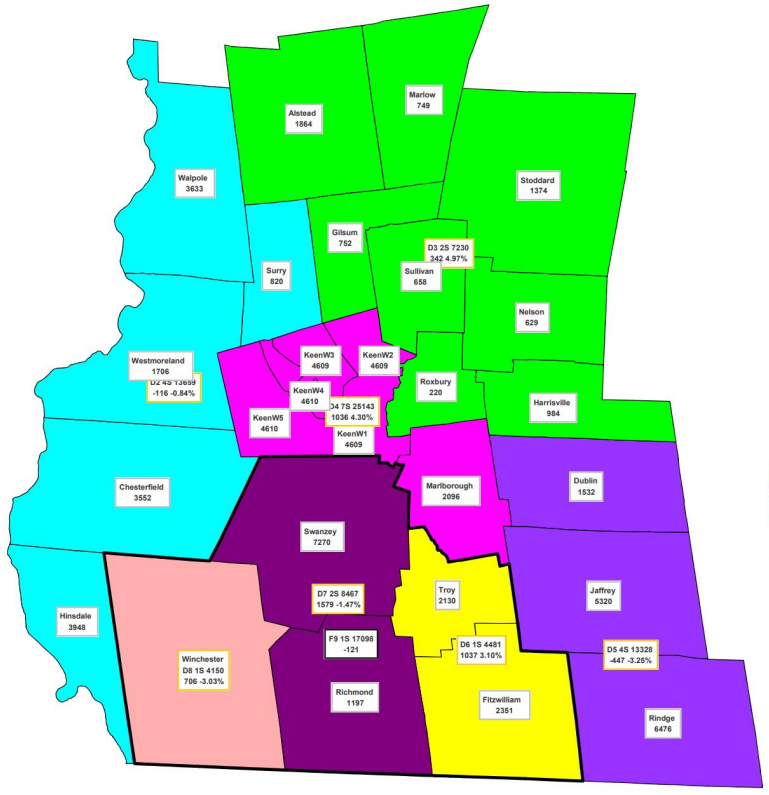


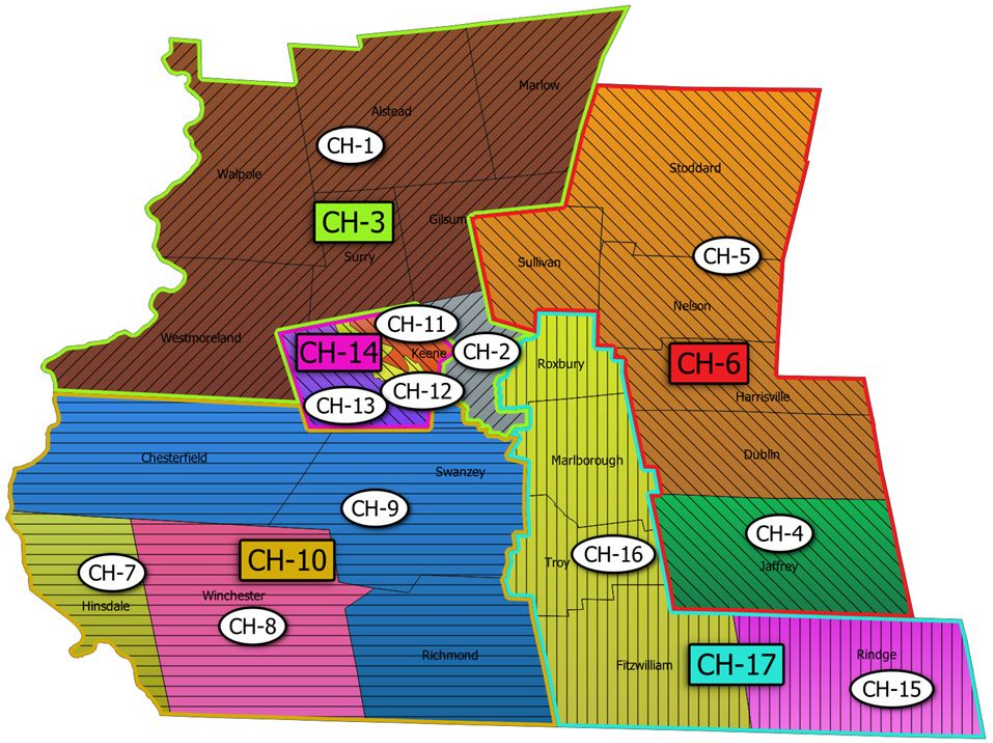


M-A-T 15% map which goes only slightly below -5% enables all eligible towns but Wolfeboro to get own House district. Unavoidably, all maps have large districts.

Carroll County	Democrats	Republicans	Map-a-Thon 15% Dev ★	Map-a-Thon ☆
Deviation	-4.84% to 1.60% (6.44%)	-4.84% to -0.37% (4.47%)	-5.95% to 1.54% (7.49%)	-4.93% to 1.54% (6.47%)
# Violations	3	4	1	3
# Towns/Wards in Largest Non-Float District	5	6	7	7
Largest # Reps in a Non-Floterial District	3	3	3	4
# Towns/Wards in Largest Floterial District	8	8	6	4
Largest # Reps in a Floterial District	2	2	2	1
Lean of Seats(Lean D/Lean R/Comp)	0/10/5	0/10/5	0/10/5	0/10/5

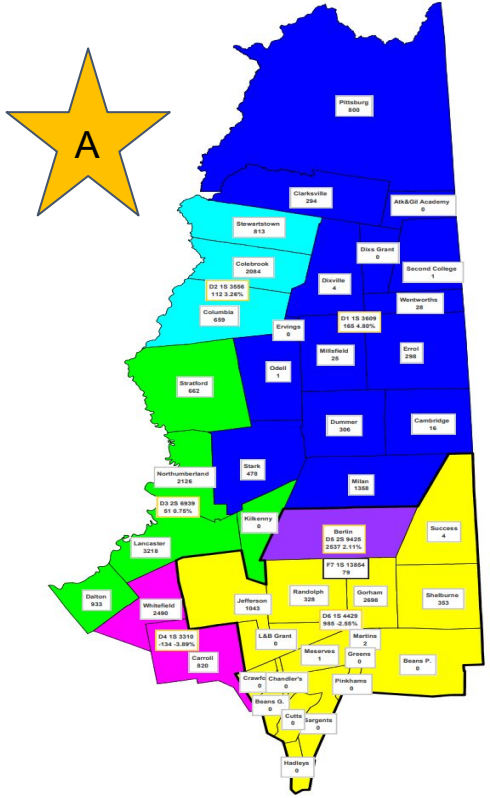


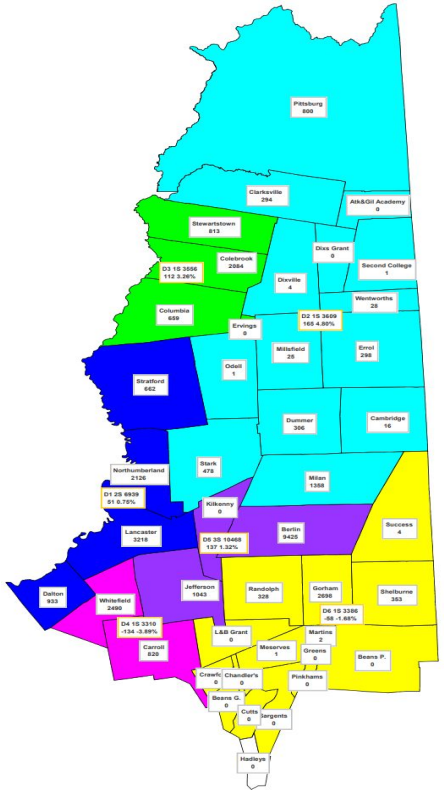


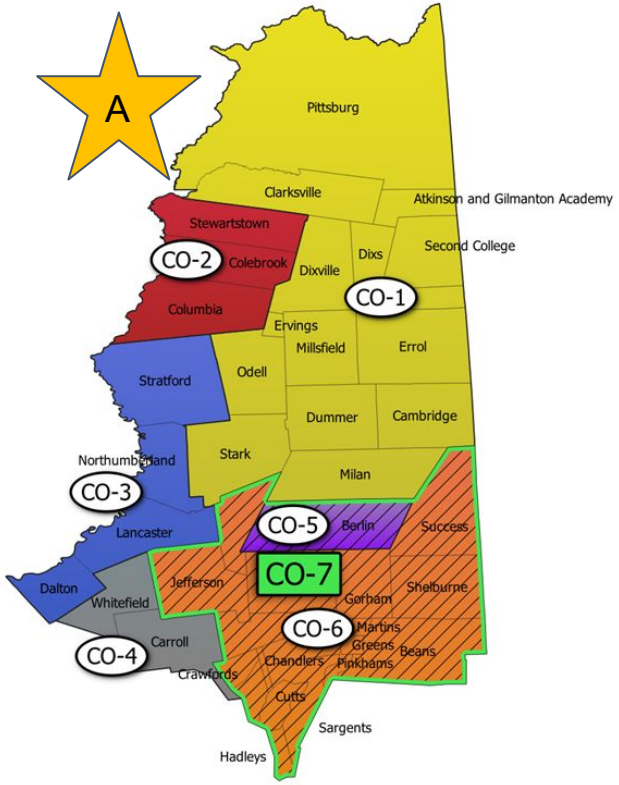


Minority map has all Keene wards in dedicated districts, and cuts overall violations in the county to 3. In Majority map, 7 of 8 eligible don't get dedicated districts.

Cheshire County	Democrats ★	Republicans	Map-a-Thon
Deviation	-3.47% to 4.15% (7.62%)	-3.25% to 4.97% (8.22%)	-4.83% to 3.43% (8.26%)
# Violations	3	7	4
# Towns/Wards in Largest Non-Floterial District	4	5	6
Largest # Reps in a Non-Floterial District	3	7	4
# Towns/Wards in Largest Floterial District	6	5	7
Largest # Reps in a Floterial District	2	1	2
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	11/1/10	13/4/5	13/3/6

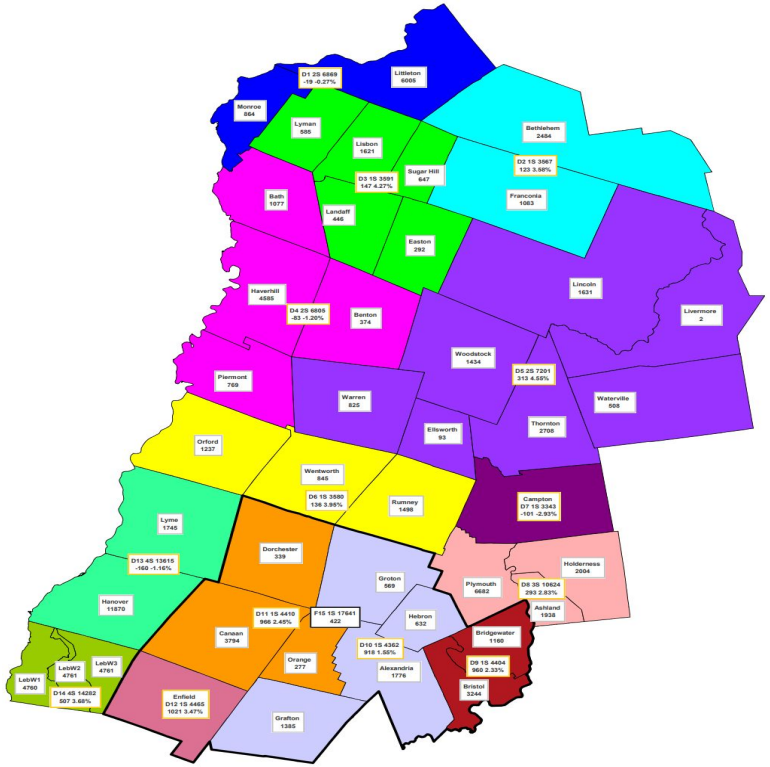


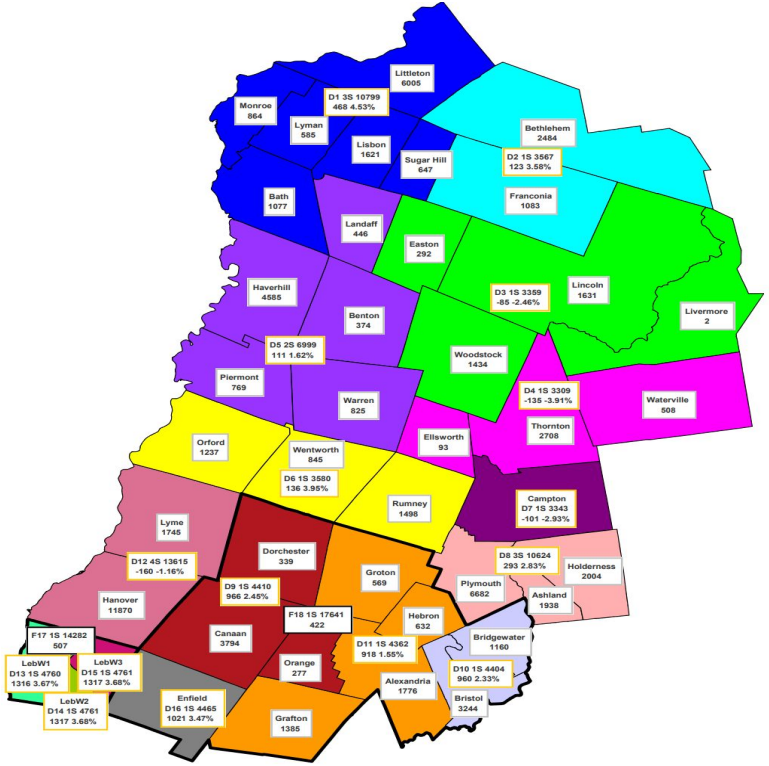


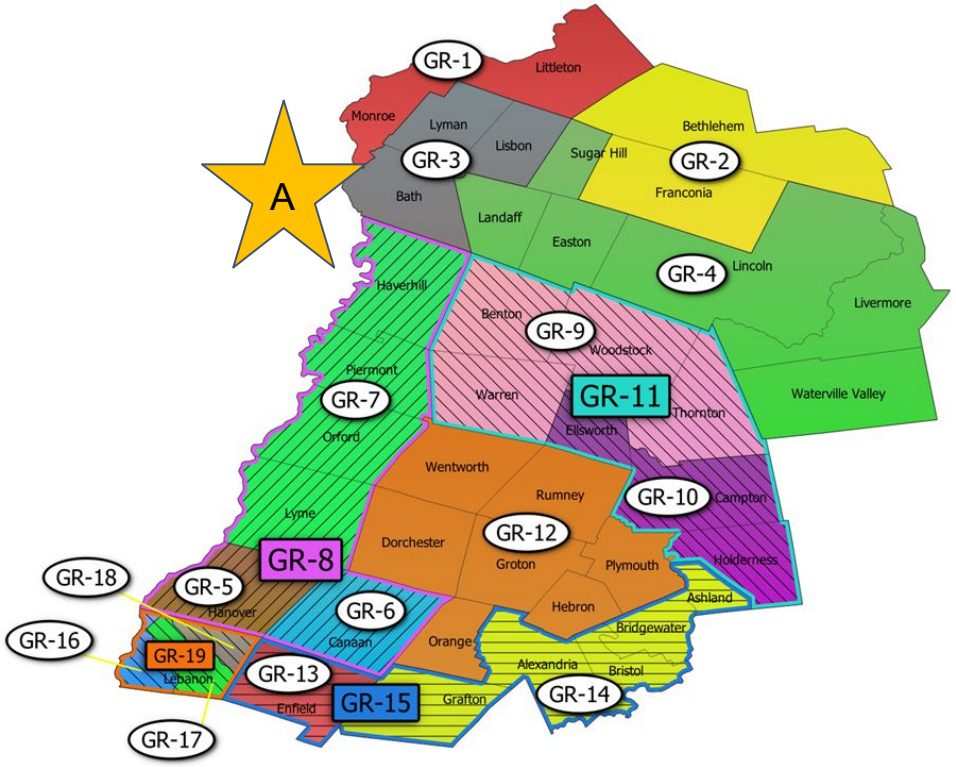


Minority and M-A-T maps are almost identical; both give Berlin its own House District. Majority is somewhat similar, but Berlin misses its own district.

Coos County	Democrats ★	Republicans	Map-a-Thon ★
Deviation	-3.89% to 4.80% (8.68%)	-3.89% to 4.80% (8.68%)	-3.89% to 4.80% (8.68%)
# Violations	0	1	0
# Towns/Wards in Largest Non-Floterial District	17	15	17
Largest # Reps in a Non-Floterial District	2	3	2
# Towns/Wards in Largest Floterial District	18	N/A	18
Largest # Reps in a Floterial District	1	N/A	1
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	0/5/4	0/5/4	0/5/4

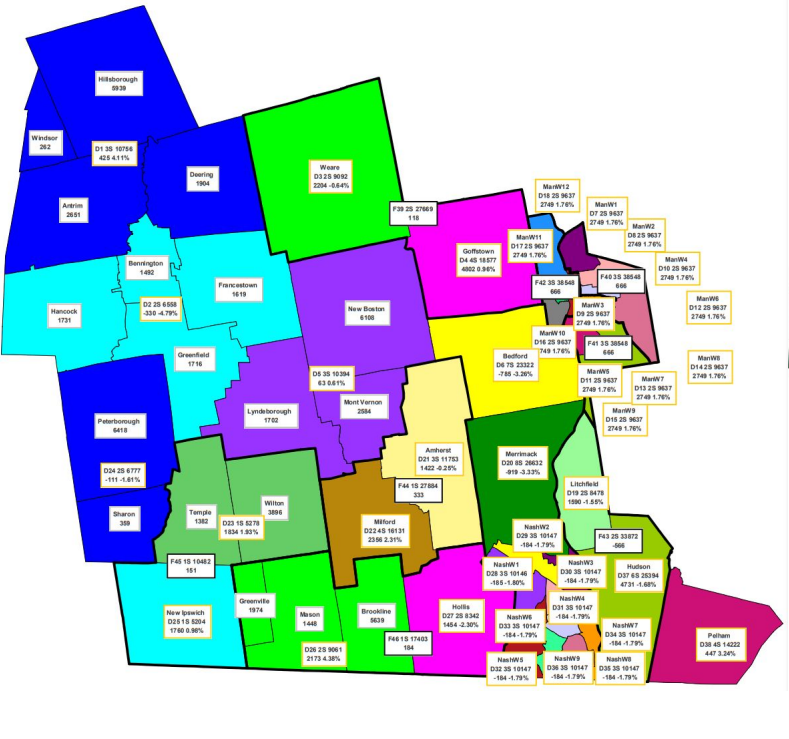


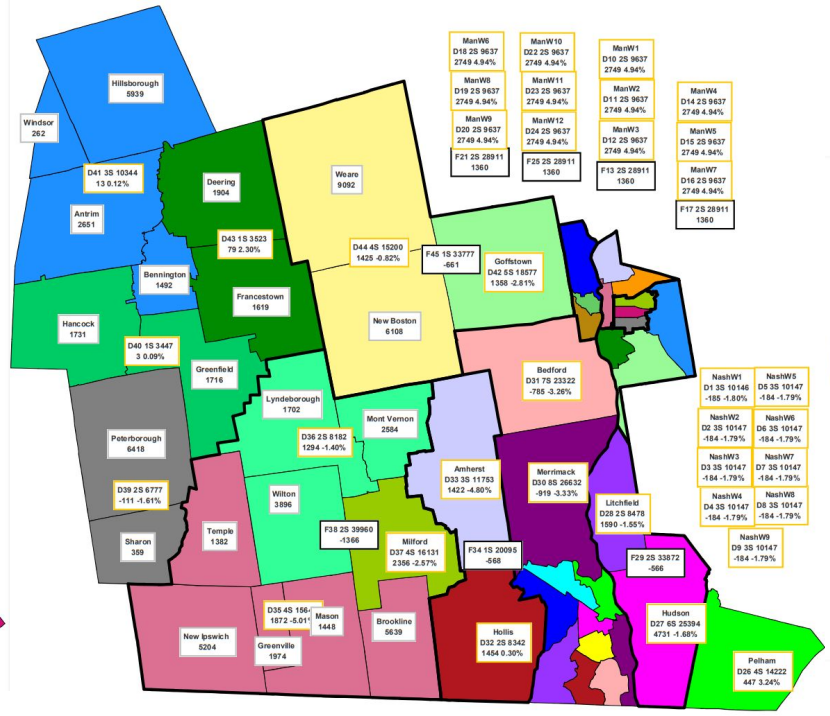


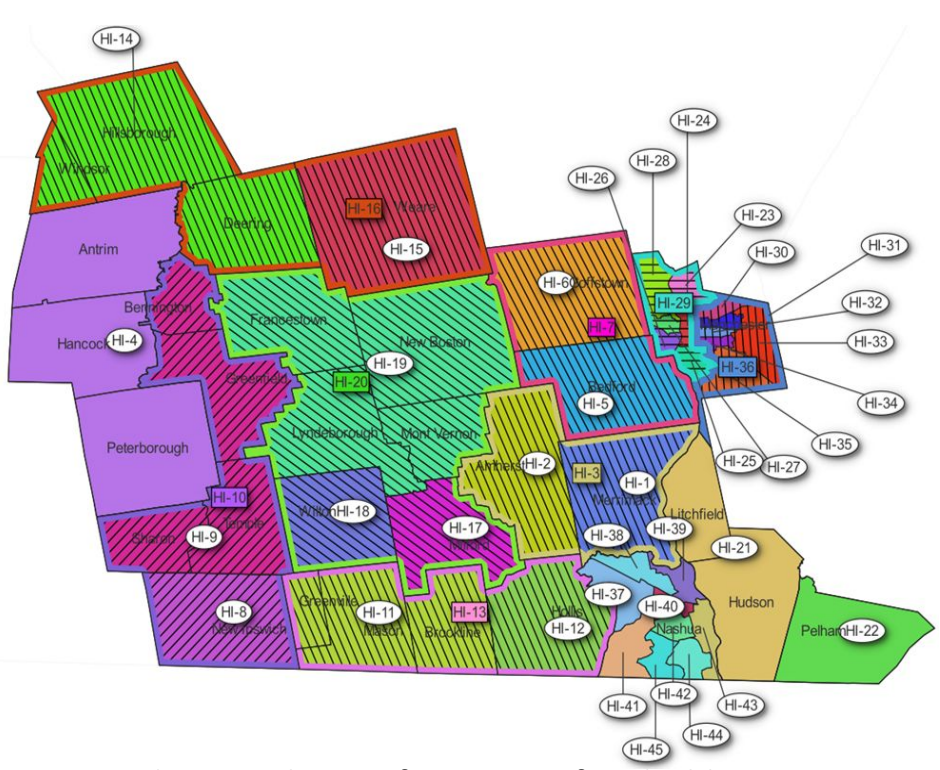


Majority and Minority maps are the same south of Ellsworth. M-A-T gives Hanover & Canaan their own dedicated districts.

Grafton County	Democrats	Republicans	Map-a-Thon ★
Deviation	-2.93% to 4.55% (7.48% overall)	-3.91% to 4.53% (8.44% overall)	-4.87% to 4.99% (9.86% overall)
# Violations	5 (6 with Leb wards)	5	3
# Towns/Wards in Largest Non-Floterial District	7	6	6
Largest # Reps in a Non-Floterial District	4	4	3
# Towns/Wards in Largest Floterial District	10	10	7
Largest # Reps in a Floterial District	1	1	7
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	13/6/7	13/7/6	12/5/9



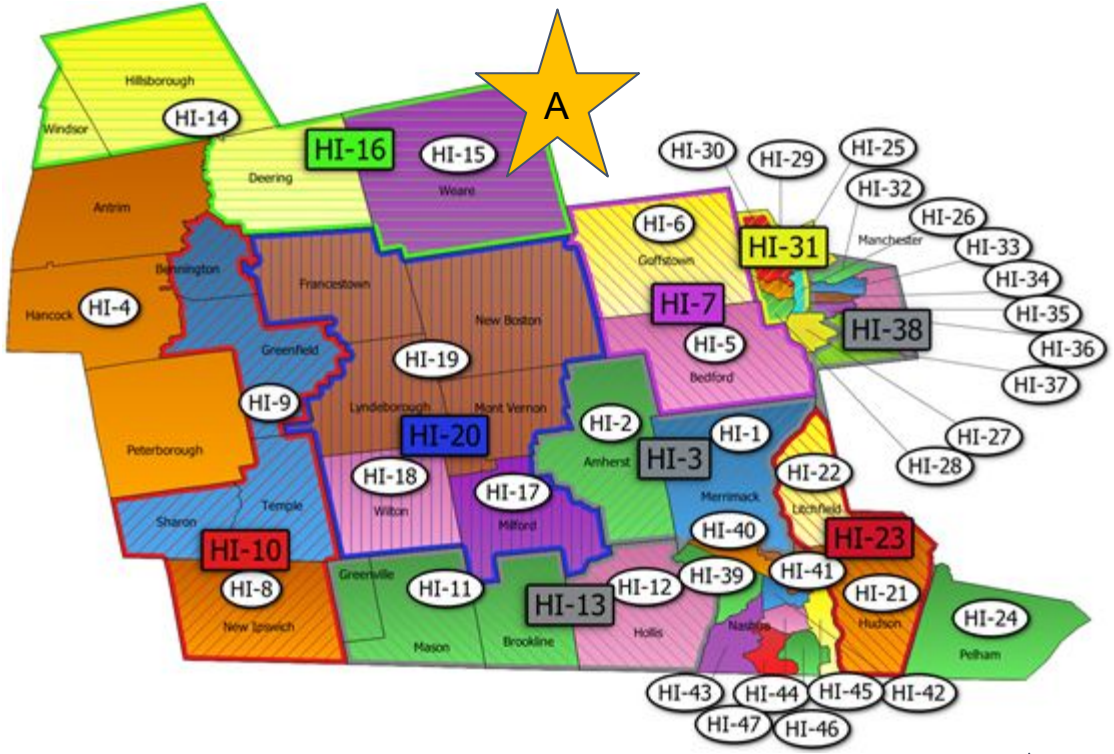




New M-A-T version (2.0 - next page) separates Litchfield & Hudson with a floterial, similar to committee's maps, and cuts violations from 6 to 4 for eligible towns. Majority's Manchester map dependant on exact numbers being drawn by the city. An 18-person difference could invalidate the map, and subject it to litigation.

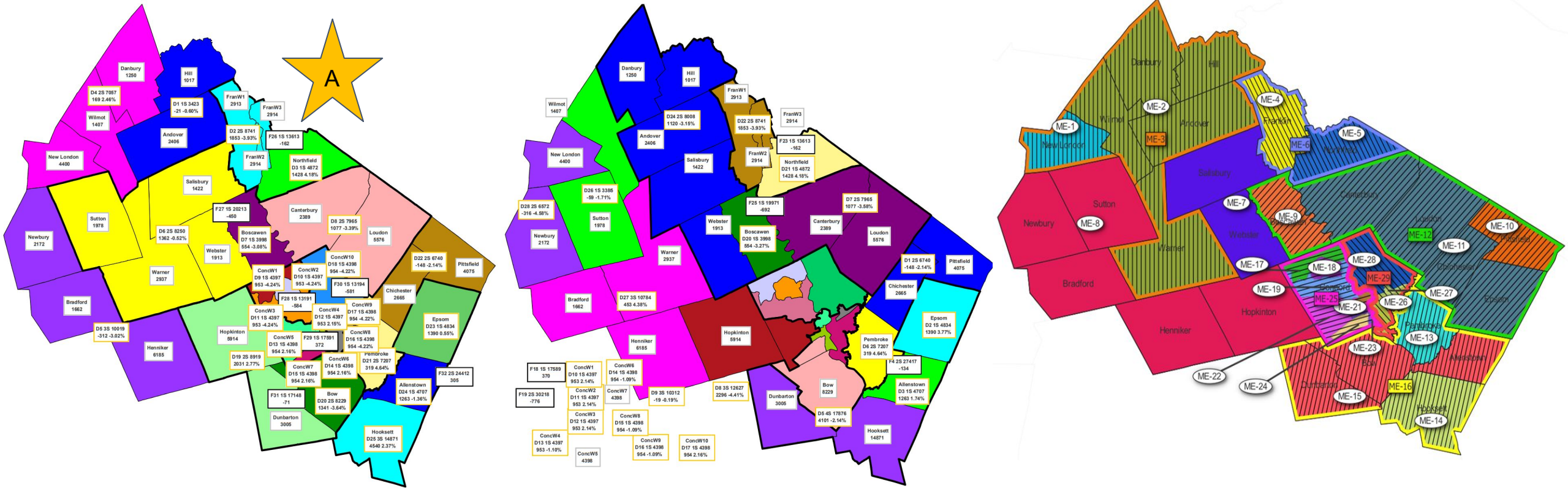
Hillsborough County	Democrats	Republicans	Map-a-Thon 1.0
Deviation	-4.79% to 4.38% (9.17%)	-5.01% to 4.94% (9.95%)	-4.77% to 4.54% (9.31%)
# Violations	5	7	6
# Towns/Wards in Largest Non-Floterial District	4	9	4
Largest # Reps in a Non-Floterial District	8	8	10
# Towns/Wards in Largest Floterial District	4	9	6
Largest # Reps in a Floterial District	3	2	5
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	33/30/60	36/36/51	34/28/61

Combination of Committee Proposals and Map-A-Thon Maps



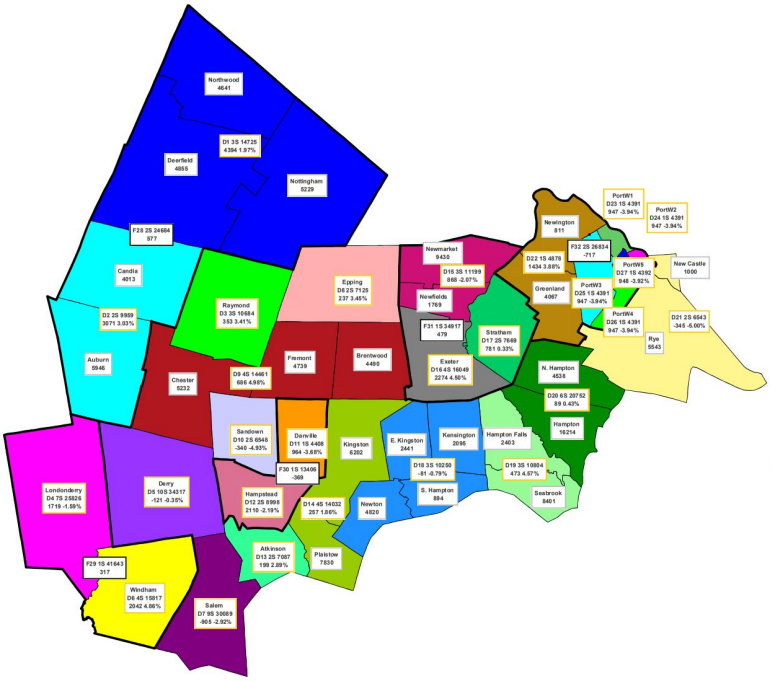
Updated from previous submission	Map-a-Thon 2.0
Deviation	-4.77% to 4.54% (9.31%)
# Violations	4
# Towns/Wards in Largest Non-F District	4
Largest # Reps in a Non-F District	10
# Towns/Wards in Largest F District	6
Largest # Reps in a Floterial District	5
Partisan Lean (Lean D/Lean R/Comp)	34/28/61

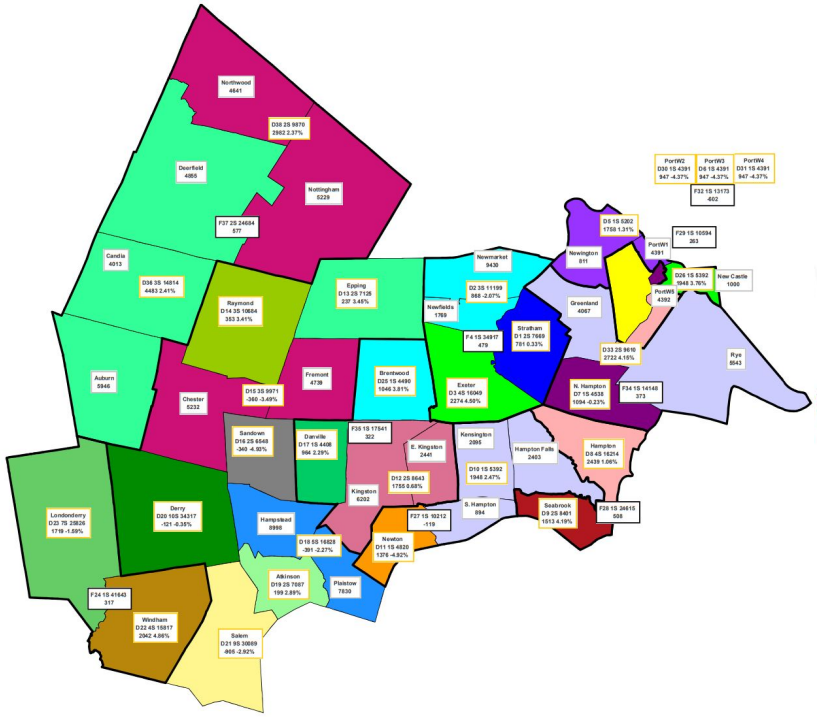
Hillsborough County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
HI-1	26,632	7	HI-3	1	Merrimack	0.51%	
HI-2	11,753	3			Amherst	3.22%	
HI-4	10,800	3			Antrim, Hancock, Peterborough	4.54%	Peterborough
HI-5	23,322	6	HI-7	1	Bedford	3.29%	
HI-6	18,577	5			Goffstown	-0.90%	
HI-8	5,204	1	HI-10	1	New Ipswich	-0.10%	
HI-9	4,949	1			Bennington, Greenfield, Sharon, Temple	-3.39%	
HI-11	9,061	2	HI-13	1	Brookline, Greenville, Mason	4.38%	Brookline
HI-12	8,342	2			Hollis	-2.30%	
HI-14	8,105	2	HI-16	1	Deering, Hillsborough, Windsor	-4.77%	Hillsborough
HI-15	9,092	2			Weare	4.41%	
HI-17	16,131	4	HI-20	1	Milford	4.01%	
HI-18	3,896	1			Wilton	0.87%	
HI-19	12,013	3			Francestown, Lyndeborough, Mont Vernon, New Boston	3.36%	New Boston
HI-21	25,394	6	HI-23	2	Hudson	-1.68%	
HI-22	8,478	2			Litchfield	-1.55%	
HI-24	14,222	4			Pelham	3.24%	
HI-25	9,637	2	HI-31	5	Manchester Ward 1*	-1.23%	
HI-26	9,637	2			Manchester Ward 3*	-1.23%	
HI-27	9,637	2			Manchester Ward 9*	-1.23%	
HI-28	9,637	2			Manchester Ward 10*	-1.23%	
HI-29	9,637	2			Manchester Ward 11*	-1.23%	
HI-30	9,637	2			Manchester Ward 12*	-1.23%	
HI-32	9,637	2	HI-38	5	Manchester Ward 2*	-1.23%	
HI-33	9,637	2			Manchester Ward 4*	-1.23%	
HI-34	9,637	2			Manchester Ward 5*	-1.23%	
HI-35	9,637	2			Manchester Ward 6*	-1.23%	
HI-36	9,637	2			Manchester Ward 7*	-1.23%	
HI-37	9,637	2			Manchester Ward 8*	-1.23%	
HI-39	10,147	3			Nashua Ward 1*	-1.79%	
HI-40	10,147	3			Nashua Ward 2*	-1.79%	
HI-41	10,147	3			Nashua Ward 3*	-1.79%	
HI-42	10,147	3			Nashua Ward 4*	-1.79%	
HI-43	10,147	3			Nashua Ward 5*	-1.79%	
HI-44	10,147	3			Nashua Ward 6*	-1.79%	
HI-45	10,147	3			Nashua Ward 7*	-1.79%	
HI-46	10,147	3			Nashua Ward 8*	-1.79%	
HI-47	10,146	3			Nashua Ward 9*	-1.80%	
Total	422,937	123					4
*Populations used are assumed to be ideal populations for wards							

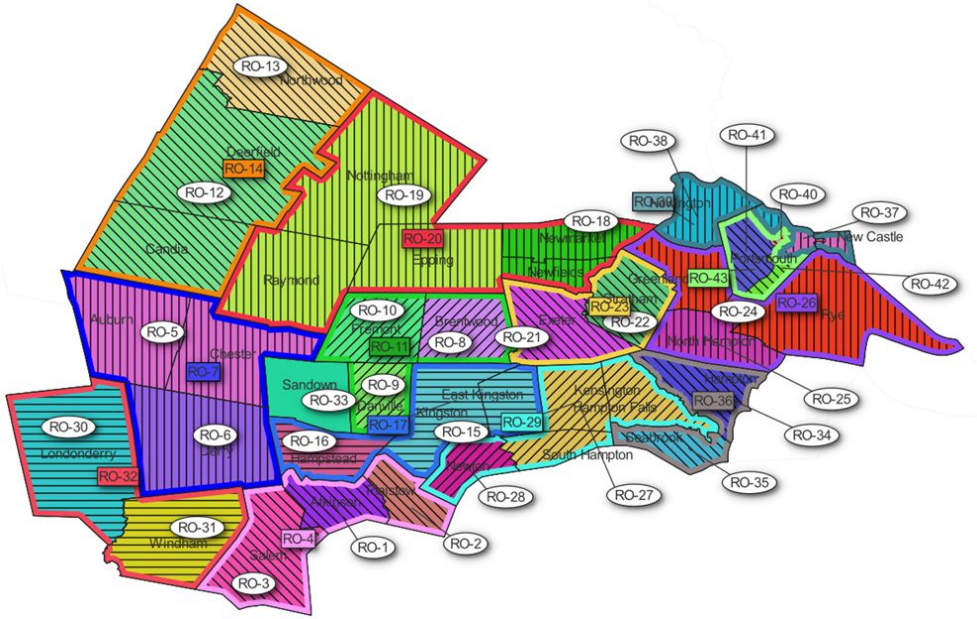


Minority map keeps Concord together, reducing violations to 5. Hopkinton districted with Dunbarton. Majority map splits Concord twice.

Merrimack County	Democrats ★	Republicans	Map-a-Thon
Deviation	-4.24% to 4.64% (8.88%)	-4.58% to 4.64% (9.22%)	-4.42% to 4.74% (9.16%)
# Violations	5	8	6
# Towns/Wards in Largest Non-Floterial District	4	5	5
Largest # Reps in a Non-Floterial District	3	4	5
# Towns/Wards in Largest Floterial District	7	8	7
Largest # Reps in a Floterial District	2	2	2
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	13/17/15	17/20/8	19/16/10

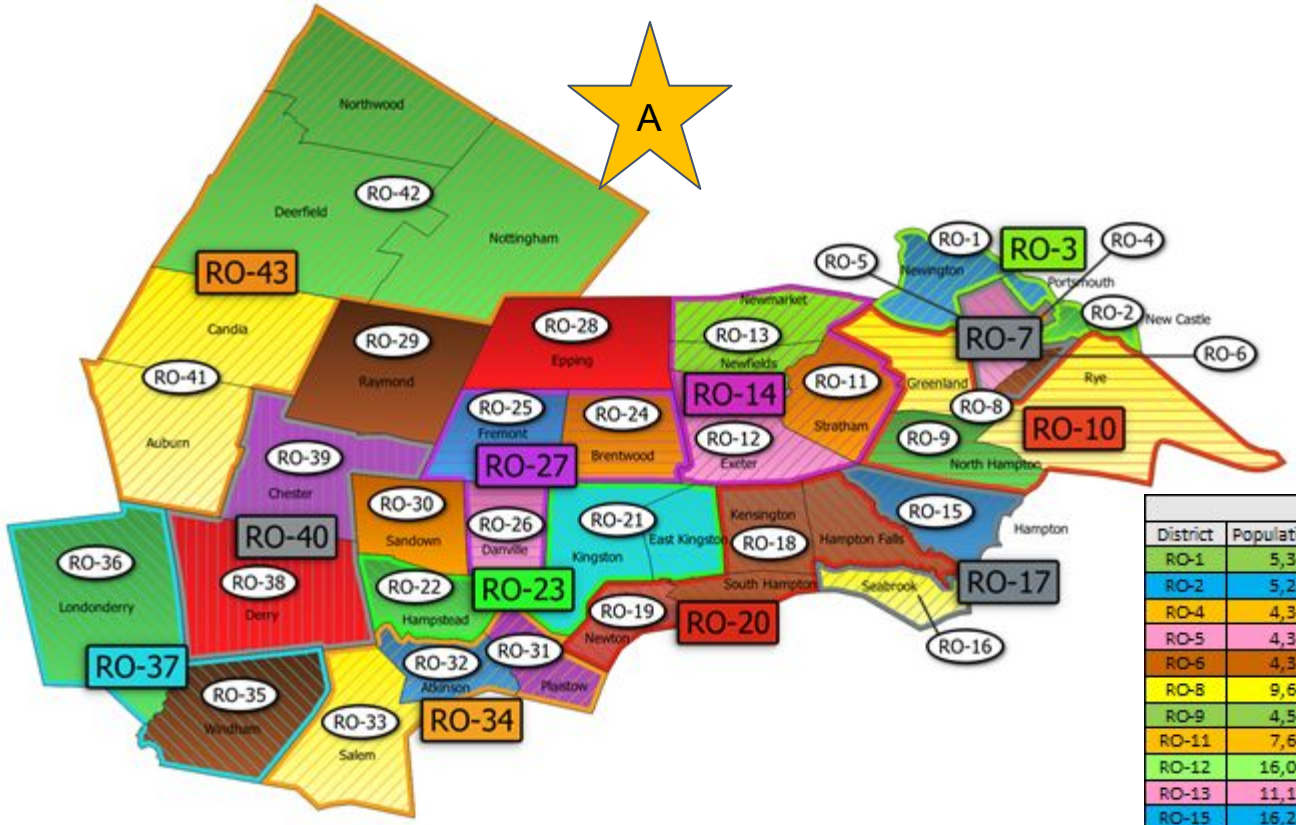






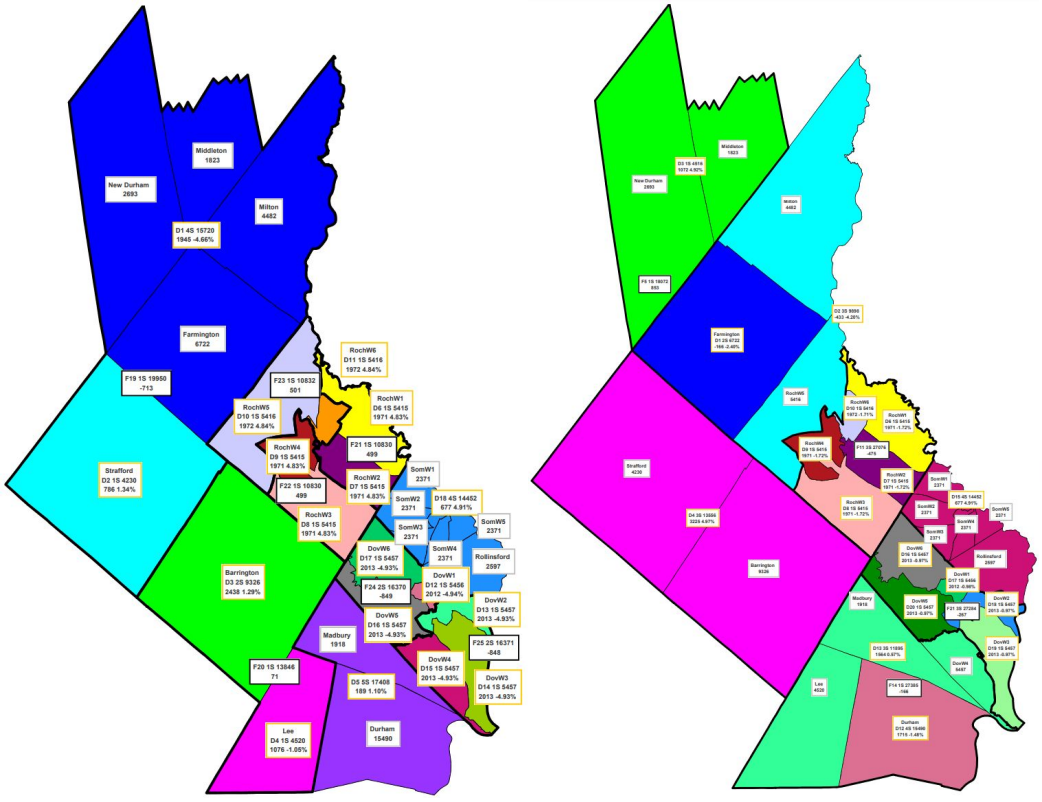
The revised M-A-T (2.0 - next page) is a combination of all three maps. Reduces violations to 10, and reduces size of districts. Deerfield w/Northwood & Nottingham, per multiple resident requests.

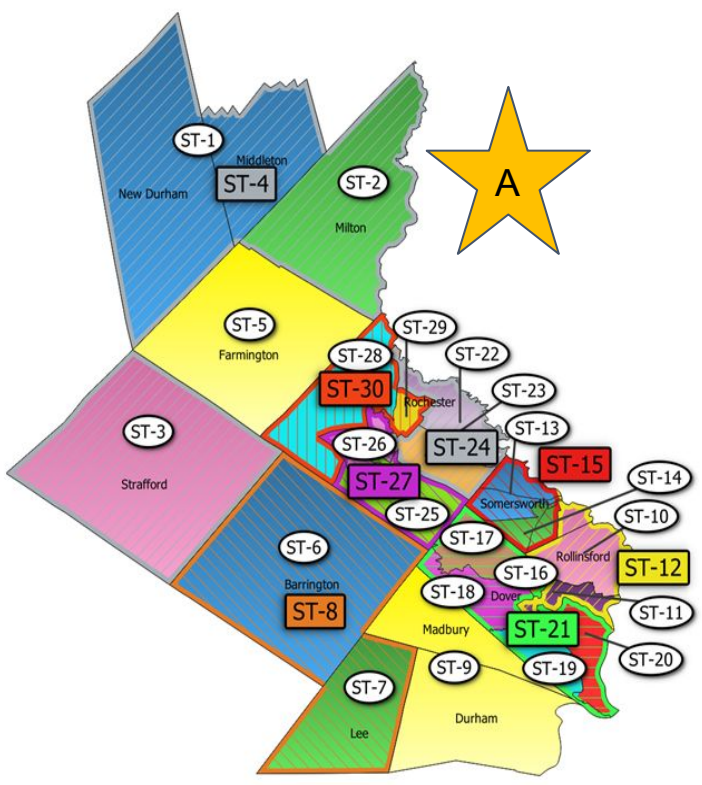
Rockingham County	Democrats	Republicans	Map-a-Thon 1.0
Deviation	-5.00% to 4.98% (9.98%)	-4.93% to 4.86% (9.80%)	-4.93% to 4.86% (9.79%)
# Violations	17	14	12
# Towns/Wards in Largest Non-Floterial District	12	10	3
Largest # Reps in a Non-Floterial District	6	10	9
# Towns/Wards in Largest Floterial District	7	3	4
Largest # Reps in a Floterial District	2	2	1
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	19/65/7	20/63/8	20/63/8

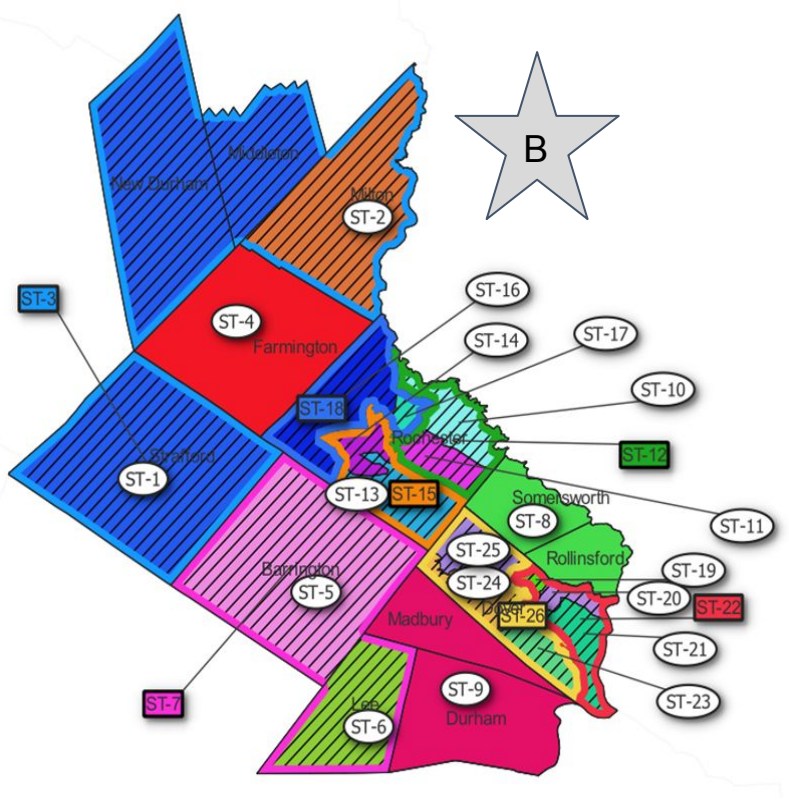


Updated from Previous Submission	Map-a-Thon 2.0
Deviation	-4.92% to 4.86% (9.78%)
# Violations	10
# Towns/Wards in Largest Non-F District	3
Largest # Reps in a Non-F District	8
# Towns/Wards in Largest F District	5
Largest # Reps in a Floterial District	4
Partisan Lean (Lean D/Lean R/Comp)	20/63/8

Rockingham County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
RO-1	5,391	1	RO-3	1	Portsmouth Ward 5*, New Castle	3.74%	Portsmouth
RO-2	5,202	1			Portsmouth Ward 1*, Newington	1.30%	
RO-4	4,391	1	RO-7	1	Portsmouth Ward 2*	-4.37%	
RO-5	4,391	1			Portsmouth Ward 3*	-4.37%	
RO-6	4,392	1			Portsmouth Ward 4*	-4.35%	
RO-8	9,610	2	RO-10	1	Greenland, Rye	4.15%	Greenland, Rye
RO-9	4,538	1			North Hampton	-0.23%	
RO-11	7,669	2	RO-14	1	Stratham	0.33%	
RO-12	16,049	4			Newfields, Newmarket	4.50%	Newmarket
RO-13	11,199	3			Exeter	-2.07%	
RO-15	16,214	4	RO-17	1	Hampton	1.06%	
RO-16	8,401	2			Seabrook	4.19%	
RO-18	5,392	1	RO-20	1	Hampton Falls, Kensington, South Hampton	2.47%	
RO-19	4,820	1			Newton	-4.92%	
RO-21	8,643	2	RO-23	1	East Kingston, Kingston	0.79%	Kingston
RO-22	8,998	2			Hampstead	4.09%	
RO-24	4,490	1	RO-27	1	Brentwood	-1.92%	
RO-25	4,739	1			Fremont	2.12%	
RO-26	4,408	1			Danville	-3.27%	
RO-28	7,125	2			Epping	3.45%	
RO-29	10,684	3			Raymond	3.41%	
RO-30	6,548	2			Sandown	-4.93%	
RO-31	7,830	2	RO-34	1	Plaistow	4.58%	
RO-32	7,087	2			Atkinson	-4.62%	
RO-33	30,089	8			Salem	0.79%	
RO-35	15,817	4	RO-37	1	Windham	4.86%	
RO-36	25,826	7			Londonderry	-1.59%	
RO-38	34,317	7	RO-40	4	Derry	-4.83%	
RO-39	5,232	1			Chester	-0.65%	
RO-41	9,959	2	RO-43	2	Auburn, Candia	3.03%	Auburn, Candia
RO-42	14,725	3			Deerfield, Northwood, Nottingham	1.97%	Deerfield, Northwood, Nottingham
Total	314,176	91					10
*Populations used are assumed to be ideal populations for wards							

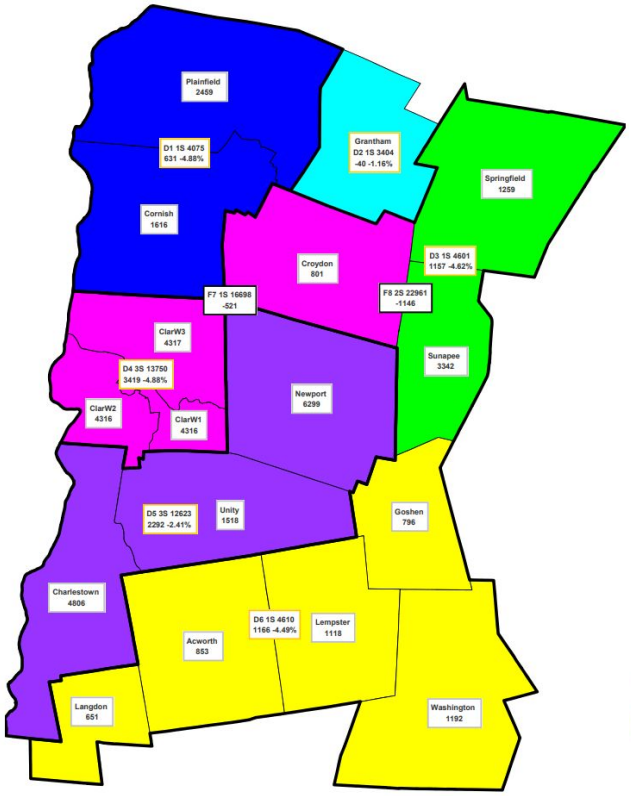


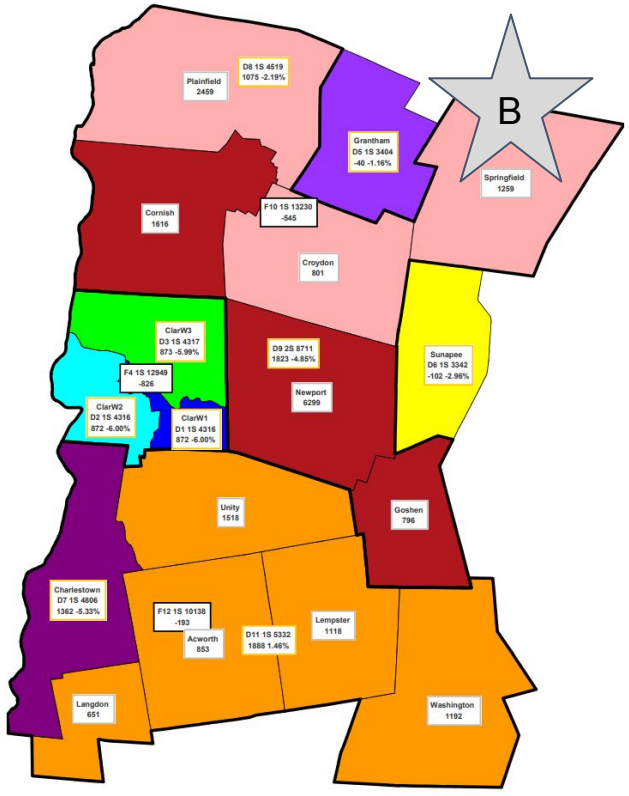


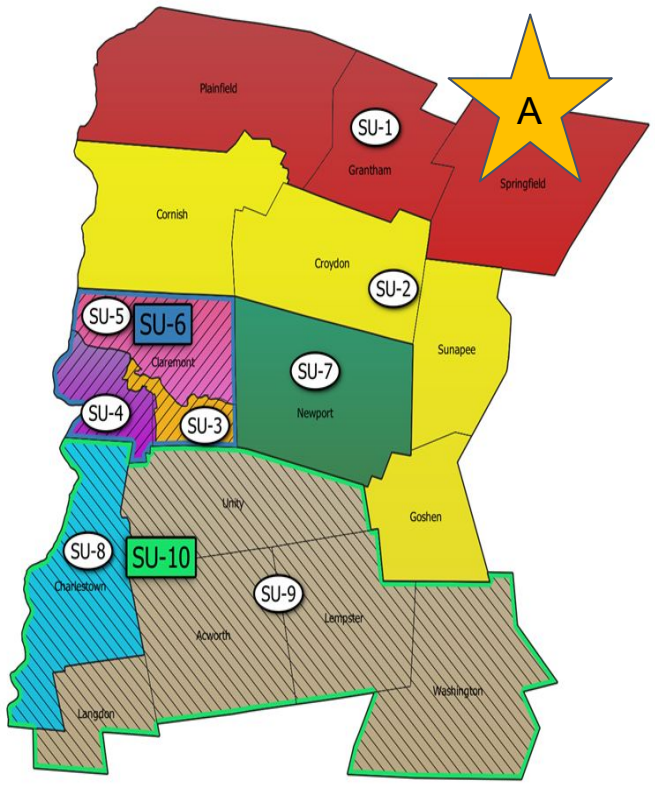


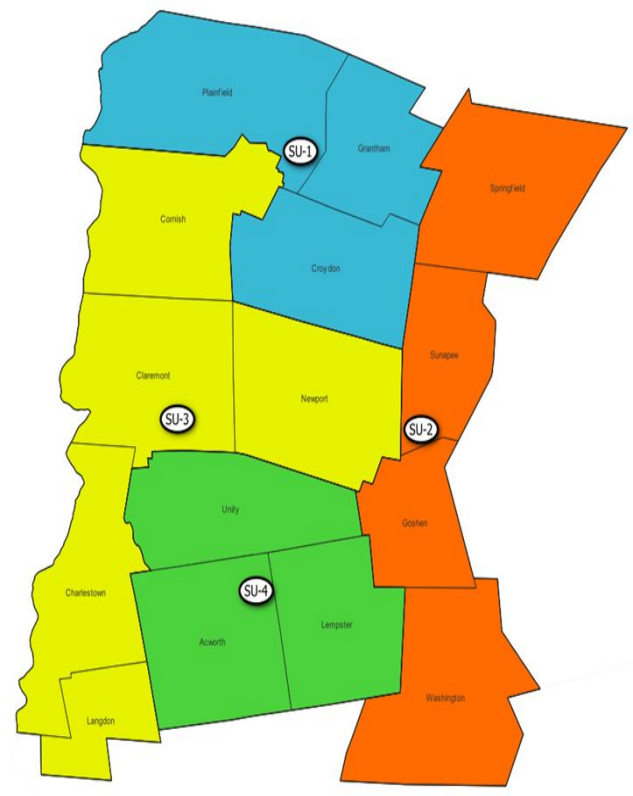
M-A-T 15% Deviation maps goes to -8.2%, but reduces violations while keeping 4 wards in Somersworth together. Strafford, Farmington, & Milton get own district.

Strafford County	Democrats	Republicans	Map-a-Thon 15% Dev. ★	Map-a-Thon ★
Deviation	-4.94% to 4.91% (9.85%)	-4.20% to 4.97% (9.16%)	-8.20% to 4.84% (13.04%)	-4.94% to 4.91% (9.85%)
# Violations	4	6	2	3
# Towns/Wards in Largest Non-Float District	6	6	2	6
Largest # Reps in a Non-Floterial District	4	4	5	5
# Towns/Wards in Largest Floterial District	3	5	5	4
Largest # Reps in a Floterial District	2	3	3	2
Lean of Seats(Lean D/Lean R/Competitive)	20/7/11	20/8/10	20/7/11	20/7/11









M-A-T's -8.55% version reduces violations to 0, has better contiguity, keeps Claremont together, and gives dedicated district to Newport.

Sullivan County	Democrats	Republicans	Map-a-Thon 15% Dev	Map-a-Thon
Deviation	-4.88% to -1.16% (3.73%)	-6.00% to 1.46% (7.47%)	-8.55% to 3.40% (11.95%)	-4.46% to 1.31% (5.77%)
# Violations	3	1	0	3
# Towns/Wards in Largest Non-Float District	5	5	5	5
Largest # Reps in a Non-Floterial District	3	2	2	8
# Towns/Wards in Largest Floterial District	11	6	6	N/A
Largest # Reps in a Floterial District	2	1	1	N/A
Lean of Seats(Lean D/Lean R/Competitive)	2/6/5	1/5/7	2/5/6	2/3/8

Map-a-Thon Proposed Maps

Map-a-thon map summary

County	Total Number of Seats	Averaged 2020 EC & NH Senate Elections		Partisan Lean Proposed NH House Seats					
		Dem (% of votes)	Rep (% of votes)	Lean Dem (# seats)	Lean Dem (% seats)	Lean Rep (# seats)	Lean Rep (% seats)	Competitive (# seats)	Competitive (% seats)
Belknap	18	39.6%	60.4%	0	0.0%	18	100.0%	0	0.0%
Carroll	15	41.1%	58.9%	0	0.0%	10	66.7%	5	33.3%
Cheshire	22	56.2%	43.8%	13	59.1%	3	13.6%	6	27.3%
Coos	9	41.5%	58.5%	0	0.0%	5	55.6%	4	44.4%
Grafton	26	57.7%	42.3%	12	46.2%	5	19.2%	9	34.6%
Hillsborough	123	49.7%	50.3%	34	27.6%	28	22.8%	61	49.6%
Merrimack	45	50.4%	49.6%	19	42.2%	16	35.6%	10	22.2%
Rockingham	91	46.5%	53.5%	20	22.0%	63	69.2%	8	8.8%
Strafford	38	54.6%	45.4%	20	52.6%	7	18.4%	11	28.9%
Sullivan	13	47.2%	52.8%	2	15.4%	5	38.5%	6	61.5%
Total	**400**	**49.3%**	**50.7%**	**120**	**30.0%**	**160**	**40.0%**	**120**	**30.0%**

Democrat Proposed Maps

Democrat map summary

County	Total Number of Seats	Averaged 2020 EC & NH Senate Elections		Partisan Lean Proposed NH House Seats					
		Dem (% of votes)	Rep (% of votes)	Lean Dem (# seats)	Lean Dem (% seats)	Lean Rep (# seats)	Lean Rep (% seats)	Competitive (# seats)	Competitive (% seats)
Belknap	18	39.6%	60.4%	0	0.0%	14	77.8%	4	22.2%
Carroll	15	41.1%	58.9%	0	0.0%	10	66.7%	5	33.3%
Cheshire	22	56.2%	43.8%	11	50.0%	1	4.5%	10	45.5%
Coos	9	41.5%	58.5%	0	0.0%	5	55.6%	4	44.4%
Grafton	26	57.7%	42.3%	13	50.0%	6	23.1%	7	26.9%
Hillsborough	123	49.7%	50.3%	33	26.8%	30	24.4%	60	48.8%
Merrimack	45	50.4%	49.6%	13	28.9%	17	37.8%	15	33.3%
Rockingham	91	46.5%	53.5%	19	20.9%	65	71.4%	7	7.7%
Strafford	38	54.6%	45.4%	20	52.6%	7	18.4%	11	28.9%
Sullivan	13	47.2%	52.8%	2	15.4%	6	46.2%	5	38.5%
Total	**400**	**49.3%**	**50.7%**	**111**	**27.8%**	**161**	**40.3%**	**128**	**32.0%**

Republican Proposed Maps

Republican map summary

County	Total Number of Seats	Averaged 2020 EC & NH Senate Elections		Partisan Lean Proposed NH House Seats					
		Dem (% of votes)	Rep (% of votes)	Lean Dem (# seats)	Lean Dem (% seats)	Lean Rep (# seats)	Lean Rep (% seats)	Competitive (# seats)	Competitive (% seats)
Belknap	18	39.6%	60.4%	0	0.0%	18	100.0%	0	0.0%
Carroll	15	41.1%	58.9%	0	0.0%	10	66.7%	5	33.3%
Cheshire	22	56.2%	43.8%	13	59.1%	4	18.2%	5	22.7%
Coos	9	41.5%	58.5%	0	0.0%	5	55.6%	4	44.4%
Grafton	26	57.7%	42.3%	13	50.0%	7	26.9%	6	23.1%
Hillsborough	123	49.7%	50.3%	36	29.3%	36	29.3%	51	41.5%
Merrimack	45	50.4%	49.6%	17	37.8%	20	44.4%	8	17.8%
Rockingham	91	46.5%	53.5%	20	22.0%	63	69.2%	8	8.8%
Strafford	38	54.6%	45.4%	20	52.6%	8	21.1%	10	26.3%
Sullivan	13	47.2%	52.8%	1	7.7%	5	38.5%	7	53.8%
Total	**400**	**49.3%**	**50.7%**	**120**	**30.0%**	**176**	**44.0%**	**104**	**26.0%**

Map-a-Thon Choice A Summary

Choice A summary

County	Total Number of Seats	Averaged 2020 EC & NH Senate Elections		Partisan Lean Proposed NH House Seats					
		Dem (% of votes)	Rep (% of votes)	Lean Dem (# seats)	Lean Dem (% seats)	Lean Rep (# seats)	Lean Rep (% seats)	Competitive (# seats)	Competitive (% seats)
Belknap	18	39.6%	60.4%	0	0.0%	14	77.8%	4	22.2%
Carroll	15	41.1%	58.9%	0	0.0%	10	66.7%	5	33.3%
Cheshire	22	56.2%	43.8%	11	50.0%	1	4.5%	10	45.5%
Coos	9	41.5%	58.5%	0	0.0%	5	55.6%	4	44.4%
Grafton	26	57.7%	42.3%	12	46.2%	5	19.2%	9	34.6%
Hillsborough	123	49.7%	50.3%	34	27.6%	28	22.8%	61	49.6%
Merrimack	45	50.4%	49.6%	13	28.9%	17	37.8%	15	33.3%
Rockingham	91	46.5%	53.5%	20	22.0%	63	69.2%	8	8.8%
Strafford	38	54.6%	45.4%	20	52.6%	7	18.4%	11	28.9%
Sullivan	13	47.2%	52.8%	2	15.4%	5	38.5%	6	46.2%
Total	**400**	**49.3%**	**50.7%**	**112**	**28.0%**	**155**	**38.8%**	**133**	**33.3%**

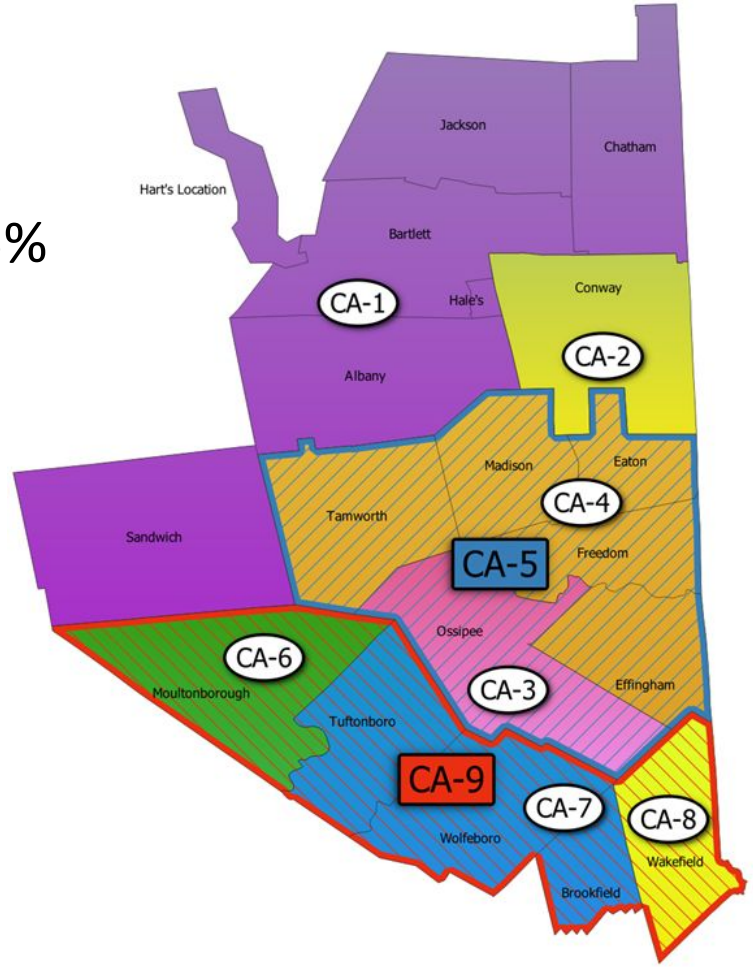
Map-a-Thon Choice B Summary

Choice B summary

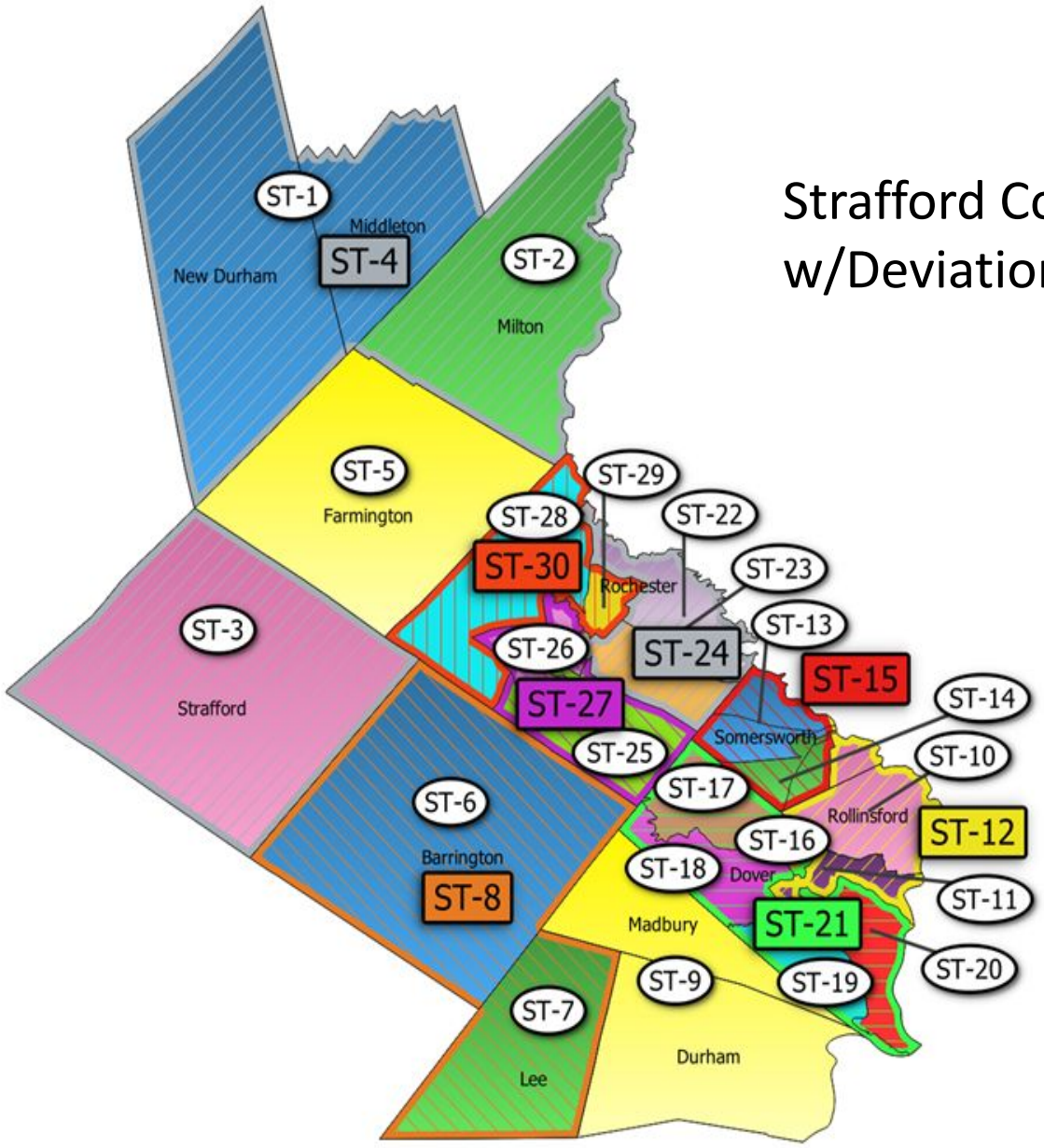
County	Total Number of Seats	Averaged 2020 EC & NH Senate Elections		Partisan Lean Proposed NH House Seats					
		Dem (% of votes)	Rep (% of votes)	Lean Dem (# seats)	Lean Dem (% seats)	Lean Rep (# seats)	Lean Rep (% seats)	Competitive (# seats)	Competitive (% seats)
Belknap	18	39.6%	60.4%	0	0.0%	14	77.8%	4	22.2%
Carroll	15	41.1%	58.9%	0	0.0%	10	66.7%	5	33.3%
Cheshire	22	56.2%	43.8%	11	50.0%	1	4.5%	10	45.5%
Coos	9	41.5%	58.5%	0	0.0%	5	55.6%	4	44.4%
Grafton	26	57.7%	42.3%	12	46.2%	5	19.2%	9	34.6%
Hillsborough	123	49.7%	50.3%	34	27.6%	28	22.8%	61	49.6%
Merrimack	45	50.4%	49.6%	13	28.9%	17	37.8%	15	33.3%
Rockingham	91	46.5%	53.5%	20	22.0%	63	69.2%	8	8.8%
Strafford	38	54.6%	45.4%	20	52.6%	7	18.4%	11	28.9%
Sullivan	13	47.2%	52.8%	2	15.4%	3	23.1%	8	61.5%
Total	**400**	**49.3%**	**50.7%**	**112**	**28.0%**	**153**	**38.3%**	**135**	**33.8%**

County	Dem Violations	Rep Violations	Map Violations	Map Dev-15 Violations	Combo Violations	A Violations	B Violations	Choice A	Choice B
Belknap	6	8	5	-	-	6	6	Dem	Dem
Carroll	3	4	3	1	-	1	3	Map Dev-15	Map
Cheshire	3	7	4	-	-	3	3	Dem	Dem
Coos	0	1	0	-	-	0	0	Dem/Map	Dem/Map
Grafton	5	5	3	-	-	3	3	Map	Map
Hillsborough	5	7	6	-	4	4	4	Combo	Combo
Merrimack	5	8	6	-	-	5	5	Dem	Dem
Rockingham	17	14	12	-	10	10	10	Combo	Combo
Strafford	4	6	3	2	-	2	3	Map Dev-15	Map
Sullivan	3	1	3	0	-	0	1	Map Dev-15	Rep
Total	51	61	45			34	38		

Carroll County
w/Deviations Under -5%



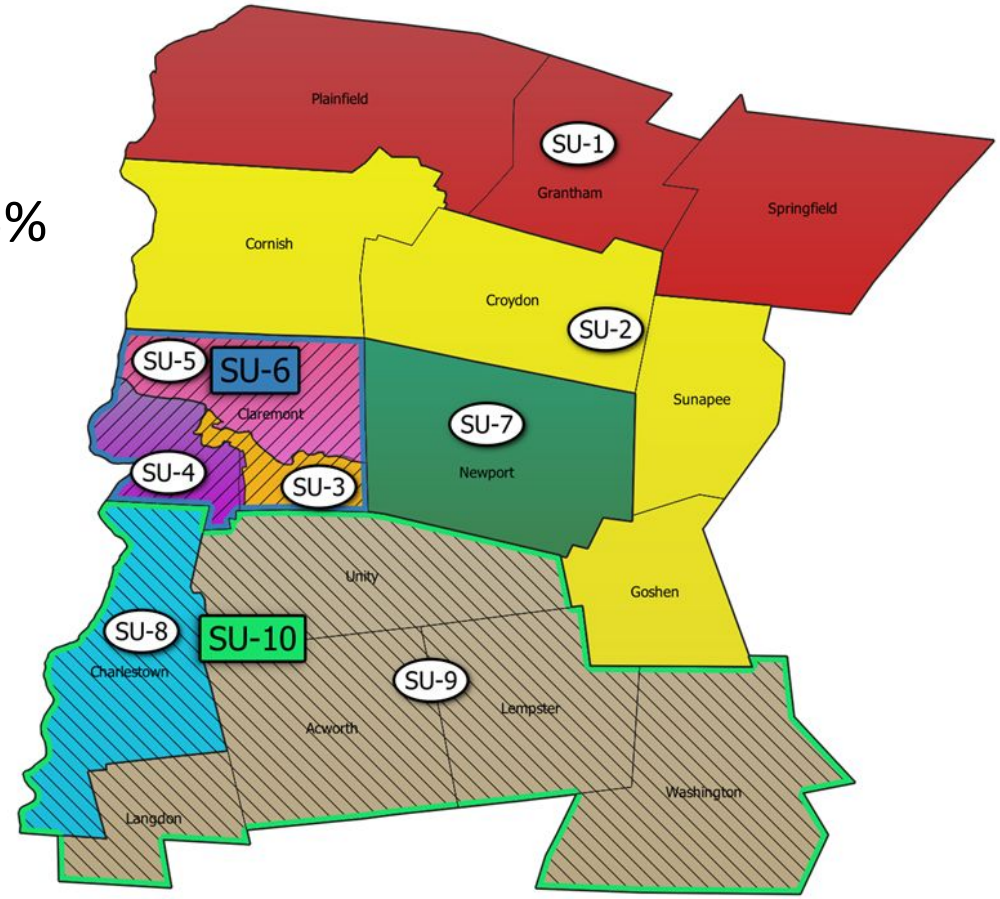
Carroll County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
CA-1	6,994	2			Chatham, Jackson, Bartlett, Hart's Location, Hales Location, Albany, Sandwich	1.54%	
CA-2	9,822	3			Conway	-4.93%	
CA-3	4,372	1	CA-5	1	Ossipee	-4.05%	
CA-4	9,162	2			Tamworth, Madison, Eaton, Freedom, Effingham	-0.62%	
CA-6	4,918	1	CA-9	2	Moultonborough	-4.66%	
CA-7	9,638	2			Brookfield, Tuftonboro, Wolfeboro	-5.95%	Wolfeboro
CA-8	5,201	1			Wakefield	-1.06%	
Total	44,906	15				7.49%	1



Strafford County w/Deviations Under -5%

Strafford County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
ST-1	4,516	1	ST-4	1	Middleton, New Durham	-2.24%	
ST-2	4,482	1			Milton	-2.79%	
ST-3	4,230	1			Strafford	-6.93%	
ST-5	6,722	2			Farmington	-2.40%	
ST-6	9,326	2	ST-8	1	Barrington	1.29%	
ST-7	4,520	1			Lee	-1.05%	
ST-9	17,408	5			Durham, Madbury	1.10%	Durham
ST-10	4,968	1	ST-12	1	Rollinsford, Somersworth Ward 5*	-2.30%	Somersworth
ST-11	5,457	1			Dover Ward 2*	4.01%	
ST-13	4,742	1	ST-15	1	Somersworth Wards 1-2*	-8.20%	
ST-14	4,742	1			Somersworth Wards 3-4*	-8.20%	
ST-16	5,457	1	ST-21	3	Dover Ward 1*	-0.97%	
ST-17	5,457	1			Dover Ward 3*	-0.97%	
ST-18	5,457	1			Dover Ward 4*	-0.97%	
ST-19	5,457	1			Dover Ward 5*	-0.97%	
ST-20	5,456	1			Dover Ward 6*	-0.98%	
ST-22	5,415	1	ST-24	1	Rochester Ward 1*	4.83%	
ST-23	5,415	1			Rochester Ward 2*	4.83%	
ST-25	5,415	1	ST-27	1	Rochester Ward 3*	4.83%	
ST-26	5,415	1			Rochester Ward 4*	4.83%	
ST-28	5,416	1	ST-30	1	Rochester Ward 5*	4.84%	
ST-29	5,416	1			Rochester Ward 6*	4.84%	
Total	130,889	38				13.05%	2
*Populations used are assumed to be ideal populations for wards							

Sullivan County w/Deviations Under -5%



Sullivan County Proposal							
District	Population	# Reps	F District	F Reps	Towns/Wards	% Deviation	Violations
SU-1	7,122	2			Plainfield, Grantham, Springfield	3.40%	
SU-2	6,555	2			Cornish, Croydon, Sunapee, Goshen	-4.83%	
SU-3	4,316	1	SU-6	1	Claremont Ward 1*	-6.00%	
SU-4	4,316	1			Claremont Ward 2*	-6.00%	
SU-5	4,317	1			Claremont Ward 3*	-5.99%	
SU-7	6,299	2			Newport	-8.55%	
SU-8	4,806	1	SU-10	1	Charlestown	-5.33%	
SU-9	5,332	1			Acworth, Langdon, Lempster, Unity, Washington	1.46%	
Total	43,063	13				11.95%	0
*Populations used are assumed to be ideal populations for wards							



About the Map-a-Thon

https://www.opendemocracynh.org/nh_map_a_thon

M-A-T Review of NH House Maps:

https://www.opendemocracyaction.org/nov_7_review_special_committee_maps

EXHIBIT F



Analysis of Proposed Congressional Map (HB52) w/o Amendment, & NH House Maps (HB50) with Senate's Amendment 2022-0339s

January 28, 2022

Map-a-Thon
Granite Staters Drawing Fair Voting Maps

Map-a-Thon Glossary

Community of Interest (COI) Communities of interest can take many forms, but generally refer to groups of people united by shared interests. In the context of redistricting, communities of interest are those communities that share policy concerns, such as similar economic interests, a shared school system, or common resources. Our maps use boundaries of shared high school districts, shared water systems, and shared police and fire protection -- in addition to the boundaries of towns and city wards-- to inform the redistricting process. More information about communities of interest can be found by visiting NYU's Brennan Center

Compactness Compactness helps us measure the cohesiveness of a district. When drawing districts to represent a region, it is best practice to strive for a compact district, since non-compact districts are less likely to share communities of interests (2010's Executive Council & some 2020 NH Senate districts), and the wider area makes it harder for representatives to understand and serve the needs of constituents. Compactness is also used as a check against gerrymandering (see below), since gerrymandered districts tend to not be compact. The compactness scores reported in our analysis come from the DRA compactness calculation described here:

Contiguity Contiguity describes how municipalities in a voting district are geographically connected to each other. Contiguous districts are a requirement for all legislative districts in New Hampshire. This definition is sometimes stretched -- quite literally -- with the towns of Meredith and Gilford only connected in the middle of Lake Winnipesaukee, the towns of Strafford and New Durham connected in an inaccessible point in the woods, and the 2010 floterial district, Grafton 9, for which the elected rep has to travel out of the district to get to constituents on the other side of the district.

Dave's Redistricting Application (DRA) Dave's Redistricting Application, hosted at https://davesredistricting.org is a free online tool for creating, viewing, sharing, and analyzing redistricting maps. The mission of Dave's Redistricting is to, "empower civic organizations and citizen activists to advocate for fair congressional and legislative districts and increased transparency in the redistricting process." Map-a-Thon's maps and most supporting data are located there for public inspection.

Deviation Deviation refers to the degree to which districts have equal population. Ideally, every representative or other elected official in proportional representation will represent the same number of people, but a small amount of flexibility --deviation-- is permissible to account for unequal population distributions and compliance with other laws, such as the 1965 Voting Rights Act or the New Hampshire Constitution's mandate to keep town boundaries intact, and NH Supreme Court Rulings

Floterial District A legislative district that includes several separate Non-Floterial districts. This district "Floats" over the other districts. This method is only used by two states, New Hampshire and Wyoming, and has never been tested in the U.S. Supreme Court.

Gerrymandering Gerrymandering is the practice of drawing district boundaries for partisan advantage. This leads to uncompetitive general elections and districts oriented toward party agendas rather than local interests. Gerrymandered districts often connect regions with little in common, leading to the splitting of cities, counties, and other communities of interest. The leading example of this in New Hampshire is 2010's Executive Council 2 and certain NH Senate districts

Splitting Because our maps are drawn with the goal of avoiding gerrymandering while keeping communities of interest intact, many parts of our analysis examine the number of communities of interest divided, or "splits," contained within a district. The ideal map minimizes the number of districts which cross other administrative boundaries to hold communities of interest intact. Our analyses examine the number of geographical splits necessary. For example, a state senator representing the towns of Dublin and Peterborough would split county lines while keeping a school district intact. Another way of examining splitting is to weight splits by population, the approach taken in the DRA county-splitting metric.

Partisan Lean Number of seats using past election data that are likely to be either Democrat seats, Republican seats, or Competitive seats.

Violation A town that has a population over 3,444 and is eligible for its own district that does not have its own district in the corresponding map. We count one violation per town/city and not by individual wards.

Map-a-Thon
Granite Staters Drawing Fair Voting Maps

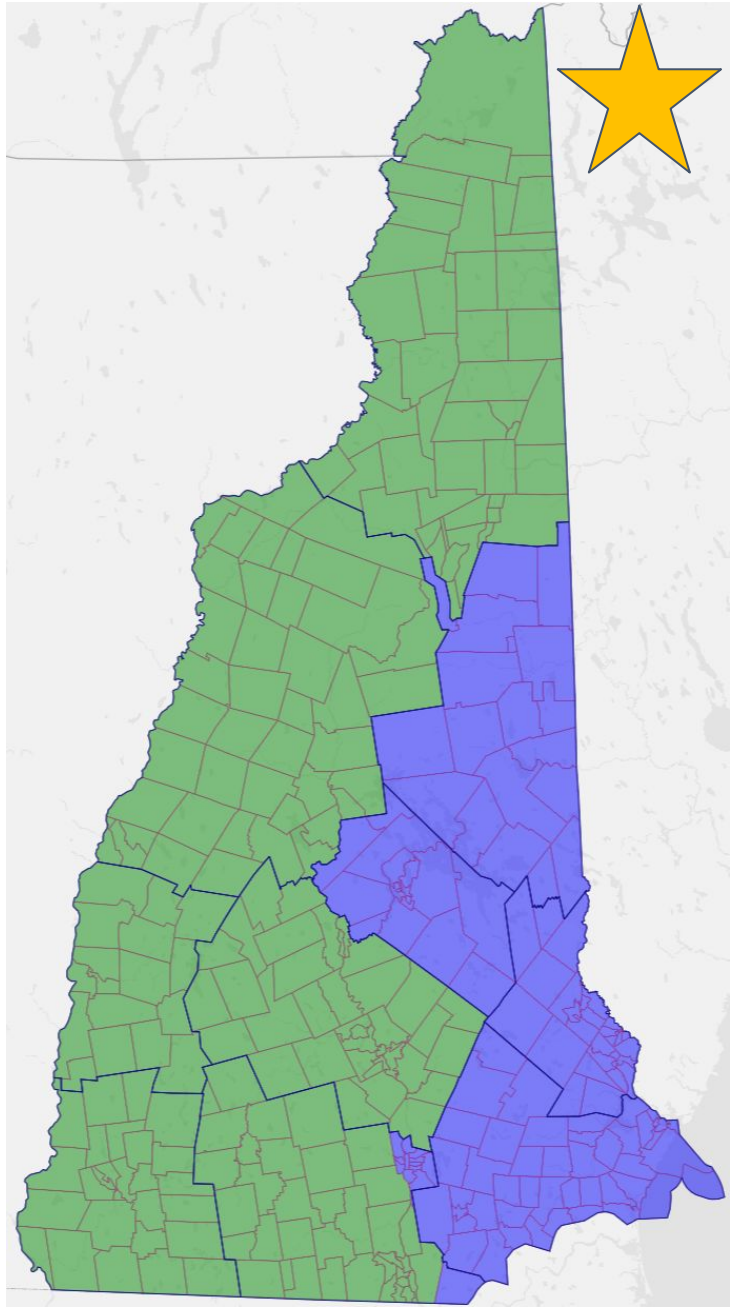
NH Congressional Map Analysis

- The Map-a-Thon Mapping & Technical team analyzed the Congressional map proposed in HB52 based on numerous factors, and compared the proposal to a new Map-a-Thon submission.
- We conclude that the proposed Republican map has been gerrymandered, with Congressional District 2 “packed” with Democrats, District 1 has been similarly “packed” with Republicans, making both Districts uncompetitive.
- Historically, this is the biggest map shift of the Congressional districts in over 140 years.
- The Map-a-Thon Citizen Mapping Project’s Mapping and Technical Team analyzed the Congressional map in detail, and also recommends its own redistricting proposal. This document summarizes our analyses with transparency and fairness.
- The Map-a-Thon team produced similar analyses for NH’s Senate, House, and Executive Council redistricting.

Map-a-Thon Proposed Congressional Map

https://davesredistricting.org/join/c7496d04-7b0c-4467-8185-f128877c6154

Map-a-Thon
Granite Staters Drawing Fair Voting Maps



Map-a-Thon Proposal

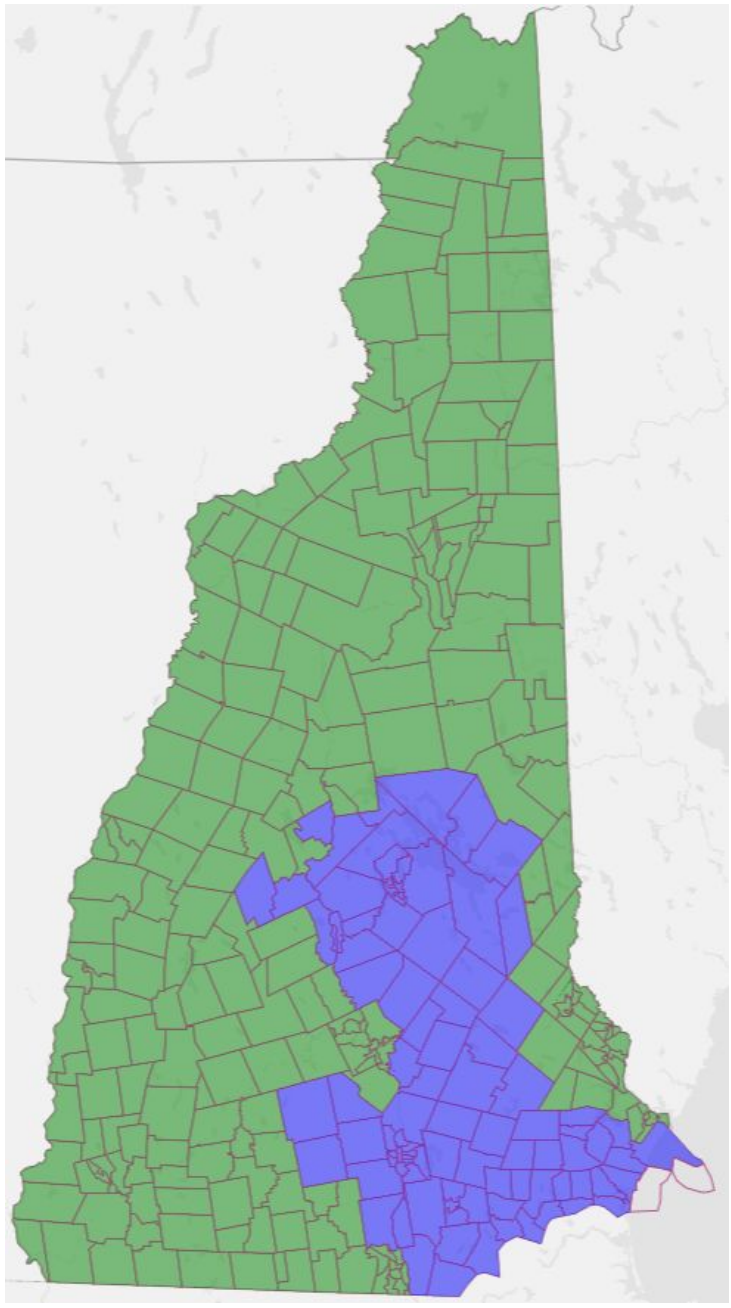
- Visually compact
- Deviation of **43**
- Keeps **9 out of 10** county boundaries intact with only Manchester and Pelham as exceptions
- Violates **only 5 SAU boundaries** (94% intact)
- Moves only **12 towns/wards**
- Very **competitive** districts
- No packing of districts
- **Follows** 140 years of precedent

Committee Proposal

- Not visually compact
- Deviation of **177**
- Breaks up **6 of 10** counties
- Violates **10 SAU boundaries**
- Moves **75 towns/wards**
- Moves **365,703** people to a new district
- **Uncompetitive** districts
- District 1 packed with Republicans and District 2 packed with Democrats
- **Breaks** 140 years of precedent

Committee Proposed Congressional Map

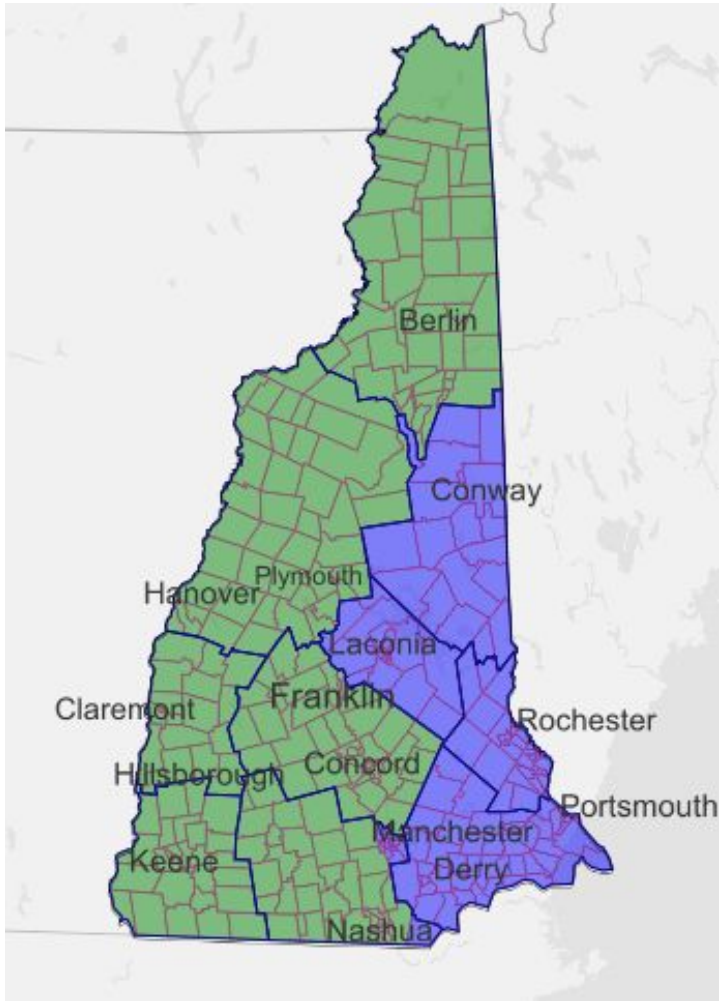
https://davesredistricting.org/join/8b9ccd94-7bf5-4cb6-9cf2-e3cdf2548544



Map-a-Thon
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Community of Interest Analysis

Map-a-Thon's Jan. 13, 2022 Congressional District Compromise Map



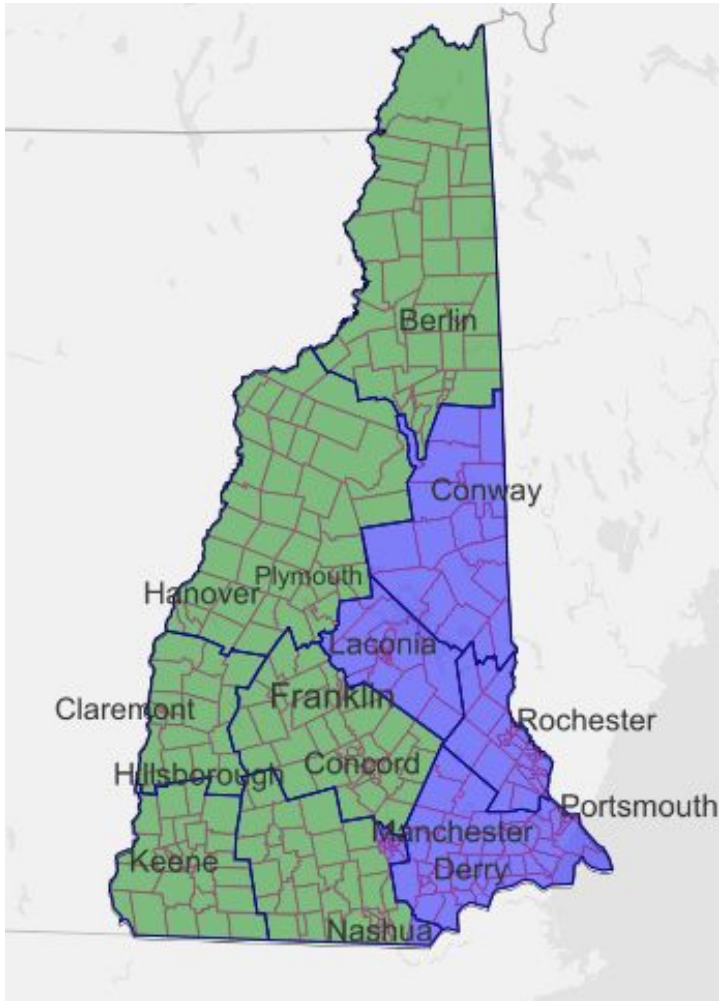
Included in chart			
Metric Description (percentages)	**Result**	**Metric Description (counts)**	**Result**
Population deviation unused	99.9%		
HS SAUs preserved	94.0%	HS SAUs split	5
Shared water/sewer preserved	90.0%	Shared water/sewer service areas split	2
Shared police and/or fire preserved	100.0%	Shared police and/or fire split	0
Cities SVI>=5 preserved	100.0%	Cities SVI>=5 split	0
Public health regions preserved	69.2%	Public health regions split	4
Regional planning preserved	44.4%	Regional planning split	5
Counties preserved	90.0%	Counties split	1
Towns/wards retained in prior districts	96.3%	Towns/wards NOT retained in prior districts	12
Population retained in prior districts	88.1%	Population NOT retained in prior districts	164496

Additional Information			
Metric Description (percentages)	**Result**	**Metric Description (counts)**	**Result**
		District contiguity (true/false)	TRUE
Towns/wards preserved	100.0%	Towns/wards split	0
Cities preserved	100.0%	Cities split	0
Competitive districts (2020 election)	50.0%	Districts NOT competitive (2020 election)	1

Map-a-Thon
Granite Staters Drawing Fair Voting Maps

Partisan Analysis

Map-a-Thon's Jan. 13, 2022 Congressional District Compromise Map



	2020 NH Senate Votes		
District	Democrat	Republican	Competitiveness
1	48.2%	51.8%	Competitive
2	51.4%	48.6%	Competitive
Total Vote Share	**49.8%**	**50.2%**	
Seats Won	**1**	**1**	

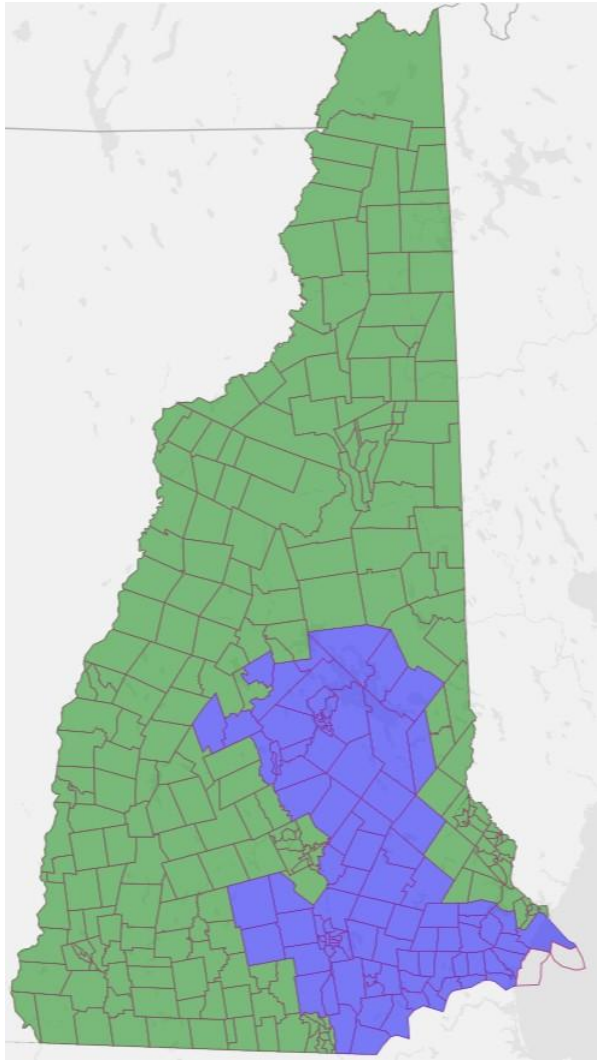
	2020 NH Executive Council Votes		
District	Democrat	Republican	Competitiveness
1	46.9%	53.1%	Competitive
2	50.5%	49.5%	Competitive
Total Vote Share	**48.7%**	**51.3%**	
Seats Won	**1**	**1**	

	2020 U.S. House Votes			
District	Democrat	Republican	Libertarian	Competitiveness
1	50.7%	46.9%	2.4%	Competitive
2	54.6%	43.1%	2.4%	Leans Democrat
Total Vote Share	**52.6%**	**45.0%**	**2.4%**	
Seats Won	**2**	**0**	**0**	

Map-a-Thon
Granite Staters Drawing Fair Voting Maps

Communities of Interest & Partisan Analysis

NH House-Approved Congressional District Map



Included in chart			
Metric Description (percentages)	**Result**	**Metric Description (counts)**	**Result**
Population deviation unused	100.0%		
HS SAUs preserved	88.0%	HS SAUs split	10
Shared water/sewer preserved	90.0%	Shared water/sewer service areas split	2
Shared police and/or fire preserved	100.0%	Shared police and/or fire split	0
Cities SVI>=5 preserved	100.0%	Cities SVI>=5 split	0
Public health regions preserved	53.8%	Public health regions split	6
Regional planning preserved	33.3%	Regional planning split	6
Counties preserved	40.0%	Counties split	6
Towns/wards retained in prior districts	75.9%	Towns/wards NOT retained in prior districts	75
Population retained in prior districts	73.5%	Population NOT retained in prior districts	365703

Additional Information			
Metric Description (percentages)	**Result**	**Metric Description (counts)**	**Result**
		District contiguity (true/false)	TRUE
Towns/wards preserved	100.0%	Towns/wards split	0
Cities preserved	100.0%	Cities split	0
Competitive districts (2020 election)	50.0%	Districts NOT competitive (2020 election)	1

	2020 U.S. House Votes			
District	**Democrat**	**Republican**	**Other**	**Competitiveness**
1	47.9%	49.7%	2.3%	Competitive
2	57.4%	40.1%	2.5%	Leans Democrat
Total Vote Share	**52.6%**	**45.0%**	**2.4%**	
Seats Won	**1**	**1**	**0**	

Map-a-Thon
Granite Staters Drawing Fair Voting Maps

NH Congressional Map Takeaways

- The Committee proposed map is a drastic shift from the current map offering few benefits outside of low population deviation. The boundaries of the districts are not visually compact, in large part due to the long neck that splits Carroll County and connects Portsmouth and Dover to the rest of District 2 (historically, a district that represents the western part of New Hampshire).
- These and other major changes suggest that the map was **drawn with a goal of securing a partisan advantage**.
- The Map-a-thon proposed map satisfies statutory criteria while prioritizing communities of interest and achieving very low deviation (0.01%), a good balance of rural and urban areas, and districts with levels of competitiveness that are similar to the current map.
- It is the responsibility of the legislature to define districts based on principles of equality rather than partisan advantage.
- Several aspects of the proposed districts appear to be **designed for partisan advantage**.

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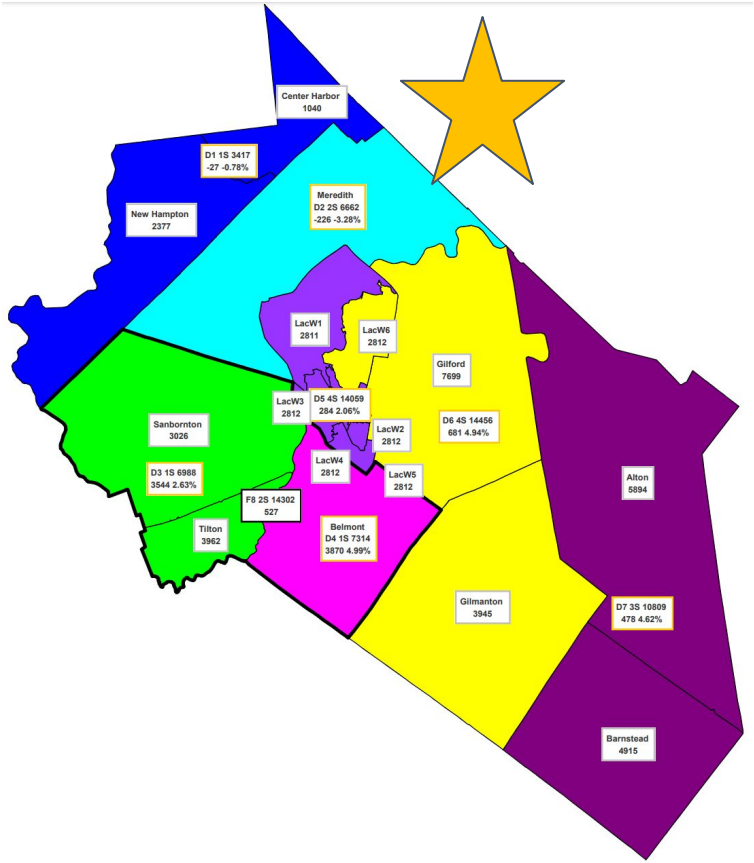
NH House Map Analysis, updated with 1/31/22 Amendment 2022-0339s

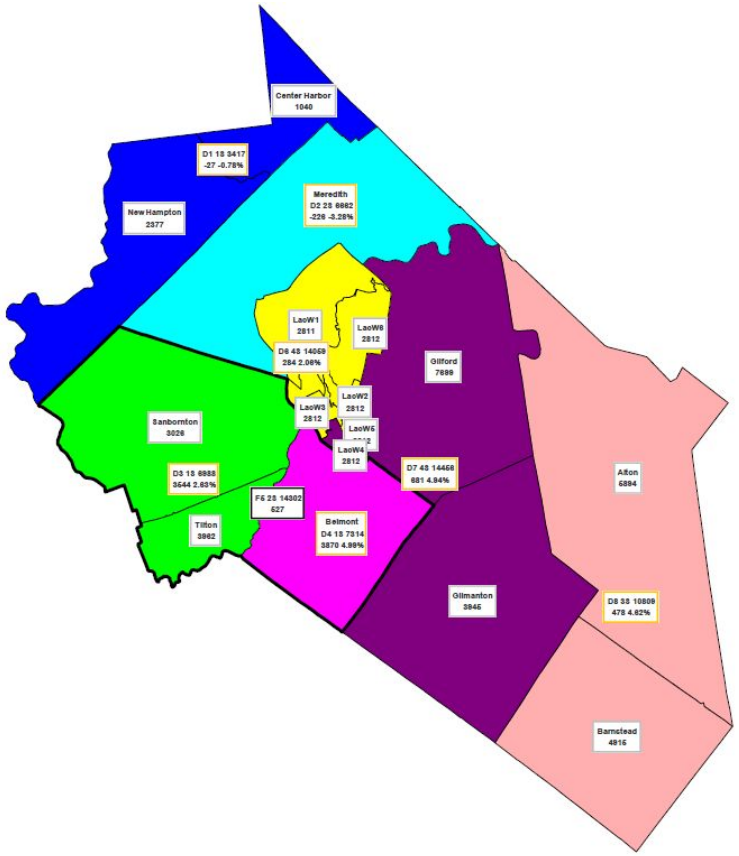
- The New Hampshire House Redistricting Committee developed redistricting proposals for the 400-member NH House of Representatives.
- On 16 November 2021, the Committee voted “Ought to Pass” on its proposal, known as HB50.
- The full House voted to pass HB50 on January 5th. To become law, the NH Senate will vote on it soon, and the Governor will then either approve or veto.
- The Map-a-Thon Citizen Mapping Project’s Mapping and Technical Team analyzed the HB50 maps in detail, and also recommends its own redistricting proposals. This document summarizes our analyses with transparency and fairness.
- The Map-a-Thon team produced similar analyses for NH’s Congressional, Senate, and Executive Council redistricting. [See all the Map-a-Thon Reports]

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Belknap County

Both maps are the same except for one Laconia ward is combined with Gilford and Gilmanton. In our recommendation this leads to 4 competitive seats in Laconia and with the Committee's proposal there are zero competitive seats. This may change when Laconia redraws it's wards.



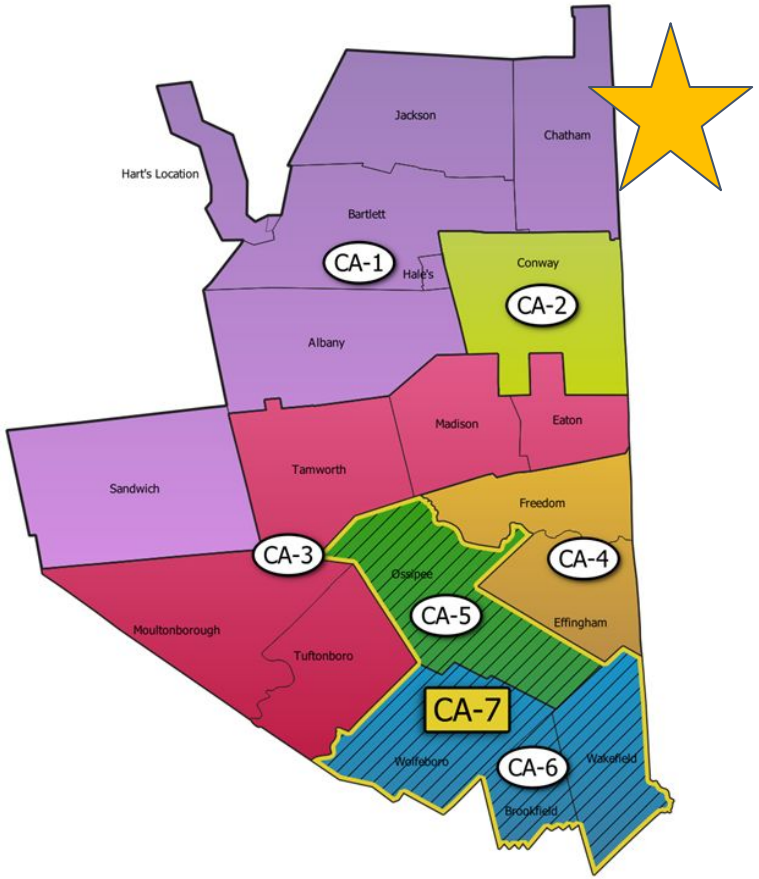


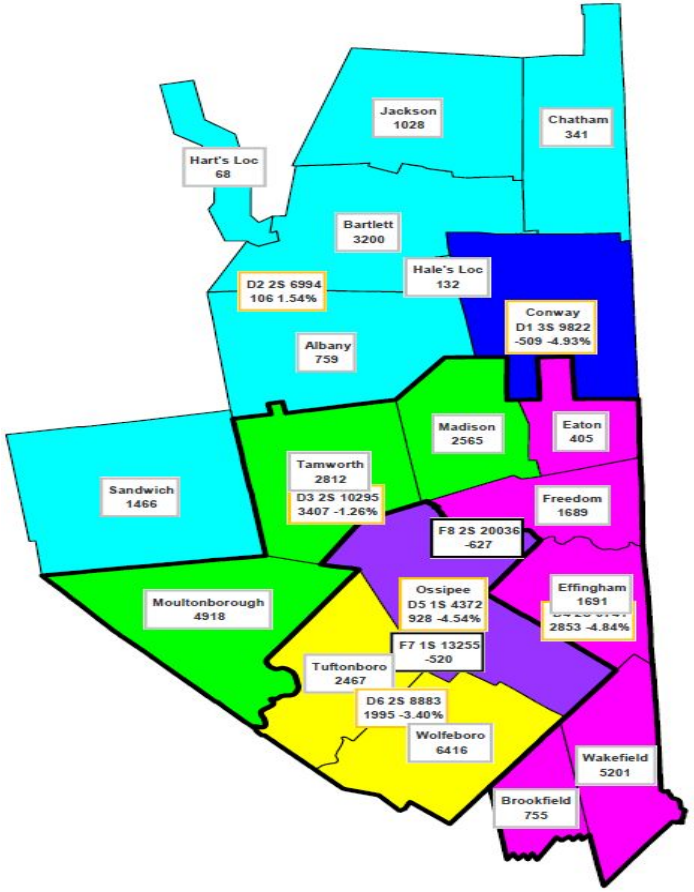
Belknap County	Map-a-Thon Recommendation	HB50 Map
Deviation	-3.28% to 4.99% (8.27%)	-3.28% to 4.99% (8.27%)
# Violations	6	6
# Towns/Wards in Largest Non-Floterial District	5	5
Largest # Reps in a Non-Floterial District	4	4
# Towns/Wards in Largest Floterial District	3	3
Largest # Reps in a Floterial District	2	2
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	0/14/4	0/18/0

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Carroll County

Both maps are similar, with Conway and Ossipee getting their own districts, and the district from Sandwich to Chatham being the same. The main difference is that the Committee's map creates a very large floterial district spanning from Moultonborough to Brookfield totalling 8 towns. Map-a-Thon's proposal has a smaller floterial and gives Freedom and Effingham a small district together.





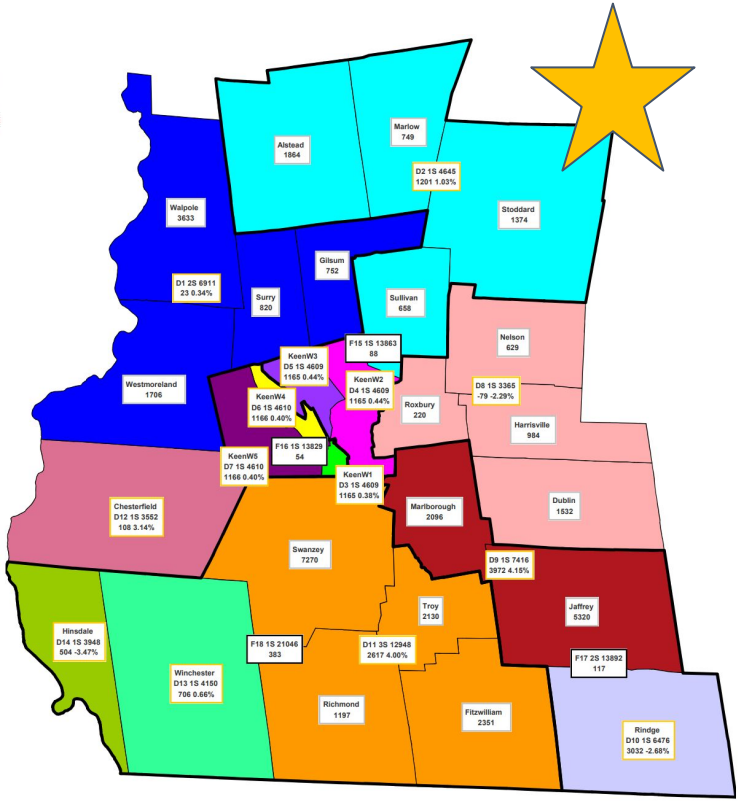
Carroll County	Map-a-Thon Recommendation	HB50 Map
Deviation	-4.93% to 1.54% (6.47%)	-4.93% to 1.54% (6.48%)
# Violations	3	3
# Towns/Wards in Largest Non-Float District	7	7
Largest # Reps in a Non-Floterial District	4	3
# Towns/Wards in Largest Floterial District	4	8
Largest # Reps in a Floterial District	1	2
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	0/10/5	0/10/5

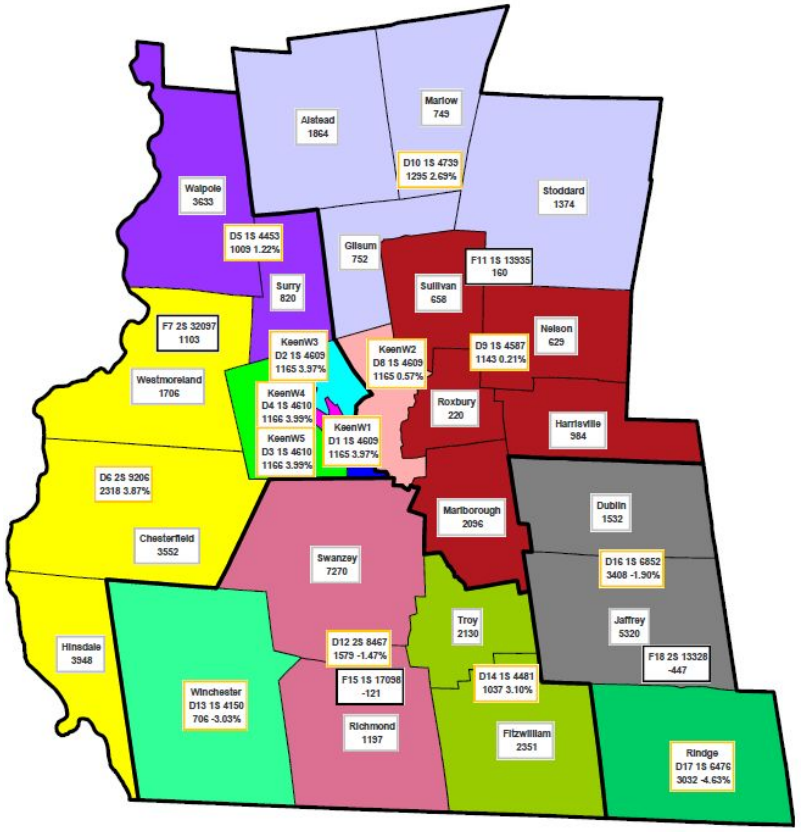
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Cheshire County

The Committee's map is an improvement on the majority's initial proposal, but does not go as far as Map-a-Thon's recommended map in terms of towns getting their own district if eligible. The committee's map does give Rindge and Winchester their own district, a positive.

Map-a-Thon also separates Hinsdale and Chesterfield to give them their own district.





Cheshire County	Map-a-Thon Recommendation	HB50 Map
Deviation	-3.47% to 4.15% (7.62%)	-4.63% to 3.99% (8.62%)
# Violations	3	5
# Towns/Wards in Largest Non-Floterial District	4	5
Largest # Reps in a Non-Floterial District	3	2
# Towns/Wards in Largest Floterial District	6	10
Largest # Reps in a Floterial District	2	2
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	11/1/10	12/3/7

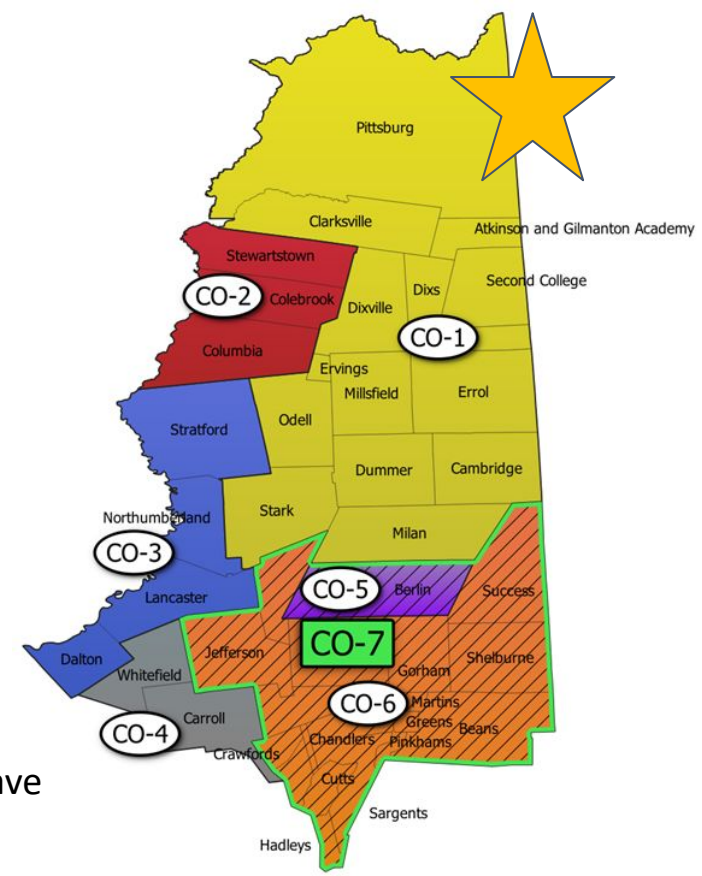
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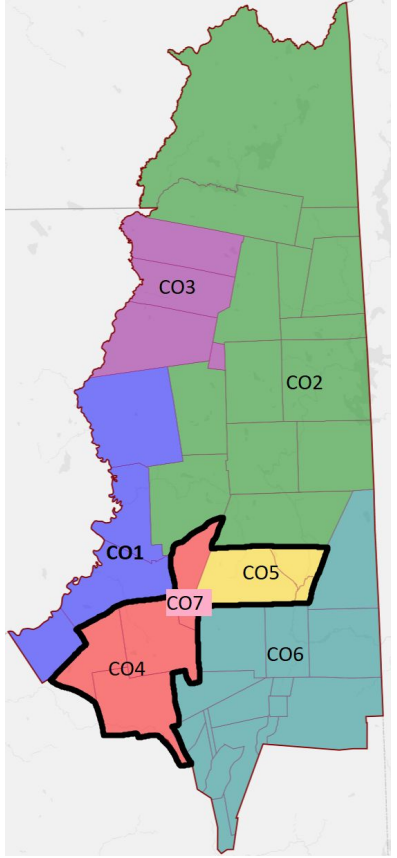
Coos County

The Senate's Amendment to Coos County is an improvement over the House's final map which did not give Berlin it's own district. It does pair Jefferson with Carroll and Whitefield which allows Republicans a better chance to win the floterial seat in Coos.

Map-a-Thon's proposal pairs Jefferson with Randolph, Gorham and Shelburne so that these towns can be paired with Berlin in a floterial which they have more in common with. Whitefield and Carroll are then paired in a small district.

Note: Map-a-Thon's proposal has a floterial with 18 towns but only 5 have populations of over 5 people with most being land grants in the White Mountains.



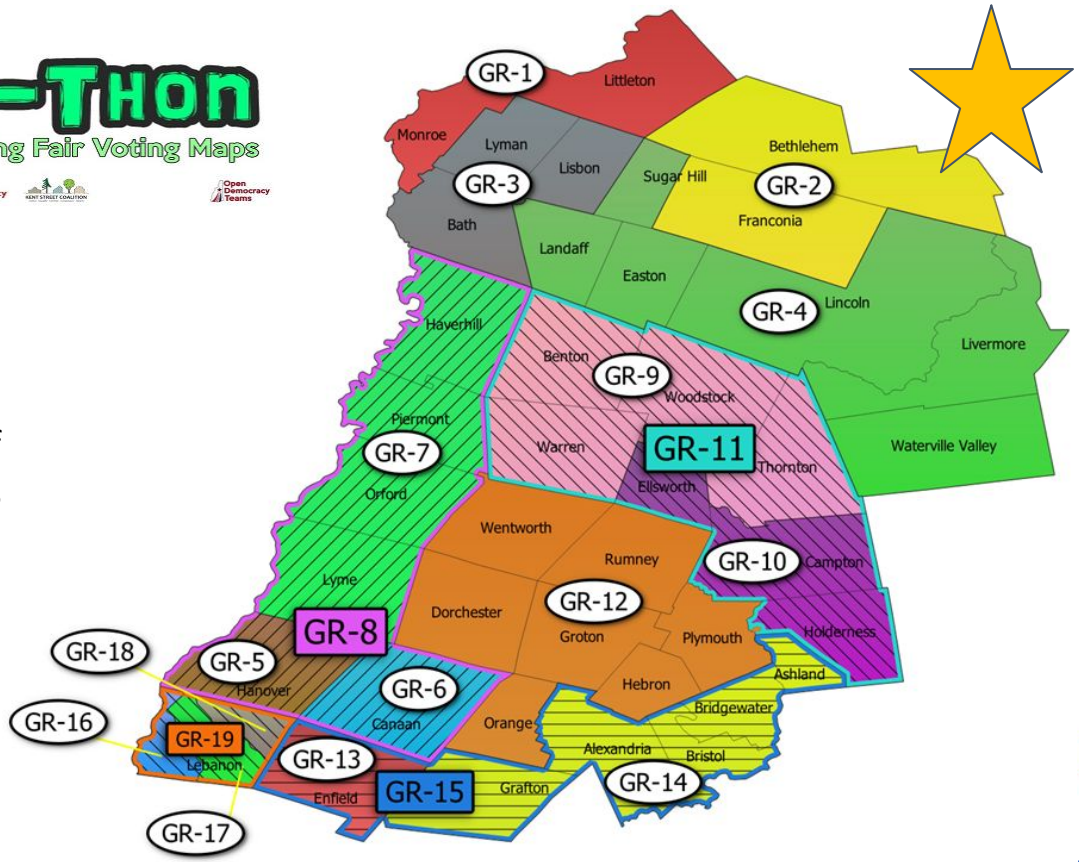


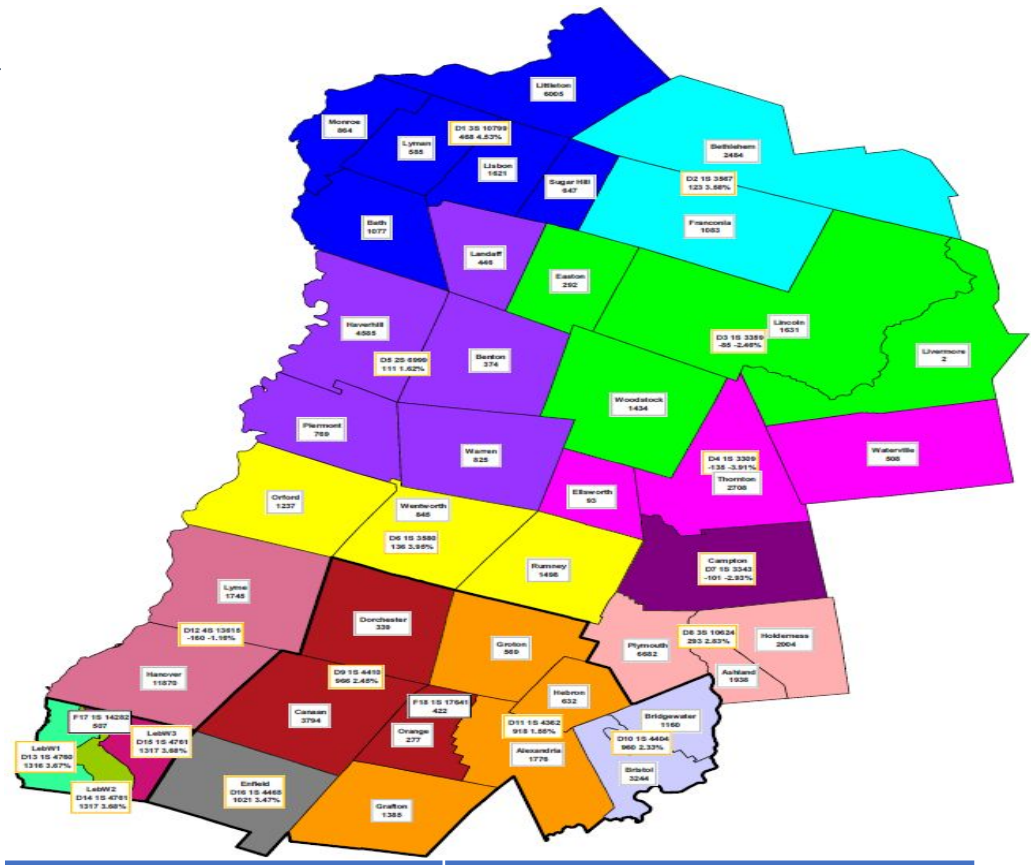
Coos County	Map-a-Thon Recommendation	HB50 Map w/ Senate Amendment
Deviation	-3.89% to 4.80% (8.68%)	-3.95% to 4.80% (8.75%)
# Violations	0	0
# Towns/Wards in Largest Non-Floterial District	17	17
Largest # Reps in a Non-Floterial District	2	2
# Towns/Wards in Largest Floterial District	18 (see note above)	5
Largest # Reps in a Floterial District	1	1
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	0/5/4	0/5/4

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Grafton County

The northern section of the Committee's map is reasonable with small compact districts. The southern section is where the committee's map has issues. It does not give Hanover or Canaan their own districts and creates a very large 10-town floterial district. The committee's map does have a lower deviation, but the Map-a-Thon map is a superior plan.



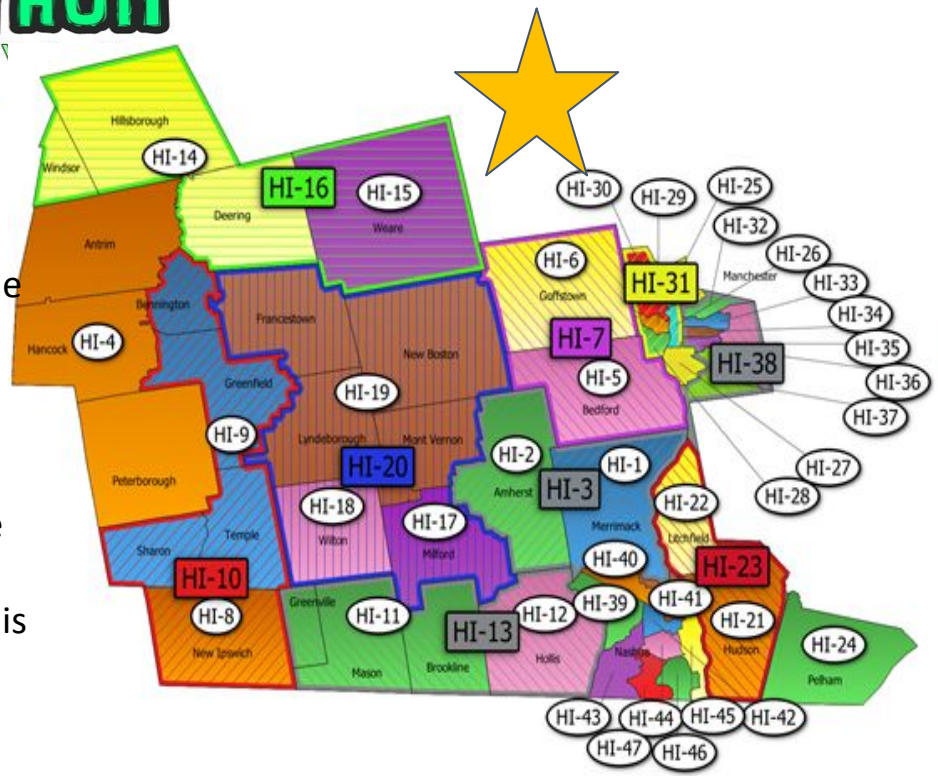


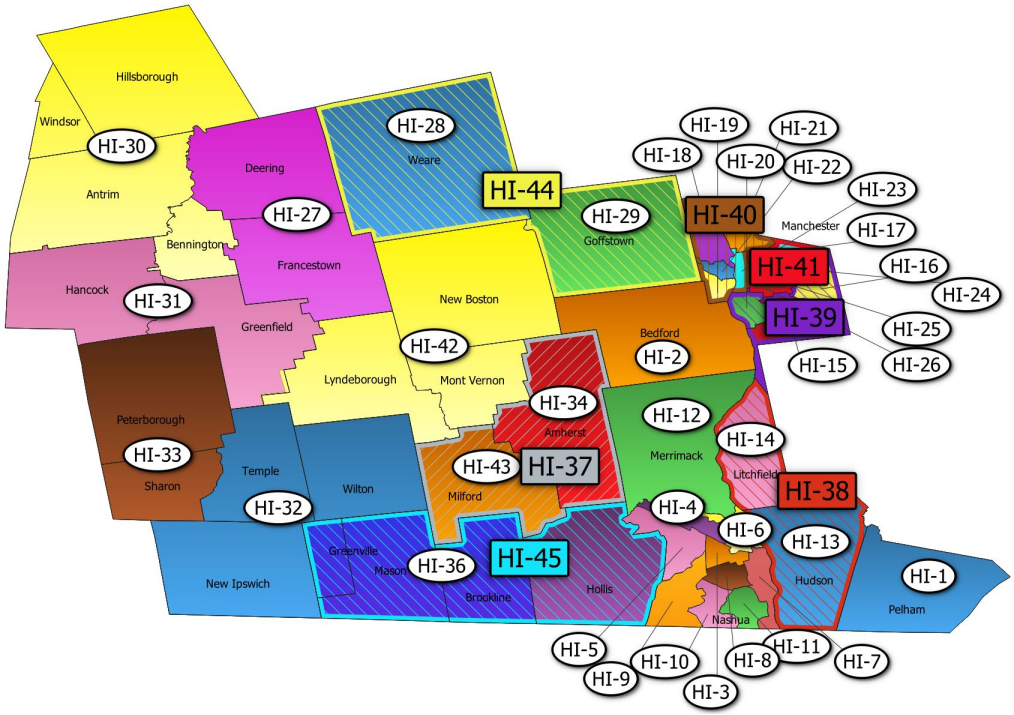
Grafton County	Map-a-Thon Recommendation	HB50 Map
Deviation	-4.87% to 4.99% (9.86% overall)	-3.91% to 4.53% (8.44% overall)
# Violations	3	5
# Towns/Wards in Largest Non-Floterial District	6	6
Largest # Reps in a Non-Floterial District	3	4
# Towns/Wards in Largest Floterial District	7	10
Largest # Reps in a Floterial District	7	1
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	12/5/9	13/7/6

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Hillsborough County

After Manchester changed their wards, the Senate had to change the proposed map in order to give Manchester one more seat. This realigned some of the rest of the county. Manchester is now aligned to give Republicans a better chance to win 6 seats rather than 4. Weare is now given its own district, which is an improvement, and the Senate amendment does have a lower deviation and smaller floterials.



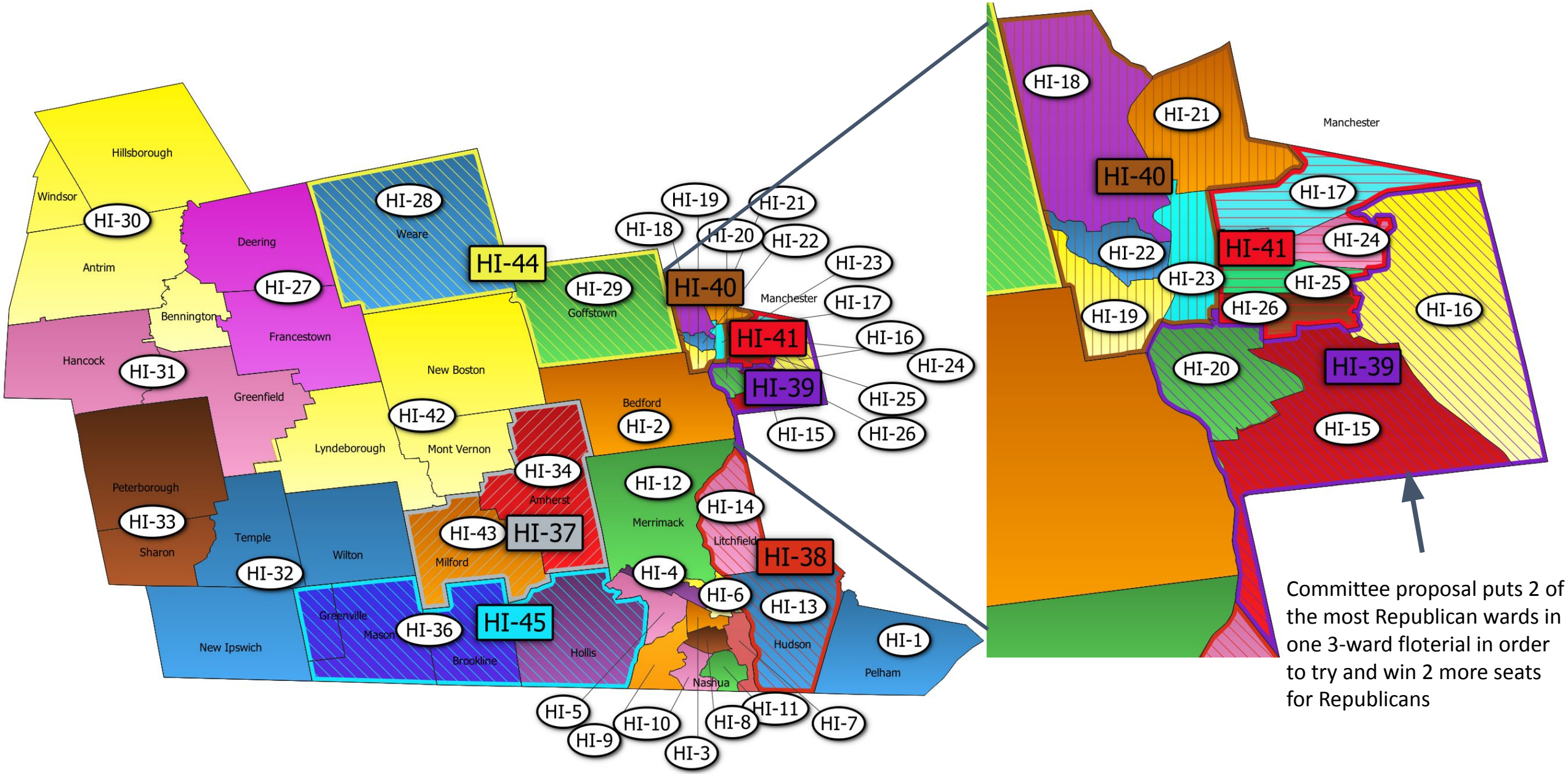


The Map-a-Thon proposal however has 2 fewer violations, with New Ipswich and Wilton being given their own districts. It also creates 8 more competitive seats than the Committee's Amendment.

Hillsborough County	Map-a-Thon Recommendation	HB50 Map w/ Senate Amendment
Deviation	-4.77% to 4.54% (9.31%)	-3.33% to 4.80% (8.13%)
# Violations	4	6
# Towns/Wards in Largest Non-Floterial District	4	4
Largest # Reps in a Non-Floterial District	10	8
# Towns/Wards in Largest Floterial District	6	5
Largest # Reps in a Floterial District	5	4
Partisan Lean of Seats (Lean Dem/Lean Rep/Competitive)	34/28/61	38/32/53

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Closer Look at the Senate Amendment for Hillsborough



Committee proposal puts 2 of the most Republican wards in one 3-ward floterial in order to try and win 2 more seats for Republicans