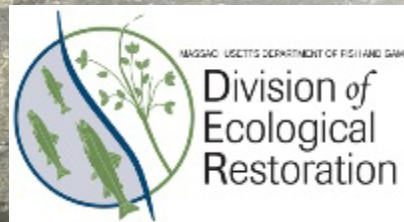


UPDATE AND STATUS OF THE USGS/MA COOPERATIVE HYDROLOGIC MONITORING NETWORK

JASON POLLENDER (USGS)

CHRIS BRUET (USGS)

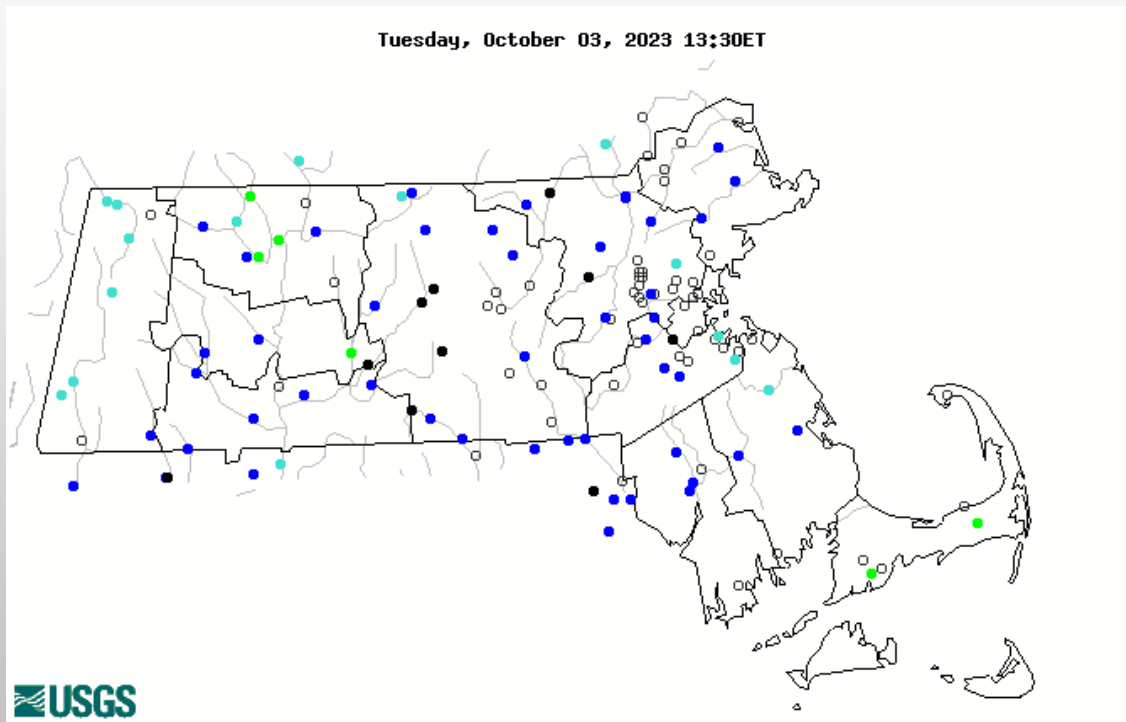
OCTOBER 12, 2023



OVERVIEW

- MASS. USGS STREAMGAGE NETWORK AND DCR CONTRIBUTIONS
- WEATHER STATIONS AND TIDE GAGES
- NEW STREAMGAGES IN MASS.
- DATA COLLECTION BACKGROUND AND DISCHARGE DATA
- SURFACE WATER CONDITIONS AND CHALLENGES IN 2023
- GROUNDWATER NETWORK

USGS STREAM GAGE NETWORK



138 USGS GAGES IN MA

**58 REAL-TIME GAGES FUNDED
BY OWR**

**13 REAL-TIME GAGES FUNDED
BY BOE**

**10 REAL-TIME GAGES FUNDED
BY WSP**

BREAKDOWN

- USGS ~ \$225,000
 - FPS(FEDERAL) ~ \$68,900
 - MA DCR (total) ~ \$989,000
- ~\$17,000 PER STREAMGAGE**

PRECIPITATION/WEATHER STATIONS IN MASS

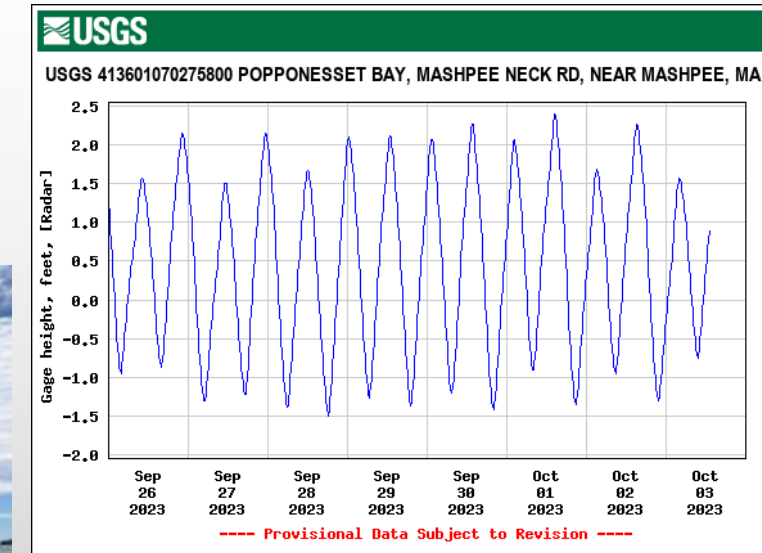


- STILLWATER RIVER NEAR STERLING, MA
 - QUINAPOXET RIVER AT CANADA MILLS NEAR HOLDEN, MA
 - SHAWSHEEN RIVER AT HANSCOM FIELD NEAR BEDFORD, MA
 - SHAWSHEEN RIVER AT BALMORAL STREET AT ANDOVER, MA
 - ABERJONA RIVER AT WINCHESTER, MA
 - HOBBS BK BELOW CAMBRIDGE RES NR KENDALL GREEN, MA
 - STONY BROOK RESERVOIR AT DAM NEAR WALTHAM, MA
 - MUDDY RIVER AT BROOKLINE, MA
 - TOWN BROOK AT DIVERSION TUNNEL AT QUINCY, MA
 - POPPONSETT BAY, MASHPEE NECK RD, NEAR MASHPEE, MA
 - FALL RIVER PRECIPITATION GAGE FALL RIVER, MA
 - MA-SJW 58R SHEFFIELD GW MET STATION, MA
 - FRESH POND IN GATE HOUSE AT CAMBRIDGE, MA
 - WARE R INTAKE WORKS NR BARRE, MA PRECIPITATION
 - EAST BR SWIFT R NR HARDWICK, MA PRECIPITATION
 - TOWN OF PEABODY PRECIPITATION PEABODY,MA
 - TOWN OF GROTON PRECIPITATION STATION GROTON,MA
 - TOWN OF FLORIDA WEATHER STATION FLORIDA, MA
- PER GAGE \$3,400/\$6,800



TIDE GAGES

- PROVINCETOWN
- DENNIS
- MERRIMACK
- POPPONESSET BAY
- \$7,300 PER GAGE



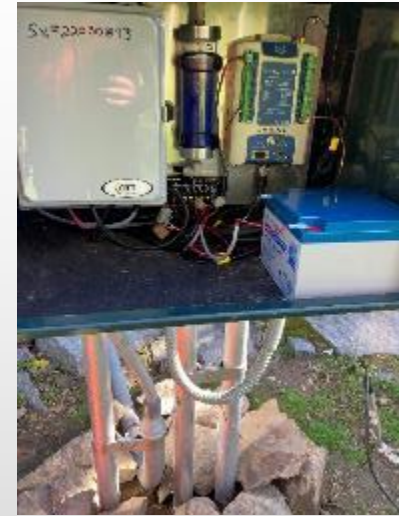
FIVE NEW GAGES IN MASS IN COOPERATION WITH USAF



- 01100571 SHAWSHEEN RIVER AT GREAT RD AT BEDFORD, MA
- 0110057120 ELM BROOK AT ROUTE 2A NEAR LINCOLN, MA
- 0110057380 HARTWELL BROOK AT BEDFORD, MA
- 01100574 ELM BROOK AT BEDFORD, MA
- 01100580 SPRING BROOK NEAR BEDFORD, MA

TYPES OF STREAMGAGE SENSORS

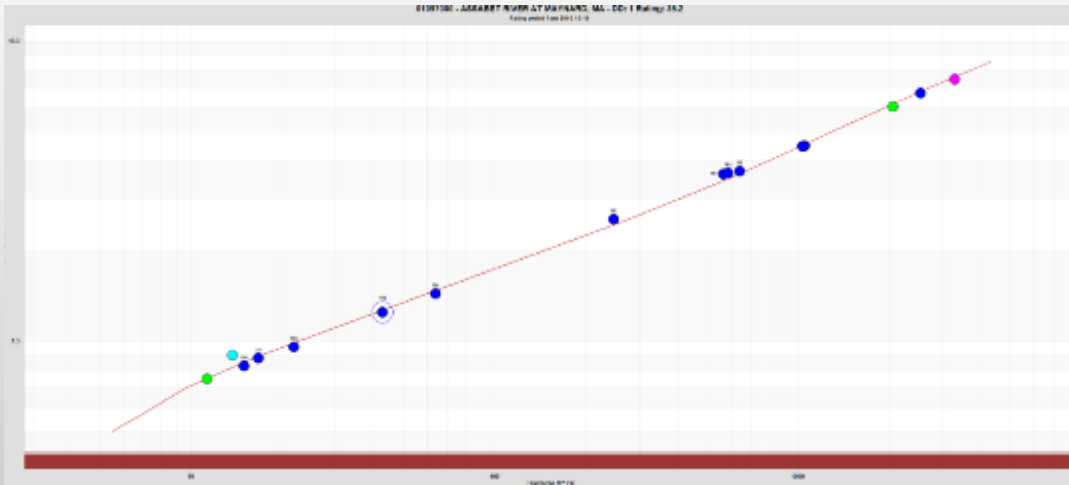
- SUBMERSIBLE PRESSURE TRANSDUCERS
- NON-SUBMERSIBLE PRESSURE TRANSDUCERS
- STILLING WELLS WITH DIGITAL ENCODER
- RADARS
- HYDRO-ACOUSTIC VELOCITY METERS
- CAMERAS?



DATA COLLECTION AND DISCHARGE

- STAGE (ELEVATION) DATA COLLECTED WITH 0.01 FT ACCURACY
- DISCHARGE MEASUREMENTS COLLECTED PERIODICALLY AT DIFFERENT STAGES.
- REGRESSION (RATING) DEVELOPED BASED ON THIS RELATIONSHIP
- RATING IS MAINTAINED (SHIFT CURVES DEVELOPED) BASED ON RE-OCCURRING DISCHARGE MEASUREMENTS IN THE FIELD.

DATA COLLECTION AND DISCHARGE

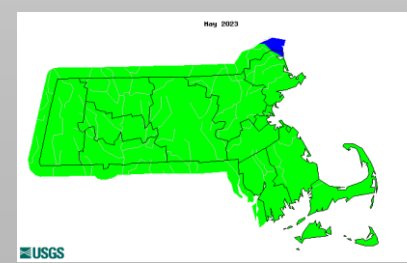
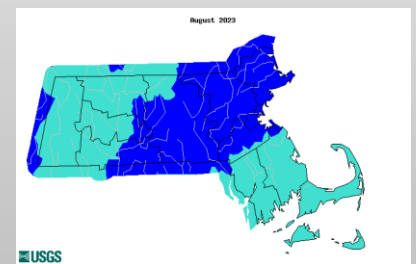
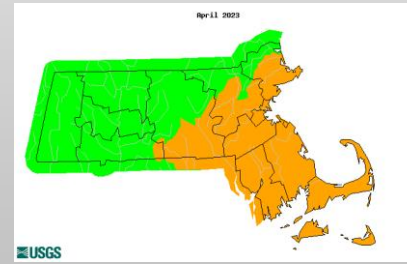
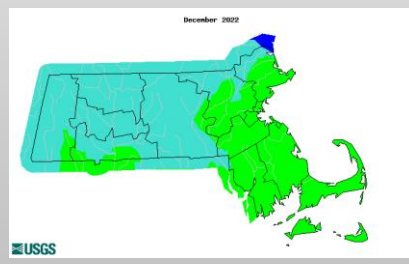
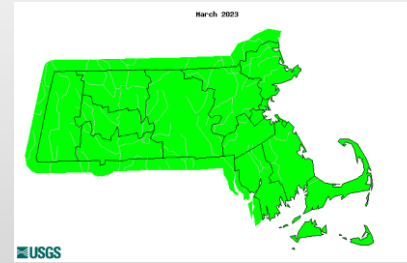
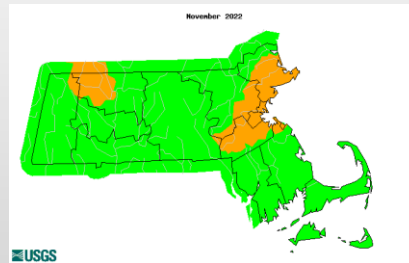
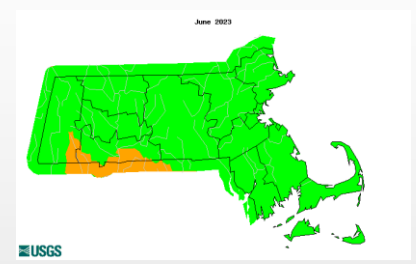
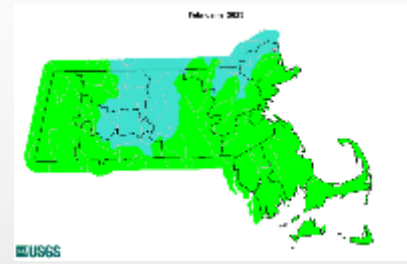
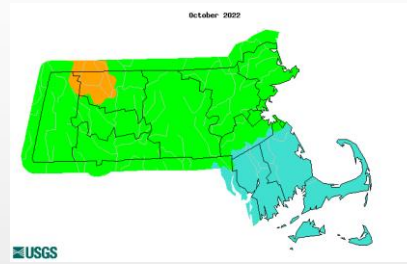


Expanded Rating Table: 38.2

Gage height (ft)	Discharge (ft ³ /s)									Diff In Q Per .1 Units	
	.00	.01	.02	.03	.04	.05	.06	.07	.08		.09
0.80	5.500*	5.688	5.879	6.073	6.269	6.468	6.669	6.873	7.080	7.289	2.000
0.90	7.500*	7.704	7.910	8.118	8.327	8.540	8.754	8.970	9.188	9.408	2.130
1.00	9.630*	9.944	10.26	10.59	10.92	11.26	11.60	11.95	12.30	12.66	3.390
1.10	13.02	13.40	13.77	14.16	14.54	14.94	15.34	15.75	16.16	16.58	3.980
1.20	17.00*	17.51	18.03	18.56	19.10	19.65	20.21	20.78	21.35	21.94	5.540
1.30	22.54	23.15	23.77	24.40	25.04	25.69	26.35	27.02	27.70	28.39	6.550
1.40	29.09	29.81	30.53	31.27	32.01	32.77	33.54	34.32	35.11	35.91	7.640
1.50	36.73	37.55	38.39	39.24	40.10	40.97	41.85	42.75	43.66	44.58	8.780
1.60	45.51	46.45	47.41	48.37	49.35	50.35	51.35	52.37	53.40	54.44	9.990
1.70	55.50	56.56	57.64	58.74	59.84	60.96	62.10	63.24	64.40	65.57	11.260
1.80	66.76	67.96	69.17	70.39	71.63	72.88	74.15	75.43	76.72	78.03	12.590
1.90	79.35	80.69	82.03	83.40	84.77	86.17	87.57	88.99	90.42	91.87	13.990
2.00	93.34	94.81	96.31	97.81	99.33	100.9	102.4	104.0	105.6	107.2	15.460
2.10	108.8	110.4	112.0	113.7	115.4	117.1	118.8	120.5	122.2	124.0	16.900
2.20	125.7	127.5	129.3	131.1	132.9	134.8	136.6	138.5	140.4	142.3	18.500
2.30	144.2	146.2	148.1	150.1	152.1	154.1	156.1	158.1	160.2	162.3	20.200
2.40	164.4	166.5	168.6	170.7	172.9	175.0	177.2	179.4	181.7	183.9	21.800
2.50	186.2	188.4	190.7	193.0	195.4	197.7	200.1	202.4	204.8	207.3	23.500
2.60	209.7	212.1	214.6	217.1	219.6	222.1	224.7	227.2	229.8	232.4	25.300
2.70	235.0*	237.5	240.1	242.7	245.3	247.9	250.5	253.1	255.8	258.5	26.100
2.80	261.1	263.9	266.6	269.3	272.1	274.9	277.7	280.5	283.3	286.1	27.900
2.90	289.0*	291.7	294.5	297.2	300.0	302.8	305.6	308.4	311.2	314.1	27.900

CONDITIONS OVER LAST YEAR

- No More Drought!

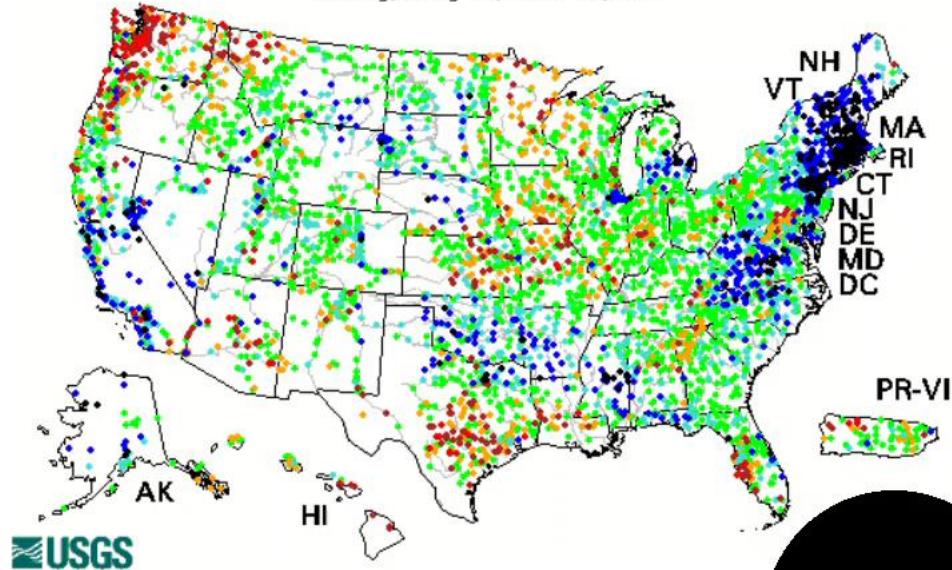


CONDITIONS IN JULY

Animation of daily streamflow maps for July 2023

July 2023

Sunday, July 16, 2023 19:30ET



Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

FLOODING IN 2023

ANNUAL EXCEEDANCE PROBABILITY

- 01094400 NORTH NASHUA AT FITCHBURG
- 01096000 SQUANNACOOK NR WEST GROTON
- 01097000 ASSABET AT MAYNARD
- 01100600 SHAWSHEEN NR WILMINGTON
- 01101000 PARKER AT BYFIELD
- 01102000 IPSWICH AT IPSWICH
- 01105000 NEPONSET AT NORWOOD
- 01105870 JONES AT KINGSTON
- 01108000 TAUNTON AT BRIDGEWATER
- 01110000 QUINSIGAMOND AT N. GRAFTON
- 01162000 MILLERS NR WINCHENDON
- 01162500 PRIEST AT WINCHENDON
- 01163200 OTTER AT OTTER RIVER
- 01174565 WEST BRANCH SWIFT NR SHUTESBURY
- 01175670 SEVENMILE NR SPENCER
- 01176000 QUABOAG AT WEST BRIMFIELD
- 01181000 WEST BRANCH WESTFIELD AT HUNTINGTON
- 01197000 EAST BRANCH HOUSATONIC AT COLTSVILLE
- 01331500 HOOSIC AT ADAMS
- 01170100 GREEN NR COLRAIN
- 01168500 DEERFIELD AT CHARLEMONT (20-PERCENT AEP)
- 01169000 NORTH AT SHATTUCKVILLE (20-PERCENT AEP)
- 01174500 EAST BRANCH SWIFT NR HARDWICK (20-PERCENT AEP)
- 01185500 WEST BRANCH FARMINGTON NR NEW BOSTON (20-PERCENT AEP)
- 01332500 HOOSIC NR WILLIAMSTOWN (20-PERCENT AEP)
- 01094500 NORTH NASHUA NR LEOMINSTER (10-PERCENT AEP)
- 01095220 STILLWATER NR STERLING (10-PERCENT AEP)
- 01170000 DEERFIELD NR WEST DEERFIELD (10-PERCENT AEP)
- 01169900 SOUTH NR CONWAY (4-PERCENT AEP)
- 01171500 MILL AT NORTHAMPTON (4-PERCENT AEP)

FLOODING IN 2023

PARTIAL LIST OF HIGH FLOW DISCHARGE MEASUREMENTS

- **01170100 GREEN RIVER NEAR COLRAIN, MA – 7TH HIGHEST QM**
- **01174500 EAST BRANCH SWIFT RIVER NEAR HARDWICK, MA – TOP 10 HIGHEST DIRECT QM**
- **01185500 WEST BRANCH FARMINGTON RIVER NEAR NEW BOSTON, MA – HIGHEST DIRECT QM EVER**
- **01103455 TROUT BROOK AT DOVER, MA – HIGHEST QM MADE**
- **01332500 HOOSIC RIVER NEAR WILLIAMSTOWN, MA – HIGHEST QM MADE**
- **01094500 NORTH NASHUA RIVER NEAR LEOMINSTER, MA**
- **01095220 STILLWATER RIVER NEAR STERLING, MA – 3RD HIGHEST QM ON RECORD**
- **01170000 DEERFIELD RIVER NEAR WEST DEERFIELD, MA – TOP 10 HIGHEST QM**
- **01161280 CONNECTICUT RIVER NEAR NORTHFIELD, MA - HIGHEST MEASURED**
- **01170500 CONNECTICUT RIVER AT MONTAGUE CITY, MA – 5TH HIGHEST MEASURED**
- **01168500 DEERFIELD RIVER AT CHARLEMONT, MA – 2ND HIGHEST DIRECT MEASUREMENT**
- **01169900 SOUTH RIVER NR CONWAY, MA - INDIRECT MEAS.**
- **01123600 QUINEBAUG R BL WESTVILLE DAM NR SOUTHBRIDGE, MA – HIGHEST EVER MEASURED**

FLOODING IN 2023

HIGH FLOW DISCHARGE MEASUREMENTS



FLOODING IN 2023

HIGH FLOW DISCHARGE MEASUREMENTS CONT.



Active Water Level Network

~120 WELLS

- ~70 REALTIME
- 53 MONTHLY

PLANNED CHANGES FOR FY24

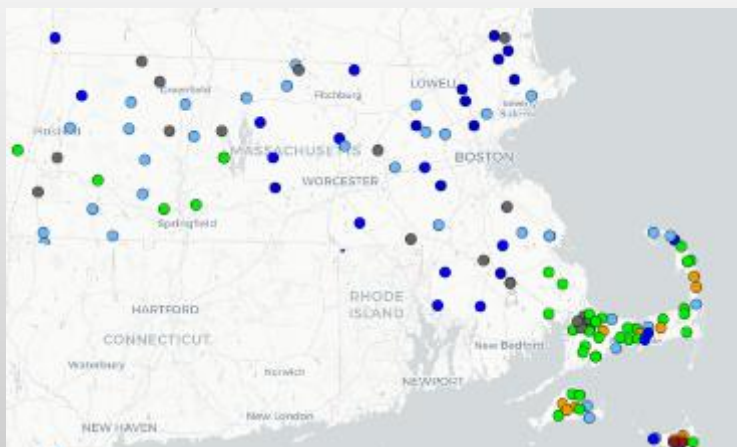
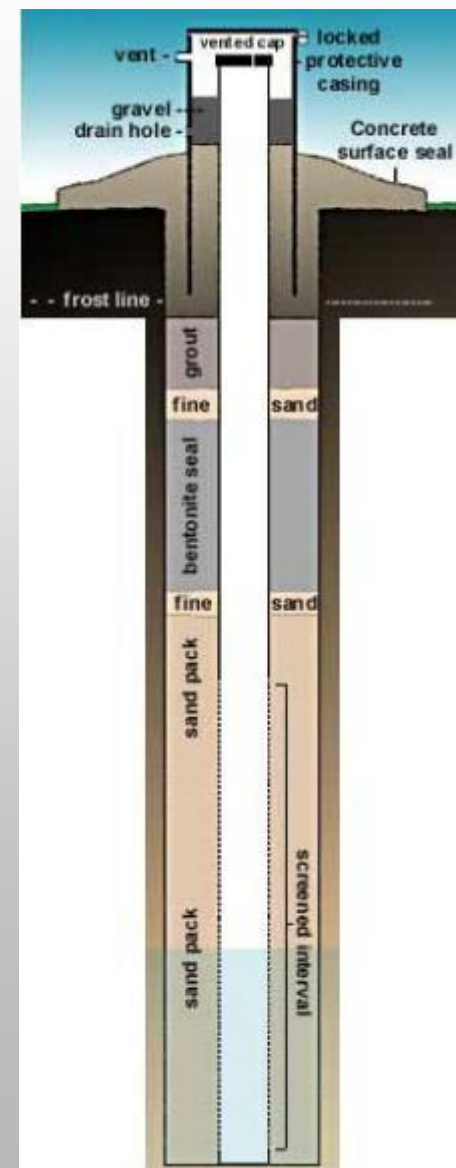
- FINISH UPGRADING CRN

ANNUAL O&M ~ \$400,000

- USGS ~ 65,000
- MA DCR ~ 335,000

\$6,000 PER REALTIME GAGE

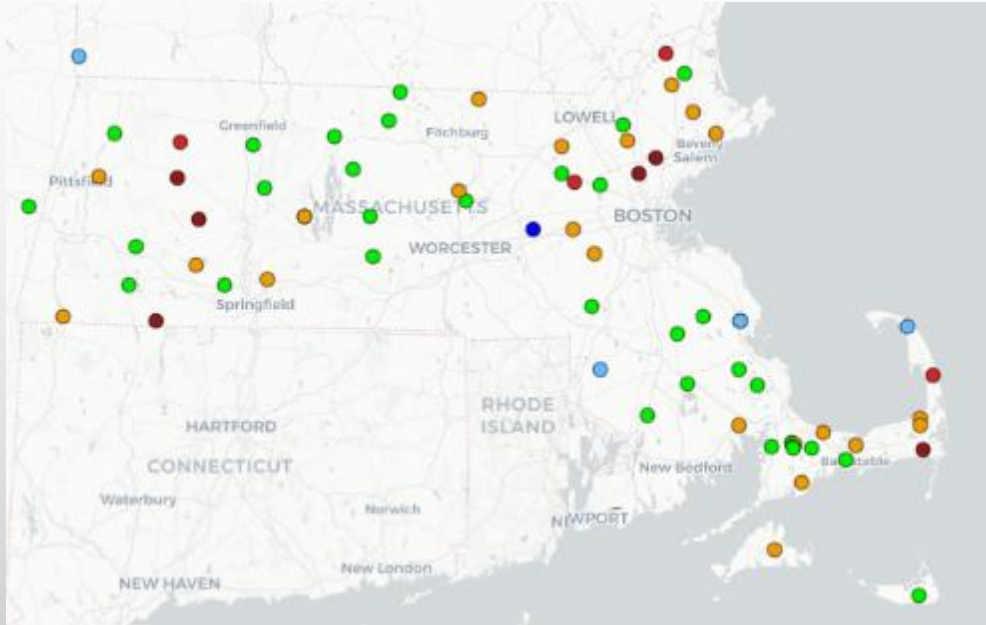
**\$1,100 PER FURNISHED
(DISCRETE)**



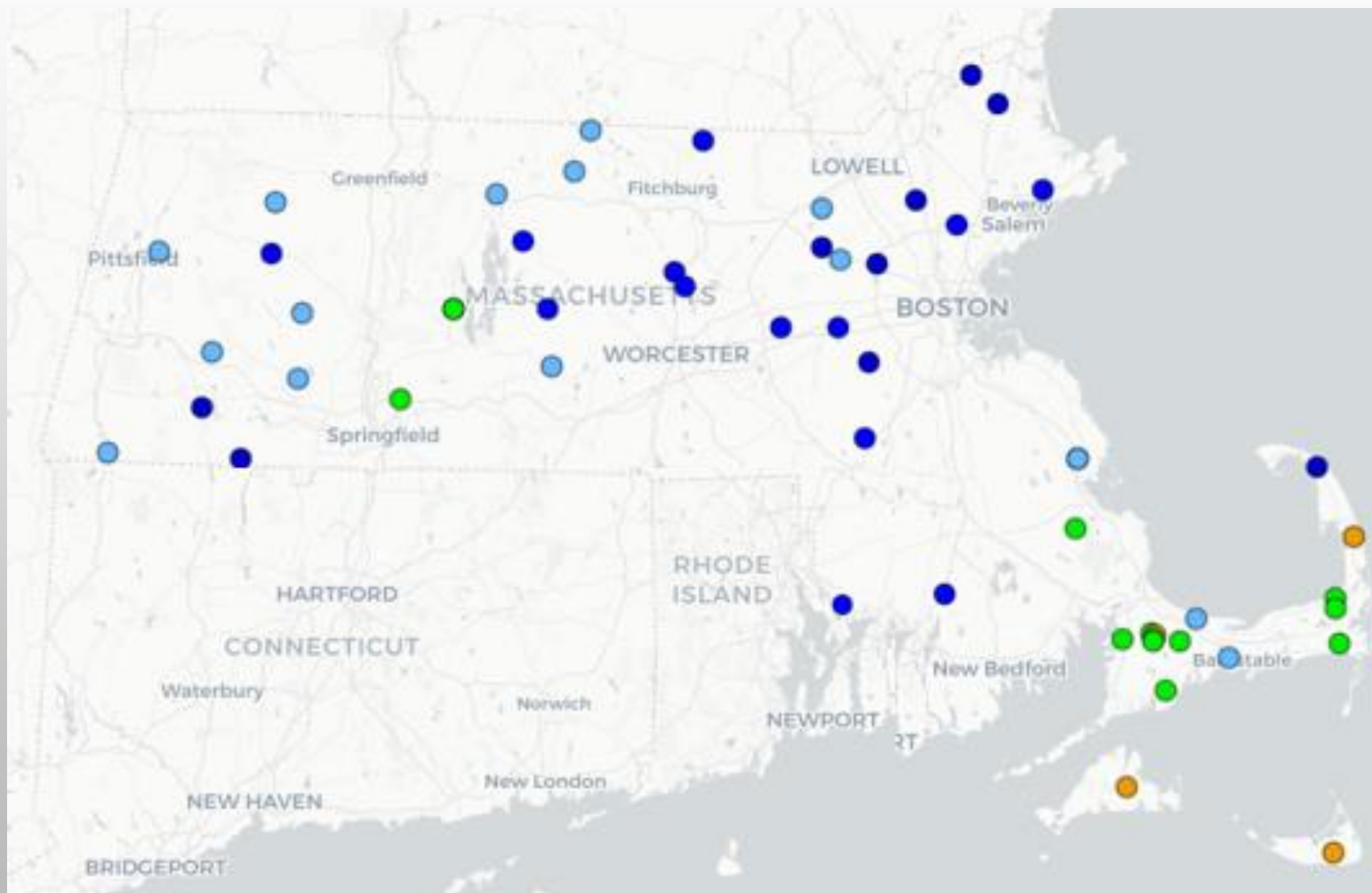
CLIMATE RESPONSE NETWORK

~70 OBSERVATION WELLS

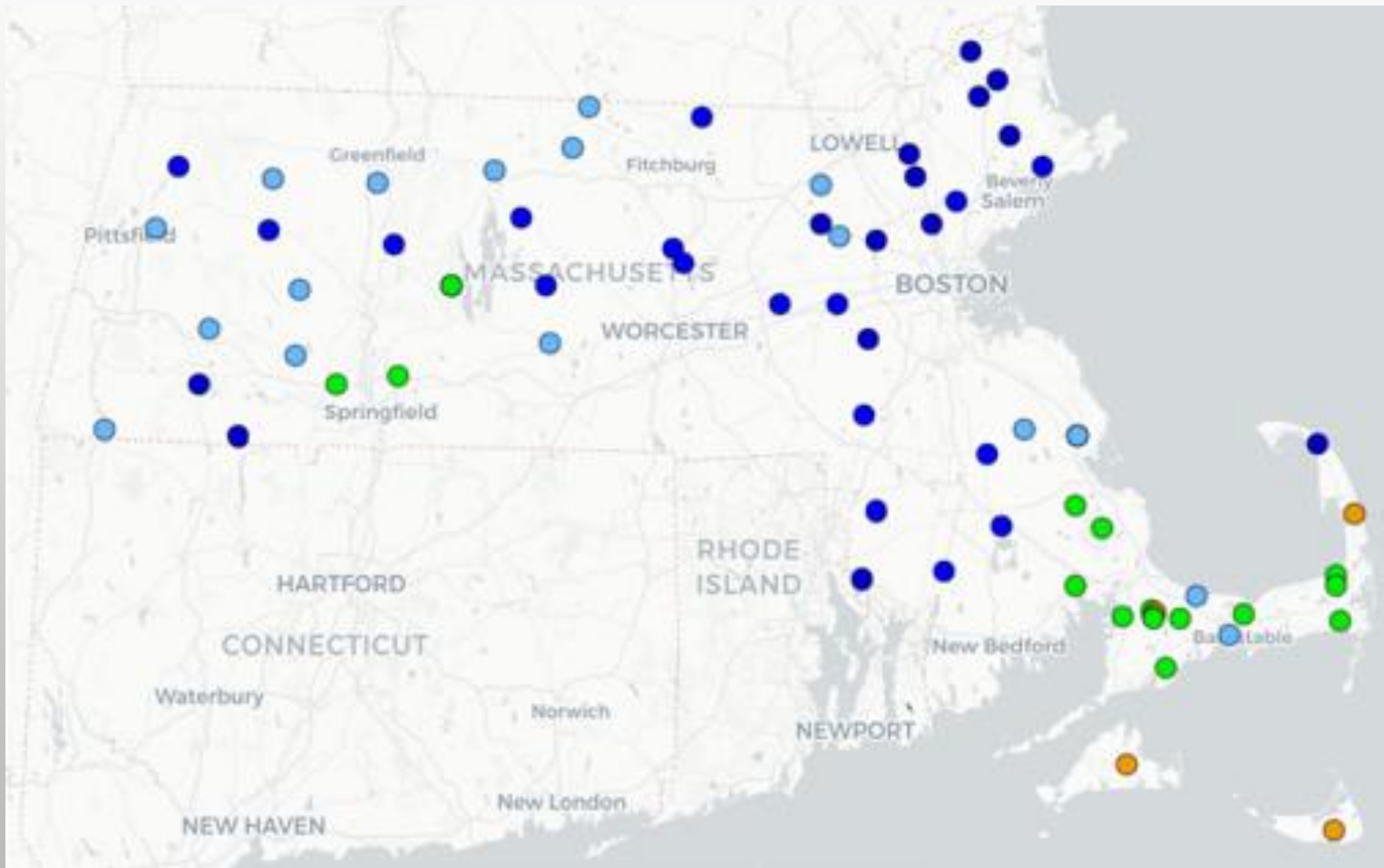
ALL WILL BE REALTIME BY
END OF FY24



CURRENT REALTIME NETWORK



FUTURE REAL-TIME GW NETWORK



QUESTIONS

