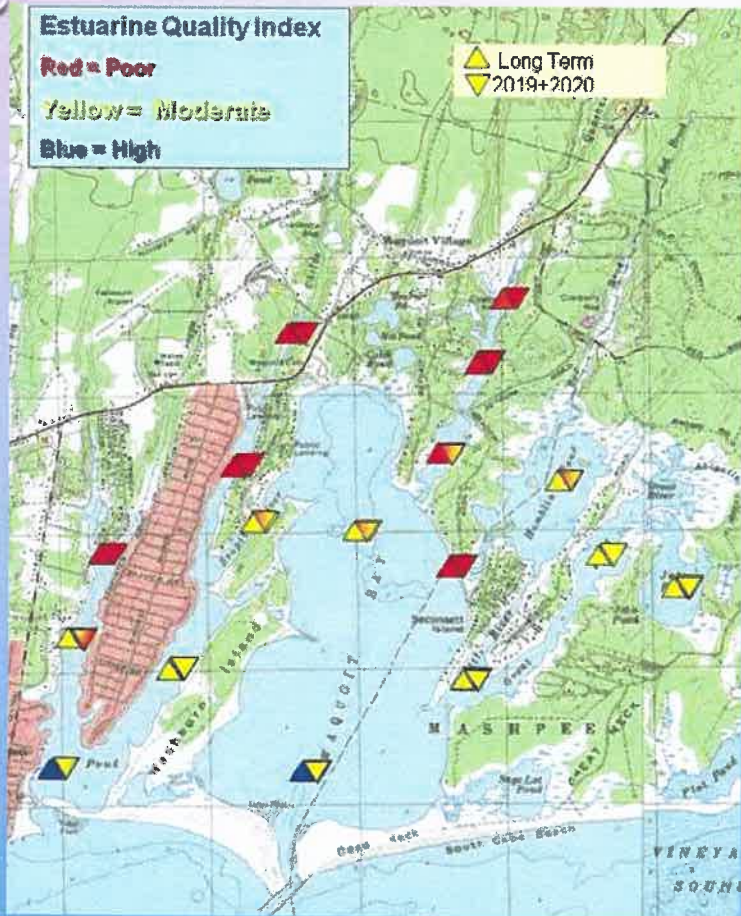
The background features a vertical gradient from light purple at the top to light blue at the bottom. Scattered throughout are several realistic water droplets of various sizes, some with highlights and shadows, giving a fresh and clean aesthetic.

SUMMARY OF MASHPEE WATERBODY HEALTH

MASHPEE ESTUARIES

- “BOTH WAQUOIT AND POPPONNESSET BAYS SUPPORT IMPAIRED HABITATS THROUGHOUT THEIR TIDAL REACHES AND REMAIN BELOW THE WATER QUALITY LEVELS SET BY THE MASSDEP/EPA. THIS IS CONSISTENT WITH THE FACT THAT THE THRESHOLD NITROGEN LEVEL SPECIFIED IN THE TMDL WAS NOT ATTAINED WITHIN ANY BASIN IN 2019 AND 2020, INDICATING THAT THE IMPAIRMENTS ARE CAUSED BY NITROGEN ENRICHMENT.” HOWES ET. AL.

WAQUOIT BAY

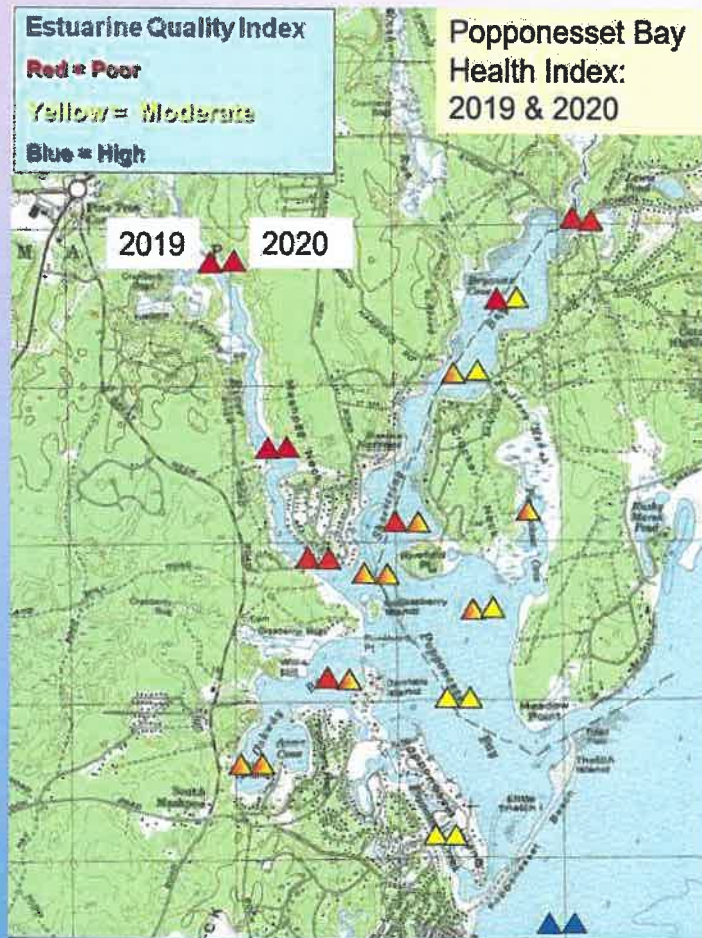


- JEHU POND: DECLINING. ONE OF THE LAST KNOWN AREAS IN THE EASTERN BASINS OF WAQUOIT BAY TO BE SUITABLE FOR EEL GRASS. ALL AREAS WHERE EEL GRASS ONCE WAS (2018 ISH) HAS SINCE DISAPPEARED. SHELLFISH HABITAT IS NOW SCARCE. THE DNR'S SEEDING ACREAGE HAS SEVERELY REDUCED OVER THE PAST 5 YEARS. TREATMENT – SEWERING, SHELLFISH AQUACULTURE, AND STORMWATER IMPROVEMENTS.
- QUASHNET RIVER: UNCHANGING. SEVERELY DEGRADED. PROHIBITED TO SHELL FISHING. AREA CANNOT SUPPORT HIGH SPECIES DIVERSITY. TREATMENT – SEWERING AND STORMWATER IMPROVEMENTS
- MAIN BASIN: DECLINING. THERE IS NO LONGER ANY HIGH WATER QUALITY IN THE LOWER REACHES OF WAQUOIT BAY. TREATMENT-SEWERING , STORMWATER IMPROVEMENTS, AND SHELLFISH AQUACULTURE.

WAQUOIT BAY

- LITTLE RIVER: DECLINING. PAST SHELLFISH SEEDING SHOWED INITIAL IMPROVEMENTS IN THE AREA FOR THE 2019 TESTING PERIOD, HOWEVER NUTRIENT INPUTS WERE TOO HIGH TO SHOW IMPROVEMENTS IN 2020 EVEN THOUGH SEEDING EFFORTS WERE SIMILAR. TREATMENT-SEWERING , STORMWATER IMPROVEMENTS, AND SHELLFISH AQUACULTURE.
- GREAT RIVER: DECLINING. IN 2021 AREAS OF GREAT RIVER ARE NOW CLASSIFIED AS CONDITIONALLY APPROVED (SEASONAL) TO SHELLFISHING, WHICH WILL REDUCE SHELLFISHING HARVESTING IN THE AREA. TREATMENT-SEWERING , STORMWATER IMPROVEMENTS, AND SHELLFISH AQUACULTURE.
- HAMBLIN POND: DECLINING SHELLFISH SEEDING WAS INCREASED IN 2019 AND 2020 WITHIN HAMBLIN POND, BUT NO MAJOR IMPROVEMENTS WERE SEEN. 2019 DATA RESULTS ALSO SHOWED INITIAL IMPROVEMENTS, BUT WERE NOT DISPLAYED IN 2020 WATER QUALITY RESULTS. HAMBLIN POND, ALONG WITH LITTLE RIVER, JEHU POND, AND HAMBLIN POND SHOW THE MOST HOPE FOR SHORT-TERM IMPROVEMENTS. TREATMENT-SEWERING , STORMWATER IMPROVEMENTS, AND SHELLFISH AQUACULTURE.

POPPONESSET BAY



- OCKWAY BAY: SIGNIFICANTLY IMPAIRED AND CONDITIONS ARE UNCHANGING. 2016-2020 CHLOROPHYLL-A LEVELS ARE GENERALLY HIGHER THAN THE LONG-TERM HISTORICAL DATA. NO OTHER YEARS HAVE BEEN HIGHER, AND CONDITIONS CONTINUE TO DECLINE ON A YEARLY BASIS. TREATMENT-SEWERING , STORMWATER IMPROVEMENTS, AND SHELLFISH AQUACULTURE
- SHOESTRING BAY: INCREASED LEVELS OF TOTAL NITROGEN WERE EVIDENT IN SHOESTRING BAY FOR 2020. SPECIES DIVERSITY HAS DECLINED SUBSTANTIALLY OVER THE PAST 6 YEARS DUE TO POOR CONDITIONS. SOME OF THE LARGEST BLOOMS WERE SEEN IN SHOESTRING BAY THIS PAST YEAR (HIGHEST BLOOM CONCENTRATIONS SEEN THIS YEAR OUT OF THE 20 YEARS OF DATA COLLECTION). TREATMENT-SEWERING , STORMWATER IMPROVEMENTS, AND SHELLFISH AQUACULTURE. TREATMENT-SEWERING , STORMWATER IMPROVEMENTS, AND SHELLFISH AQUACULTURE (NOW LIMITED DUE TO INCREASING IMPAIRMENT AND REDUCED OXYGEN LEVELS).
- MAIN BASIN: SHOWING DECLINE. NO GOOD WATER QUALITY IS LEFT IN POPPONESSET BAY. CHLOROPHYLL -A LEVELS ARE GENERALLY HIGH THAN THE LONG-TERM HISTORICAL MEAN SUPPORTING THAT THE AREA IS NOW NITROGEN ENRICHED AND THE CONDITIONS ARE STEADILY ON THE DECLINE. TREATMENT-SEWERING , STORMWATER IMPROVEMENTS, AND SHELLFISH AQUACULTURE (NOW LIMITED DUE TO INCREASING IMPAIRMENT AND REDUCED OXYGEN LEVELS).

POPPONESSET BAY

- MASHPEE RIVER: IMPAIRED AND THE TREND IS UNCHANGING AND DECLINING IN AREAS. TN DECLINE NOTED DUE TO SHELLFISH AQUACULTURE. CONTINUED DECLINE DUE TO NITROGEN POLLUTION. TOTAL NITROGEN LEVELS CONTINUE TO INCREASE YEARLY. THE LEVELS ARE NOW ALMOST 3 TIMES THE ACCEPTABLE LEVELS OR TMDL (TOTAL MAXIMUM DAILY LOAD) REQUIRED FOR TARGET RESTORATION.
- DISSOLVED OXYGEN (DO) LEVELS ARE BELOW 4 MG/L FOR LONG PERIODS OF TIME, CAUSING STRESS AND LOSS OF BENTHIC ANIMALS. 2021 SHOULD BE NOTED FOR A REPORTED BLUE CRAB DIE OFF WITHIN THE RIVER. DUE TO DECLINING CONDITIONS, THE SHELLFISH DIVISION WAS FORCED TO MOVE MILLIONS OF OYSTERS OUT OF THE AREA TO ENSURE THEIR SURVIVAL. AS YOU MOVE AWAY FROM THE HEAD OF THE RIVER, WATER CONDITIONS SLIGHTLY IMPROVE. ACCUMULATION OF BOTTOM MUCK FROM THICK ALGAL BLOOMS CONTINUES TO SUFFOCATE THE BENTHOS. DO LEVELS DROPPED TO 0-4 MG/L 50% OF THE TIME THIS SUMMER.
- CHLOROPHYLL LEVELS AND OTHER WATER QUALITY PARAMETERS CLASSIFY THIS AREA AS HYPERTROPHIC OR EXTREMELY EUTROPHIC. ALGAL BLOOMS ARE INCREASING AS A DIRECT RESULT OF NUTRIENT POLLUTION RESULTING IN LITTLE TO NO WATER CLARITY. SECCHI DEPTHS ARE CONTINUOUSLY LESS THAN 0.25 METERS OR 0.8 FEET DURING THE MONTHS OF JULY AND AUGUST. TREATMENT-SEWERING , STORMWATER IMPROVEMENTS, AND SHELLFISH AQUACULTURE (NOW LIMITED DUE TO INCREASING IMPAIRMENT AND REDUCED OXYGEN LEVELS).

MASHPEE PONDS

- NUTRIENT SAMPLING THROUGH THE PALS (PONDS AND LAKES STEWARDSHIP) PROGRAM 2018 AND 2020 RESULTS PRESENTED, ALONG WITH MASHPEE / APCC CYANOBACTERIA (BLUE GREEN ALGAE) SAMPLING FROM 2021:
- MOST RECENT DATA SHOWS A CONTINUING NEGATIVE TREND IN ALL PONDS. ALL PONDS ARE BECOMING INCREASINGLY IMPAIRED DUE TO GROUNDWATER AND SURFACE WATER DISCHARGE CONTAINING EXCESS NUTRIENTS AND CONTAMINANTS.
- LAKES ARE CLASSIFIED BY TROPHIC STATE INDEX:
 - OLIGOTROPHIC : “GOOD” WATER QUALITY
 - MESOTROPHIC : “FAIR” WATER QUALITY
 - EUTROPHIC / HYPEREUTROPHIC : “POOR” WATER QUALITY

ASHUMET POND

- SURFACE WATER (0.5 METERS):

2018: 17.25 UM TOTAL NITROGEN, 0.51 UM TOTAL PHOSPHORUS

2020: 23.49 UM TOTAL NITROGEN, 1.05 UM TOTAL PHOSPHORUS

- MID WATER (9 METERS):

2018: 20.79 UM TOTAL NITROGEN, 0.65 UM TOTAL PHOSPHORUS

2020: 22.30 UM TOTAL NITROGEN, 0.69 UM TOTAL PHOSPHORUS

- BOTTOM WATER (18 METERS):

2018: 47.93 UM TOTAL NITROGEN, 6.31 UM TOTAL PHOSPHORUS

2020: 17.81 UM TOTAL NITROGEN, 0.73 UM TOTAL PHOSPHORUS

- ASHUMET HAS BEEN TREATED WITH NUTRIENT INACTIVATION – ALUMINUM SULFATE. BOTTOM WATER WILL SEE A DECREASE IN TOTAL PHOSPHORUS FROM THE TREATMENT.

ASHUMET POND

- Cyanobacteria 2021: Average cyano species cell count between 5/30- 11/3 – 3,459 cells/ ml
1 posted advisory based on DPH guidelines (7/15-8/2): presence of a scum layer and high cell counts
- Trophic State: Mesotrophic / Eutrophic – nutrient inactivation when eutrophic reduces nutrient availability and will remain mesotrophic until the inactivation treatment becomes ineffective due to continued external nutrient input.
- Contaminants: Mercury – No fish consumption for largemouth bass. Phosphorus load from septic systems addressed with nutrient inactivation treatment. Chlorinated solvents – PRB . Abnormal Fish Deformities, Erosions, Lesions, Tumors (DELTS)

JOHN'S POND

- DATA PRESENTED SHOWS UNCHANGING CONDITIONS IN NUTRIENT CONCENTRATIONS, ALTHOUGH MORE SAMPLING IS NEEDED.
- SURFACE WATER (0.5 METERS):
 - 2018: 16.87 UM TOTAL NITROGEN, 0.36 UM TOTAL PHOSPHORUS
 - 2020: 20.50 UM TOTAL NITROGEN, 0.58 UM TOTAL PHOSPHORUS
- MID WATER (9 METERS):
 - 2018: 26.12 UM TOTAL NITROGEN, 0.65 UM TOTAL PHOSPHORUS
 - 2020: 21.10 UM TOTAL NITROGEN, 0.46 UM TOTAL PHOSPHORUS
- BOTTOM WATER (16 METERS):
 - 2018: 73.57 UM TOTAL NITROGEN, 0.65 UM TOTAL PHOSPHOROUS
 - 2020: 30.67 UM TOTAL NITROGEN, 0.54 UM TOTAL PHOSPHOROUS

JOHN'S POND

- **CYANOBACTERIA 2021: AVERAGE CYANO SPECIES CELL COUNT BETWEEN 5/30- 11/3 – 1,984 CELLS/ ML**
NO ADVISORIES POSTED FOR CYANOBACTERIA, EXCEPT FOR 1 E.COIL SWIMMING ADVISORY
CYANOBACTERIA SCUM LAYER PRESENCE NEAR THE SHORELINE SEEN BY RESIDENTS THIS SUMMER IN AND AROUND THE FISH LADDER.
- **TROPHIC STATE: EUTROPHIC. POOR OXYGEN CONDITIONS NOTED DURING THE SUMMER MONTHS.**
- **INVASIVE SPECIES : COY FISH, AND MILFOIL (TREATED IN 2021 WITH ALGAECIDE)**
- **CONTAMINANTS: PFAS AND MERCURY – NO CONSUMPTION OF FISH ORDER ISSUED BY MASS. DPH. CHLORINATED SOLVENTS – EXTRACTION WELL. MERCURY IN FISH TISSUE.**

MASHPEE WAKEBY POND

- MASHPEE WAKEBY : (TREATED AS TWO PONDS FOR PROFILE SAMPLING PURPOSES)
- MASHPEE POND: CONTINUED TOTAL PHOSPHORUS AND TOTAL NITROGEN INCREASE
- WAKEBY : CONTINUED TOTAL PHOSPHORUS AND TOTAL NITROGEN INCREASE, WITH PARTICULATE CYANOBACTERIA PRESENCE BECOMING THE NORM.

MASHPEE SIDE OF MASHPEE WAKEBY

- SURFACE WATER (0.5 METERS) :

2018: 19.34 UM TOTAL NITROGEN, 0.51 UM TOTAL PHOSPHORUS

2020: 23.49 UM TOTAL NITROGEN, 0.54 UM TOTAL PHOSPHORUS

- MID WATER (9 METERS) :

2018: 19.05 UM TOTAL NITROGEN, 0.99 UM TOTAL PHOSPHORUS

2020: 25.29 UM TOTAL NITROGEN, 0.80 UM TOTAL PHOSPHORUS

- BOTTOM WATER (16 METERS) :

2018: 75.64 UM TOTAL NITROGEN, 6.09 UM TOTAL PHOSPHOROUS

2020: 146.30 UM TOTAL NITROGEN, 8.28 UM TOTAL PHOSPHORUS

MASHPEE SIDE OF MASHPEE WAKEBY

- CYANOBACTERIA 2021: AVERAGE CYANO SPECIES CELL COUNT BETWEEN 5/30- 11/3 – 105 CELLS/ ML

1 ADVISORY POSTED DUE TO THE PRESENCE OF A SCUM LAYER
(6/24- 7/7)

- TROPIC STATE: MESOTROPHIC – GENERALLY HAS MODERATE NUTRIENT CONCENTRATIONS THROUGHOUT THE POND. SECCHI DEPTH (WATER CLARITY) IS GREATER THAN 8 FEET. NOTE- HIGH PHOSPHOROUS FROM GROUNDWATER INFILTRATION.

WAKEBY SIDE OF MASHPEE WAKEBY

- SURFACE WATER (0.5 METERS) :

2018: 23.88 UM TOTAL NITROGEN, 0.65 UM TOTAL PHOSPHORUS

2020: 29.18 UM TOTAL NITROGEN, 0.73 UM TOTAL PHOSPHORUS

- MID WATER (9 METERS) :

2018: 22.23 UM TOTAL NITROGEN, 0.58 UM TOTAL PHOSPHORUS

2020: 27.08 UM TOTAL NITROGEN, 0.69 UM TOTAL PHOSPHORUS

- BOTTOM WATER (10 METERS) :

2018: 52.06 UM TOTAL NITROGEN, 2.26 UM TOTAL PHOSPHOROUS

2020: 52.51 UM TOTAL NITROGEN, 2.65 UM TOTAL PHOSPHOROUS

WAKEBY SIDE OF MASHPEE WAKEBY

- **CYANOBACTERIA:** AVERAGE CYANO SPECIES CELL COUNT BETWEEN 5/30- 11/3 – 717 CELLS/ ML
1 ADVISORY POSTED DUE TO THE PRESENCE OF A SCUM LAYER (6/24-7/7)
- **TROPHIC STATE:** MESOTROPHIC / EUTROPHIC – GENERALLY HAS MODERATE NUTRIENT CONCENTRATIONS. SECCHI DEPTH (WATER CLARITY) IS REDUCED IN COMPARISON TO MASHPEE SIDE, AT ROUGHLY 5 FEET THROUGHOUT THE SUMMER MONTHS. NOTE- ALSO SEEING HIGHER PHOSPHOROUS CONCENTRATIONS FROM GROUNDWATER INFILTRATION.
- **CONTAMINANTS:** RECENT PFAS/MERCURY. FISHING ADVISORY POSTED.

SANTUIT POND

- SURFACE WATER (0.5 METERS):
 - 2018: 58.54 UM TOTAL NITROGEN, 1.53 UM TOTAL PHOSPHORUS
 - 2020: 80.63 UM TOTAL NITROGEN, 1.34 UM TOTAL PHOSPHORUS
- MID WATER (2 METERS):
 - 2018: 71.51 UM TOTAL NITROGEN, 0.65 UM TOTAL PHOSPHORUS
 - 2020: 87.21 UM TOTAL NITROGEN, 1.38 UM TOTAL PHOSPHORUS
- BOTTOM WATER (2.5-3 METERS): MID WATER IS FOR ALL INTENSIVE PURPOSES CONSIDERED BOTTOM WATER DUE TO THE OVERALL DEPTH OF THE POND.

SANTUIT POND

- **CYANOBACTERIA:** AVERAGE CYANO SPECIES CELL COUNT BETWEEN 5/30-11/3 – 70,475 CELLS/ ML.

ADVISORY POSTED ALL SUMMER

- **TROPHIC STATE:** EUTROPHIC / HYPERTROPHIC – HEAVY ALGAL BLOOMS POSSIBLE THROUGHOUT THE SUMMER, EXTENSIVE MACROPHYTE ISSUES, OFTEN UNDER HYPERTROPHIC CONDITIONS.
- **CONTAMINANTS/ TOXINS:** TOXINS PRESENT FROM HAB SPECIES (CYANOBACTERIA – MICROCYSTIN). ABNORMAL FISH DEFORMITIES, EROSIONS, LESIONS, TUMORS (DELTS).

• PONDS LISTED BY RANK OF IMPAIRMENT FROM MOST TO LEAST TAKING ALL SUPPORTING DATA INTO CONSIDERATION:

- SANTUIT POND
- ASHUMET POND
- JOHN'S POND
- WAKEBY SIDE OF MASHPEE WAKEBY
- MASHPEE SIDE OF MASHPEE WAKEBY