# CHILMARK POND
# Individual System Assessment
# APPENDIX

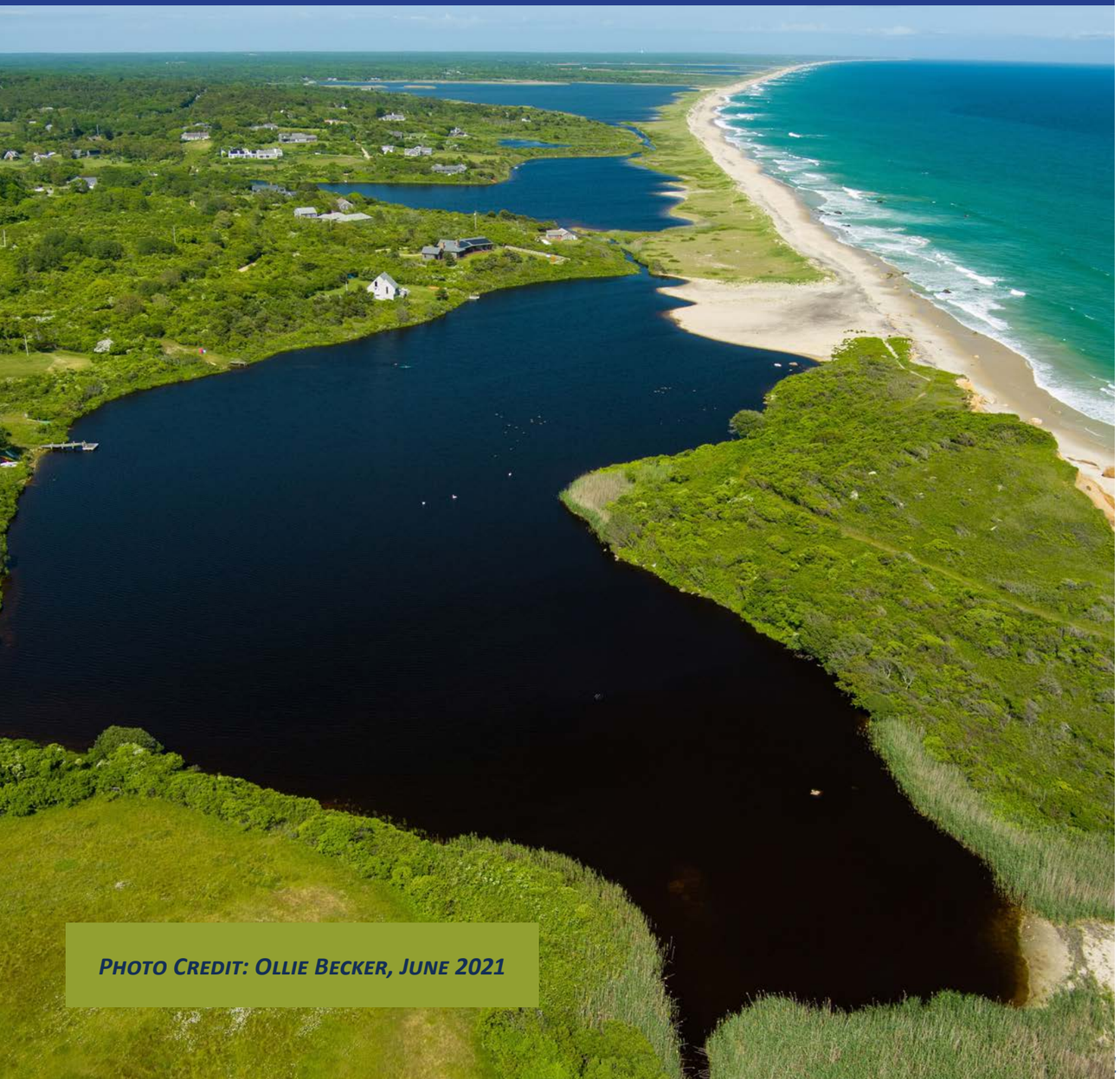


**PHOTO CREDIT: OLLIE BECKER, JUNE 2021**

***Prepared by:***

*Martha's Vineyard Commission*

*RJS Development Solutions*

*Horsley Witten Group*

***Funding Provided by:***
*MassDEP*


***Acknowledgments:***

*The Martha's Vineyard Commission would like to acknowledge all the contributors to this detailed watershed assessment.*

- *Chilmark Pond Working Group Members*
- *School for Marine Science and Technology the testing the MVC's water samples*
- *The Town of Chilmark*
- *The Martha's Vineyard Shellfish Group*
- *The Wampanoag Tribe of Gay Head (Aquinnah)*
- *The Trustees of Reservations*
- *Chris Murphy for his tireless dedication and contributions as the Chairman of the Up-Island Watershed Management Committee*

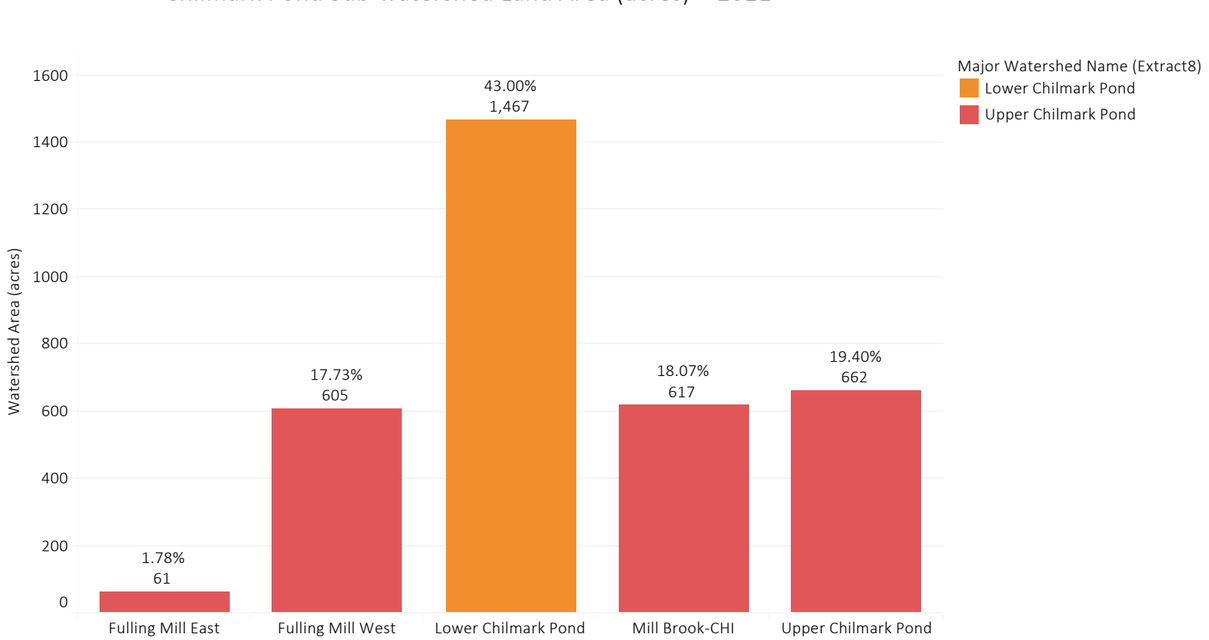

***Revised 2/23/2023***

# Appendix Contents

# APPENDIX A:

| Sub-watershed Name | Watershed Area (acres) | Land Area (% of watershed) |
|---|---|---|
| • Lower Chilmark Pond (including Wades and Gilberts Coves) | • 1,467 | • 43.0% |
| Fulling Mill East | • 61 | • 1.8% |
| • Fulling Mill West | • 605 | • 17.7% |
| • Mill Brook-CHI | • 617 | • 18.1% |
| • Upper Chilmark Pond (remaining area with no sub-watershed) | • 662 | • 19.4% |
| • Total Watershed | • 3,411 | • 100% |

*Table 1. Chilmark Pond Sub-watershed Area (acres)*



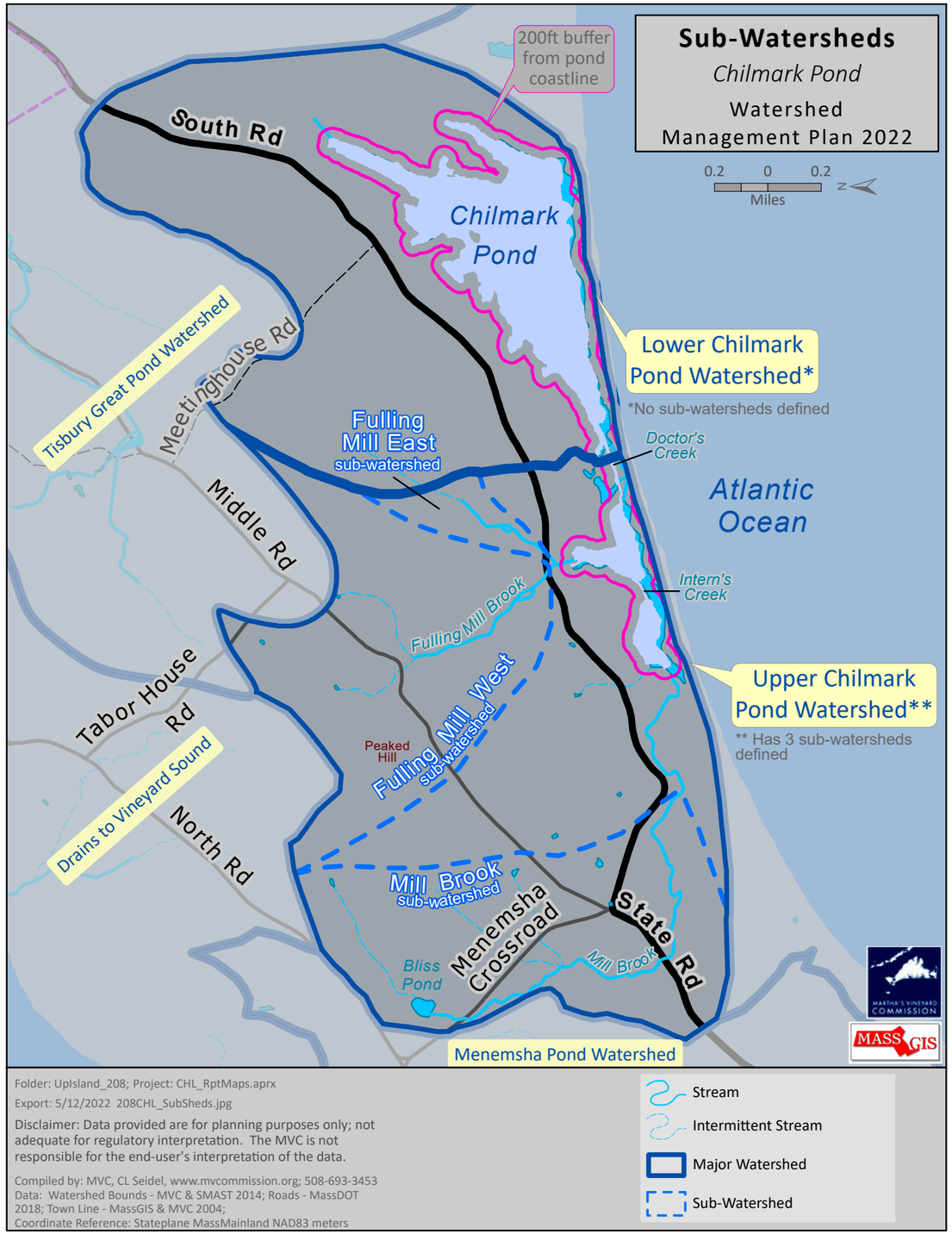



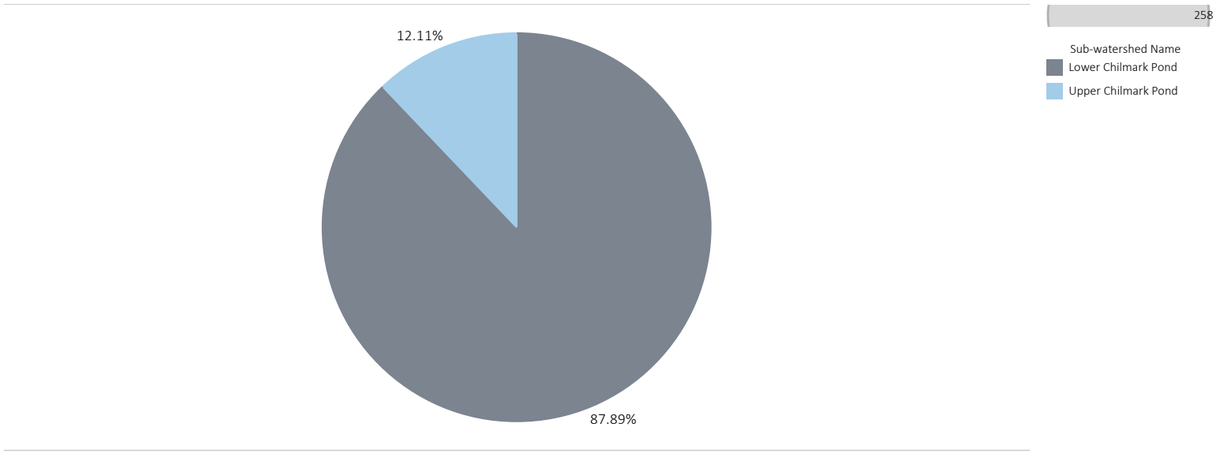

*Figure 1. Watershed and Sub-watershed Boundaries for Chilmark Pond (Martha's Vineyard Commission, 2021)*

## APPENDIX B:

# Chilmark Pond Watershed Coastal Pond Water Surface Area (acres) - Table 2021

| | % of Total Watershed Area (acres) | Watershed Area (acres) |
|---|---|---|
| Lower Chilmark Pond | 87.89% | 226 |
| Upper Chilmark Pond | 12.11% | 31 |
| Grand Total | 100.00% | 258 |

Chilmark Pond Sub-watershed Coastal Pond Water Surface Area (acres) - 2021



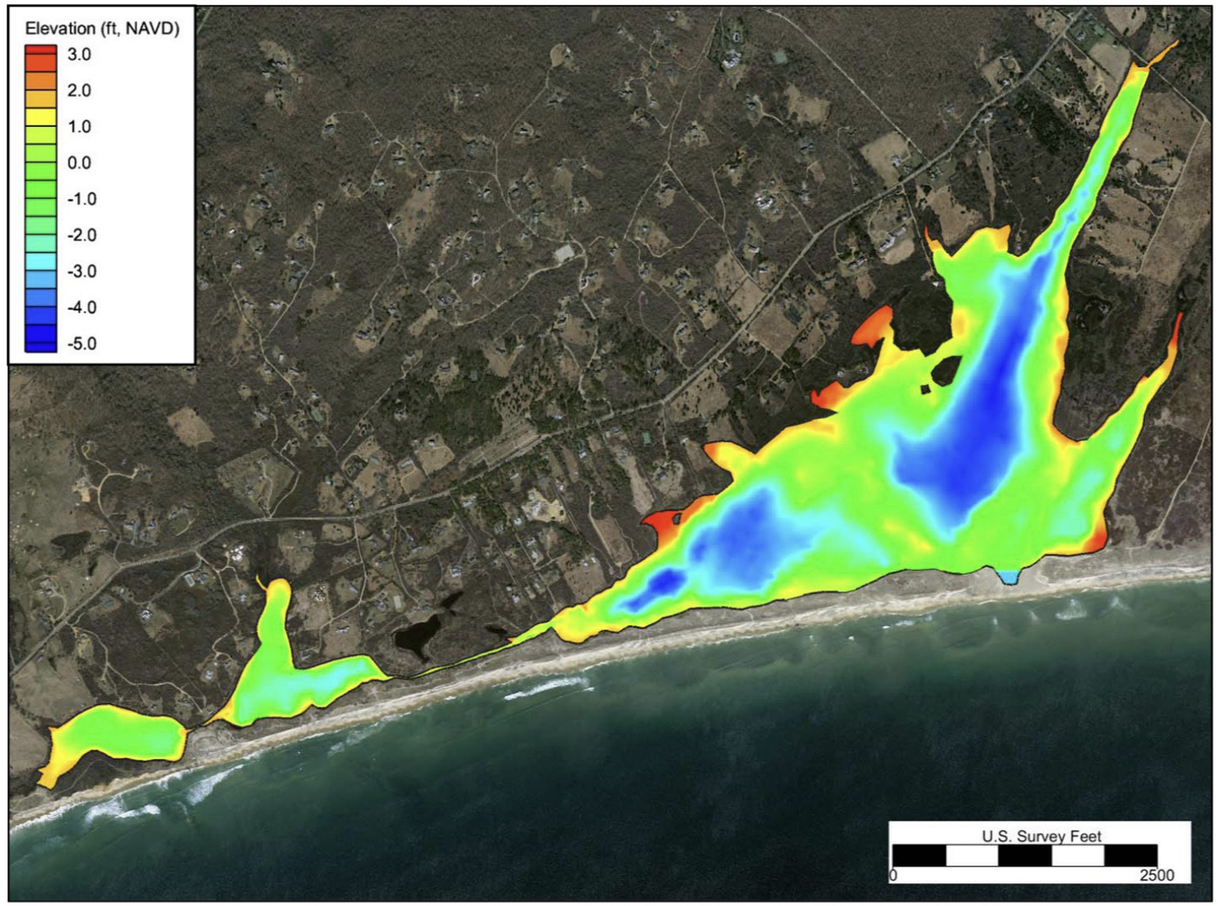




Figure V-9. Bathymetry data interpolated to the finite element mesh used with the RMA-2 hydrodynamic model. The elevations are relative to North American Vertical Datum 1988.

*Figure 2. Chilmark Pond Bathymetry Map (MEP 2015)*

# APPENDIX C:

Chilmark Pond Watersheds Land Cover (acres) - 2021 Table

Percent of Land Cover within Each Sub-Watershed

| | Bare Land | Cultivated | Deciduous Forest | Developed Open Space | Estuarine Wetland | Evergreen Forest | Grassland | Impervious | Palustrine Wetland | Pasture/Hay | Scrub/Shrub | Unconsolidated Shore | Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lower Chilmar.. | 1.97% | 0.05% | 41.65% | 6.03% | 2.49% | 3.37% | 7.45% | 4.14% | 1.34% | 3.70% | 12.08% | 0.26% | 15.45% |
| Fulling Mill East | 0.24% | | 37.60% | 9.31% | 0.06% | 2.37% | 1.92% | 5.32% | 7.79% | 0.81% | 34.58% | | |
| Fulling Mill We.. | 0.34% | | 67.85% | 4.35% | 0.02% | 0.43% | 5.24% | 3.26% | 1.43% | 5.63% | 11.45% | | 0.01% |
| Mill Brook-CHI | 0.66% | | 55.96% | 5.36% | | 0.82% | 4.96% | 4.71% | 11.30% | 8.28% | 7.61% | | 0.34% |
| Upper Chilmar.. | 3.81% | | 28.60% | 9.97% | 0.68% | 1.79% | 7.43% | 4.32% | 5.00% | 13.52% | 18.80% | 0.77% | 5.31% |
| Grand Total | 1.77% | 0.02% | 46.28% | 6.44% | 1.21% | 2.06% | 6.51% | 4.14% | 3.98% | 6.72% | 12.87% | 0.26% | 7.74% |

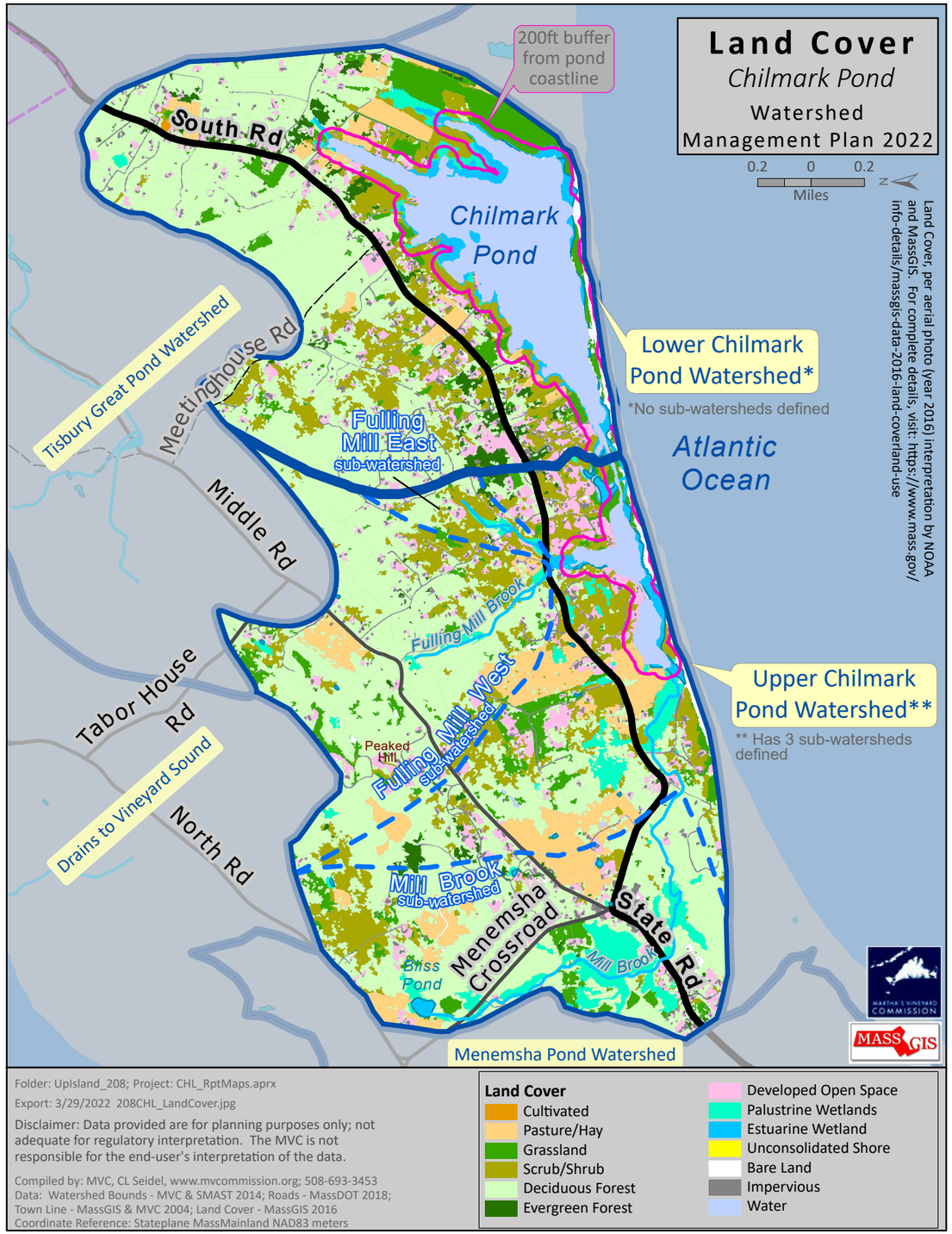



*Figure 3. Chilmark Pond Land Cover Types*

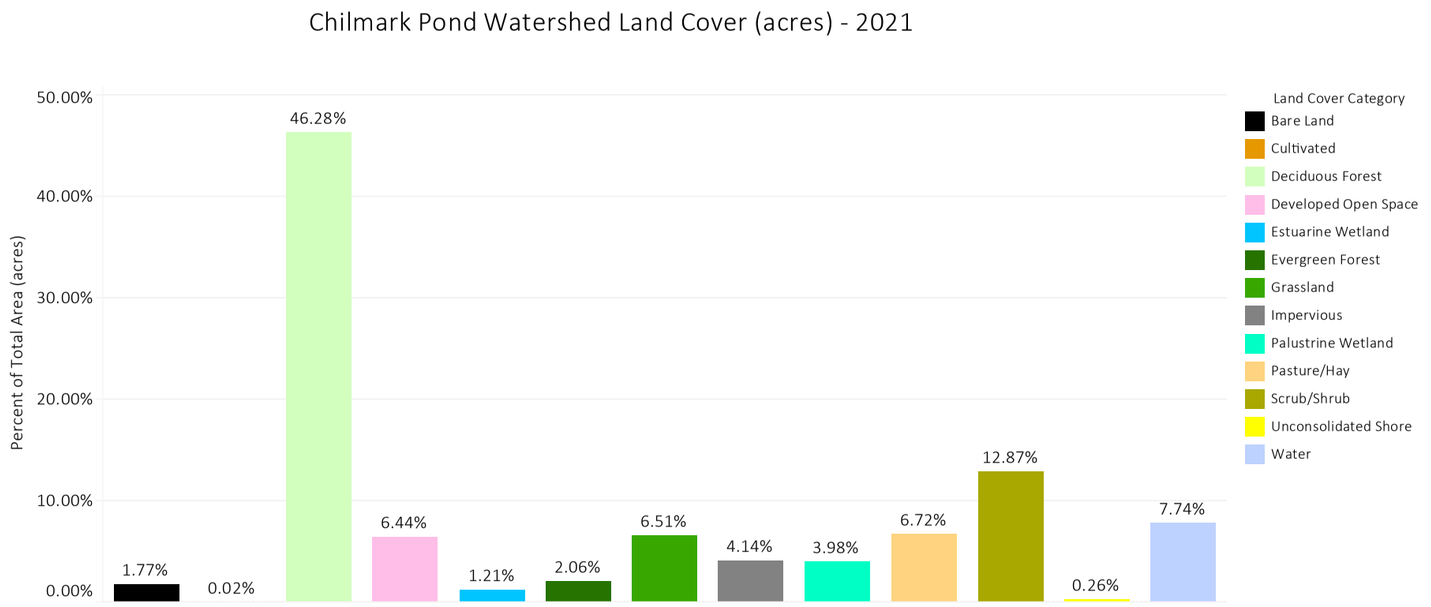
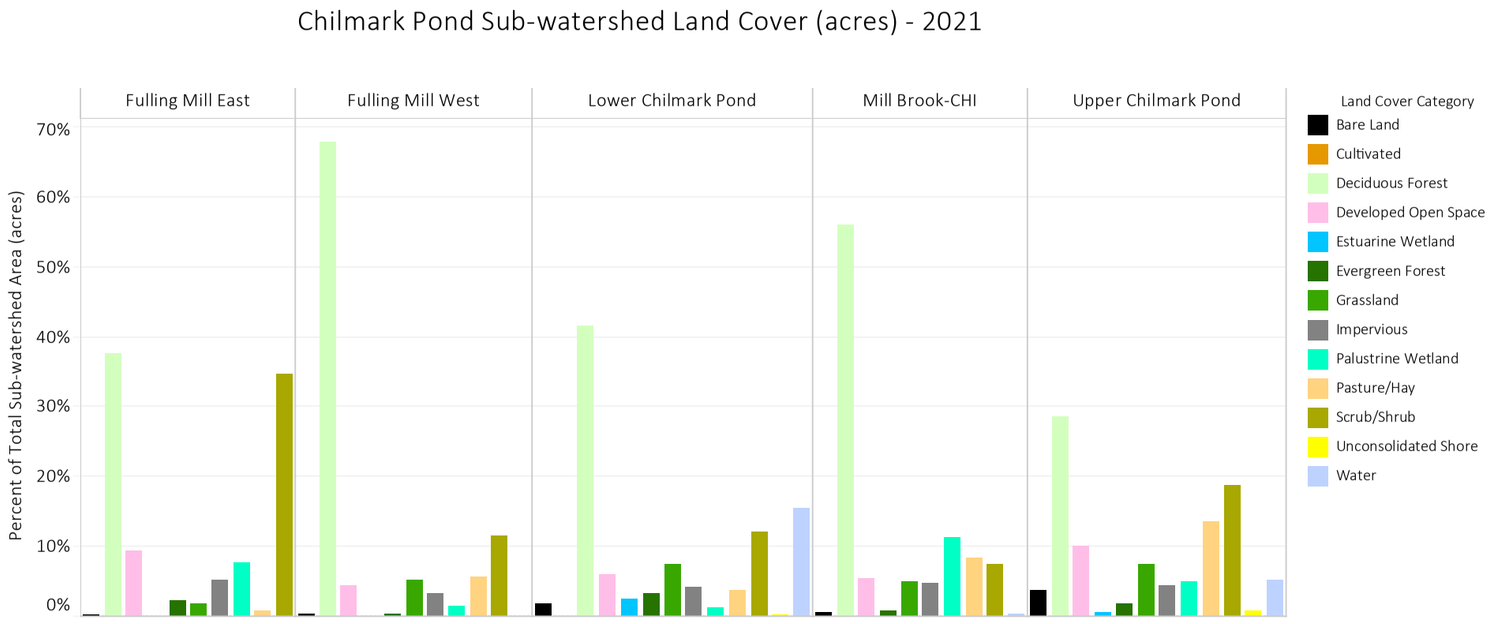



*Figure 4. Chilmark Pond Land Cover Area (acres)*



## APPENDIX D:

| Sub-watershed Name | Pasture/Hay Land Cover (% of sub-watershed) |
|---|---|
| Lower Chilmark Pond (including Wades and Gilberts Cove) | 4% (54 acres) |
| Fulling Mill East | <1% (0.5 acres) |
| Fulling Mill West | 6% (34 acres) |
| Mill Brook-CHI | 8% (51acres) |
| Upper Chilmark Pond (remaining area with no sub-watershed) | 14% (89 acres) |

*Table 2. Agricultural Land Cover in Chilmark Pond Watershed*

# APPENDIX E:

## Chilmark Pond Watershed Hydrolic Soil Group - 2021 Table

| | | % of Total Area (acres) along Hydrolo.. | Area (acres) |
|---|---|---|---|
| Fulling Mill East | A | 99.88% | 61 |
| | B | 0.08% | 0 |
| | B/D | 0.01% | 0 |
| | C | 0.04% | 0 |
| | Total | 100.00% | 61 |
| Fulling Mill West | A | 63.40% | 383 |
| | A/D | 0.90% | 5 |
| | B | 12.29% | 74 |
| | B/D | 0.52% | 3 |
| | C | 20.18% | 122 |
| | C/D | 1.10% | 7 |
| | D | 1.62% | 10 |
| | Total | 100.00% | 605 |
| Lower Chilmark Pond | A | 55.53% | 815 |
| | A/D | 11.19% | 164 |
| | B | 10.50% | 154 |
| | Beaches | 2.17% | 32 |
| | C | 10.38% | 152 |
| | C/D | 0.22% | 3 |
| | Water | 10.00% | 147 |
| | Total | 100.00% | 1,467 |
| Mill Brook-CHI | A | 31.97% | 197 |
| | A/D | 11.09% | 68 |
| | B | 28.86% | 178 |
| | B/D | 4.47% | 28 |
| | C | 8.24% | 51 |
| | C/D | 8.01% | 49 |
| | D | 5.80% | 36 |
| | Pits | 0.90% | 6 |
| | Water | 0.66% | 4 |
| | Total | 100.00% | 617 |
| Upper Chilmark Pond | A | 29.59% | 196 |
| | A/D | 4.64% | 31 |
| | B | 22.98% | 152 |
| | B/D | 1.17% | 8 |
| | Beaches | 3.36% | 22 |
| | C | 24.04% | 159 |
| | C/D | 2.12% | 14 |
| | D | 6.41% | 42 |
| | Water | 5.71% | 38 |
| | Total | 100.00% | 662 |

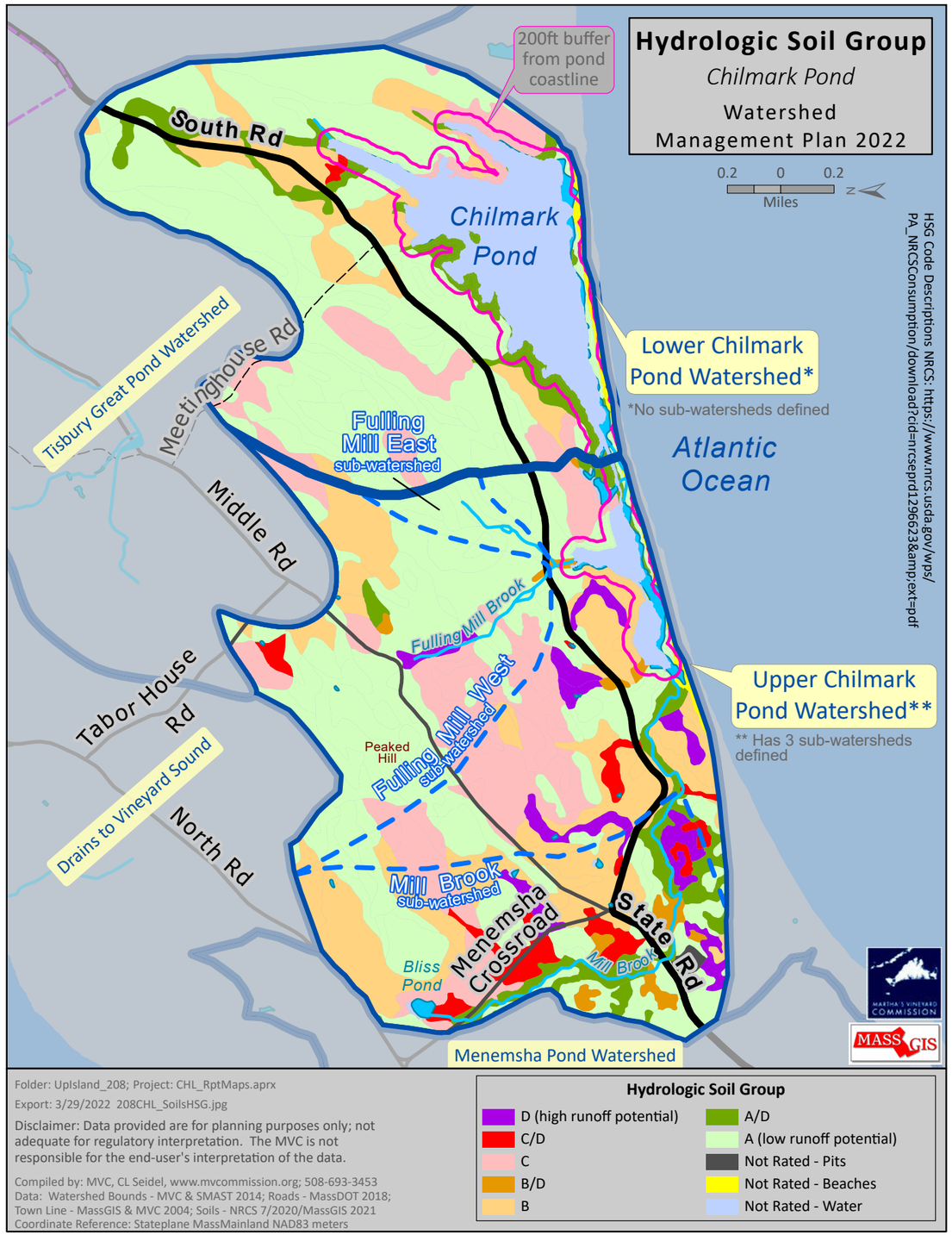


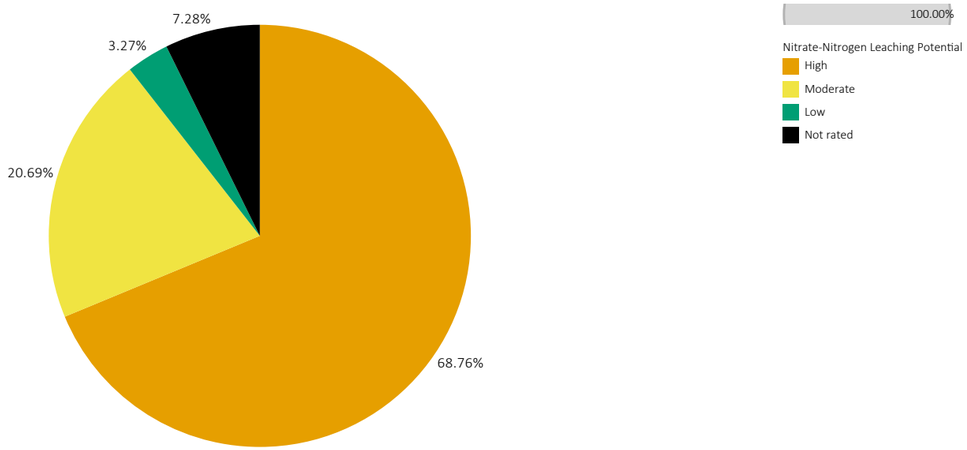

*Figure 5. Chilmark Pond Hydrologic Soil Groups*

Chilmark Pond Watershed Hydrolic Soil Group - 2021
Hydrologic Soil Group
D
C/D
C
B/D
B
A/D
A
Pits
Beaches
Water
48.43%
0.16%
1.59%
5.53%
2.58%
2.15%
14.20%
1.13%
16.37%
7.88%
A
Pits
Beaches
Water
D
C/D
C
B/D
B
A/D
0%
10%
20%
30%
40%
50%
Percent of Total Watershed Area (acres)


Chilmark Pond Sub-watershed Hydrolic Soil Group - 2021
Hydrologic Soil Group
D
C/D
C
B/D
B
A/D
A
Pits
Beaches
Water
Upper Chilmark Pond
Mill Brook-CHI
Lower Chilmark Pond
Fulling Mill West
Fulling Mill East
6.41%
2.12%
24.04%
1.17%
22.98%
4.64%
29.59%
3.36%
5.71%
5.80%
8.01%
8.24%
4.47%
28.86%
11.09%
31.97%
0.90%
0.66%
10.00%
2.17%
55.53%
11.19%
10.50%
10.38%
0.22%
63.40%
0.90%
12.29%
0.52%
20.18%
1.10%
1.62%
99.88%
0.04%
0.01%
0.08%
0%
20%
40%
60%
80%
100%
120%
Percent of Total Sub-Watershed Area (acres)

# APPENDIX F:

Chilmark Pond Watershed Nitrogen Leaching Potential of All Soil (% of total acres) - 2021




Chilmark Pond Sub-watershed Nitrogen Leaching Potential of All Soil (% of total acres) - 2021

Note: Areas representing less than 2% of the sub-watershed are not labeled.

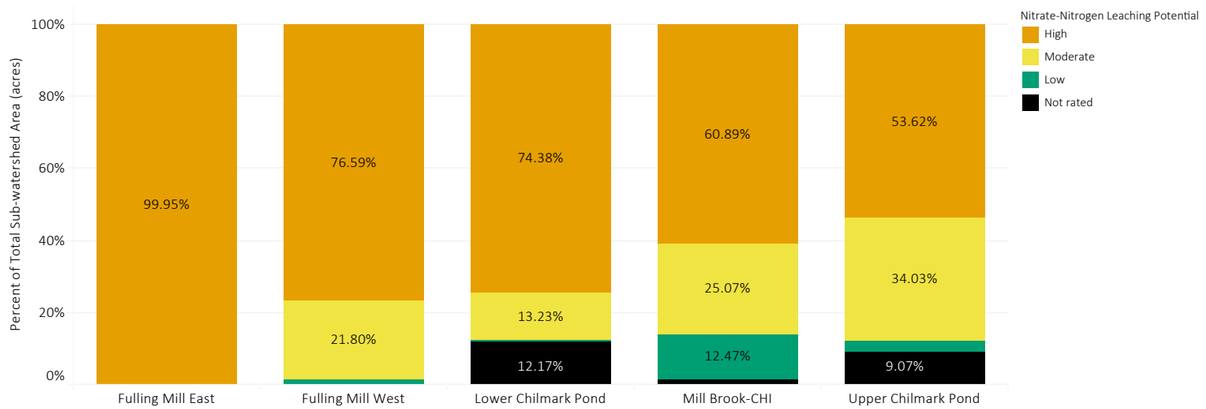



*Figure 6. Chilmark Nitrogen Leaching Potential by Sub-watershed*

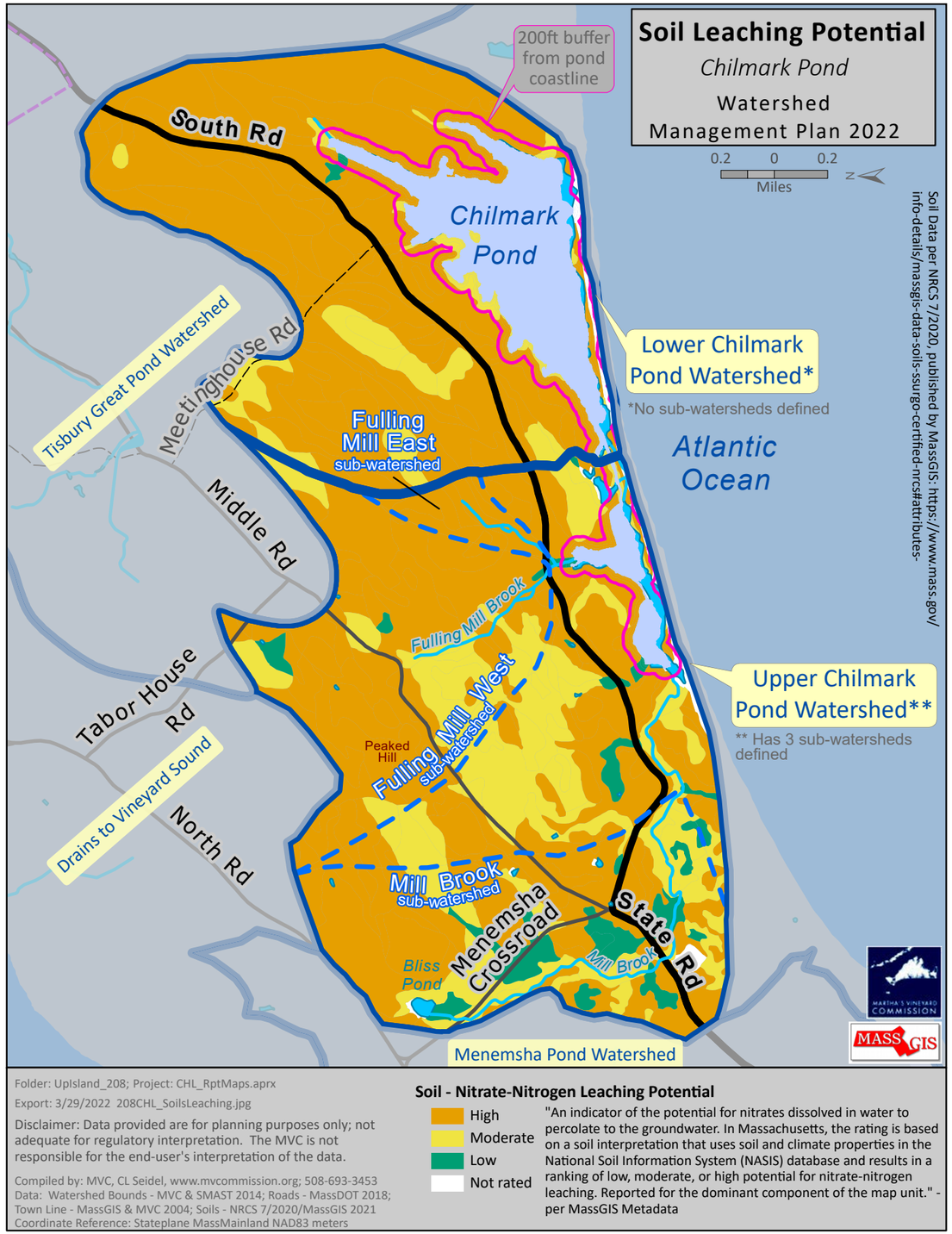


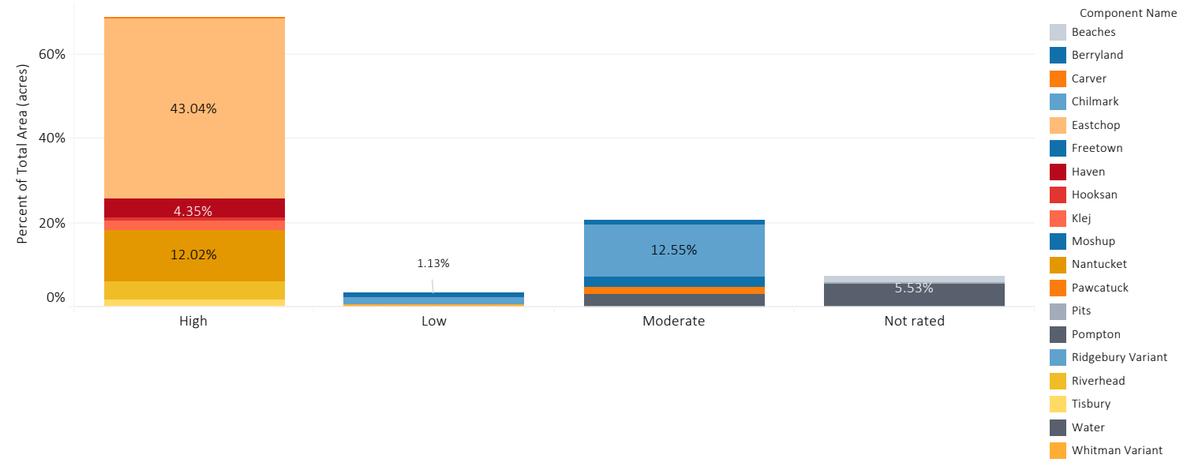

*Figure 7. Chilmark Pond Soil Leaching Potential*

# Chilmark Pond Watershed Soil Type and Nitrate-Nitrogen Leaching Potential (acres) Entire Watershed - 2021 Table

| Component Name | High | Low | Moderate | Not rated | Grand Total |
|---|---|---|---|---|---|
| Beaches | | | | 1.59% | 1.59% |
| Berryland | | | 0.97% | | 0.97% |
| Carver | 0.09% | | | | 0.09% |
| Chilmark | | | 12.55% | | 12.55% |
| Eastchop | 43.04% | | | | 43.04% |
| Freetown | | 1.13% | | | 1.13% |
| Haven | 4.35% | | | | 4.35% |
| Hooksan | 0.81% | | | | 0.81% |
| Klej | 2.32% | | | | 2.32% |
| Moshup | | | 2.58% | | 2.58% |
| Nantucket | 12.02% | | | | 12.02% |
| Pawcatuck | | | 1.66% | | 1.66% |
| Pits | | | | 0.16% | 0.16% |
| Pompton | | | 2.94% | | 2.94% |
| Ridgebury Variant | | 1.60% | | | 1.60% |
| Riverhead | 4.49% | | | | 4.49% |
| Tisbury | 1.65% | | | | 1.65% |
| Water | | | | 5.53% | 5.53% |
| Whitman Variant | | 0.55% | | | 0.55% |
| Grand Total | 68.76% | 3.27% | 20.69% | 7.28% | 100.00% |

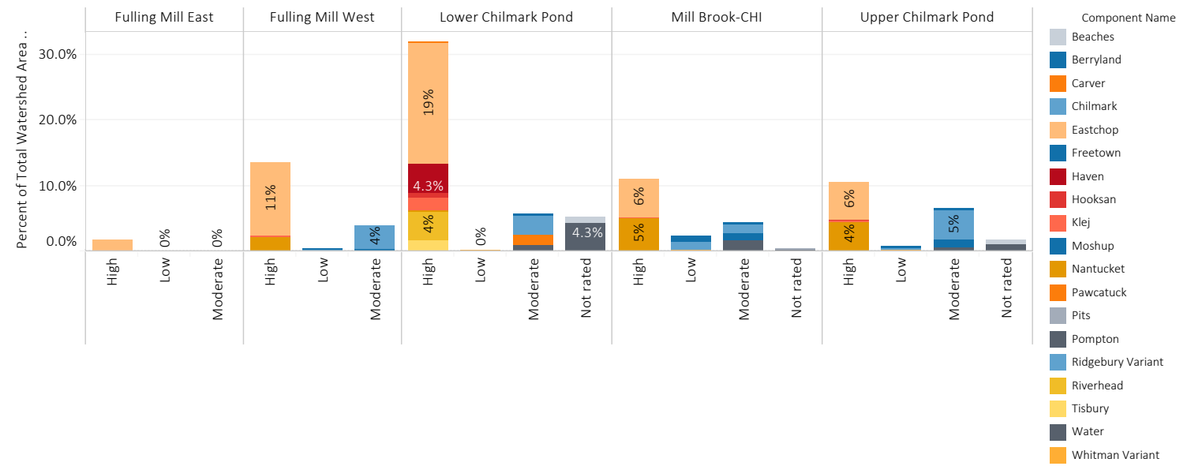
Chilmark Pond Watershed Soil Type and Nitrate-Nitrogen Leaching Potential (acres) - 2021

Note: Areas representing less than 3% of the sub-watershed are not labeled.




Chilmark Pond Sub-watershed Soil Type and Nitrate-Nitrogen Leaching Potential (acres)

Note: Areas representing less than 3% of the sub-watershed are not labeled.



## APPENDIX G:

| Sub-watershed Name | Daily Input (ct/day) |
|---|---|
| Lower Chilmark Pond (estuarine) | 353,430 |
| Upper Chilmark Pond (freshwater) | 175,922 |
| Fulling Mill East (freshwater) | 17,374 |
| Fulling Mill West (freshwater) | 172,659 |
| Mill Brook (freshwater) | 175,970 |
| **Total** | **895,355** |

*Table 3. Chilmark Pond Sub-watershed Groundwater Input*

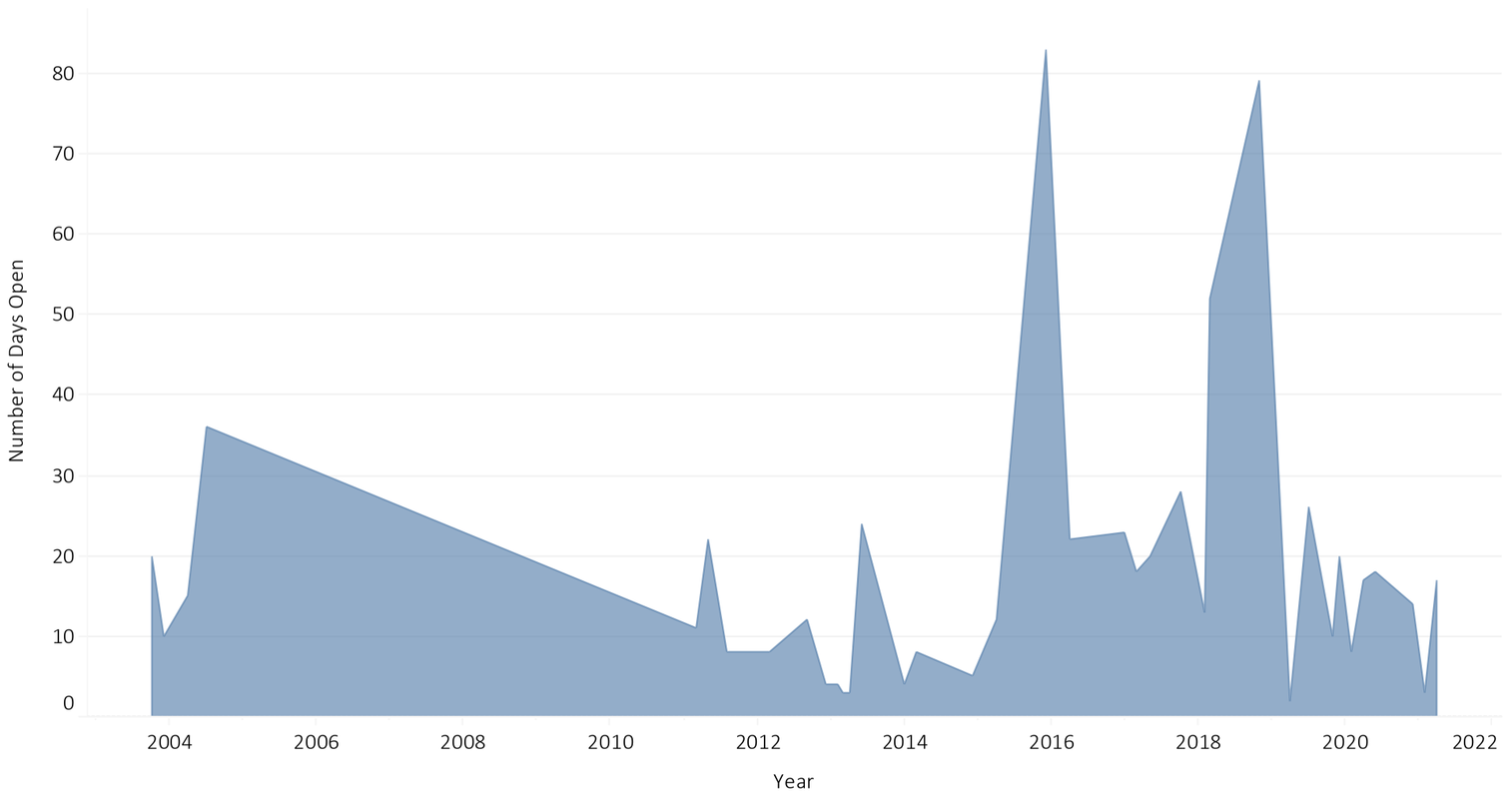
*Table 4. Chilmark Pond Managed Breaches - Number of Days Pond Open (2003-2021)*

Chilmark Pond Watershed - Number of Days Open (2003-2021)

| | January | March | April | May | June | July | August | October | Novemb.. | Decemb.. | February | Septem.. | Annual Days Open (total) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | | | | | | | | 20 | | 10 | | | 30 |
| 2004 | | | 15 | | | 36 | | | | | | | 51 |
| 2011 | | 11 | | 22 | | | 8 | | 8 | | | | 49 |
| 2012 | | 8 | | | | | | | | 4 | | 12 | 24 |
| 2013 | | 3 | 3 | | 24 | | | | | | 4 | | 34 |
| 2014 | 4 | 8 | | | | | | | | 5 | | | 17 |
| 2015 | | | 12 | | | | | | | 83 | | | 95 |
| 2016 | | | 22 | | | | | | | | | | 22 |
| 2017 | 23 | 18 | | 20 | | | | 28 | | | | | 89 |
| 2018 | | 52 | | | | | | | 79 | | 13 | | 144 |
| 2019 | | | 2 | | | 26 | | | 10 | 20 | | | 58 |
| 2020 | | | 17 | | 18 | | | | | 14 | 8 | | 57 |
| 2021 | | | 17 | | | | | | | | 3 | | 20 |



Chilmark Pond Number of Open Days (2003-2021)



## APPENDIX H:

| Water Quality Parameters | Regulatory Standards | MEP Status (2015)* | MVC Average (2016-2021) | Standard Sources |
|---|---|---|---|---|
| Nitrogen | 0.50 mg/L | Impaired (0.61 mg/L) | Exceeds Standard (0.85 mg/L) | 2015 Massachusetts Estuary Project, TMDL |
| Temperature | <85°F/29.4°C (At one time)<br><80°F/26.7°C (Max daily mean) | Status Not Reported | Meets Standard Requirements (74.9°F / 23.8°C) | Massachusetts Surface Water Quality Standards (314 CMR 4.00) |
| Dissolved Oxygen | 6.0 mg/L | Most sampling sites were below standard requirements | Meets Threshold Requirements (7.17 mg/L) | Massachusetts Surface Water Quality Standards (314 CMR 4.00) |
| Total Pigment Gradient | 10.0 µg/L | Above impairment threshold** | CHPUP (10.5) and CHP6 (25.6) exceed requirements. All other sampling sites meet threshold requirements. | 2020 Martha's Vineyard Water Quality Technical Report |
| * Values in this column represent the average of four samples collected from CHP1 in 2004 (Howes et. al2015, Table VI-1) | | | | |
| ** MEP pigment data was based on chlorophyll-a only. The Total Pigment Gradient data referenced here is for "MVC Six Year Average" is based on Total Pigment. | | | | |

*Table 5. Chilmark Pond Water Quality Standards and Thresholds*

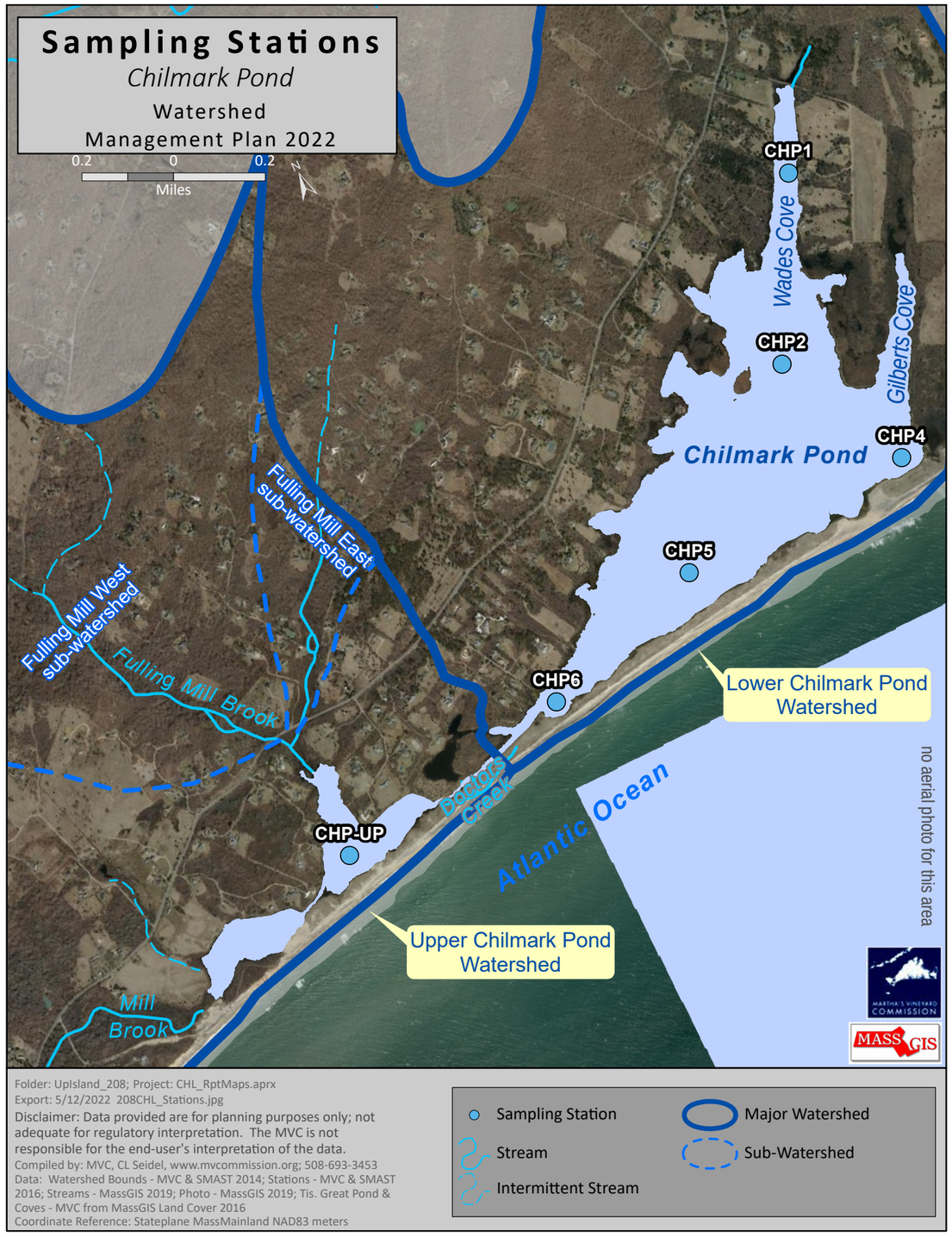



*Figure 8. Chilmark Pond Water Quality Sampling Stations (2016-2021)*

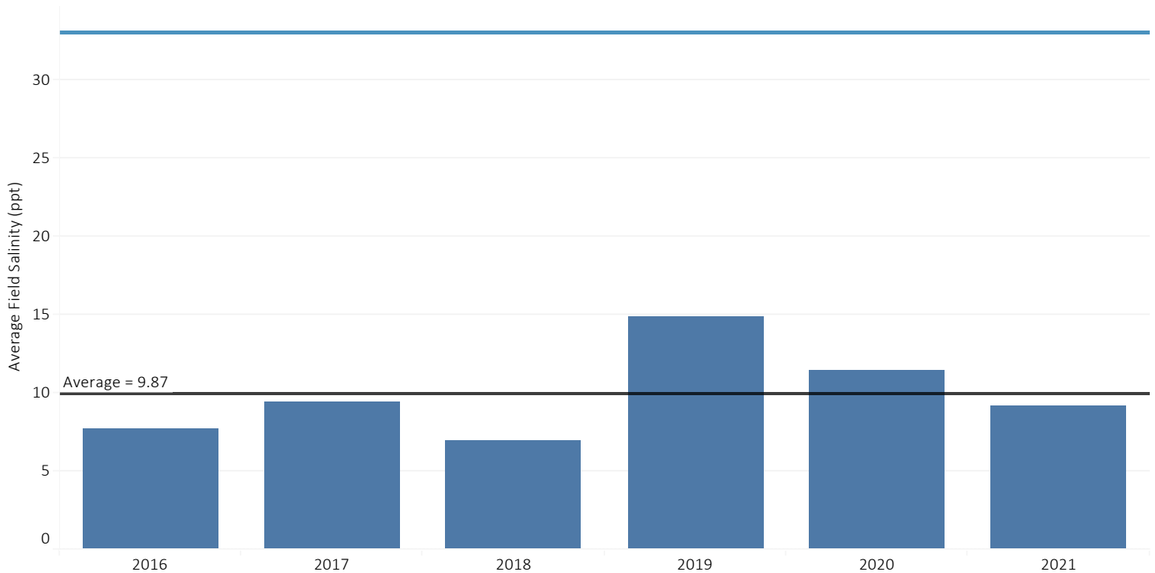
# APPENDIX I:

Chilmark Pond Watershed - Salinity (2016-2021) - Table

| Station ID | Sub-watershed Name | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | Six Year Average |
|---|---|---|---|---|---|---|---|---|
| CHP1 | Wade's Cove Upper | 9.49 | 12.03 | 8.14 | 16.01 | 14.28 | 10.51 | 11.74 |
| CHP2 | Chilmark Pond | 9.88 | 12.31 | 8.85 | 23.20 | 14.34 | 11.01 | 13.26 |
| CHP4 | Gilbert's Cove | 9.58 | 12.73 | 9.10 | 16.94 | 14.04 | 11.31 | 12.28 |
| CHP5 | Chilmark Pond | 9.48 | 12.14 | 8.57 | 22.32 | 13.37 | 10.71 | 12.76 |
| CHP6 | Chilmark Pond | 7.43 | 8.37 | 7.29 | 13.50 | 13.78 | 10.55 | 10.15 |
| CHPUP | Chilmark Pond Upper | 0.10 | 0.34 | 0.15 | 0.15 | 0.81 | 1.82 | 0.56 |
| Annual Average | | 7.66 | 9.65 | 7.01 | 15.35 | 11.77 | 9.32 | 10.13 |

Chilmark Pond Watershed - Salinity (2016-2021)

The BLUE LINE in the upper area of the graph represents average offshore/Atlantic Ocean salinity (ppt). The average salinity In the waters off Martha's Vinyard is 33 (ppt).






Chilmark Pond Sub-watershed - Salinity (2016-2021)

The BLUE LINE in the upper area of the graph represents average offshore/Atlantic Ocean salinity (ppt). The average salinity In the waters off Martha's Vinyard is 33 (ppt).
The BLACK LINE within the sub-watershed pane indicates the average salinity value over a five year period (2017-2021).

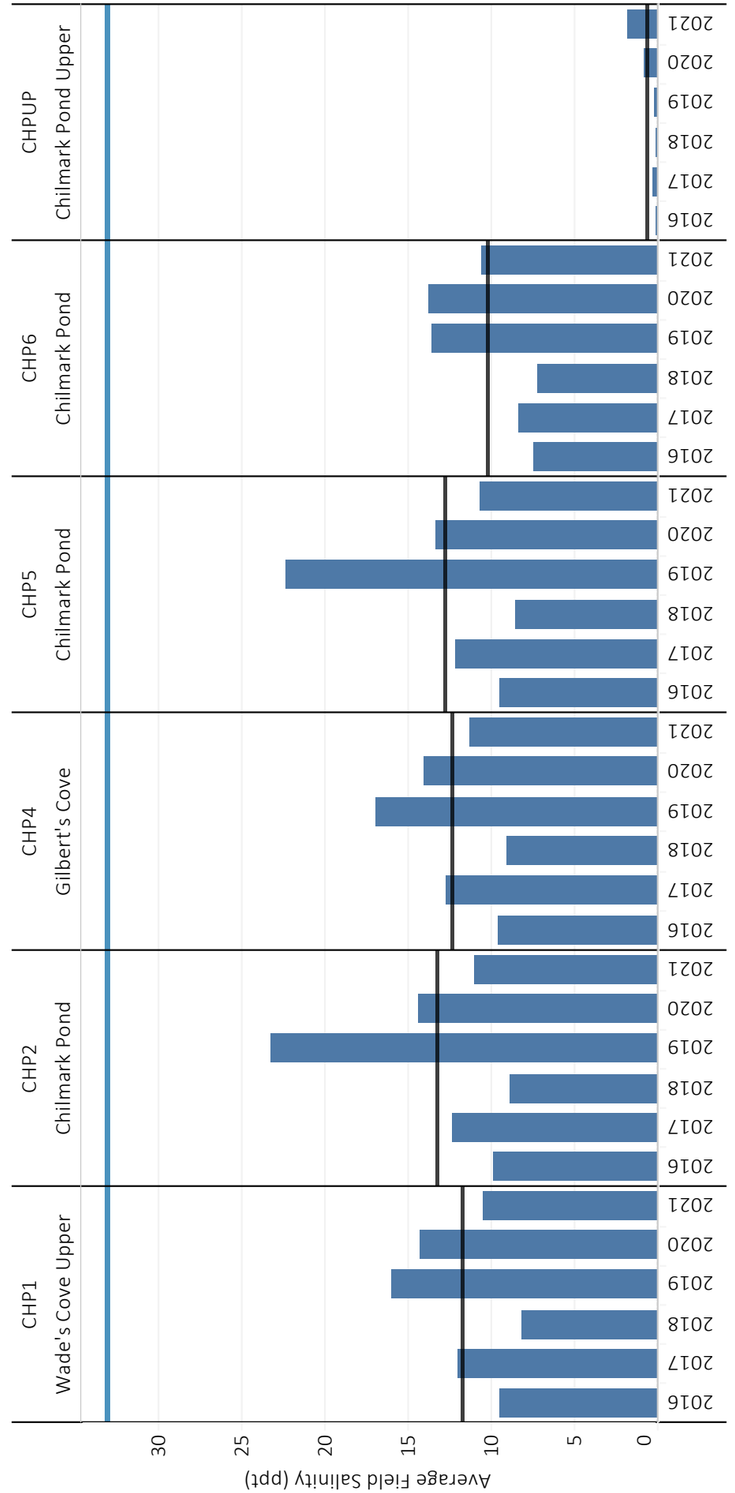



*Figure 9. Chilmark Pond Salinity Data (2016-2021)*

# APPENDIX J:

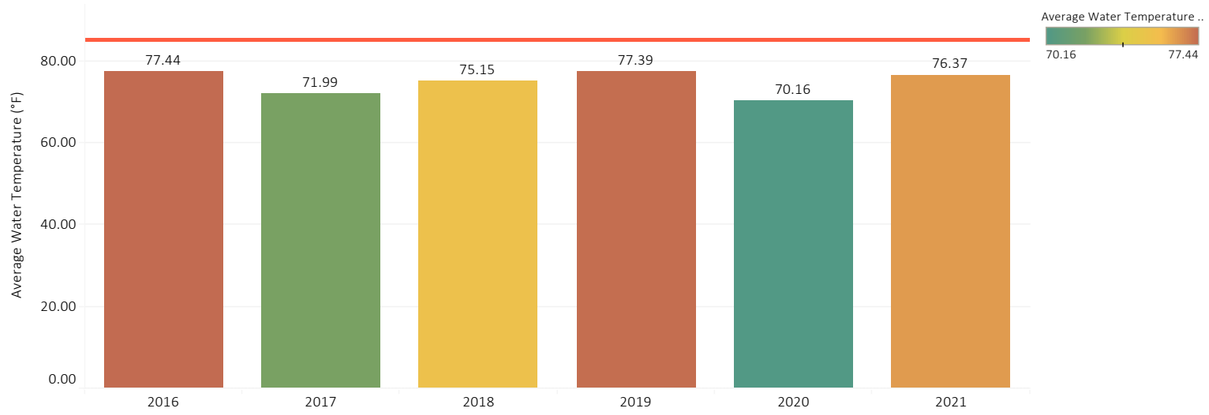
## Chilmark Pond Watershed - Water Temperature (°F) (2016-2021) - Table

Massachusetts surface water quality standards state that coastal water temperature shall not exceed 85°F (29.4°C) nor a maximum daily mean of 80°F (26.7°C).
https://www.epa.gov/sites/default/files/2014-12/documents/mawqs-2006.pdf

| | | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | Six Year Average |
|---|---|---|---|---|---|---|---|---|
| CHP1 | Wade's Cove Upper | 77.84 | 72.75 | 74.84 | 77.90 | 71.98 | 77.30 | 75.56 |
| CHP2 | Chilmark Pond | 77.59 | 72.35 | 75.68 | 77.45 | 71.44 | 76.29 | 75.18 |
| CHP4 | Gilbert's Cove | 76.57 | 71.80 | 75.43 | 74.57 | 68.90 | 75.85 | 74.04 |
| CHP5 | Chilmark Pond | 77.95 | 72.29 | 75.44 | 77.51 | 67.34 | 76.19 | 74.94 |
| CHP6 | Chilmark Pond | 77.62 | 71.40 | 75.38 | 82.04 | 70.59 | 76.46 | 75.42 |
| CHPUP | Chilmark Pond Upper | 77.00 | 71.21 | 74.30 | 76.60 | 70.02 | 76.03 | 74.35 |
| Annual Average | | 77.44 | 71.99 | 75.15 | 77.39 | 70.16 | 76.37 | 74.90 |

## Chilmark Pond Watershed - Water Temperature (2016-2021)

Massachusetts surface water quality standards state that coastal water temperature shall not exceed 85°F (29.4°C) nor a maximum daily mean of 80°F (26.7°C). The RED LINE indicates the 85°F (29.4°C) limit. https://www.epa.gov/sites/default/files/2014-12/documents/mawqs-2006.pdf



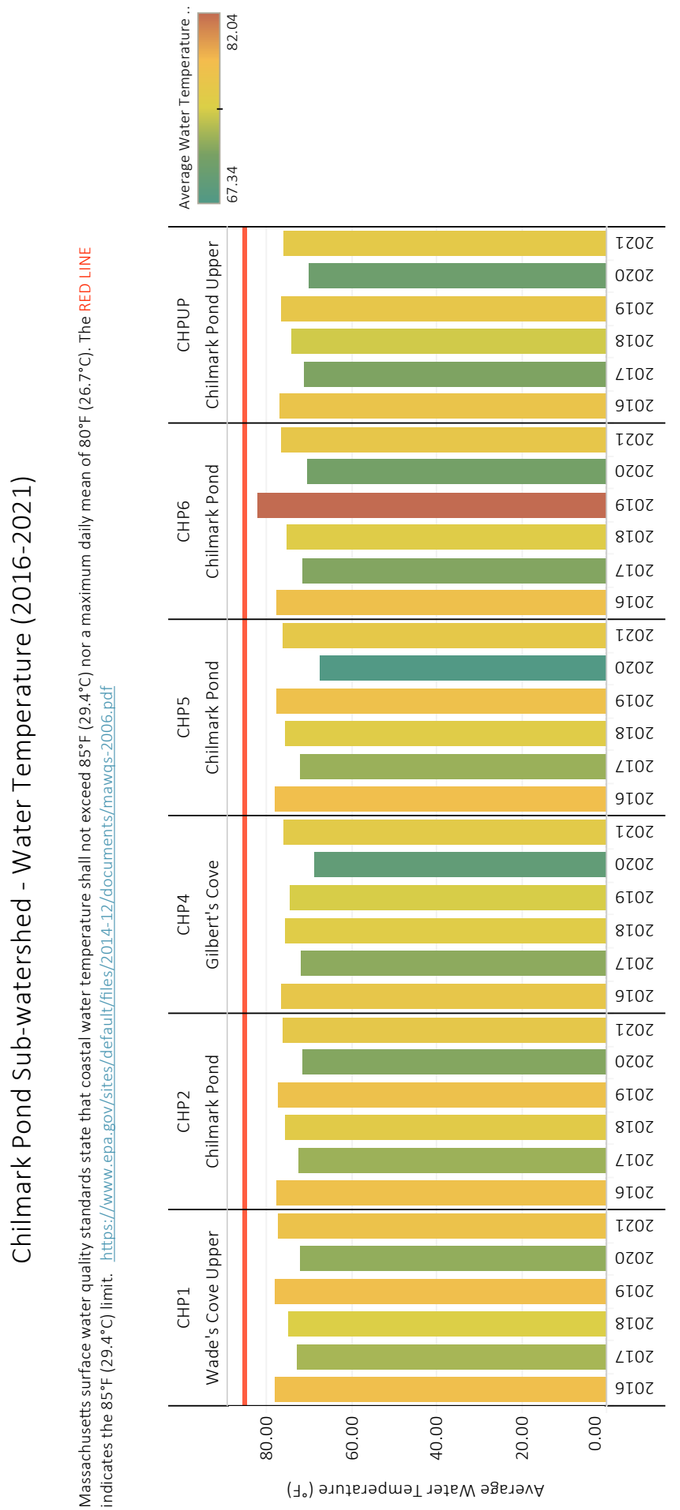




*Figure 10. Chilmark Pond Temperature Data (2016-2021)*

# APPENDIX K:

| Source | Nitrogen Load (kg/year) |
|---|---|
| Wastewater | 2,560 |
| Turf Fertilizers | 264 |
| Agricultural Fertilizers | 253 |
| Agricultural Animals | 2,877 |
| Impervious Cover | 267 |
| Water Surface (atmospheric deposits) | 1,429 |
| Natural Surfaces | 1,337 |
| • Buildout* | 271 |
| * Buildout loads include direct atmospheric deposition to water surfaces from sources including wastewater disposal, fertilizer, and impervious surface additions from developable properties. . | |

*Table 6. Chilmark Pond Nitrogen Load Model Inputs (Howes, et. al, 2017)*

| Sub-embayment | Present Load (kg/year) | Threshold Load (kg/year) | Threshold % Change |
|---|---|---|---|
| Chilmark Pond East | 2002.0 | 1553.1 | -22% |
| Chilmark Pond West | 4239.1 | 3847.1 | -9% |
| *Embayment and surface water loads used for **total nitrogen** modeling of threshold conditions for Chilmark Pond, with total watershed N loads, atmospheric N loads, and benthic flux. | | | |
| ** Information published in Table ES-2 (Page 11) of the Chilmark Pond Embayment System Massachusetts Estuaries Project Report (2015). | | | |

*Table 7. Chilmark Pond TOTAL Nitrogen Load Reductions Required to Achieve Nitrogen Threshold (TMDL)*

| Sub-embayment | Sampling Station | MEP Observed Total Nitrogen Concentration (2013) (mg/L) | 2016-2021 Average Total Nitrogen Concentration (mg/L) | 2021 Observed Total Nitrogen Concentration (mg/L) | Threshold Total Nitrogen Concentration (mg/L) |
|---|---|---|---|---|---|
| Lower Chilmark Pond (including Wades Coves) | CHP1 | 0.61 | 0.81 | 0.64 | 0.50 |
| Lower Chilmark Pond | CHP2 | - | 0.75 | 0.63 | 0.50 |
| Gilberts Cove | CHP4 | - | 0.71 | 0.60 | 0.50 |
| Lower Chilmark Pond | CHP5 | - | 0.97 | 0.64 | 0.50 |
| Lower Chilmark Pond | CHP6 | - | 0.79 | 0.62 | 0.50 |
| Upper Chilmark Pond | CHPUP | - | 0.85 | 0.41 | 0.50 |
| **Total System** | | **0.61** | **0.71-0.97** | **0.41-0.64** | **0.50** |

*Table 8. Chilmark Pond Total Nitrogen Data Comparison*

## Chilmark Pond Watershed - Total Nitrogen (2016-2021) - Table

| | | | Average Total Nitrogen (mg/L) | TMDL Targets | Average Percent Difference |
|---|---|---|---|---|---|
| CHP1 | Wade's Cove Upper | 2016 | 1.02 | | |
| | | 2017 | 0.64 | | |
| | | 2018 | 0.51 | | |
| | | 2019 | 0.79 | | |
| | | 2020 | 1.26 | | |
| | | 2021 | 0.64 | | |
| | Six Year Average | | 0.81 | | |
| CHP2 | Chilmark Pond | 2016 | 0.86 | 0.50 | 71.16% |
| | | 2017 | 0.60 | 0.50 | 19.69% |
| | | 2018 | 0.46 | 0.50 | -8.37% |
| | | 2019 | 0.74 | 0.50 | 47.91% |
| | | 2020 | 1.23 | 0.50 | 145.75% |
| | | 2021 | 0.63 | 0.50 | 25.05% |
| | Six Year Average | | 0.75 | 0.50 | 50.20% |
| CHP4 | Gilbert's Cove | 2016 | 0.80 | | |
| | | 2017 | 0.53 | | |
| | | 2018 | 0.43 | | |
| | | 2019 | 0.65 | | |
| | | 2020 | 1.26 | | |
| | | 2021 | 0.60 | | |
| | Six Year Average | | 0.71 | | |
| CHP5 | Chilmark Pond | 2016 | 0.83 | 0.50 | 66.40% |
| | | 2017 | 0.58 | 0.50 | 15.64% |
| | | 2018 | 0.48 | 0.50 | -3.63% |
| | | 2019 | 0.57 | 0.50 | 13.07% |
| | | 2020 | 2.72 | 0.50 | 444.29% |
| | | 2021 | 0.64 | 0.50 | 28.56% |
| | Six Year Average | | 0.97 | 0.50 | 94.06% |
| CHP6 | Chilmark Pond | 2016 | 0.92 | 0.50 | 84.70% |
| | | 2017 | 0.53 | 0.50 | 6.80% |
| | | 2018 | 0.56 | 0.50 | 12.57% |
| | | 2019 | 0.67 | 0.50 | 34.75% |
| | | 2020 | 1.43 | 0.50 | 186.21% |
| | | 2021 | 0.62 | 0.50 | 23.70% |
| | Six Year Average | | 0.79 | 0.50 | 58.12% |
| CHPUP | Chilmark Pond Upper | 2016 | 1.10 | 0.50 | 119.22% |
| | | 2017 | 0.56 | 0.50 | 11.25% |
| | | 2018 | 0.81 | 0.50 | 61.54% |
| | | 2019 | 0.86 | 0.50 | 71.19% |
| | | 2020 | 1.36 | 0.50 | 172.52% |
| | | 2021 | 0.41 | 0.50 | -18.52% |
| | Six Year Average | | 0.85 | 0.50 | 69.53% |

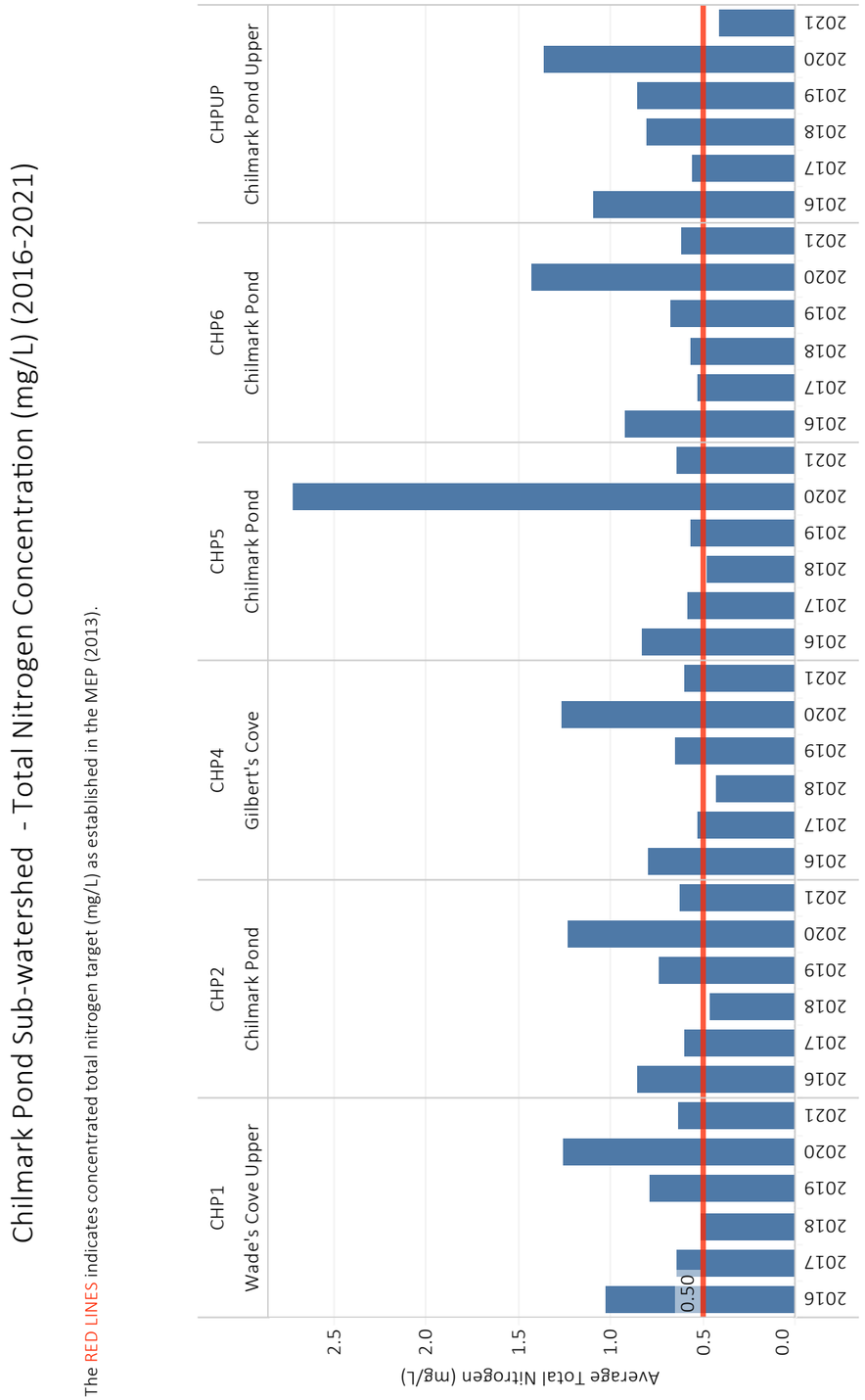



*Figure 11. Chilmark Pond Total Nitrogen by Sub-watershed (2016-2021)*

## Chilmark Pond Watershed - Dissolved Oxygen (mg/L) (2016-2021) - Table

*All values represent dissolved oxygen levels taken at the BOTTOM surface of the pond.

| | | 2016 | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | | 2021 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | July | August | July | August | October | July | August | September | July | August | September | July | August | September | November | January | June | July | August | October |
| CHP1 | Wade's Cove Upper | 5.2<br>5.2 | 5.7<br>5.2 | 5.3 | 5.7<br>5.3 | | 6.6 | 8.7<br>5.9 | 7.0 | | 9.2 | 5.1 | 4.9 | 5.7 | 8.5 | 10.2 | 7.6 | 7.0 | 6.9<br>6.4 | 6.0<br>0.6 | 6.4 |
| CHP2 | Chilmark Pond | 8.3<br>5.5 | 6.3<br>5.3 | 6.5<br>5.5 | 6.0<br>5.8 | 6.8 | 7.2 | 8.4<br>6.4 | 7.8 | 6.5 | 7.8 | 6.7 | 5.0 | 5.7 | 8.7 | 10.7 | 11.0 | 5.7 | 7.0<br>6.7 | 6.7 | 7.6 |
| CHP4 | Gilbert's Cove | 8.5<br>7.0 | 7.7<br>5.4 | 7.1 | 7.0<br>5.6 | | 7.9 | 8.0<br>6.5 | | | | 7.0 | 5.8 | 5.3 | 8.5 | 10.5 | 11.2 | 6.1 | 6.7<br>6.7 | | 8.0 |
| CHP5 | Chilmark Pond | 13.6<br>8.0 | 9.1<br>3.9 | 6.2<br>5.9 | 6.5<br>6.1 | | 7.2 | 8.0<br>7.0 | 8.1 | | 10.7 | 7.9 | | 5.5 | 9.1 | 10.6 | | 7.2 | 7.2<br>6.7 | 7.1<br>6.8 | 7.7 |
| CHP6 | Chilmark Pond | 6.5<br>5.1 | 8.9<br>5.4 | | 6.0 | | | | 6.1 | | | | 4.7 | | 9.0 | 11.1 | | 5.7 | 7.2<br>6.9 | 6.4<br>5.5 | |
| CHPUP | Chilmark Pond Upper | 8.7<br>6.8 | 9.1<br>6.3 | 8.2<br>5.6 | 9.4<br>6.7 | | 9.5 | 9.1<br>8.2 | 9.4 | 9.8 | 6.4 | 5.9 | 9.5 | 10.1 | 9.1 | 11.6 | 9.8 | 7.6 | 3.4<br>2.0 | 6.3<br>6.1 | 10.8 |

**APPENDIX L:**



## Chilmark Pond Watershed - Dissolved Oxygen (2016-2021)

The RED LINE indicates the threshold dissolved oxygen level, values below this line are associated with stressful conditions in which aquatic species fail to thrive.

*All values represent dissolved oxygen levels taken at the BOTTOM surface of the pond.

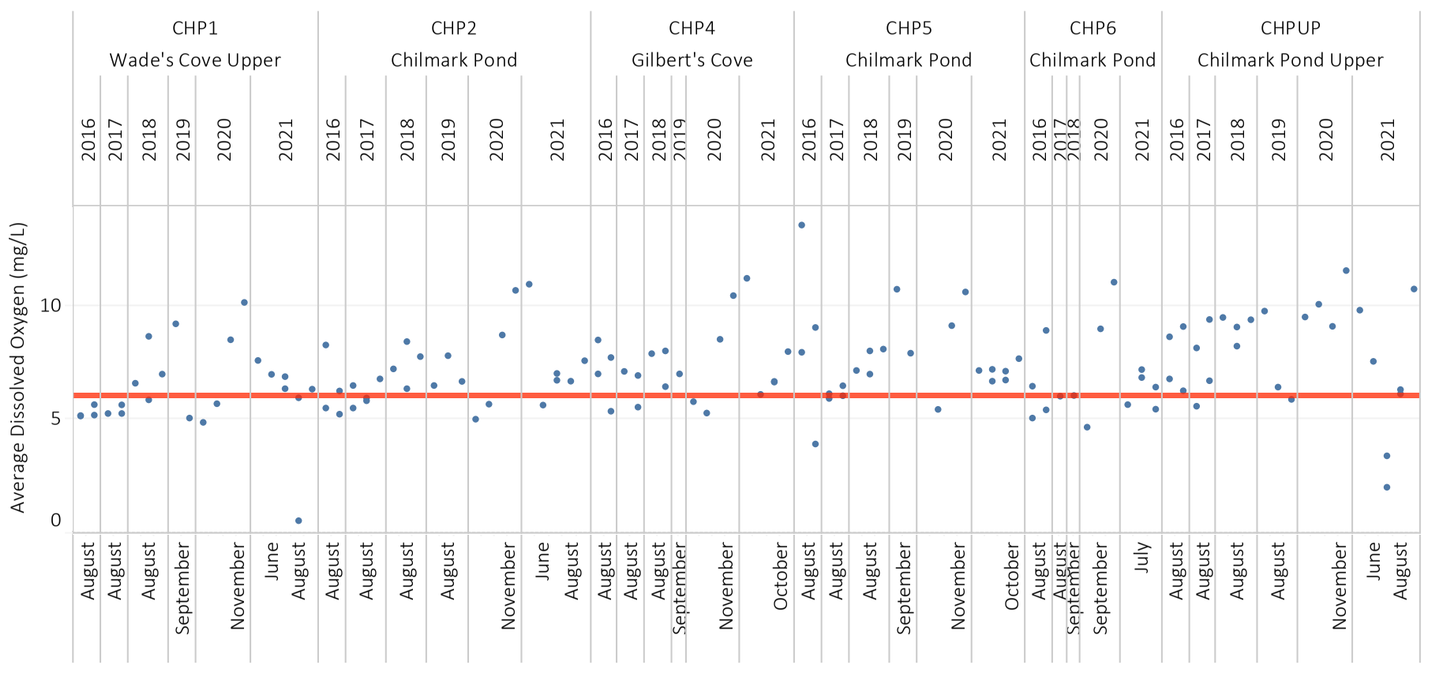



*Figure 12. Chilmark Pond Dissolved Oxygen by Sub-watershed (2016-2021)*

## Chilmark Pond Watershed - Chlorophyll-a (2016-2021) - Table

| | | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | Six Year Average |
|---|---|---|---|---|---|---|---|---|
| CHP1 | Wade's Cove Upper | 9.32 | 9.19 | 4.96 | 5.48 | 3.35 | 8.00 | 6.72 |
| CHP2 | Chilmark Pond | 6.04 | 4.18 | 3.44 | 9.18 | 3.20 | 8.03 | 5.68 |
| CHP4 | Gilbert's Cove | 3.59 | 2.96 | 2.80 | 3.29 | 4.08 | 6.83 | 3.92 |
| CHP5 | Chilmark Pond | 4.98 | 2.78 | 3.52 | 2.49 | 3.43 | 10.38 | 4.60 |
| CHP6 | Chilmark Pond | 6.82 | 5.56 | 10.55 | 9.81 | 7.43 | 14.04 | 9.03 |
| CHPUP | Chilmark Pond Upp.. | 23.20 | 5.54 | 45.20 | 16.70 | 10.29 | 14.95 | 19.31 |
| Annual Average | | 8.99 | 5.03 | 11.74 | 7.82 | 5.30 | 10.37 | 8.21 |



## Chilmark Pond Sub-watershed - Chlorophyll-a (2016-2021)

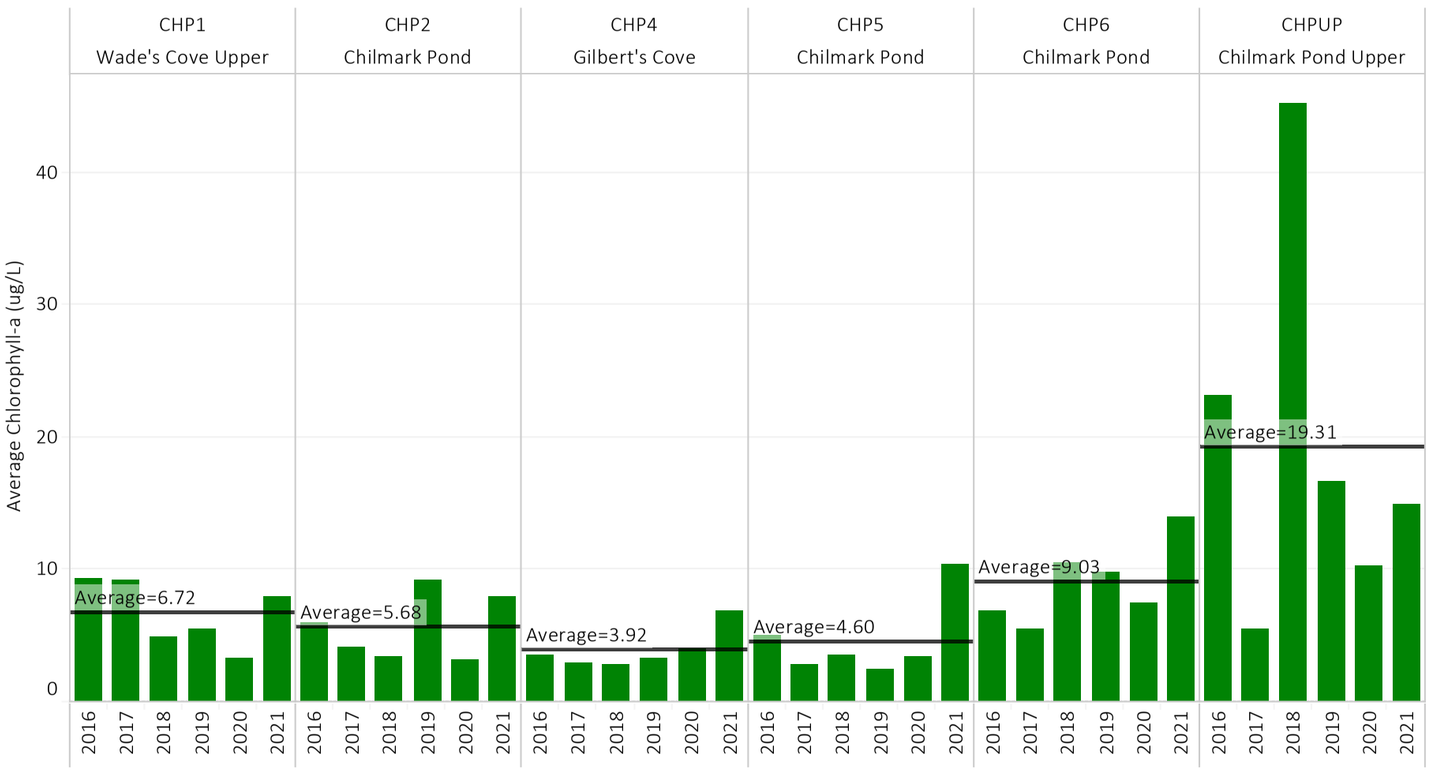



*Figure 13. Chilmark Pond Chlorophyll-a (2016-2021)*

## Chilmark Pond Watershed - Total Pigment (2016-2021) - Table

| | | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | Six Year Average |
|---|---|---|---|---|---|---|---|---|
| CHP1 | Wade's Cove Upper | 9.25 | 10.50 | 6.50 | 6.67 | 5.00 | 11.20 | 8.19 |
| CHP2 | Chilmark Pond | 6.00 | 6.50 | 4.25 | 9.67 | 4.67 | 10.00 | 6.85 |
| CHP4 | Gilbert's Cove | 3.75 | 4.50 | 3.50 | 4.50 | 5.33 | 8.67 | 5.04 |
| CHP5 | Chilmark Pond | 5.00 | 5.00 | 3.50 | 2.67 | 4.67 | 11.60 | 5.41 |
| CHP6 | Chilmark Pond | 7.00 | 8.00 | 12.25 | 10.67 | 9.33 | 15.80 | 10.51 |
| CHPUP | Chilmark Pond Upper | 23.75 | 14.00 | 62.00 | 17.67 | 18.67 | 17.20 | 25.55 |
| Annual Average | | 9.13 | 8.08 | 15.33 | 8.64 | 7.94 | 12.41 | 10.26 |



## Chilmark Pond Sub-watershed - Total Pigment (2016-2021)

The RED LINE represents 10 ug/L total pigment threshold. Total pigment values that exceed 10 ug/L indicate an impaired aquatic environment.

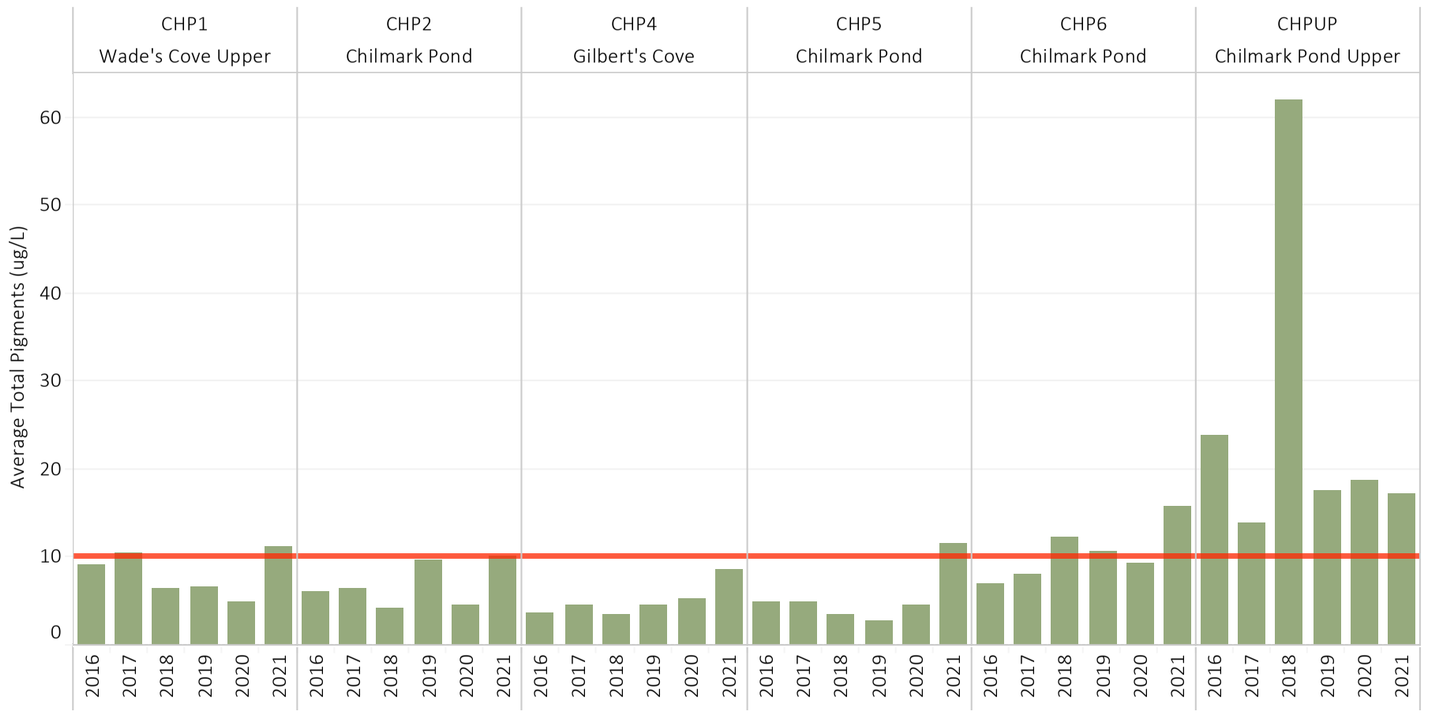



*Figure 14. Chilmark Pond Total Pigment (2016-2021)*

## Chilmark Pond Watershed - Total Phosphorus (2003-2021) - Table

| Station ID | Sub-watershed Name | 2003 | 2018 | 2019 | 2020 | 2021 | Average |
|---|---|---|---|---|---|---|---|
| CHPUP | Chilmark Pond Upper | | 4.36 | 3.19 | 5.97 | 2.02 | 3.88 |
| CHP6 | Chilmark Pond | | | | | | |
| CHP5 | Chilmark Pond | 2.26 | | | | | 2.26 |
| CHP4 | Gilbert's Cove | | | | | | |
| CHP2 | Chilmark Pond | | | | | | |
| CHP1 | Wade's Cove Upper | 1.86 | | | | | 1.86 |
| Annual Average | | 2.06 | 4.36 | 3.19 | 5.97 | 2.02 | 3.27 |



## Chilmark Pond Sub-watershed - Total Phosphorus (2016-2021)

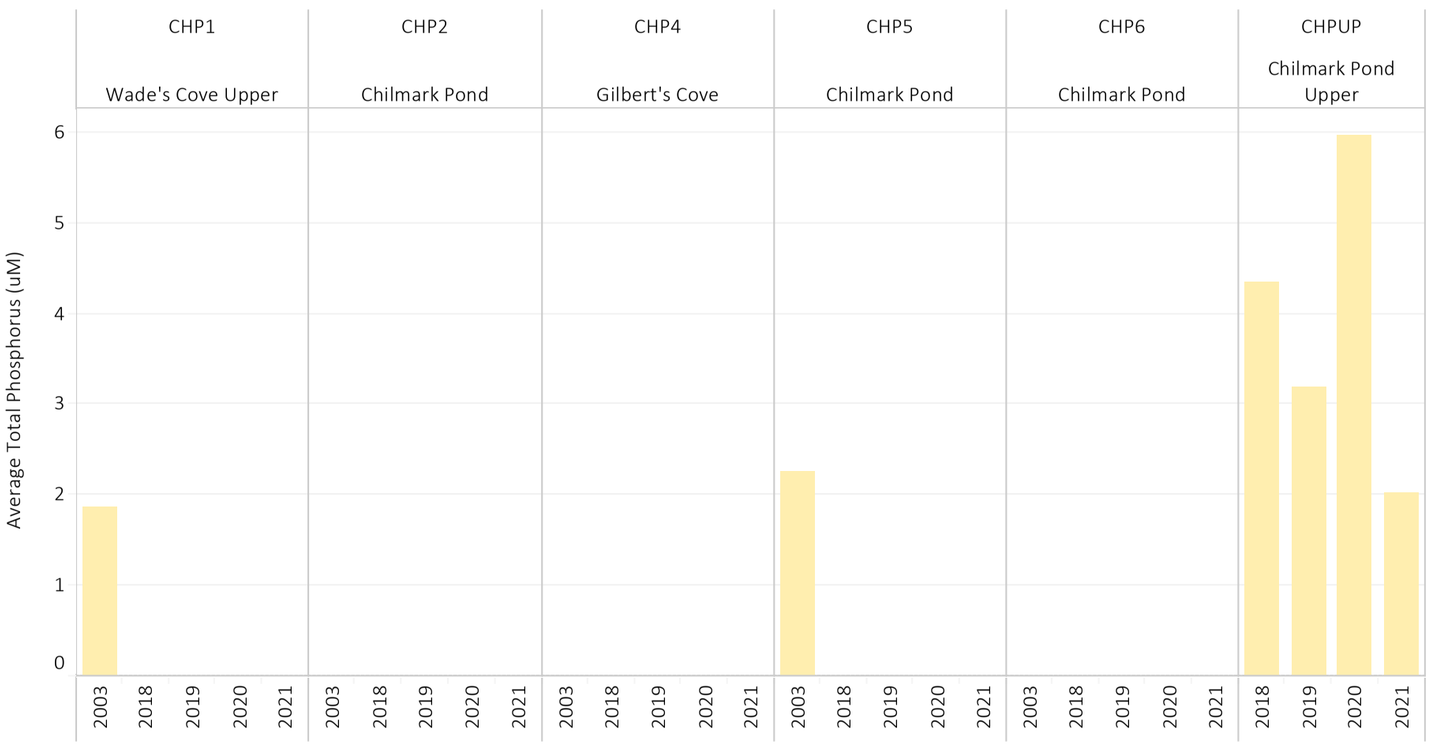



*Figure 15. Chilmark Pond Total Phosphorus by Sub-watershed (2016-2021)*

# APPENDIX P:

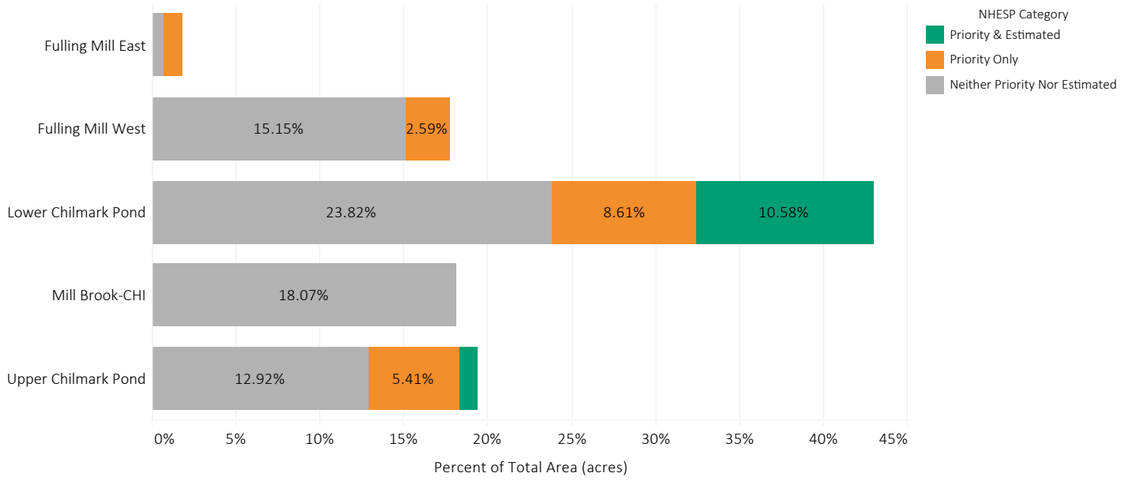
Chilmark Pond Watershed Natural Heritage & Endangered Species Habitats
Within and Beyond 200ft from Pond Edge - 2021 Table

| | | Priority & Estimated | Priority Only | Neither Priority Nor Estimated | Grand Total |
|---|---|---|---|---|---|
| Fulling Mill East | Beyond 200ft | | 6.41% | 0.92% | 1.78% |
| Fulling Mill West | Beyond 200ft | | 14.58% | 21.45% | 17.73% |
| Lower Chilmark Pond | Within 200ft | 63.99% | 14.96% | 0.58% | 10.52% |
| | Beyond 200ft | 26.77% | 33.57% | 33.15% | 32.48% |
| Mill Brook-CHI | Beyond 200ft | | | 25.60% | 18.07% |
| Upper Chilmark Pond | Within 200ft | 5.04% | 9.33% | 0.43% | 2.54% |
| | Beyond 200ft | 4.19% | 21.16% | 17.87% | 16.86% |
| Grand Total | | 100.00% | 100.00% | 100.00% | 100.00% |

Chilmark Pond Sub-watershed Natural Heritage & Endangered Species Habitats - 2021

Percent of Habitat within the Entire Watershed Area

Note: Areas representing less than 2% of the total area (acres) are not labled.



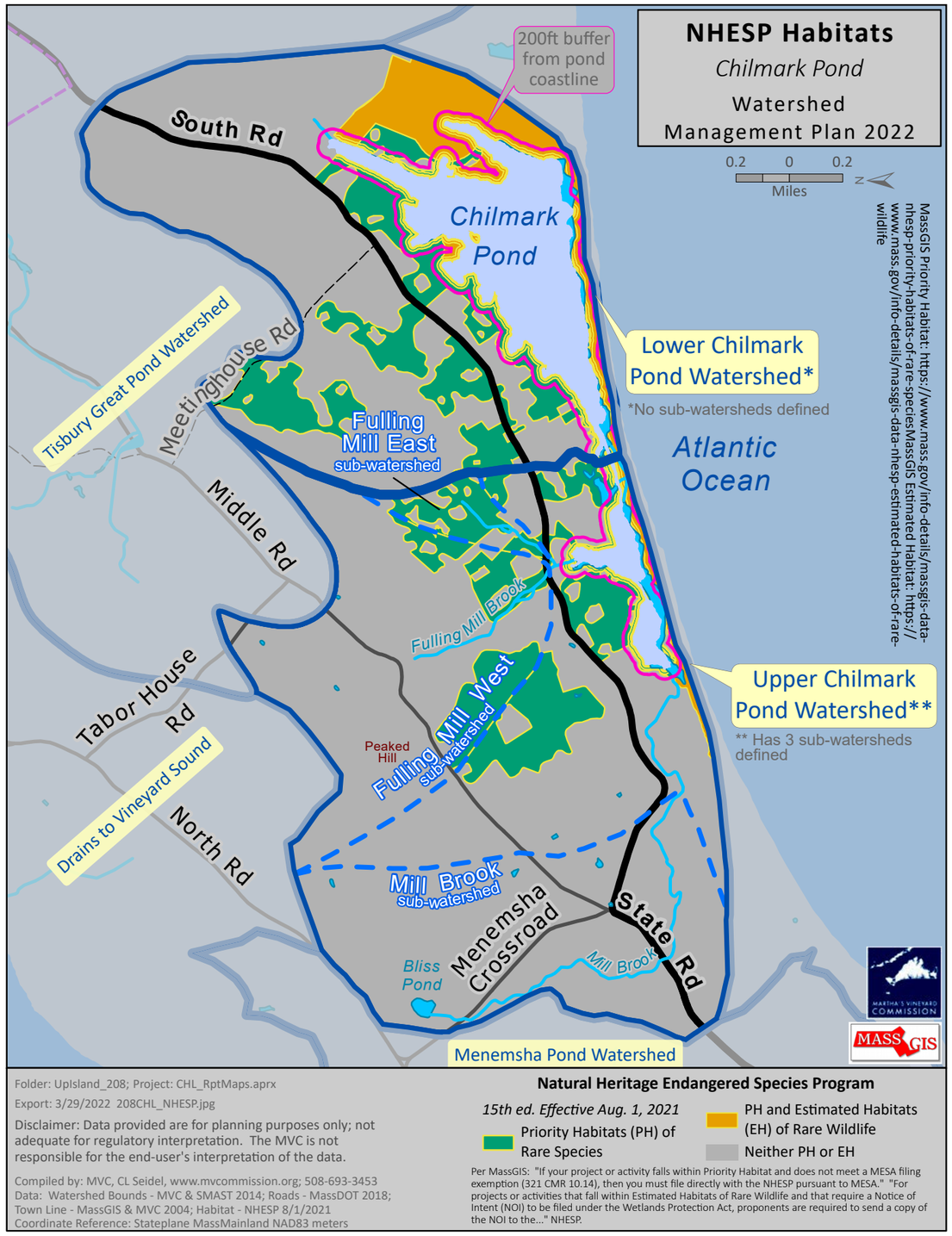
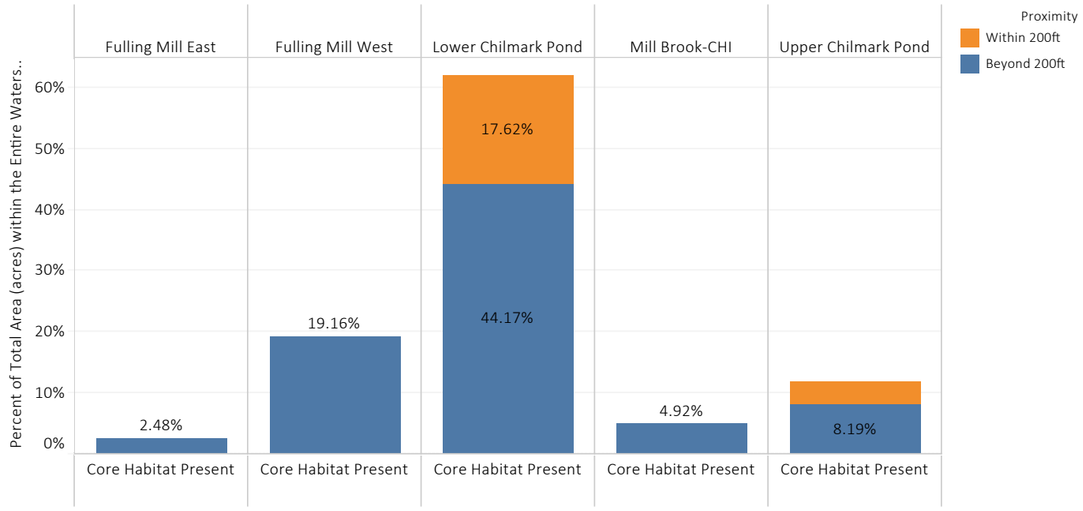




*Figure 16. Natural Heritage & Endangered Species Program Map*

# Chilmark Pond Watershed Core Habitat - 2021 Table

| | | Core Habitat Present |
|---|---|---|
| Fulling Mill East | Beyond 200ft | 2.48% |
| Fulling Mill West | Beyond 200ft | 19.16% |
| Lower Chilmark Pond | Beyond 200ft | 44.17% |
| | Within 200ft | 17.62% |
| Mill Brook-CHI | Beyond 200ft | 4.92% |
| Upper Chilmark Pond | Beyond 200ft | 8.19% |
| | Within 200ft | 3.46% |

Chilmark Pond Sub-watershed Core Habitat
Within and Beyond 200ft from Pond Edge - 2021



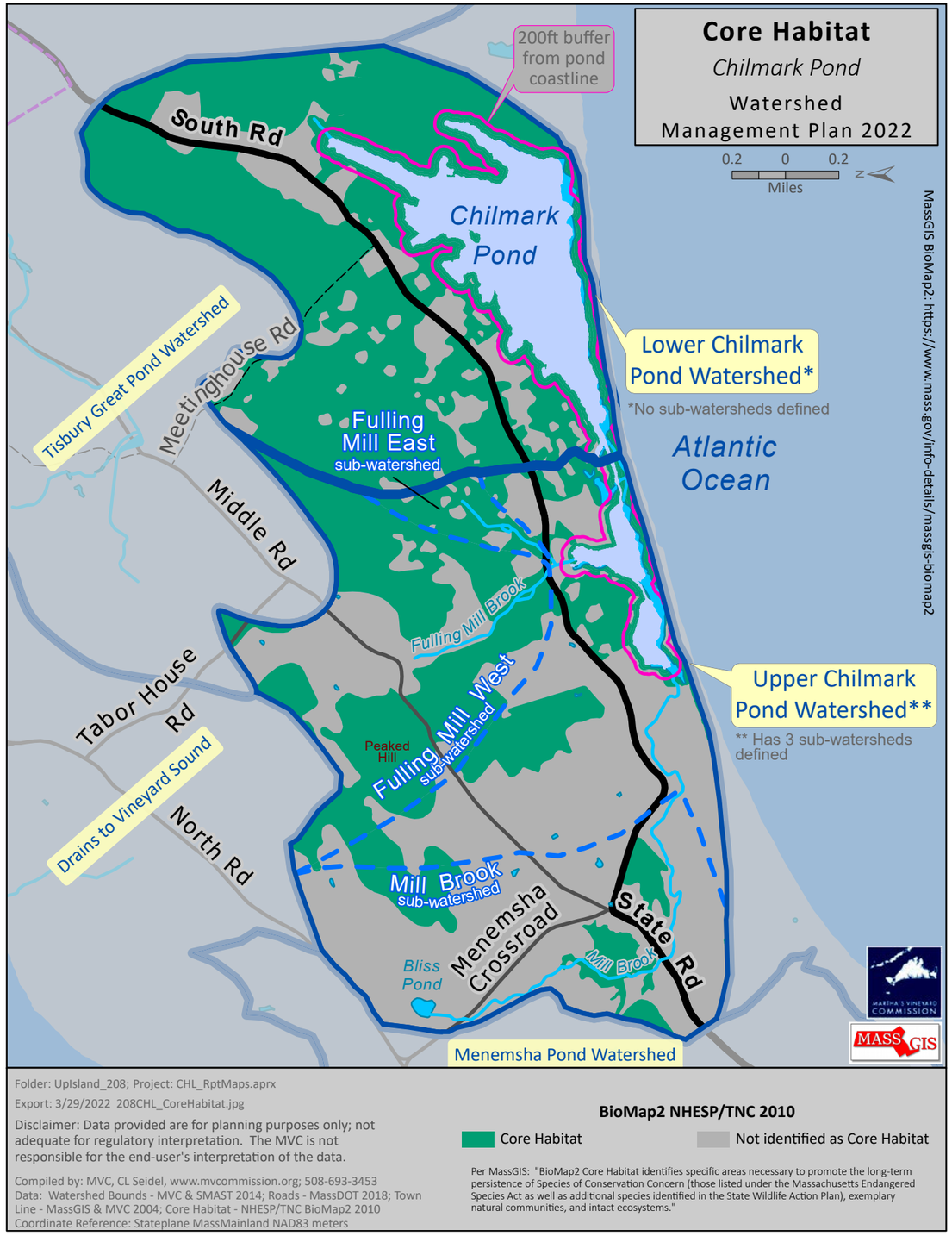



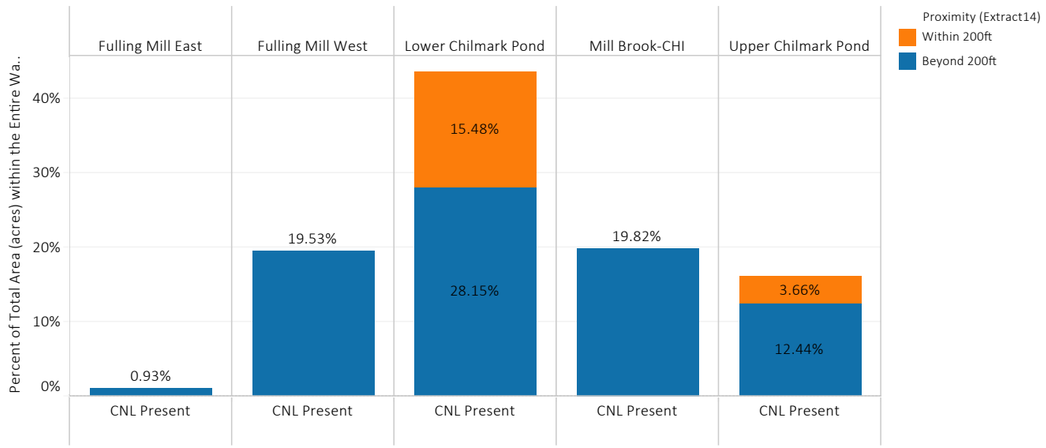

*Figure 17. BioMap2 Core Habitat and Critical Natural Landscapes (Note Core IDs correspond with elements list)*

## Chilmark Pond Watershed Critical Habitat Within and Beyond 200ft from Pond Edge - 2021 Table

| | | CNL Present |
|---|---|---|
| Fulling Mill East | Beyond 200ft | 0.93% |
| Fulling Mill West | Beyond 200ft | 19.53% |
| Lower Chilmark Pond | Beyond 200ft | 28.15% |
| | Within 200ft | 15.48% |
| Mill Brook-CHI | Beyond 200ft | 19.82% |
| Upper Chilmark Pond | Beyond 200ft | 12.44% |
| | Within 200ft | 3.66% |

Chilmark Pond Sub-watershed Critical Habitat Within and Beyond 200ft from Pond Edge - 2021

Note: Areas representing less than 2% of the total area (acres) are not labled.



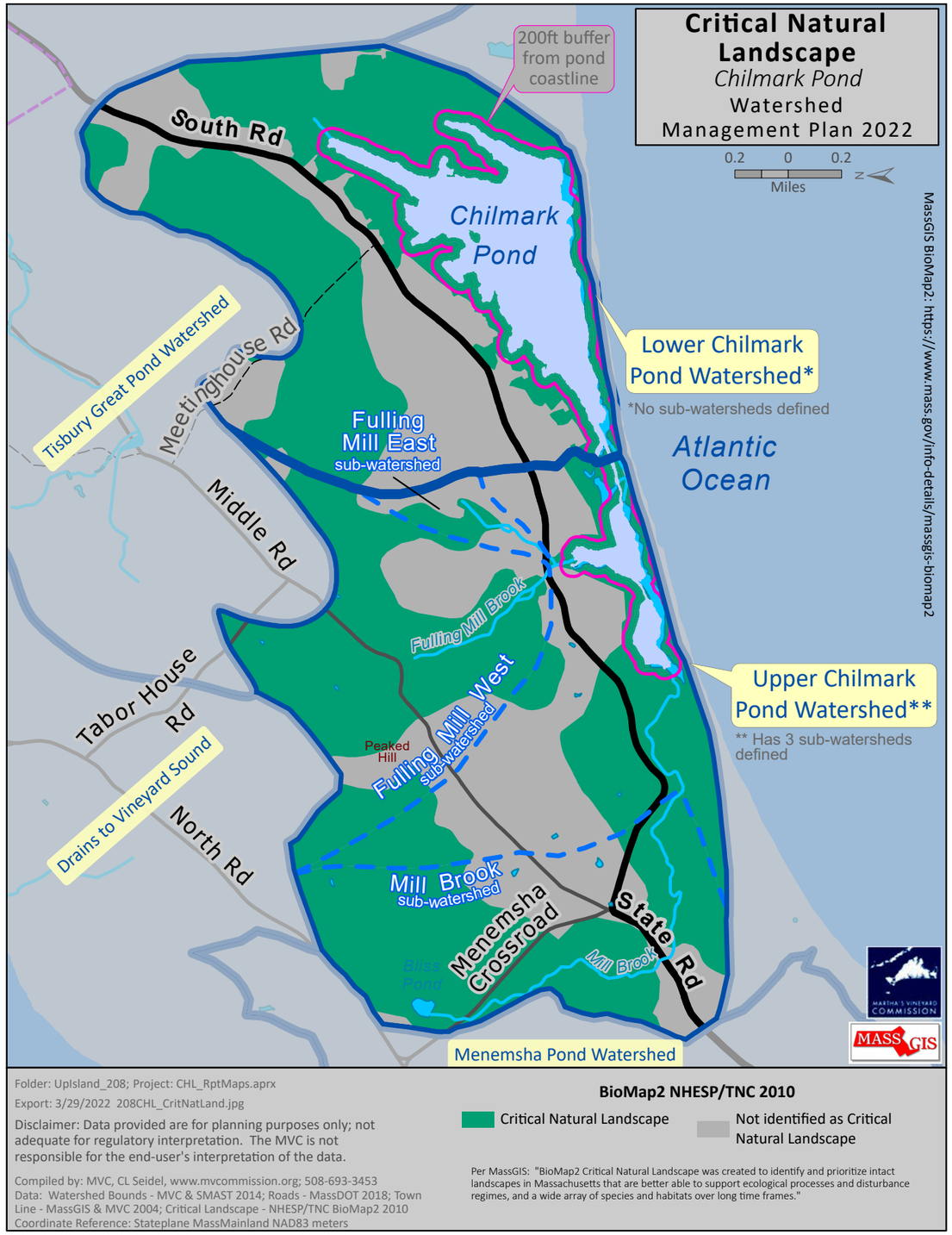




*Figure 18. Critical Natural Landscape Map*

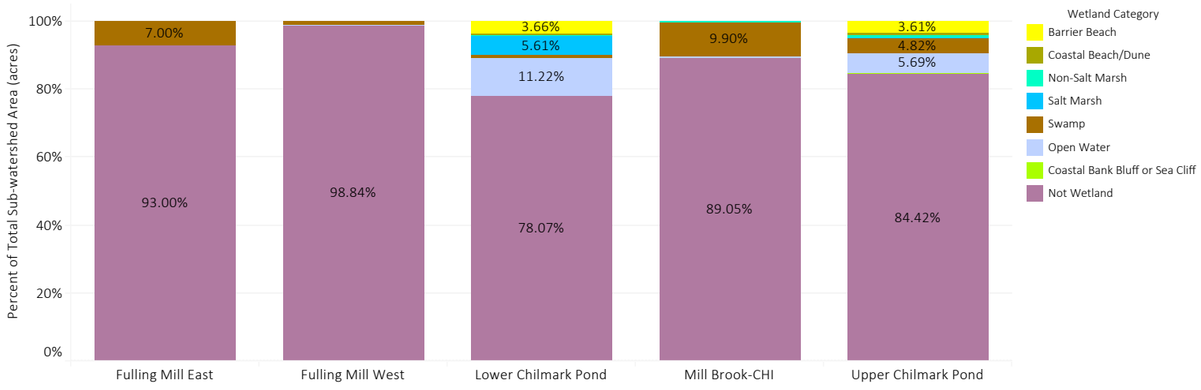
# APPENDIX Q:

Chilmark Pond Watershed Wetland Area (acres) - 2021 Table

| | Barrier Beach | Coastal Bank Bluff or Sea C.. | Coastal Beach/Dune | Non-Salt Marsh | Not Wetland | Open Water | Salt Marsh | Swamp | Grand Total |
|---|---|---|---|---|---|---|---|---|---|
| Fulling Mill East | | | | | 93.00% | | | 7.00% | 100.00% |
| | | | | | 57 | | | 4 | 61 |
| Fulling Mill West | | | | | 98.84% | 0.13% | | 1.03% | 100.00% |
| | | | | | 598 | 1 | | 6 | 605 |
| Lower Chilmark Pond | 3.66% | | 0.03% | 0.71% | 78.07% | 11.22% | 5.61% | 0.70% | 100.00% |
| | 54 | | 0 | 10 | 1,145 | 165 | 82 | 10 | 1,467 |
| Mill Brook-CHI | | | | 0.53% | 89.05% | 0.53% | | 9.90% | 100.00% |
| | | | | 3 | 549 | 3 | | 61 | 617 |
| Upper Chilmark Pond | 3.61% | 0.32% | 0.52% | 0.59% | 84.42% | 5.69% | 0.04% | 4.82% | 100.00% |
| | 24 | 2 | 3 | 4 | 559 | 38 | 0 | 32 | 662 |
| Grand Total | 2.28% | 0.06% | 0.11% | 0.52% | 85.24% | 6.05% | 2.42% | 3.33% | 100.00% |
| | 78 | 2 | 4 | 18 | 2,907 | 206 | 82 | 114 | 3,411 |

Chilmark Pond Sub-watershed Wetland Area (acres) - 2021

Note: Areas representing less than 3% of the total area (acres) are not labled.



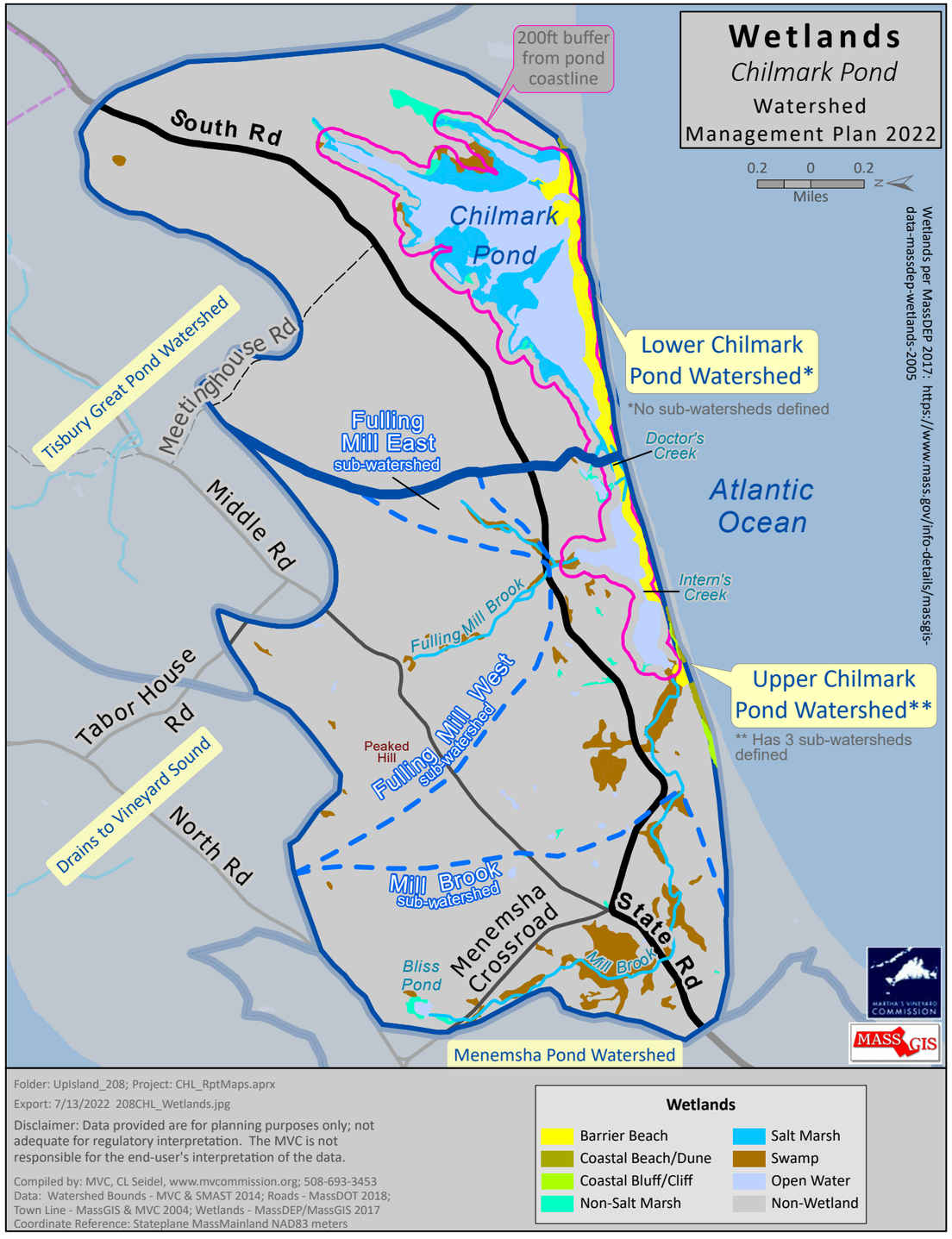




*Figure 19. Chilmark Pond Watershed Wetlands Map*

# APPENDIX R:

| Town | Year-round Population 1950 | Year-round Population 2020 | Total Population % Increase 1950 - 2020 | Peak In-season Population 2020 |
|---|---|---|---|---|
| Chilmark | 183 | 1,212 | 562% | 6,530 |

*Table 9. Chilmark Pond Watershed Population*

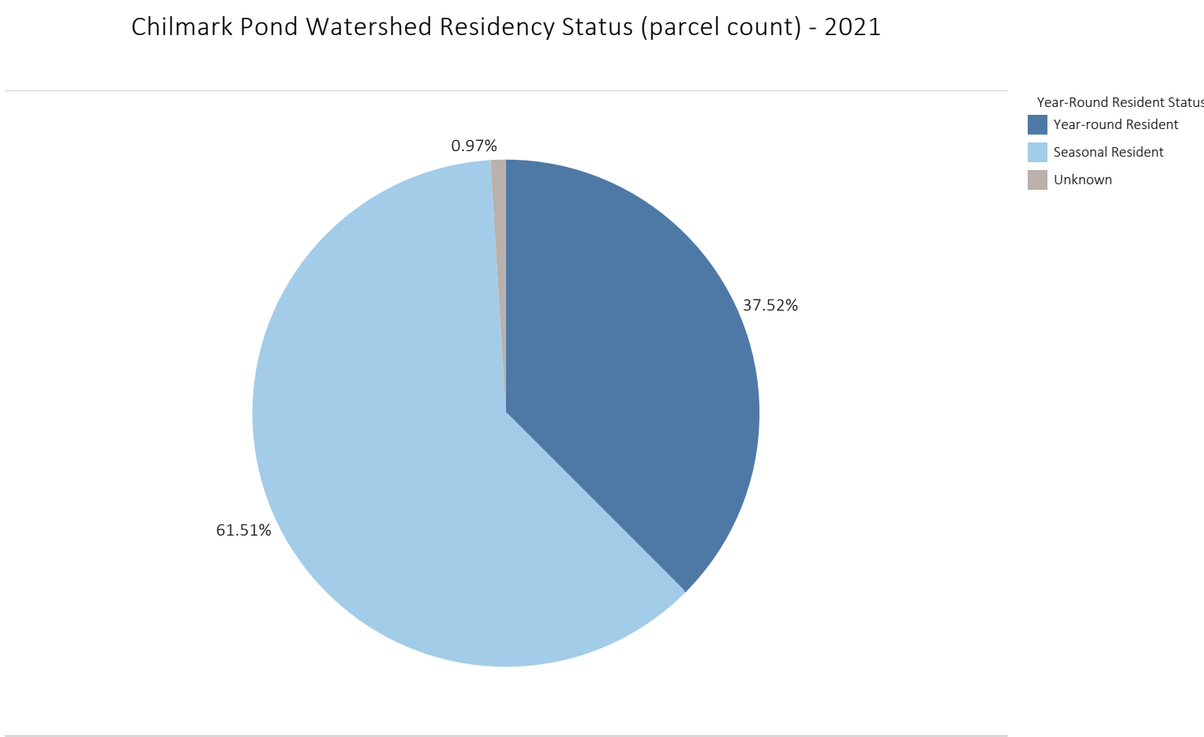
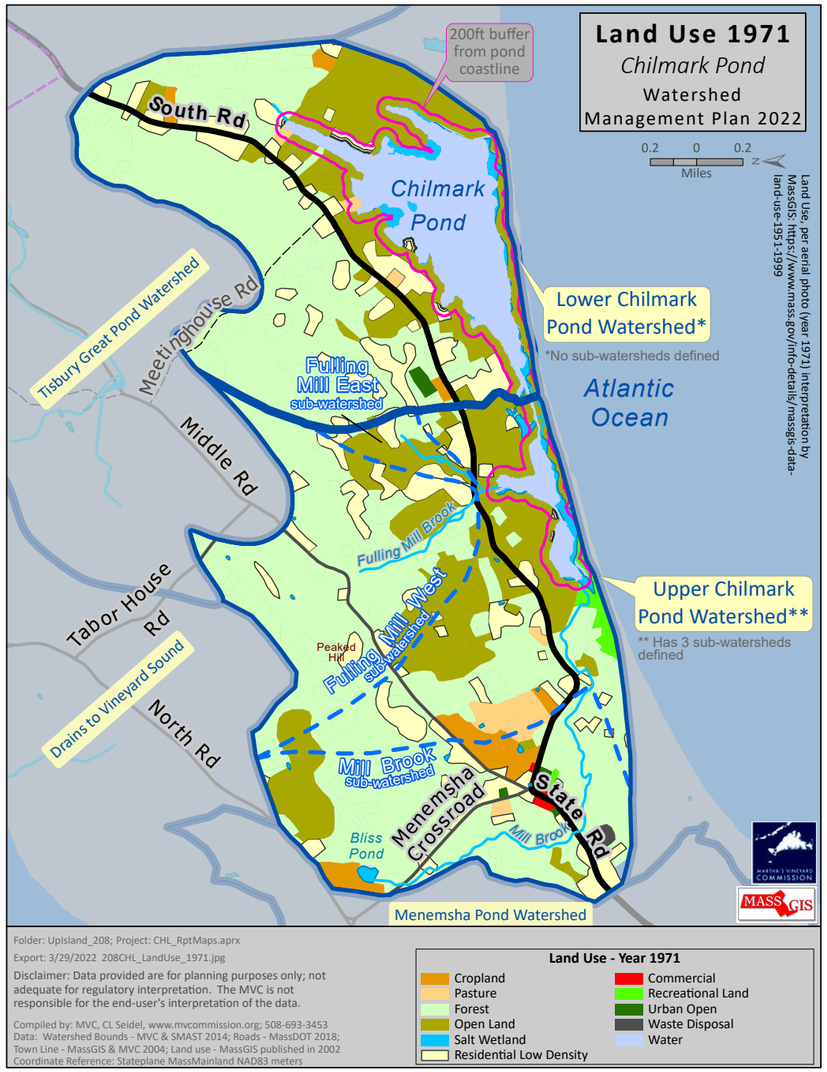
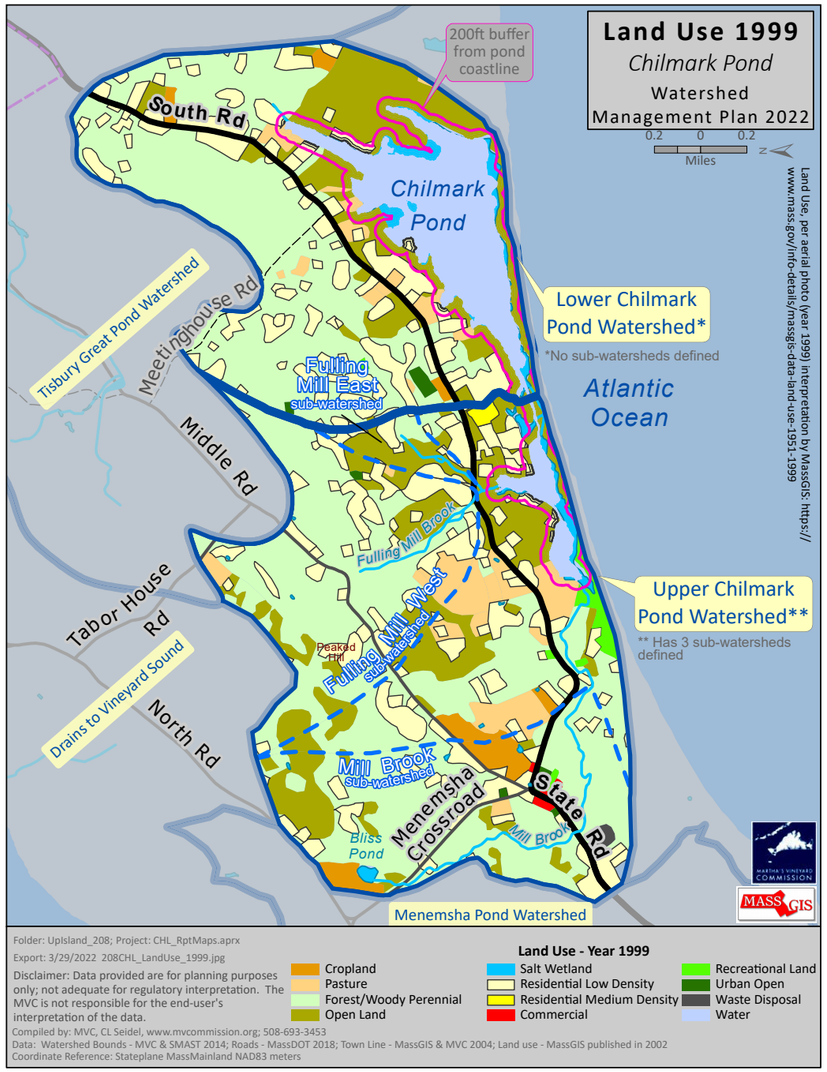



*Figure 20. Housing and Residency Status (2021)*



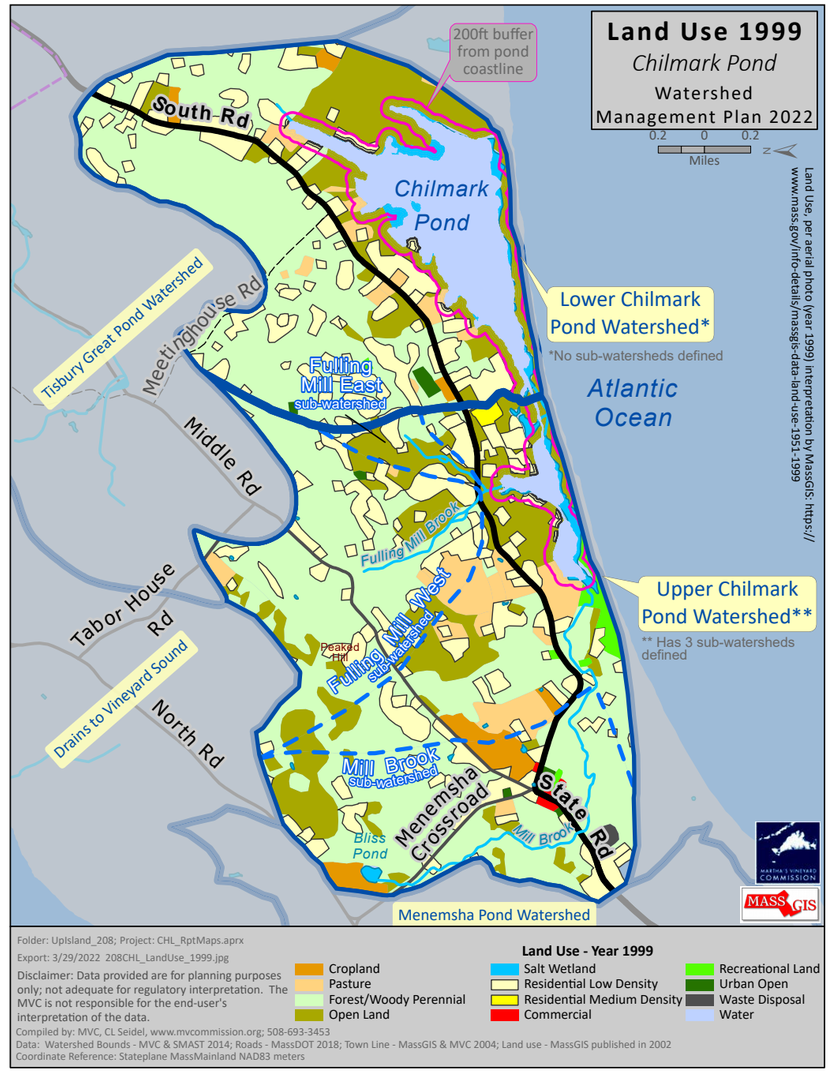




*Figure 21. Land Use Map Comparison - 1971, 1985, 1999*

## *Construction Year of Oldest Building on a Given Parcel in Upper Chilmark Pond Watershed*

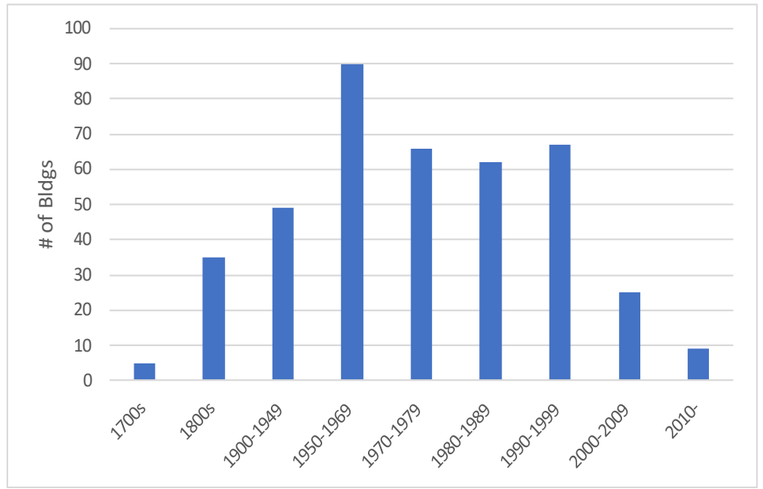



***Figure 22. Construction Year of Oldest Building on a Given Parcel In Chilmark Pond Watershed***

## *Construction Year of Oldest Building on a Given Parcel in Lower Chilmark Pond Watershed*

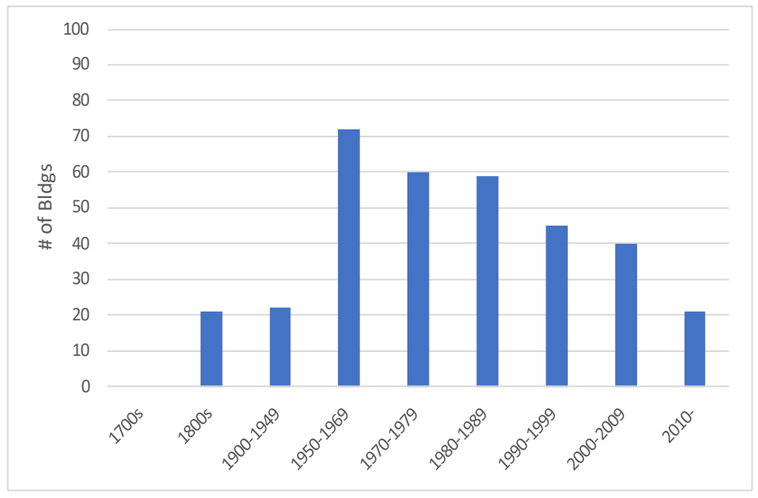



***Figure 23. Construction Year of Oldest Building on a Given Parcel In Chilmark Pond Watershed***

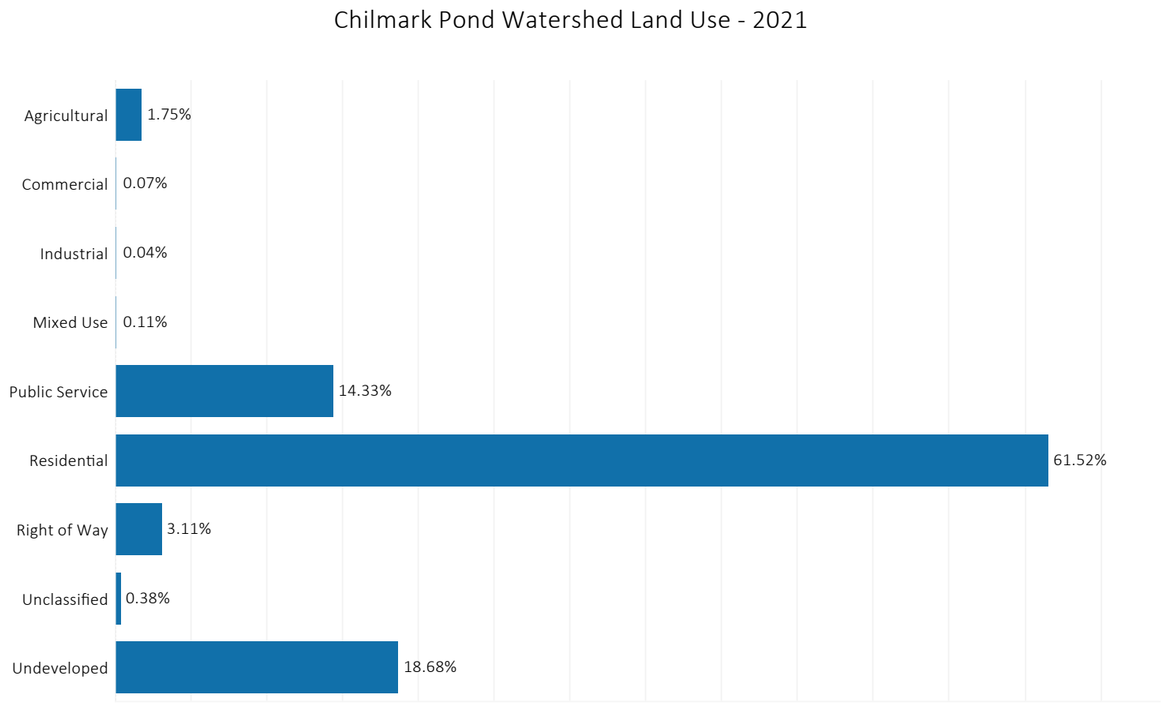



***Figure 24. Land Use in Chilmark Pond Watershed (2021)***

# Chilmark Pond Sub-watershed Land Use - 2021 Table

| | | % of Total Area (acres) al.. | Area (acres) |
|---|---|---|---|
| Fulling Mill East | Public Service | 22.82% | 13.9 |
| | Residential | 53.96% | 32.8 |
| | Right of Way | 4.63% | 2.8 |
| | Unclassified | 0.00% | 0.0 |
| | Undeveloped | 18.59% | 11.3 |
| Fulling Mill West | Agricultural | 4.69% | 28.3 |
| | Public Service | 24.28% | 146.9 |
| | Residential | 57.41% | 347.3 |
| | Right of Way | 2.76% | 16.7 |
| | Unclassified | 0.04% | 0.2 |
| | Undeveloped | 10.83% | 65.5 |
| Lower Chilmark Pond | Agricultural | 0.01% | 0.1 |
| | Public Service | 14.25% | 184.8 |
| | Residential | 57.83% | 749.8 |
| | Right of Way | 3.66% | 47.4 |
| | Unclassified | 0.82% | 10.6 |
| | Undeveloped | 23.43% | 303.8 |
| Mill Brook-CHI | Commercial | 0.35% | 2.1 |
| | Industrial | 0.19% | 1.2 |
| | Mixed Use | 0.58% | 3.6 |
| | Public Service | 10.25% | 63.2 |
| | Residential | 73.22% | 451.4 |
| | Right of Way | 2.12% | 13.1 |
| | Undeveloped | 13.29% | 81.9 |
| Upper Chilmark Pond | Agricultural | 4.44% | 27.3 |
| | Public Service | 8.00% | 49.3 |
| | Residential | 62.38% | 384.5 |
| | Right of Way | 3.14% | 19.3 |
| | Unclassified | 0.23% | 1.4 |
| | Undeveloped | 21.81% | 134.5 |

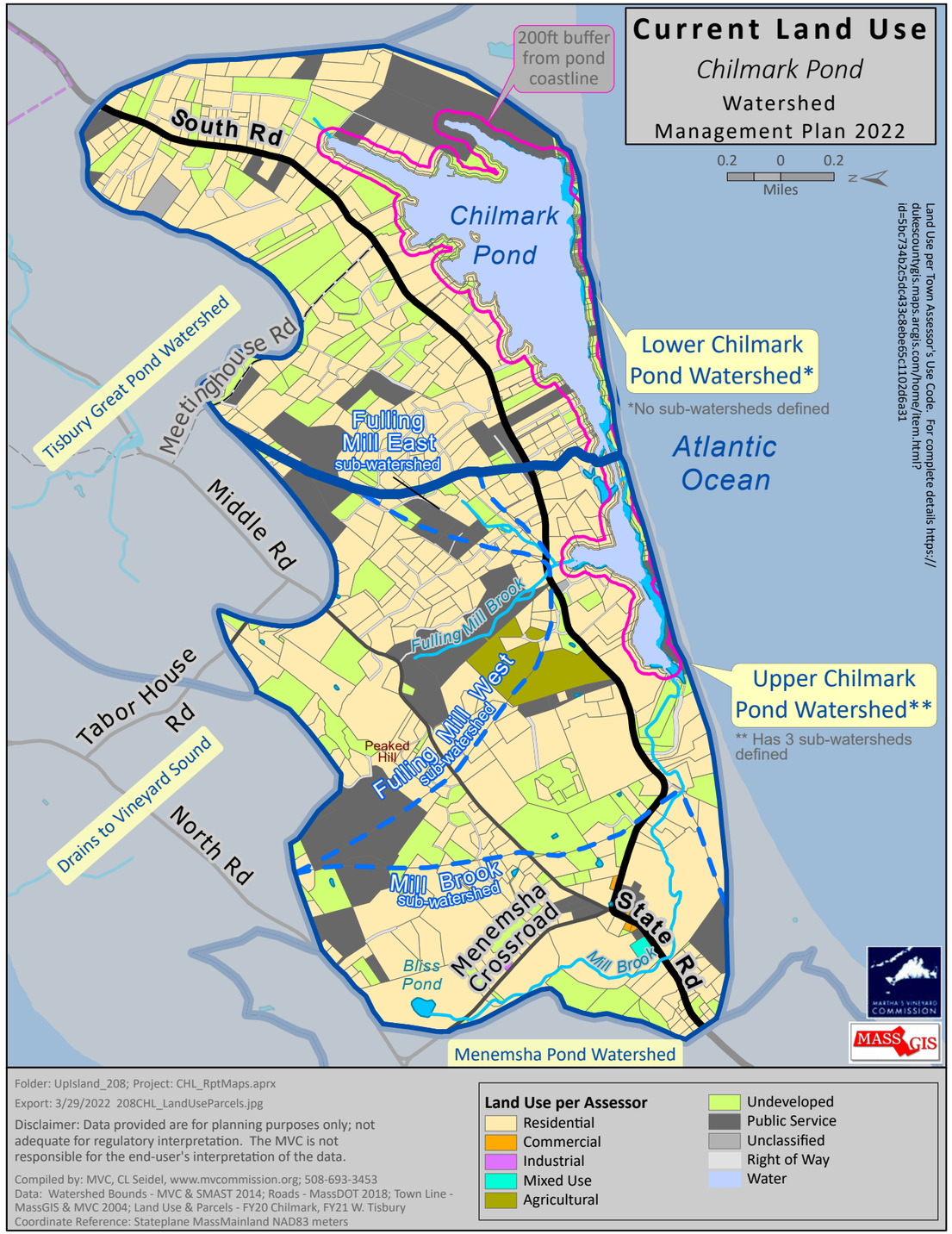



*Figure 25. Chilmark Pond Watershed Land Use Map (2021)*

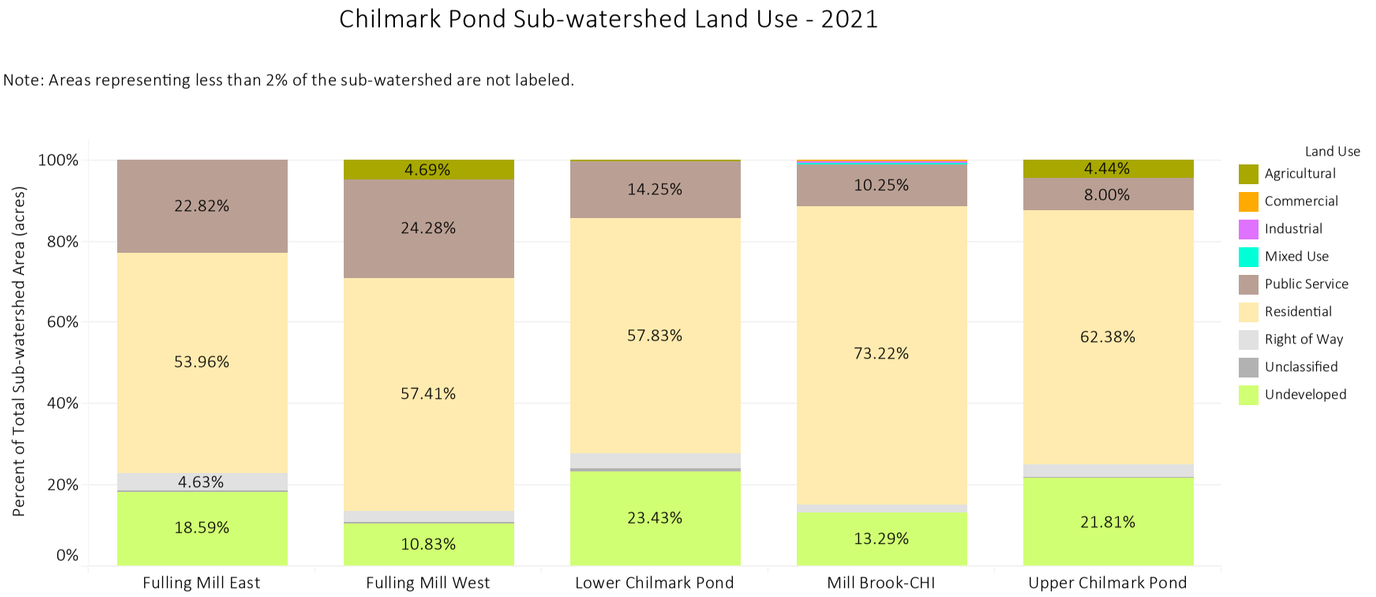



*Figure 26. Chilmark Pond Land Use Categories by Sub-watershed*



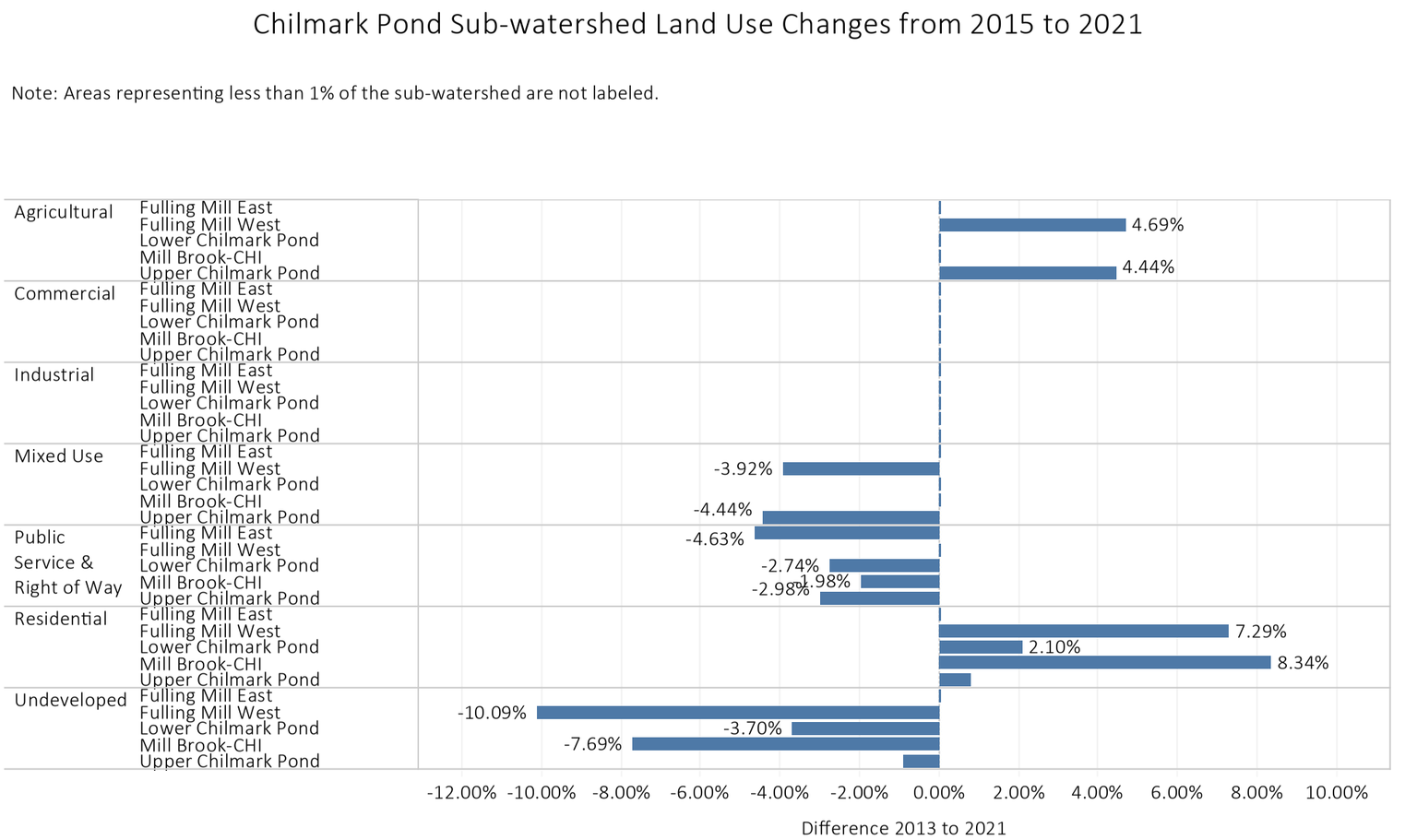



*Figure 27. Chilmark Pond Land Use Changes from 2013 to 2021*

# APPENDIX S:

Chilmark Pond Watershed ESTIMATED Number of Wastewater Management Systems Within and Beyond 200ft from Pond Edge - 2021 Table

| | | (Approximate) Count of Wastewater Systems | | | % of Total (Approximate) Count of Wastewater Systems | | |
|---|---|---|---|---|---|---|---|
| | | Innovative Alternative | Title V | Non-Title V | Innovative Alternative | Title V | Non-Title V |
| Fulling Mill East | Beyond 200ft | | 4 | 12 | | 25.00% | 75.00% |
| Fulling Mill West | Beyond 200ft | | 45 | 32 | | 58.44% | 41.56% |
| Lower Chilmark Pond | Within 200ft | | 3 | 6 | | 1.43% | 2.86% |
| | Beyond 200ft | 2 | 108 | 91 | 0.95% | 51.43% | 43.33% |
| Mill Brook-CHI | Beyond 200ft | 2 | 26 | 61 | 2.25% | 29.21% | 68.54% |
| Upper Chilmark Pond (Main Basin) | Within 200ft | 1 | 3 | 2 | 1.49% | 4.48% | 2.99% |
| | Beyond 200ft | 1 | 29 | 31 | 1.49% | 43.28% | 46.27% |
| Grand Total | | 6 | 218 | 235 | 1.31% | 47.49% | 51.20% |

Chilmark Pond Sub-watershed ESTIMATED Number of Wastewater Management Systems - 2021

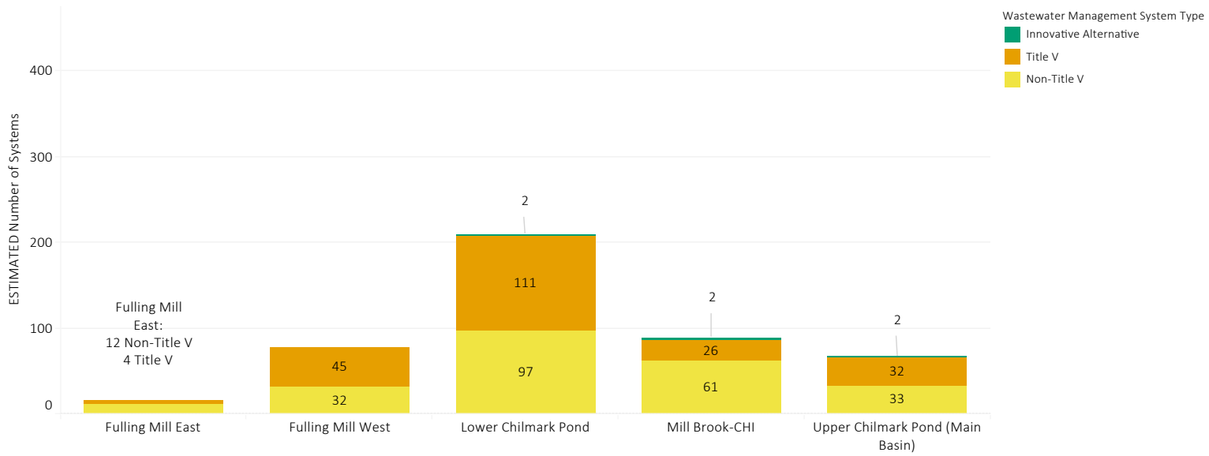



***Figure 28. Wastewater Management Systems in Chilmark Pond Sub-watersheds***

| Sub-embayment | Present Load (kg/year) | Threshold Load (kg/year) | Threshold % Change |
|---|---|---|---|
| Chilmark Pond East | 1122.0 | 687.7 | -40% |
| Chilmark Pond West | 1119.8 | 728.2 | -35% |
| *Comparison of embayment attenuated **septic loads** used for modeling of present and threshold loading scenarios of Chilmark Pond. These loads do not include direct atmospheric deposition (onto the sub-embayment surface) or benthic flux loading terms. | | | |
| ** Information published in Table VIII-2 (Page 121) of the Chilmark Pond Embayment System Massachusetts Estuaries Project Report (2015). | | | |

***Table 10. Tisbury Great Pond Total SEPTIC Nitrogen Load Reductions Required to Achieve Nitrogen Threshold (TMDL)***

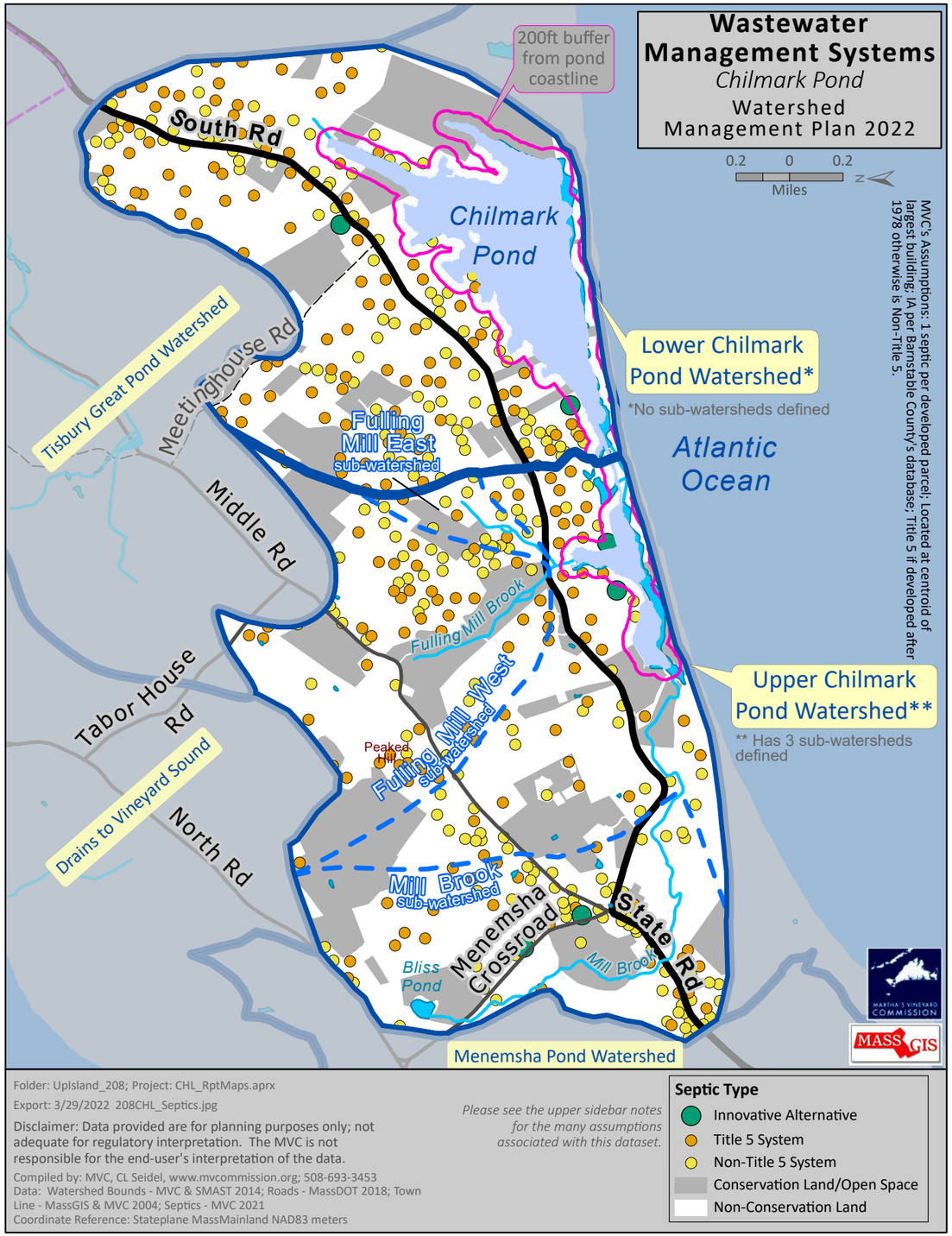



*Figure 29. Wastewater Management Systems in Chilmark Pond Map*

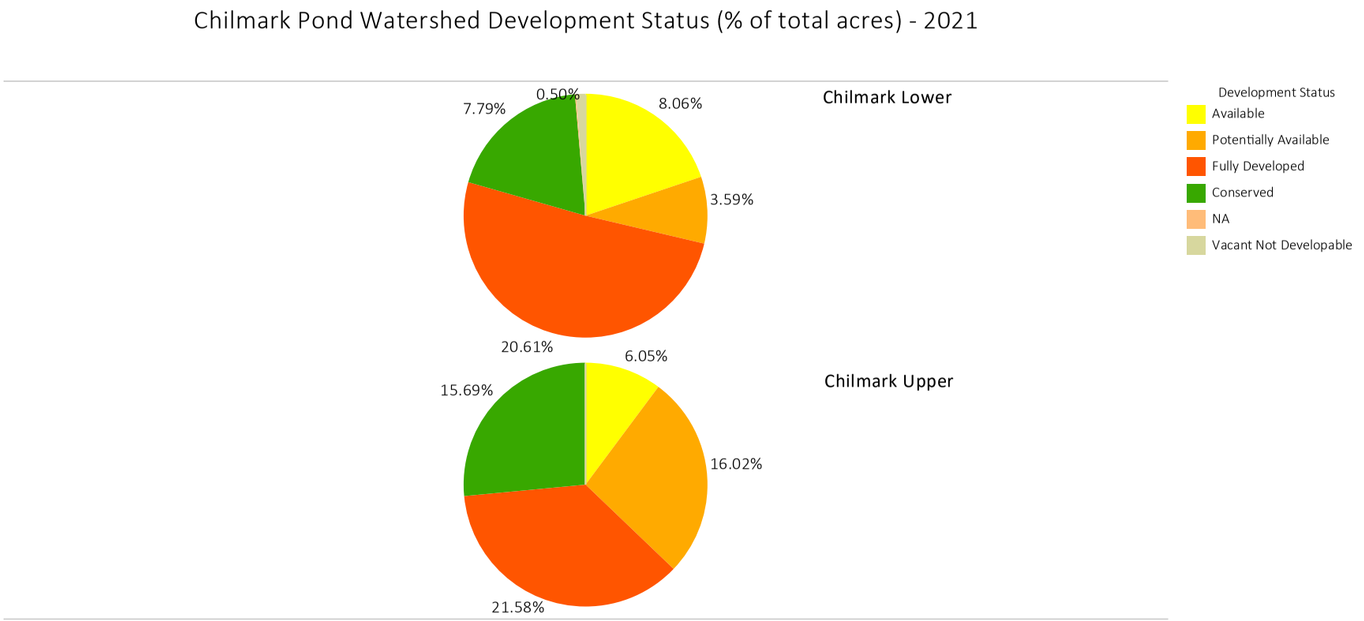



*Figure 30. Chilmark Pond Watershed Development Status/Land Availability*

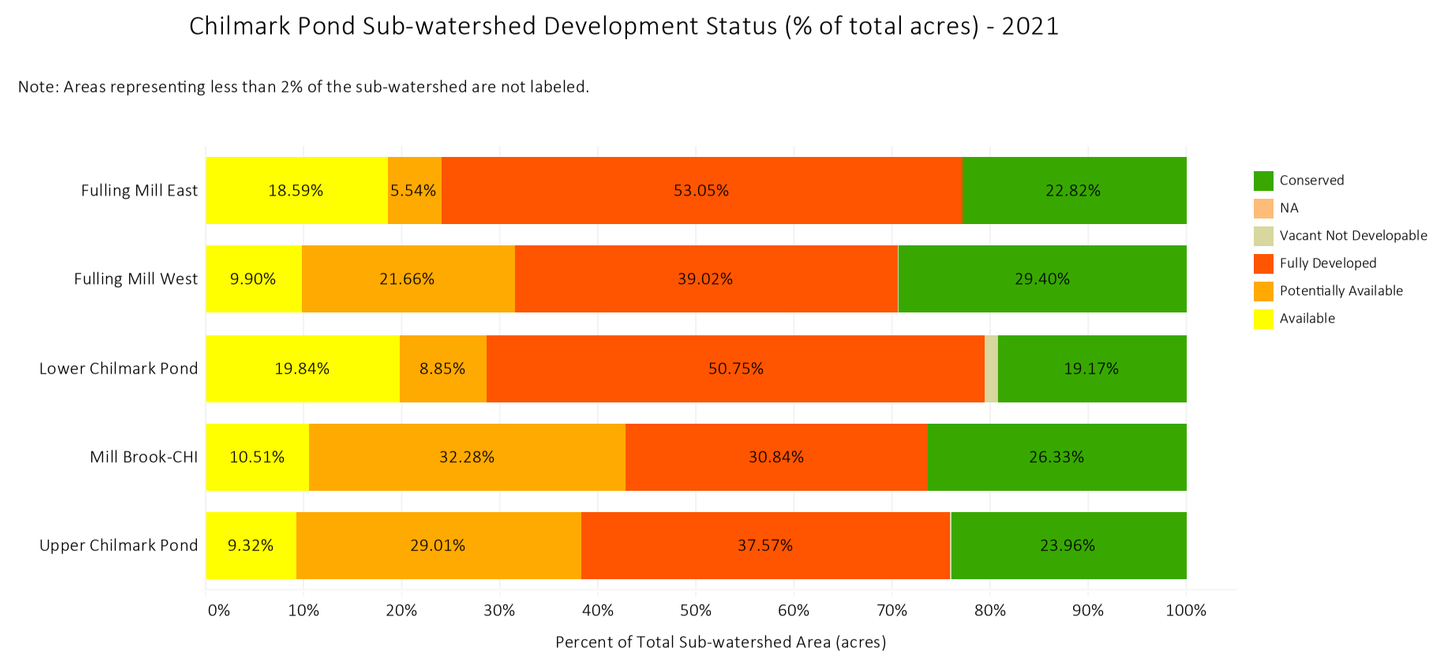



*Figure 31. Development Status/Land Availability for Chilmark Pond Sub-watershed*

## Chilmark Pond Watershed Development Status (% of total acres) - 2021 Table

| | | Percent of Total Area (acres) | Area (acres) |
|---|---|---|---|
| Available | Fulling Mill East | 18.59% | 11 |
| | Fulling Mill West | 9.90% | 60 |
| | Lower Chilmark Pond | 19.84% | 258 |
| | Mill Brook-CHI | 10.51% | 65 |
| | Upper Chilmark Pond | 9.32% | 57 |
| | Total | 14.11% | 451 |
| Potentially Available | Fulling Mill East | 5.54% | 3 |
| | Fulling Mill West | 21.66% | 131 |
| | Lower Chilmark Pond | 8.85% | 115 |
| | Mill Brook-CHI | 32.28% | 199 |
| | Upper Chilmark Pond | 29.01% | 179 |
| | Total | 19.62% | 627 |
| Fully Developed | Fulling Mill East | 53.05% | 32 |
| | Fulling Mill West | 39.02% | 236 |
| | Lower Chilmark Pond | 50.75% | 659 |
| | Mill Brook-CHI | 30.84% | 190 |
| | Upper Chilmark Pond | 37.57% | 232 |
| | Total | 42.19% | 1,349 |
| Conserved | Fulling Mill East | 22.82% | 14 |
| | Fulling Mill West | 29.40% | 178 |
| | Lower Chilmark Pond | 19.17% | 249 |
| | Mill Brook-CHI | 26.33% | 162 |
| | Upper Chilmark Pond | 23.96% | 148 |
| | Total | 23.48% | 751 |
| Vacant Not Developable | Fulling Mill East | 0.00% | 0 |
| | Fulling Mill West | 0.01% | 0 |
| | Lower Chilmark Pond | 1.23% | 16 |
| | Mill Brook-CHI | 0.03% | 0 |
| | Upper Chilmark Pond | 0.13% | 1 |
| | Total | 0.53% | 17 |
| NA | Lower Chilmark Pond | 0.16% | 2 |
| | Upper Chilmark Pond | 0.02% | 0 |
| | Total | 0.07% | 2 |
| Grand Total | | 100.00% | 3,197 |

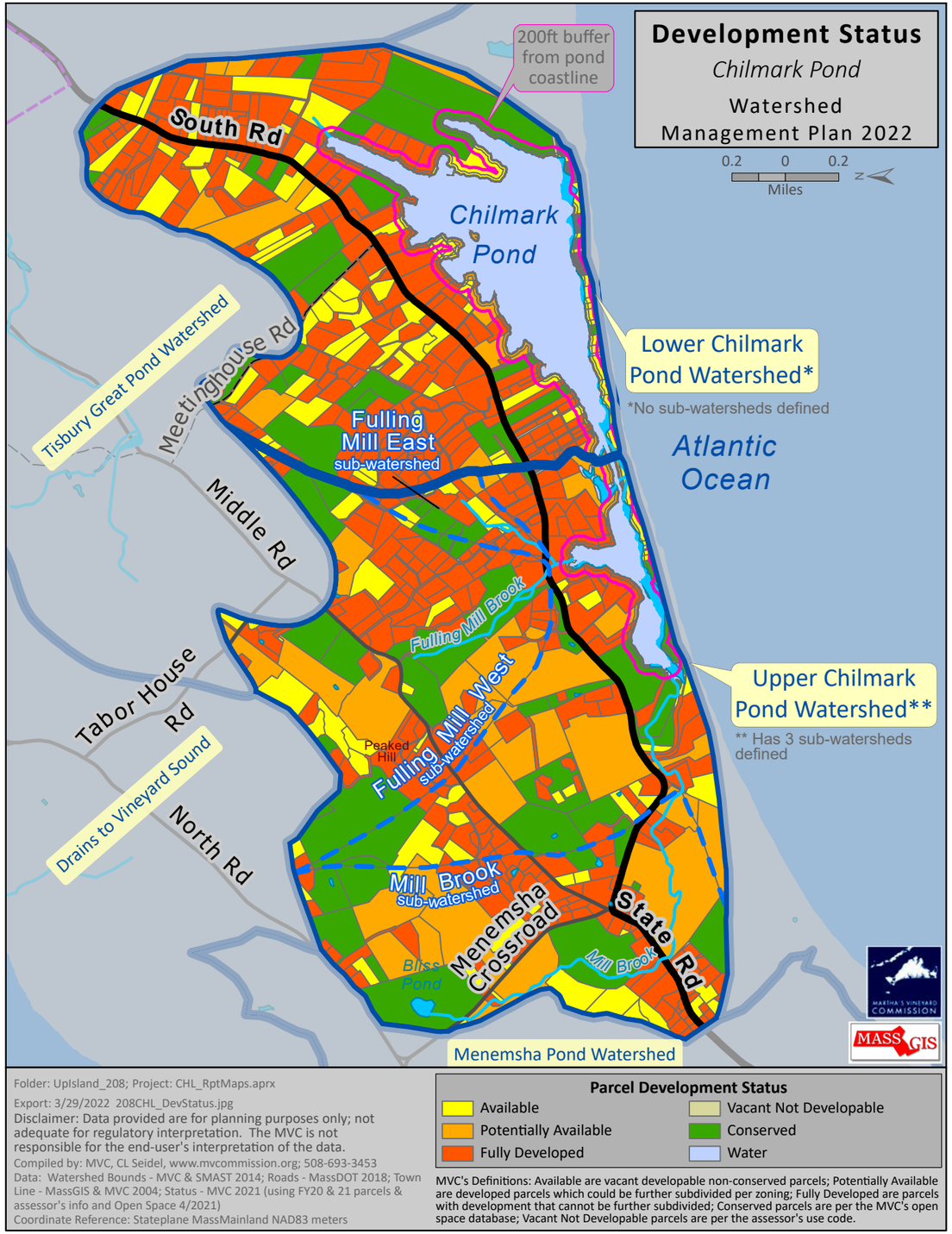
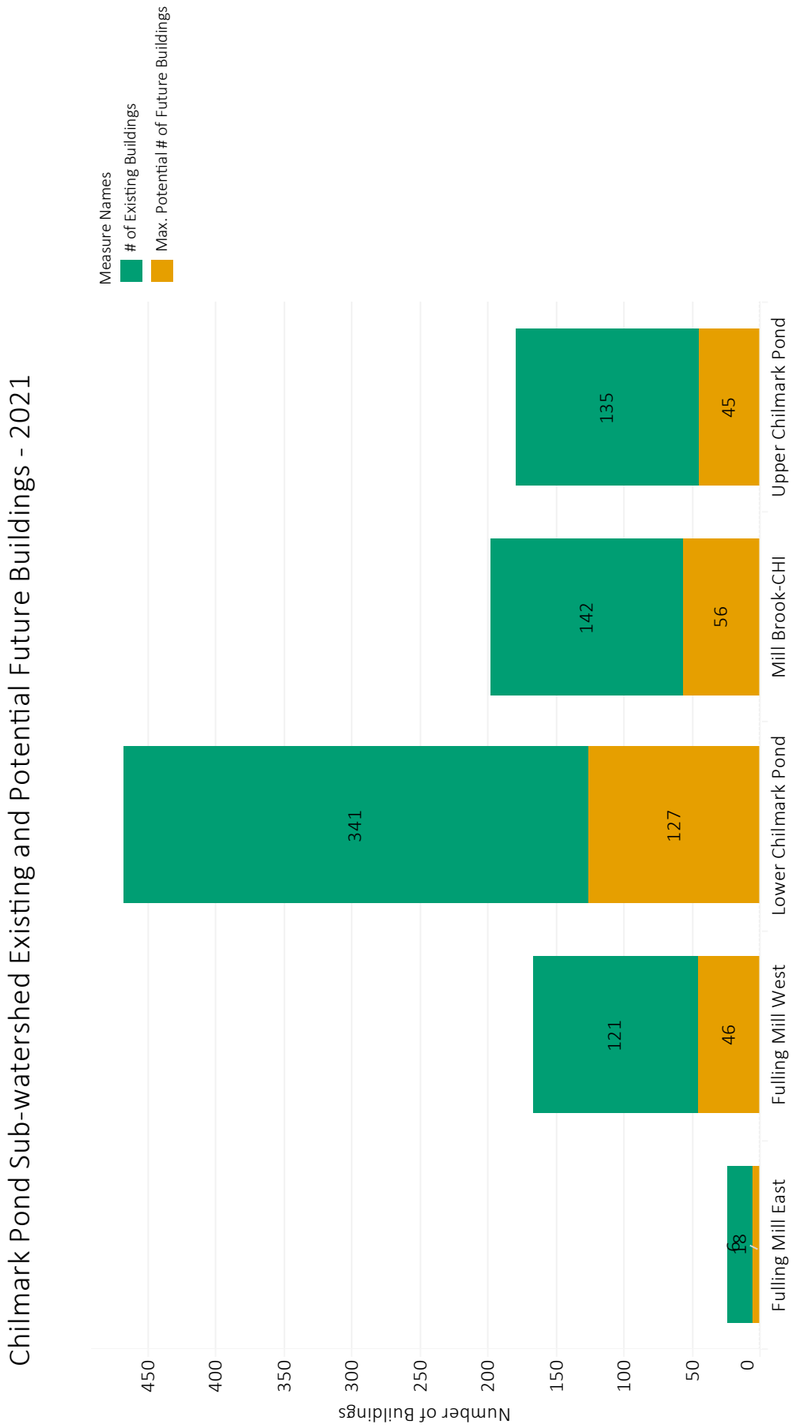



*Figure 32. Chilmark Pond Development Status Map*

# APPENDIX U:



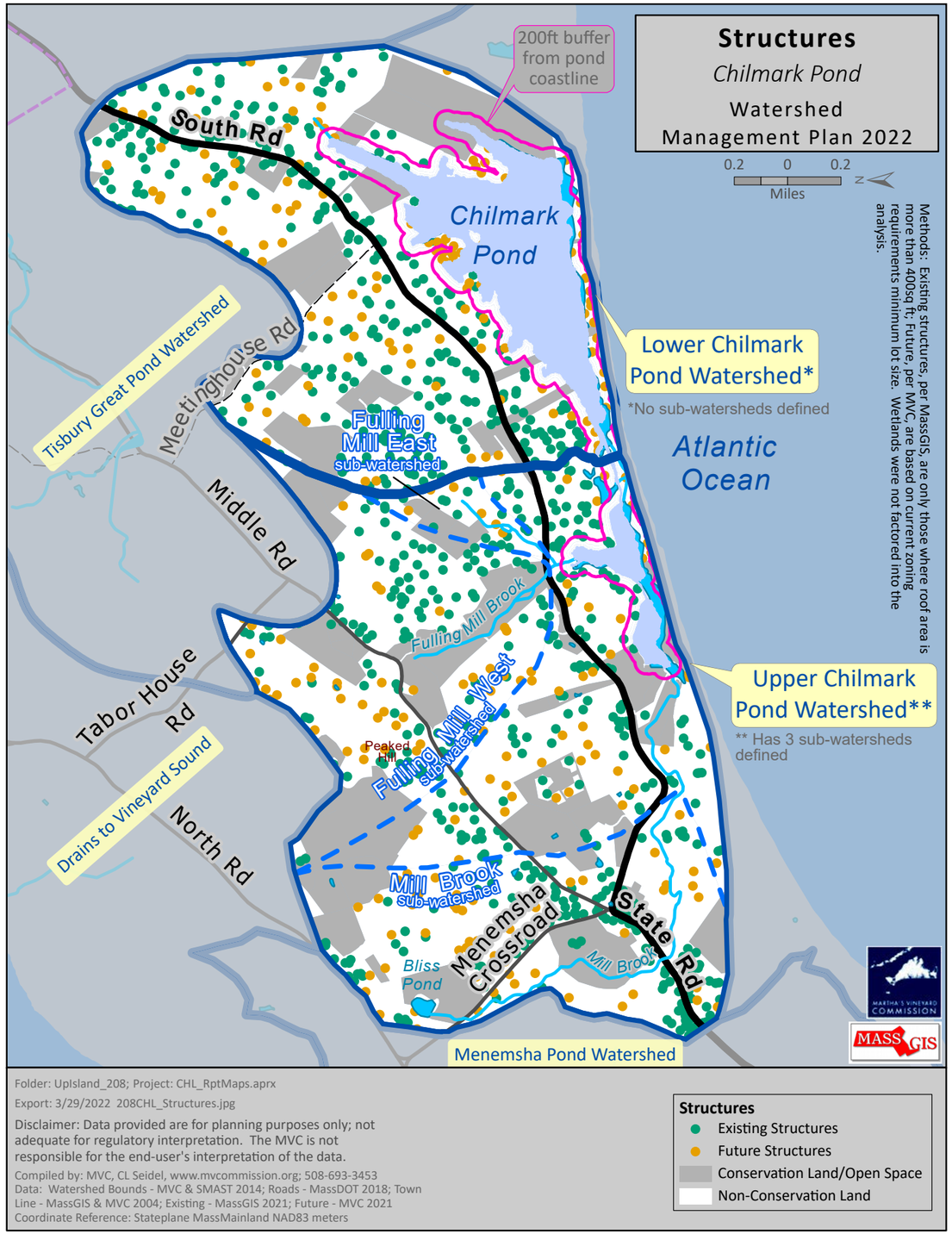




*Figure 33. Existing and Potential Structures in the Chilmark Pond Watershed*

Chilmark Pond Watershed Existing Building Density (Number of Existing Buildings/Acre) - 2021




*Figure 34. Existing Building Density (# Existing Buildings/Acres)*

Chilmark Pond Watershed Number of Buildings and Density (Number of Existing Buildings/Acre) - 2021 Table

| | # of Existing Buildings | Max. Potential # of Future Buildings | Existing Building Density |
|---|---|---|---|
| Fulling Mill East | 18.0 | 6 | 0.30 |
| Fulling Mill West | 121.0 | 46 | 0.20 |
| Lower Chilmark Pond | 341.0 | 127 | 0.23 |
| Mill Brook-CHI | 142.0 | 56 | 0.23 |
| Upper Chilmark Pond | 135.0 | 45 | 0.20 |
| Grand Total | 757.0 | 280 | 0.22 |

# APPENDIX V:

| | Cattle | Equines | Pigs | Sheep | Goats | Poultry | Total |
|---|---|---|---|---|---|---|---|
| **2015 MEP Survey** | 77 | 37 | 39 | 119 | 24 | 213 | 509 |
| **2021 Town Survey** | 20 | 19 | 0 | 114 | 2 | 120 | 275 |
| **Percent Change** | -74% | -49% | -100% | -4% | -92% | -44% | -46% |
| **Nitrogen Load Change (kg/year)** | **-233.3** | **-1,272.2** | **-14.6** | **-226.2** | **-14.9** | **-64.2** | **-1,825.4** |

*Table 11. Animal Count (2015 &2021) for the Chilmark Watersheds*

# APPENDIX W:

Chilmark Pond Sub-watershed Conservation Land (Legal Restriction Category) - 2021 Table

| | | Percent of Total Sub-watershed Area (acres) | Area (acres) |
|---|---|---|---|
| Fulling Mill East | Perpetuity | 22.95% | 14 |
| | Non-Conserved Land | 77.05% | 47 |
| Fulling Mill West | Perpetuity | 31.25% | 189 |
| | Unknown Protection | 0.00% | 0 |
| | Non-Conserved Land | 68.75% | 416 |
| Lower Chilmark Pond | Perpetuity | 13.95% | 205 |
| | Limited/Temporary | 0.70% | 10 |
| | Unknown Protection | 2.40% | 35 |
| | Non-Conserved Land | 82.95% | 1,217 |
| Mill Brook-CHI | Perpetuity | 9.23% | 57 |
| | Limited/Temporary | 2.88% | 18 |
| | Unknown Protection | 11.52% | 71 |
| | Non-Conserved Land | 76.37% | 471 |
| Upper Chilmark Pond | Perpetuity | 19.99% | 132 |
| | Limited/Temporary | 2.15% | 14 |
| | Non-Conserved Land | 77.87% | 515 |

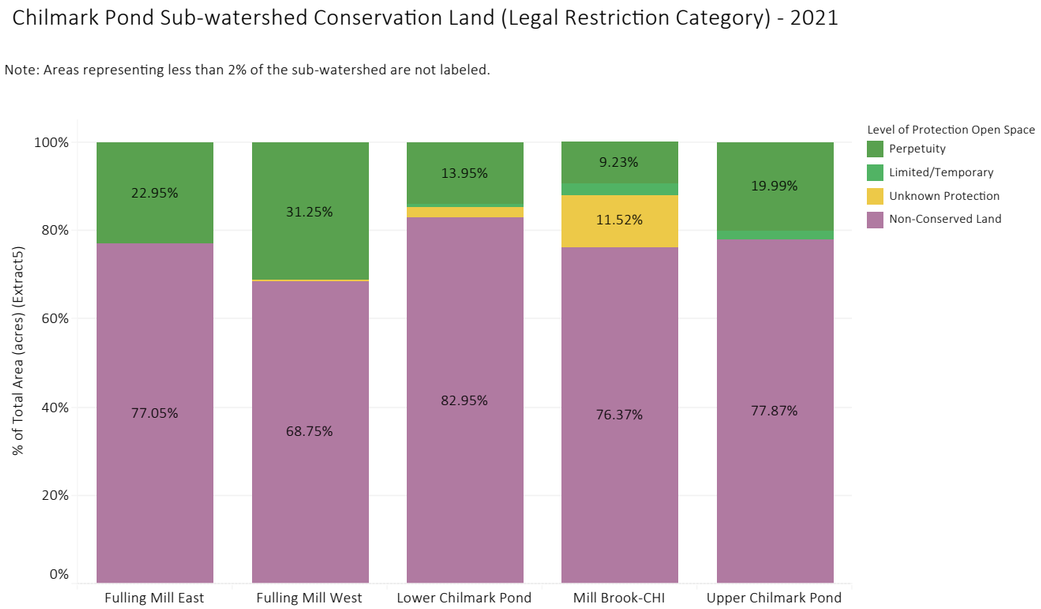



*Figure 36. Legal Restrictions for Conservation Land in Chilmark Pond*

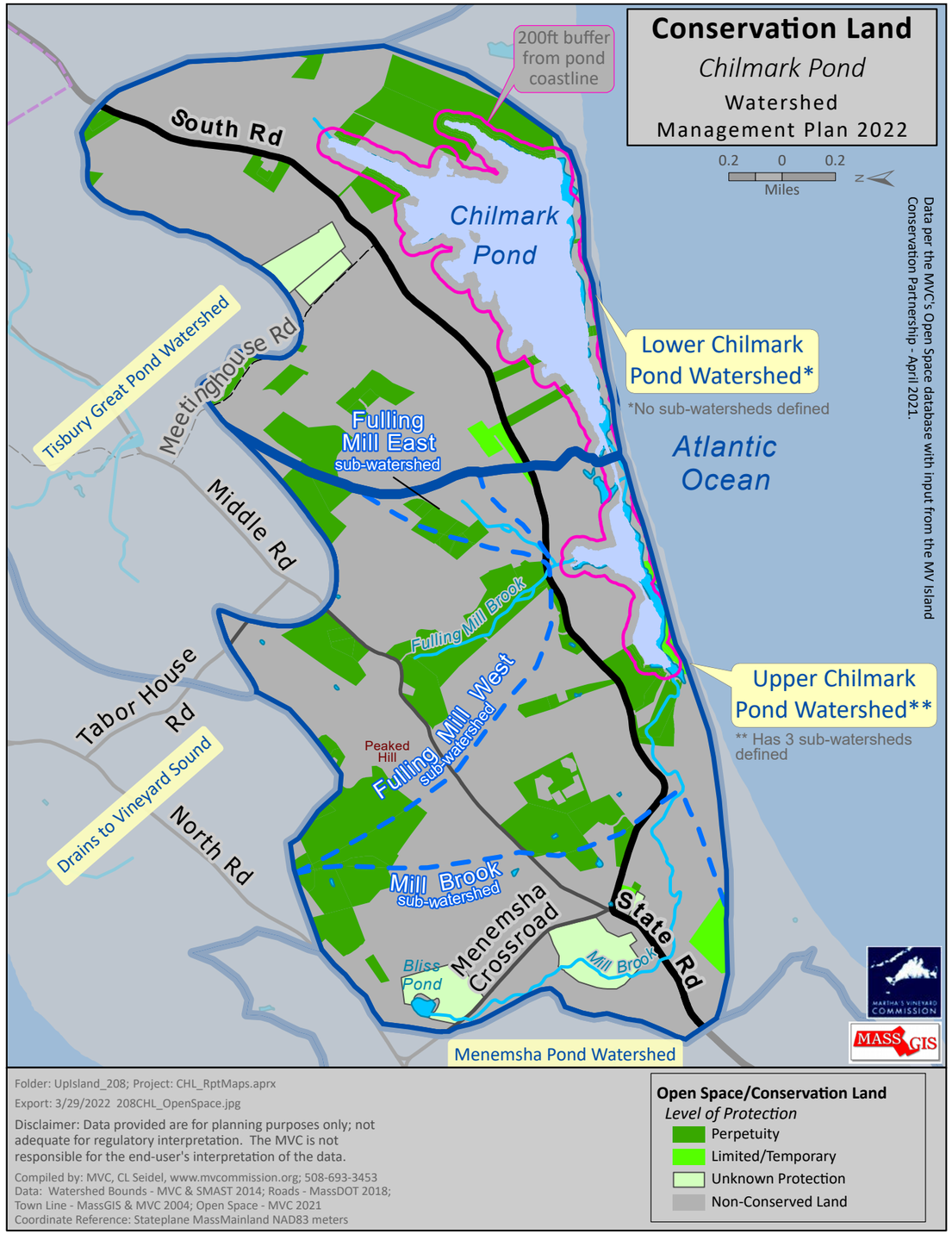



*Figure 35. Chilmark Pond Watershed Conservation Land Map*

## APPENDIX X:

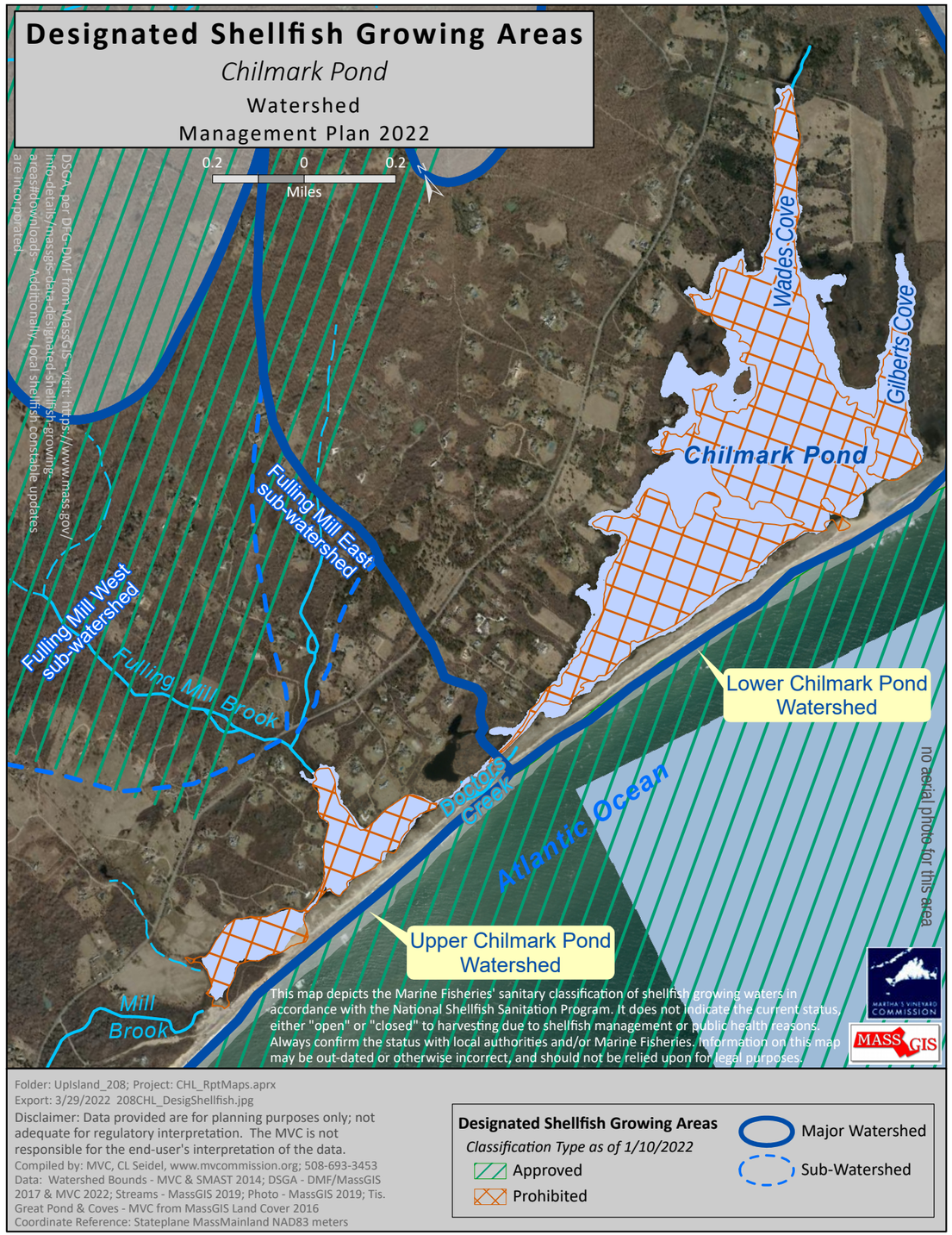



*Figure 37. Chilmark Pond Designated Shellfish Harvest Area*