Explore Vermont's Sentinel Lakes

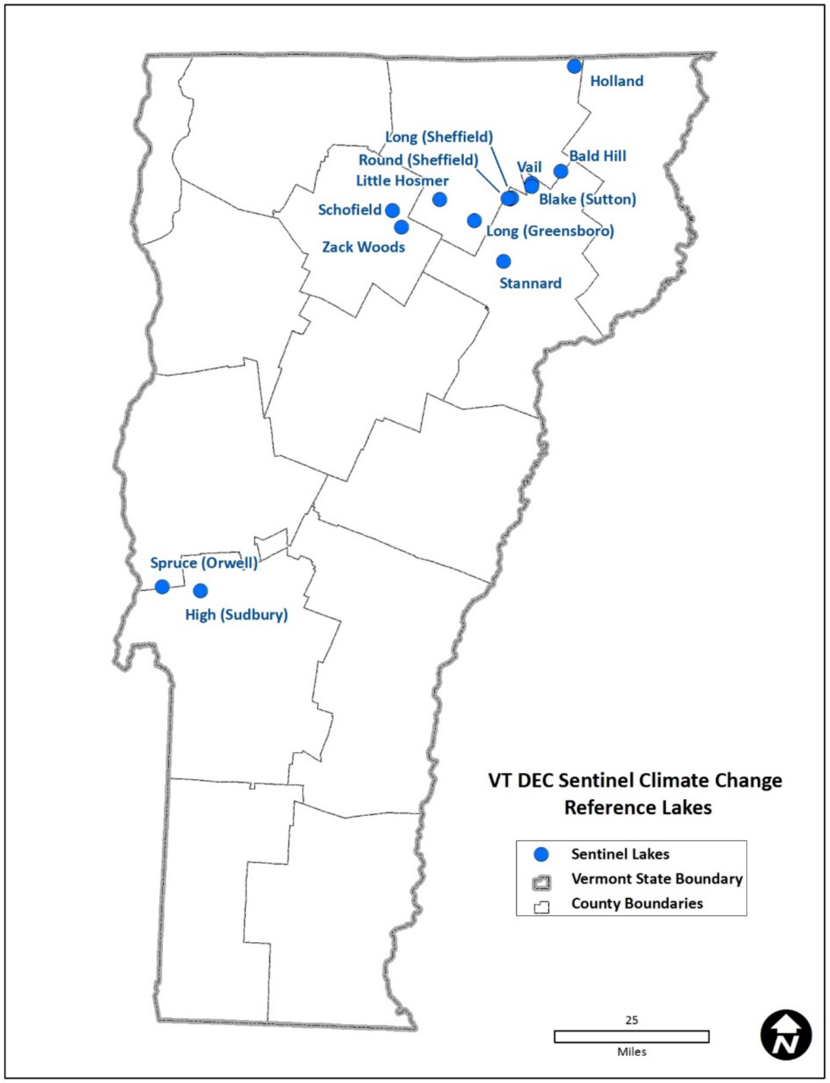


Figure 1. Location of Vermont's 13 Sentinel Lakes

Contents

Temperature Trends 2018-2022

- Preliminary results from three lakes with continuous temperature data from 2018-2022, found that surface waters warmed, the length of time the lakes were ice covered decreased and the length of time the lakes stratified grew longer. See the preliminary report findings here.

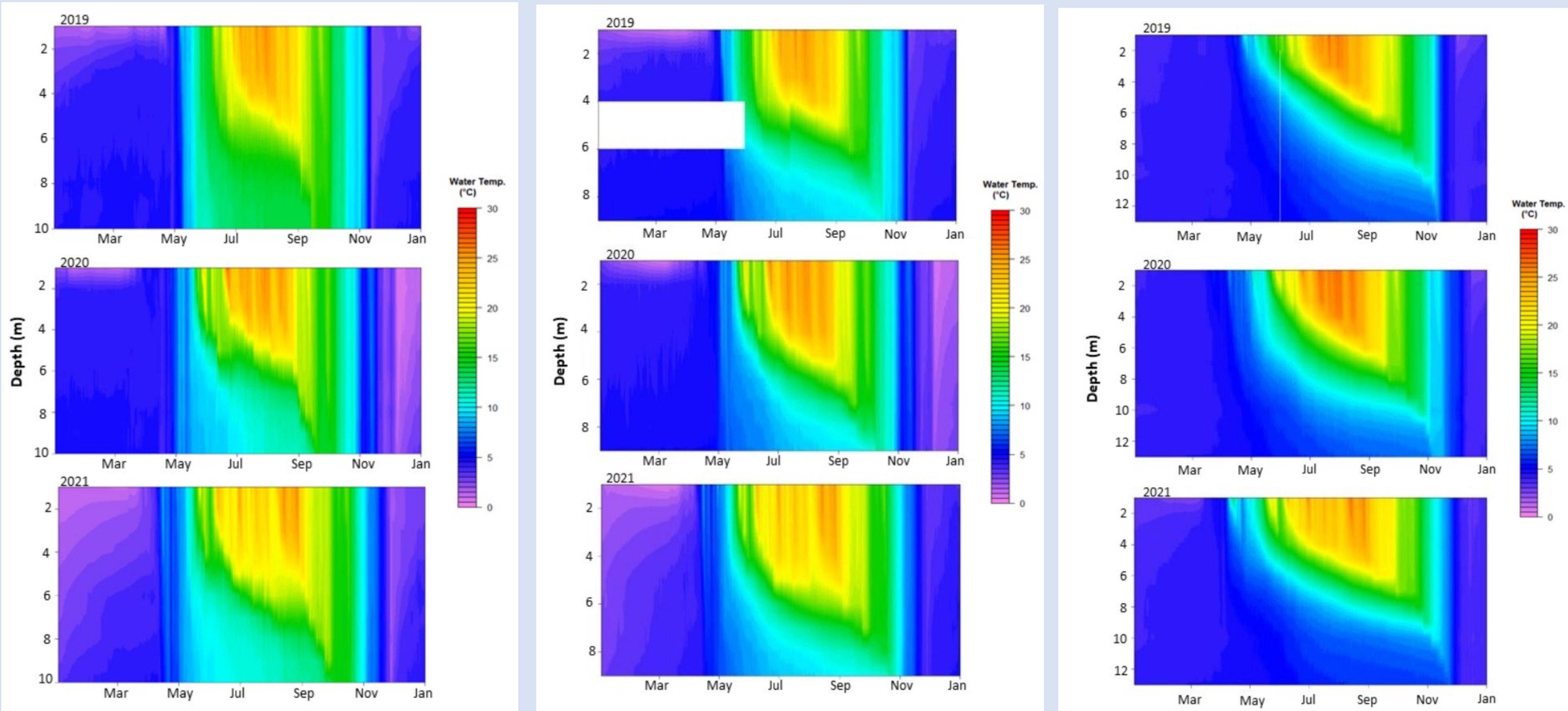


Figure 2. Thermal regime from 3 years continuous temperature sensors on Holland Pond, Long Pond in Greensboro and High Pond in Sudbury, VT

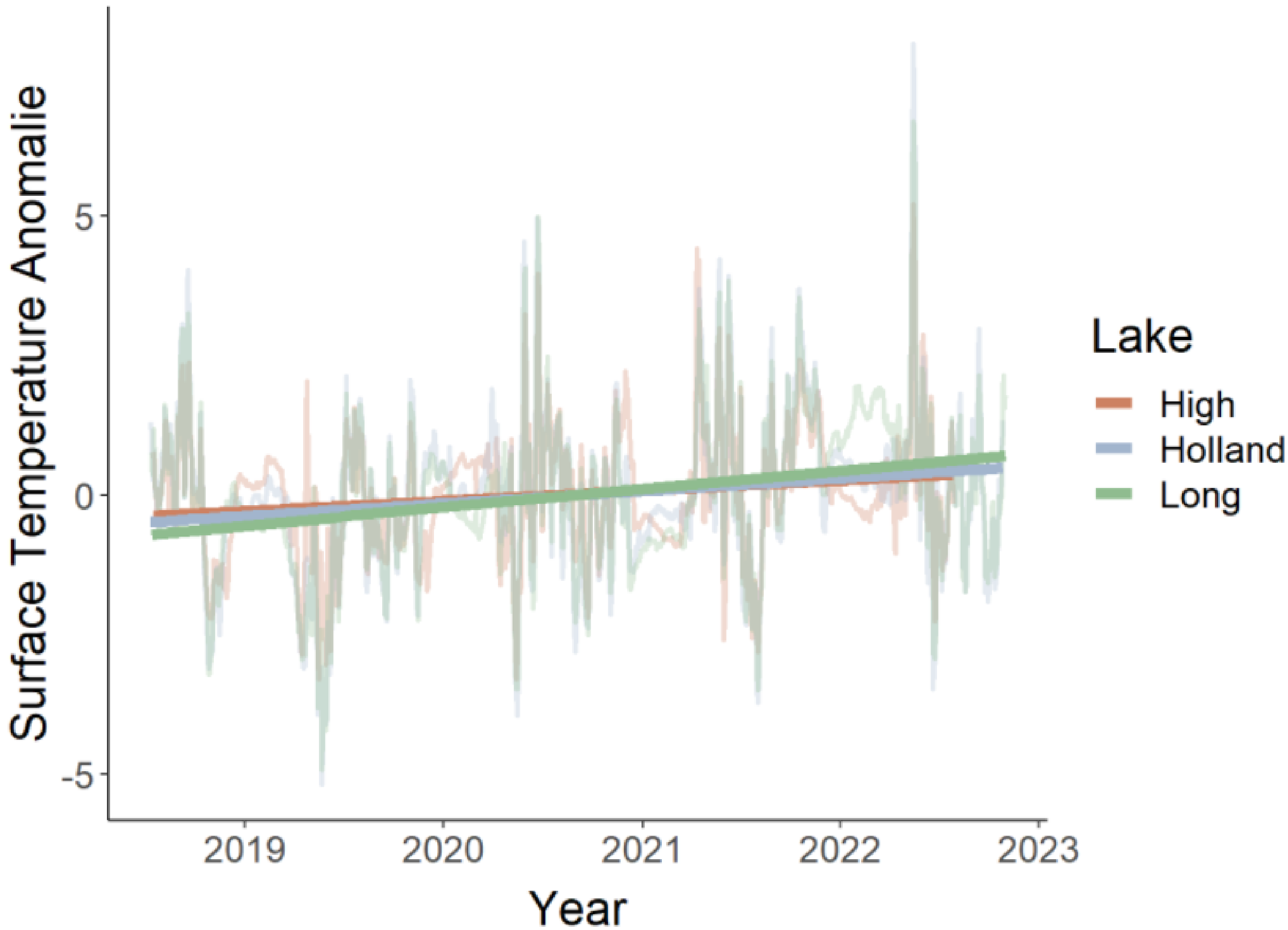


Figure 10. *Temperature anomalies for surface waters in all three lakes over the three years of continuous data collection.*

From looking at individual surface water temperatures through the thermal heat maps and surface water boxplots, we see that each lake in this study has been getting warmer over the past few years in both the spring and the fall. However, the surface temperature anomalies plot above shows how many degrees Celsius each day is compared to the 5 year average. After graphing all three lakes together and applying a simple linear model, on average, all of the lakes have experienced warming surface waters over the time monitored (**Figure 10**).

3.2.1 Air Temperature Trends

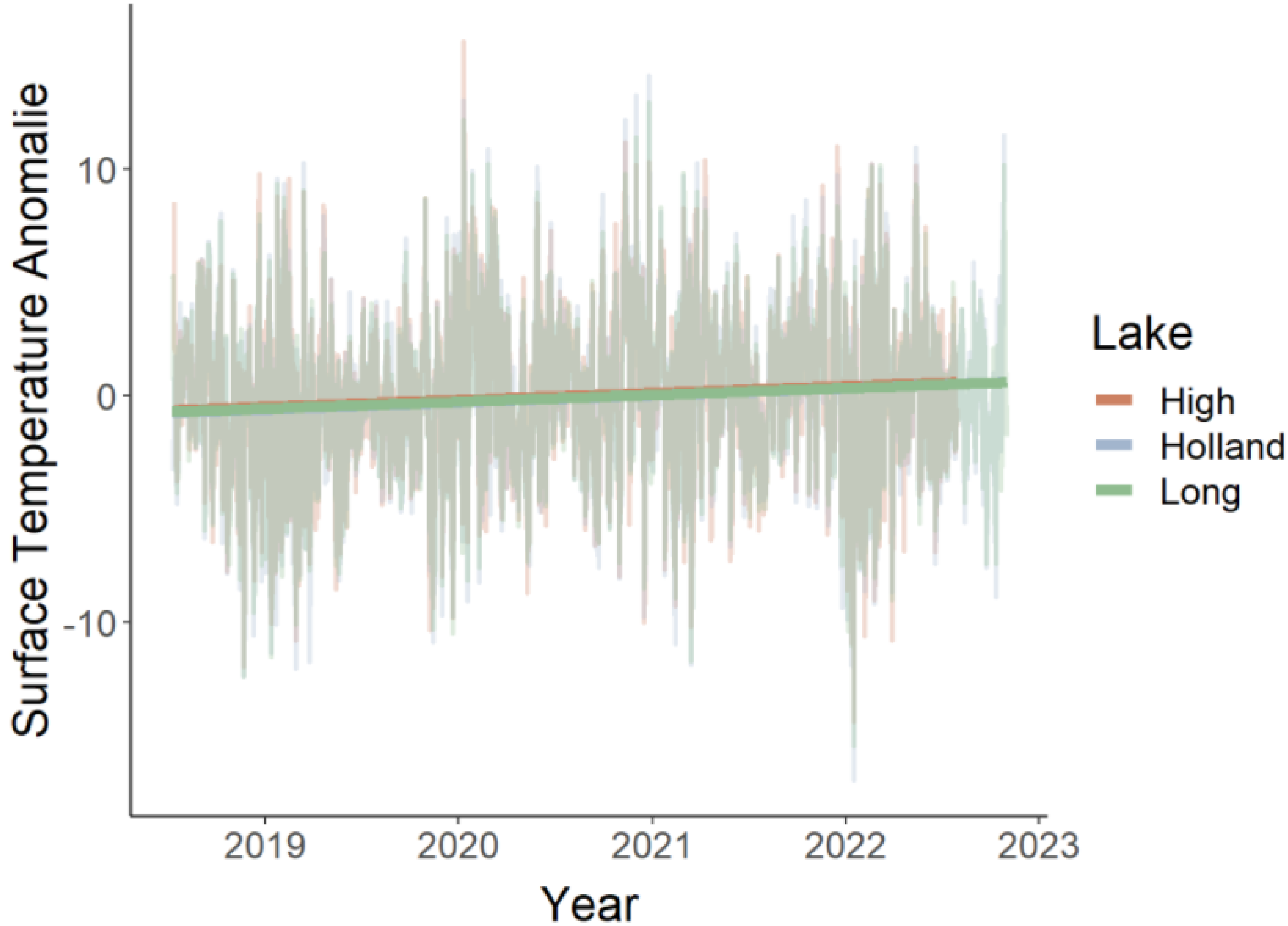


Figure 11. *Temperature anomalies in air temperature at all three lakes. Solid lines reprensent linear trends.*

Because there is only 3 full consecutive years of water temperature data collected on these lakes in Vermont, we can't necessarily conclude climate change is the primary driver of the increase we are seeing. However, there are longer term air temperature data sets from Vermont. By exploring trends in air temperature and surface water temperature, we can get an idea as to how well trends in water temperature track with air temperatures over time, and can infer the impact of climate change on lake water temperatures.

Here we can see that just like the surface waters in all of the lakes, after applying a linear model, the air temperatures are also increasing over time (**Figure 11**). However, there is much more noise in the measured air temperature data as compared to the water temperature data, as would be expected.

3.2.3 Length of Stratification

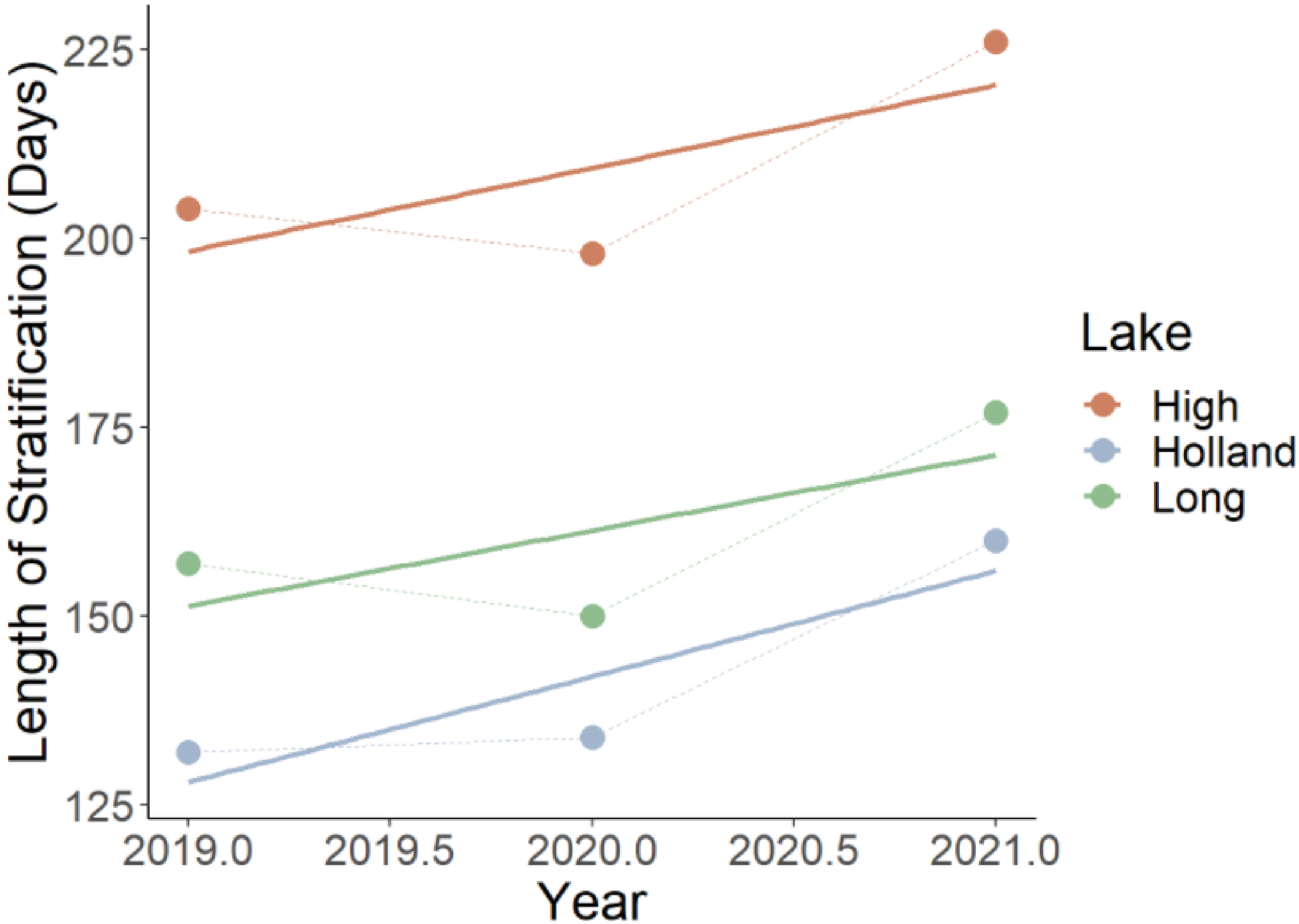


Figure 13. *Length of summer stratification in each lake over time for each year where there was full season of collected data. Solid lines represent linear trends.*

All three lakes experienced similar patterns in length of summer stratification over time (**Figure 13**). High Pond, which is the deepest lake and the most southern lake, experiences longer periods of stratification than the other two lakes. Both High Pond and Long Pond experienced a decrease in the stratification period in 2020, while Holland had a longer period. All lakes had a sharp increase in stratification days from 2020 to 2021.

3.2.4 Length of the Ice Period

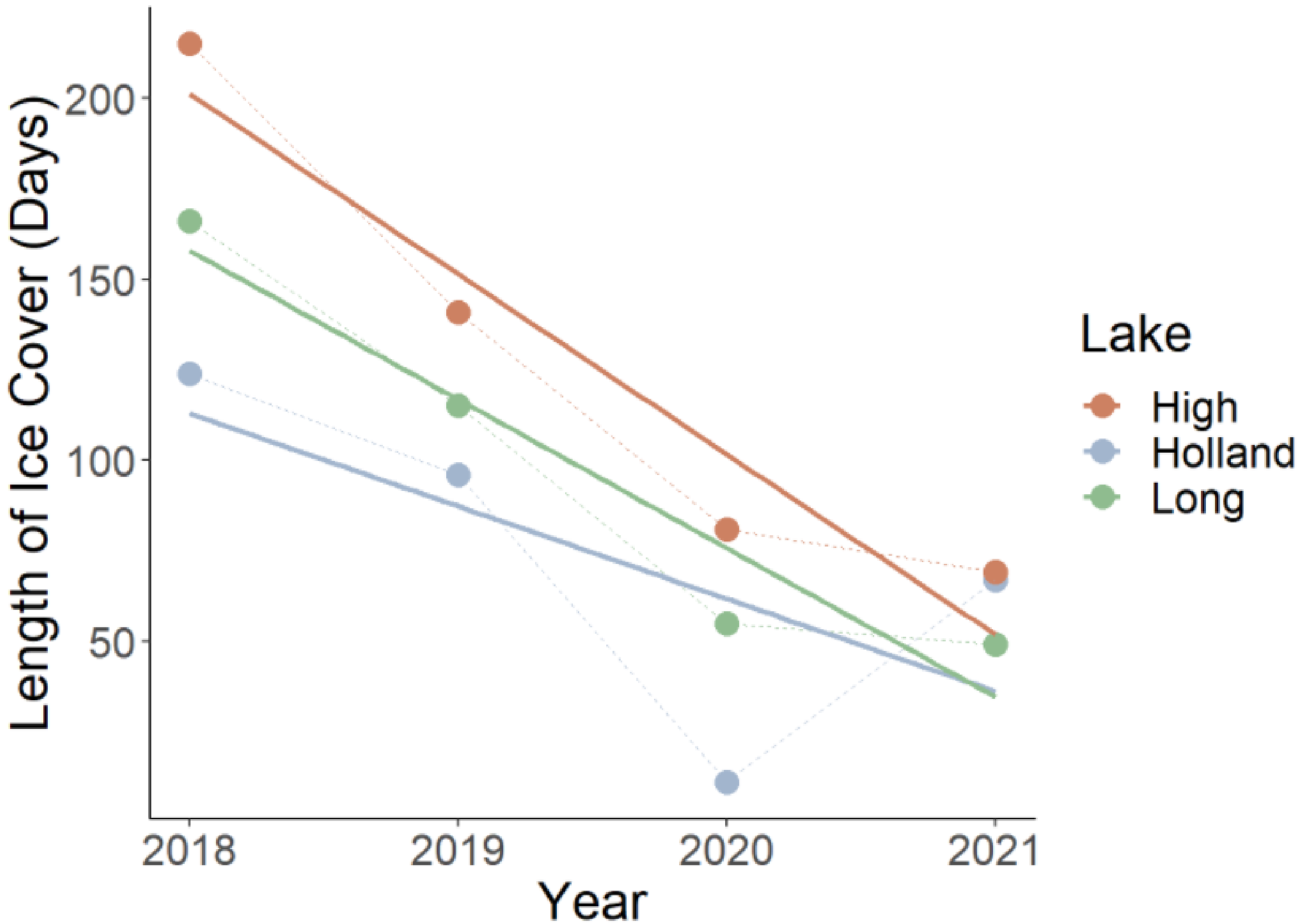


Figure 14. *Length of ice cover in each lake where there was a full sampling period for the winter season. Ice cover was determined by counting days where inverse stratification occurred (at least 1 degree Celcius difference between 1 meter). Solid lines represent linear trends.*

When looking at the length of ice cover, or the duration of time where there is inverse winter stratification, all of the lakes displayed similar patterns, with the exception of Holland Pond, which had a longer duration of inverse stratification this past winter (**Figure 14**). In general, it appears that the length of ice cover decreased in all of the lakes over the period monitored.

Aquatic Macrophyte Cover

- Explore the plant survey data to see the extent of littoral area colonized, depth of maximum colonization, species richness and distribution of different species at https://vermont-lakes-and-ponds.shinyapps.io/vt-macrophytes/ Below are maps of plant abundance for all but three of the sentinel lakes. The size of the dot denotes density, with larger dots representing higher densities.

Vermont Macrophyte Data Lakes Plants

Point-Intercept Surveys

Select a Lake

BALD HILL

Metric	Value
Survey Date	07/21/2016
Number of Sites Surveyed	122
Number of Sites Colonized	2
Maximum Depth of Colonization	2.5 ft
Number of Sites Shallower than Max Depth of Colonization	15
Percentage of Sites Shallower than Max Depth of Colonization Where Plants Were Observed	13.3%
Species Richness	1
Species Richness Including Visuals	4
Simpson's Diversity	0
Evenness	NaN

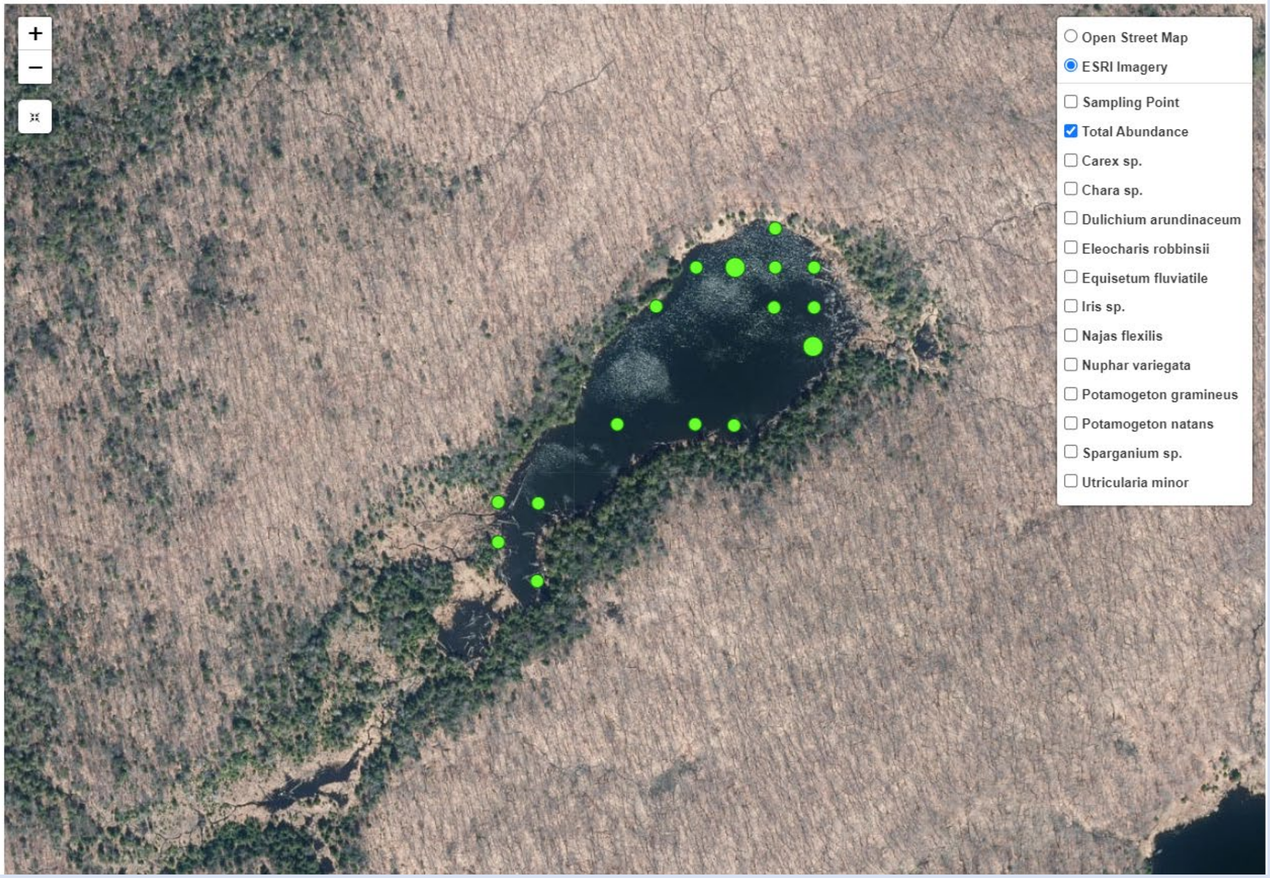
Vertmont Macrophyte Data | Lakes | Plants

Point-Intercept Surveys

Select a Lake

BLAKE (SUTTON)

Metric	Value
Survey Date	07/19/2016
Number of Sites Surveyed	40
Number of Sites Colonized	16
Maximum Depth of Colonization	10 ft
Number of Sites Shallower than Max Depth of Colonization	28
Percentage of Sites Shallower than Max Depth of Colonization Where Plants Were Observed	57.1%
Species Richness	8
Species Richness Including Visuals	12
Simpson's Diversity	0.84
Evenness	0.93



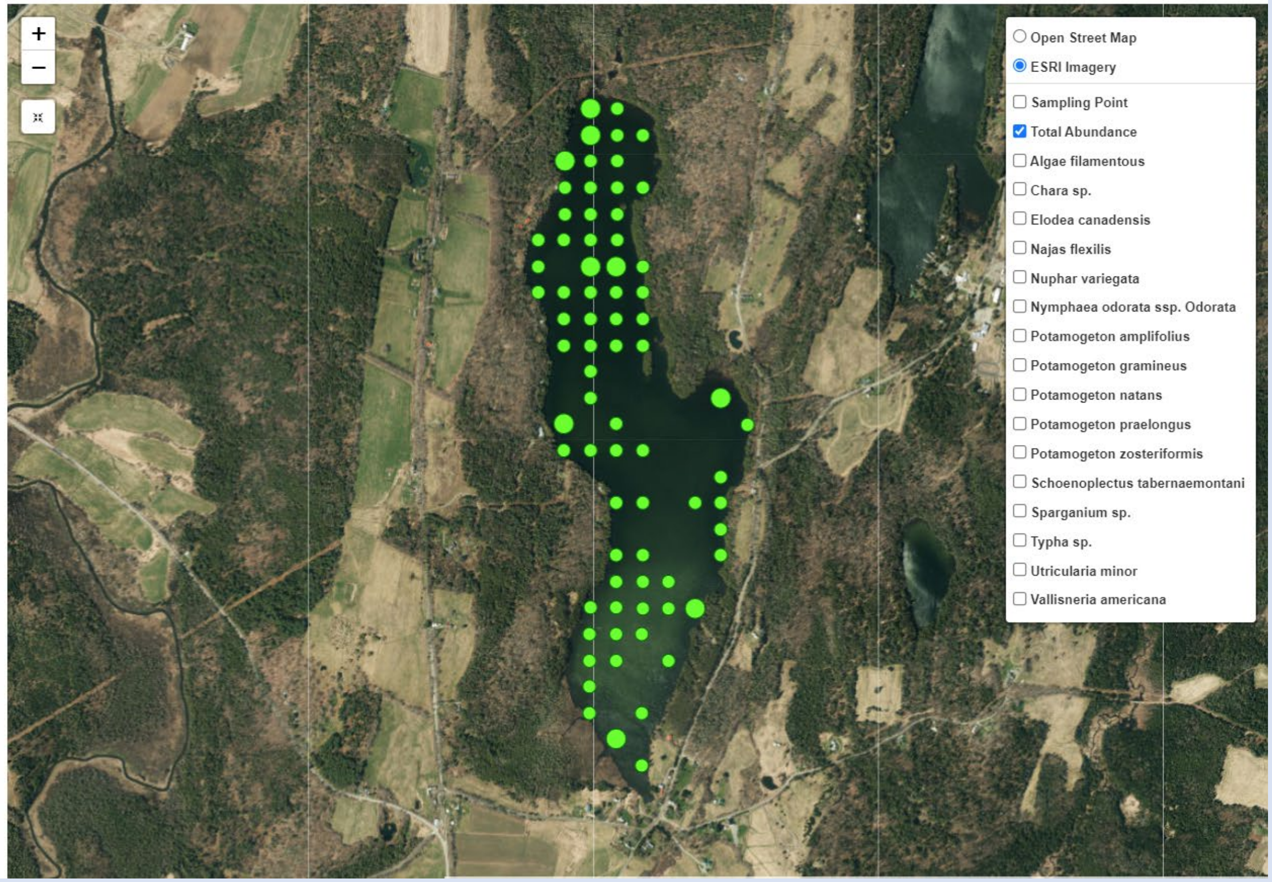
Vermont Macrophyte Data Lakes Plants

Point-Intercept Surveys

Select a Lake

LITTLE HOSMER

Metric	Value
Survey Date	07/08/2016
Number of Sites Surveyed	113
Number of Sites Colonized	74
Maximum Depth of Colonization	10 ft
Number of Sites Shallower than Max Depth of Colonization	113
Percentage of Sites Shallower than Max Depth of Colonization Where Plants Were Observed	65.5%
Species Richness	10
Species Richness Including Visuals	15
Simpson's Diversity	0.53
Evenness	0.54



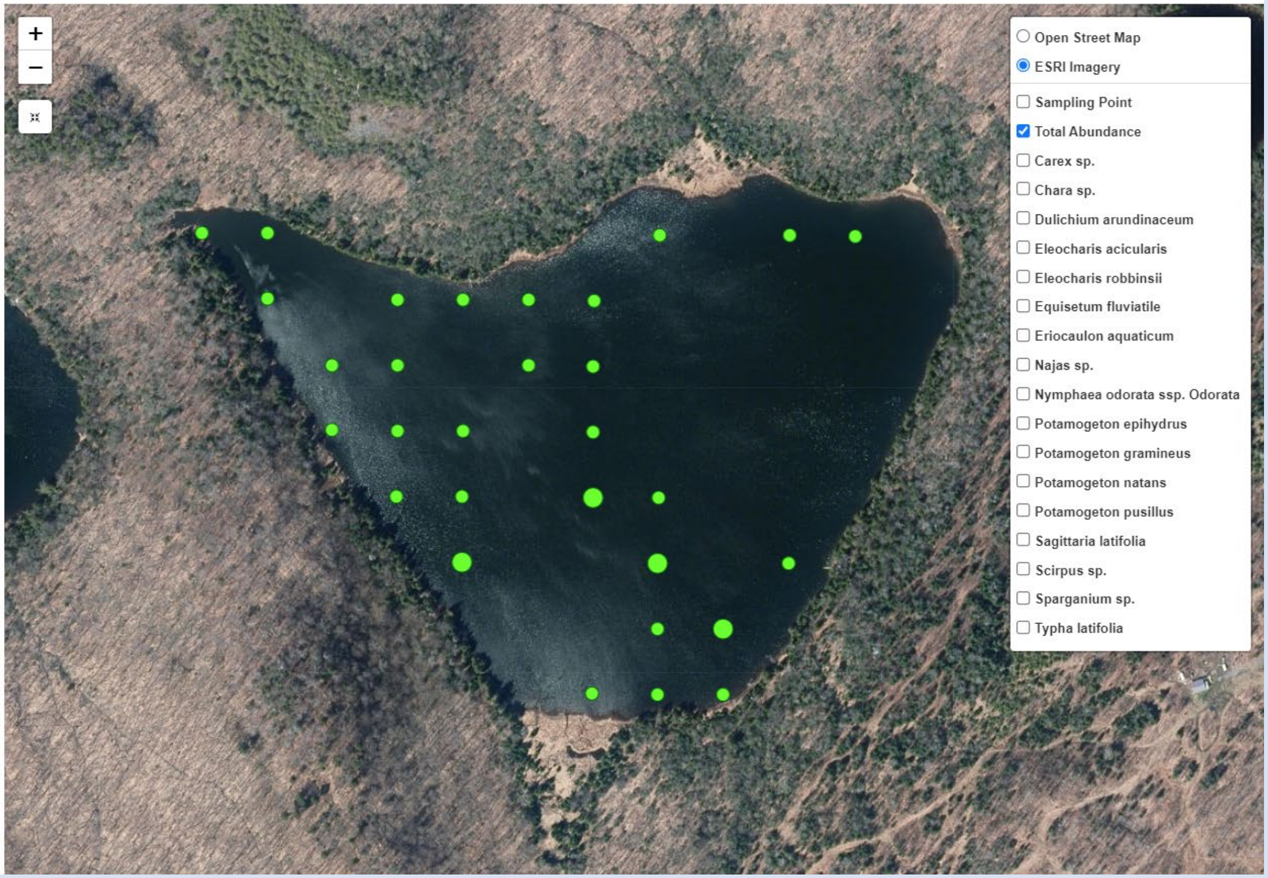
Vermont Macrophyte Data   Lakes   Plants

Point-Intercept Surveys

Select a Lake

LONG (SHEFLD)

Metric	Value
Survey Date	07/16/2015
Number of Sites Surveyed	62
Number of Sites Colonized	30
Maximum Depth of Colonization	16 ft
Number of Sites Shallower than Max Depth of Colonization	48
Percentage of Sites Shallower than Max Depth of Colonization Where Plants Were Observed	62.5%
Species Richness	9
Species Richness Including Visuals	17
Simpson's Diversity	0.71
Evenness	0.72



Vermont Macrophyte Data | Lakes | Plants

Point-Intercept Surveys

Select a Lake

ROUND (SHEFLD)

Metric	Value
Survey Date	07/06/2016
Number of Sites Surveyed	36
Number of Sites Colonized	6
Maximum Depth of Colonization	25 ft
Number of Sites Shallower than Max Depth of Colonization	17
Percentage of Sites Shallower than Max Depth of Colonization Where Plants Were Observed	35.3%
Species Richness	4
Species Richness Including Visuals	9
Simpson's Diversity	0.61
Evenness	0.83

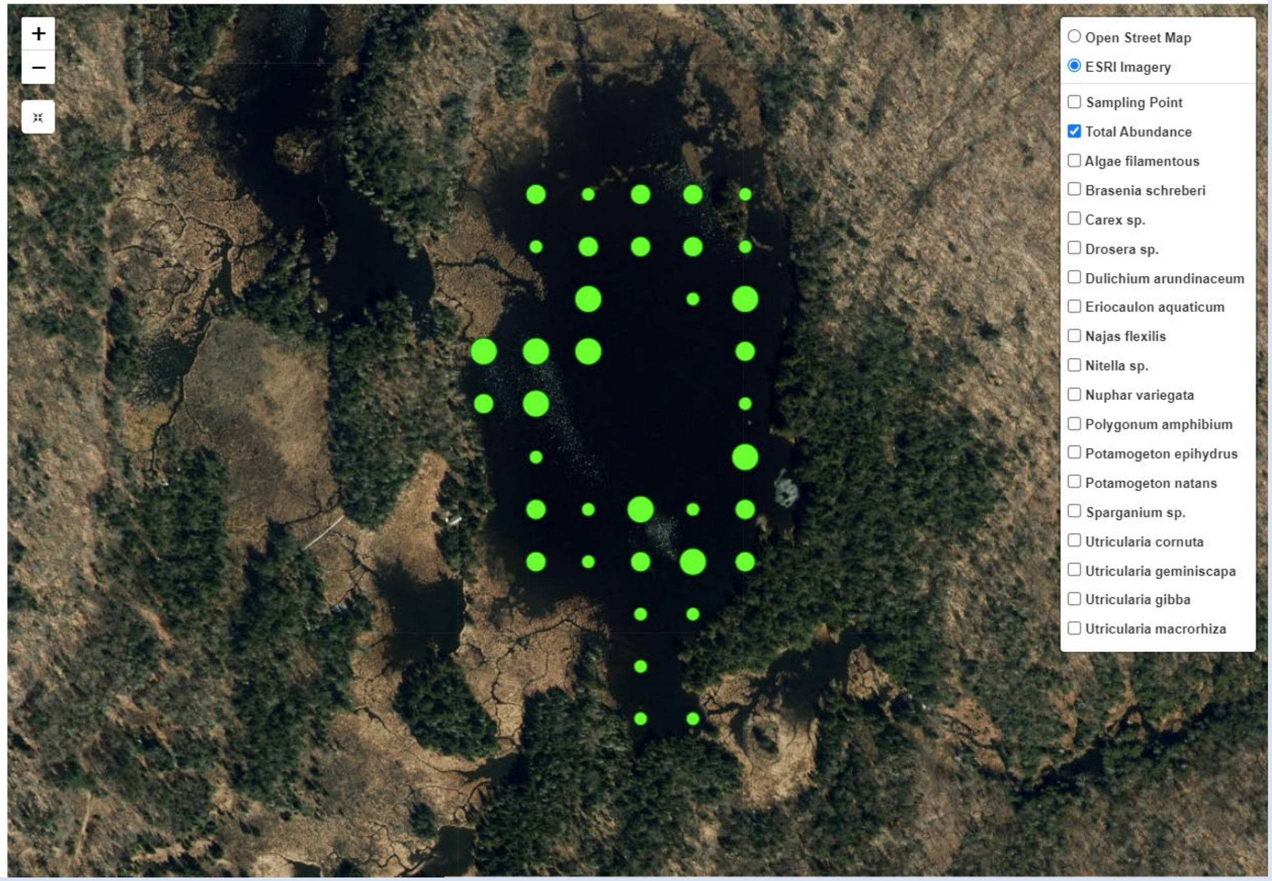
Vermont Macrophyte Data | Lakes | Plants

Point-Intercept Surveys

Select a Lake

SCHOFIELD

Metric	Value
Survey Date	07/28/2015
Number of Sites Surveyed	46
Number of Sites Colonized	37
Maximum Depth of Colonization	7.4 ft
Number of Sites Shallower than Max Depth of Colonization	37
Percentage of Sites Shallower than Max Depth of Colonization Where Plants Were Observed	100%
Species Richness	11
Species Richness Including Visuals	16
Simpson's Diversity	0.72
Evenness	0.72



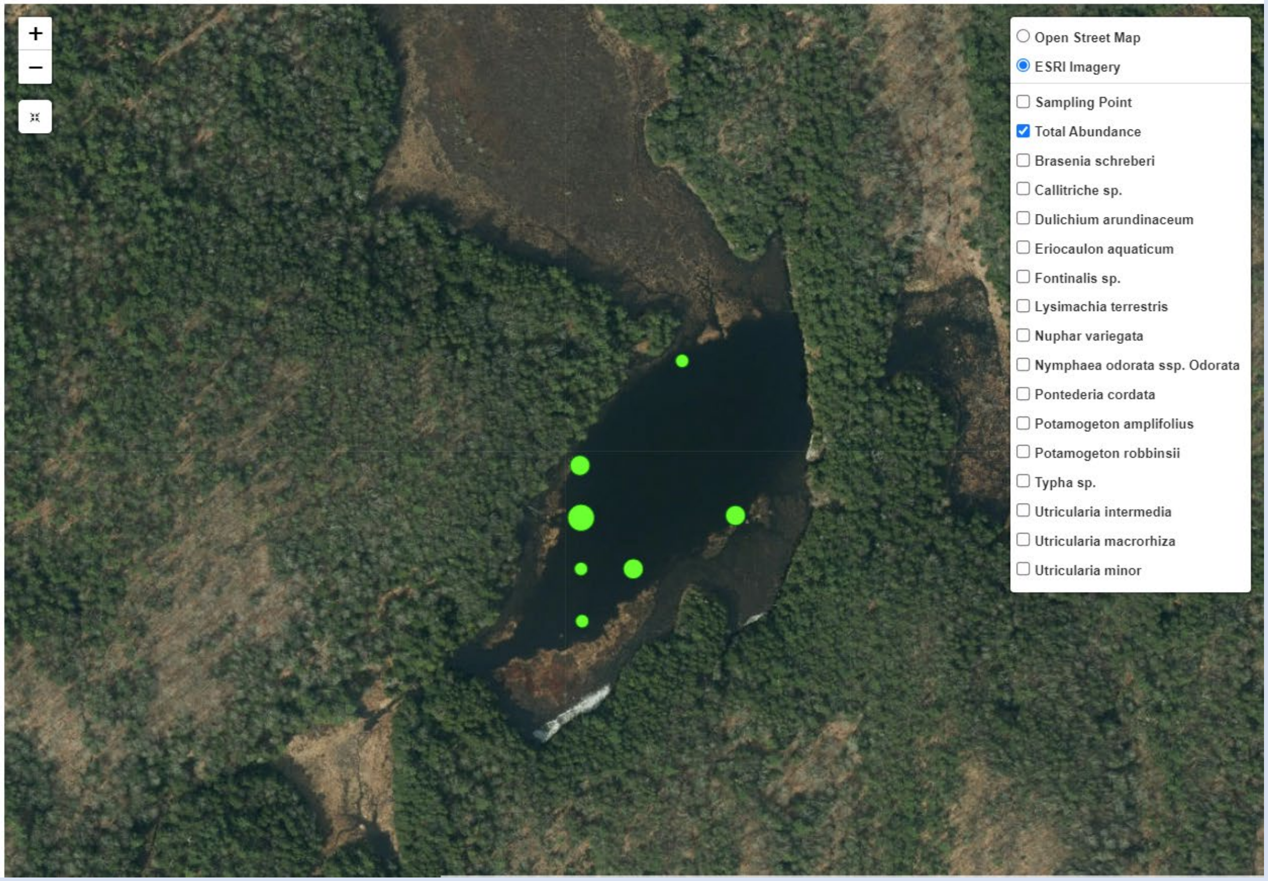
Vertmont Macrophyte Data | Lakes | Plants

Point-Intercept Surveys

Select a Lake

SPRUCE (ORWELL)

Metric	Value
Survey Date	07/13/2016
Number of Sites Surveyed	32
Number of Sites Colonized	7
Maximum Depth of Colonization	3.2 ft
Number of Sites Shallower than Max Depth of Colonization	7
Percentage of Sites Shallower than Max Depth of Colonization Where Plants Were Observed	100%
Species Richness	8
Species Richness Including Visuals	15
Simpson's Diversity	0.75
Evenness	0.84



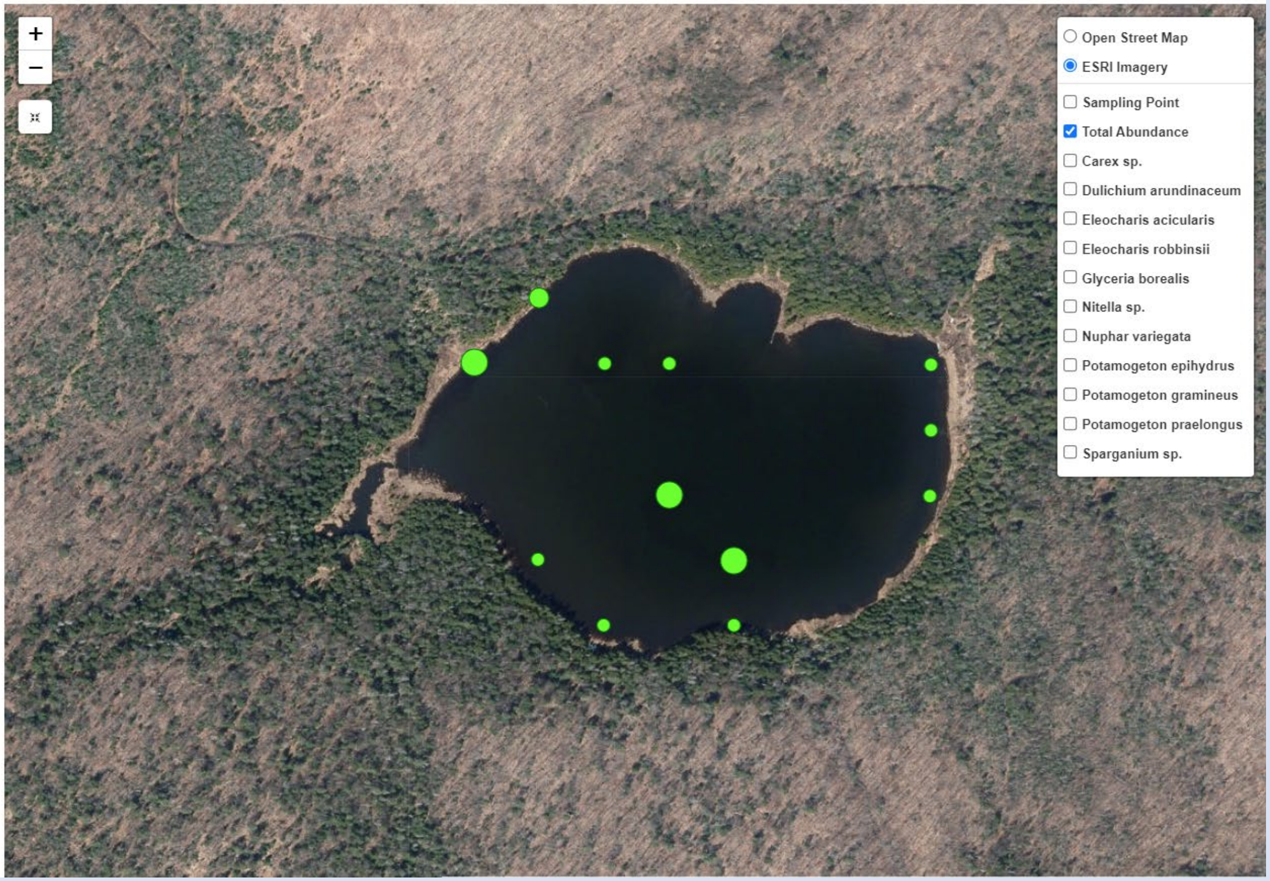
Vermont Macrophyte Data | Lakes | Plants

Point-Intercept Surveys

Select a Lake

STANNARD

Metric	Value
Survey Date	07/22/2015
Number of Sites Surveyed	39
Number of Sites Colonized	12
Maximum Depth of Colonization	6.4 ft
Number of Sites Shallower than Max Depth of Colonization	31
Percentage of Sites Shallower than Max Depth of Colonization Where Plants Were Observed	38.7%
Species Richness	11
Species Richness Including Visuals	11
Simpson's Diversity	0.88
Evenness	0.95



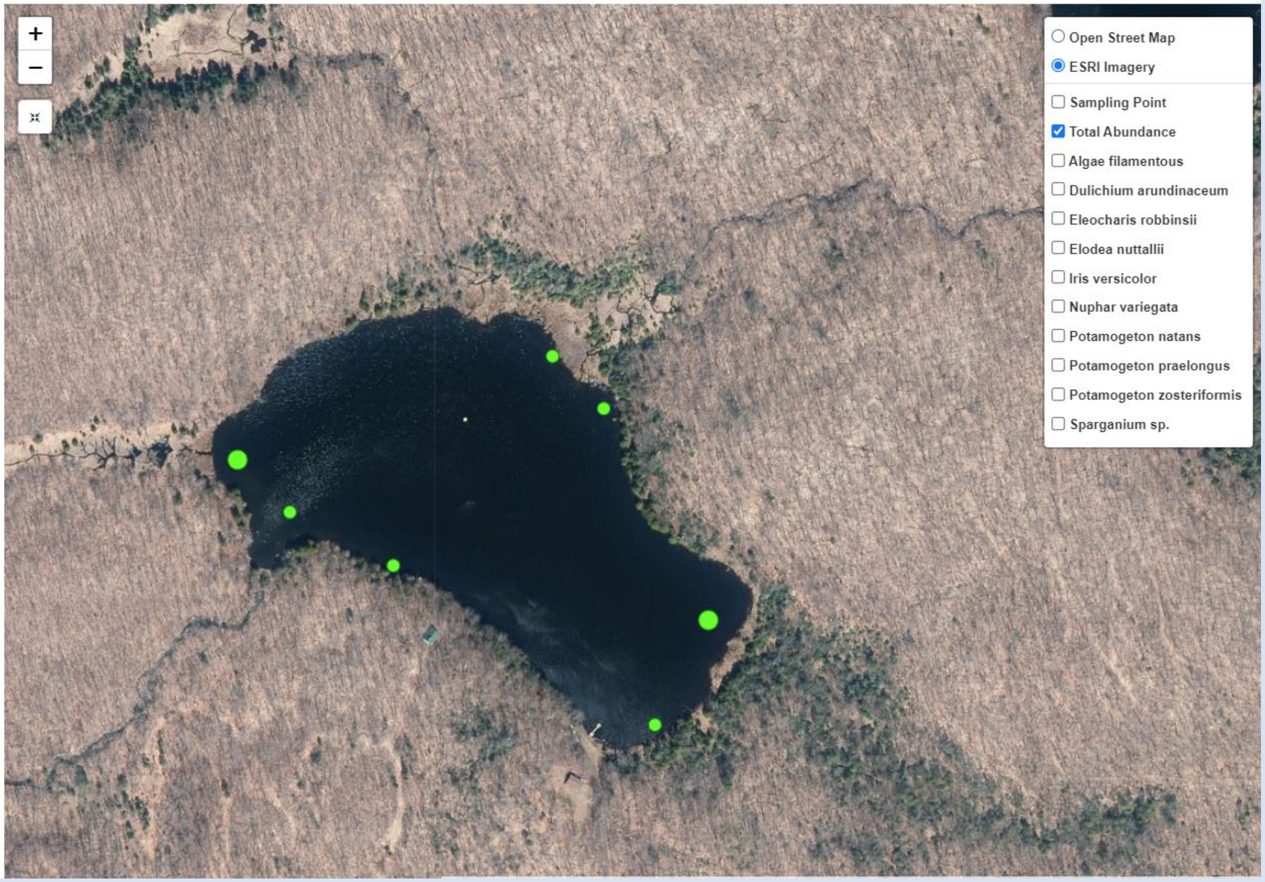
Vermont Macrophyte Data   Lakes   Plants

Point-Intercept Surveys

Select a Lake

VAIL

Metric	Value
Survey Date	07/07/2016
Number of Sites Surveyed	45
Number of Sites Colonized	7
Maximum Depth of Colonization	9.4 ft
Number of Sites Shallower than Max Depth of Colonization	10
Percentage of Sites Shallower than Max Depth of Colonization Where Plants Were Observed	70%
Species Richness	5
Species Richness Including Visuals	9
Simpson's Diversity	0.69
Evenness	0.85



Vermont Macrophyte Data | Lakes | Plants

Point-Intercept Surveys

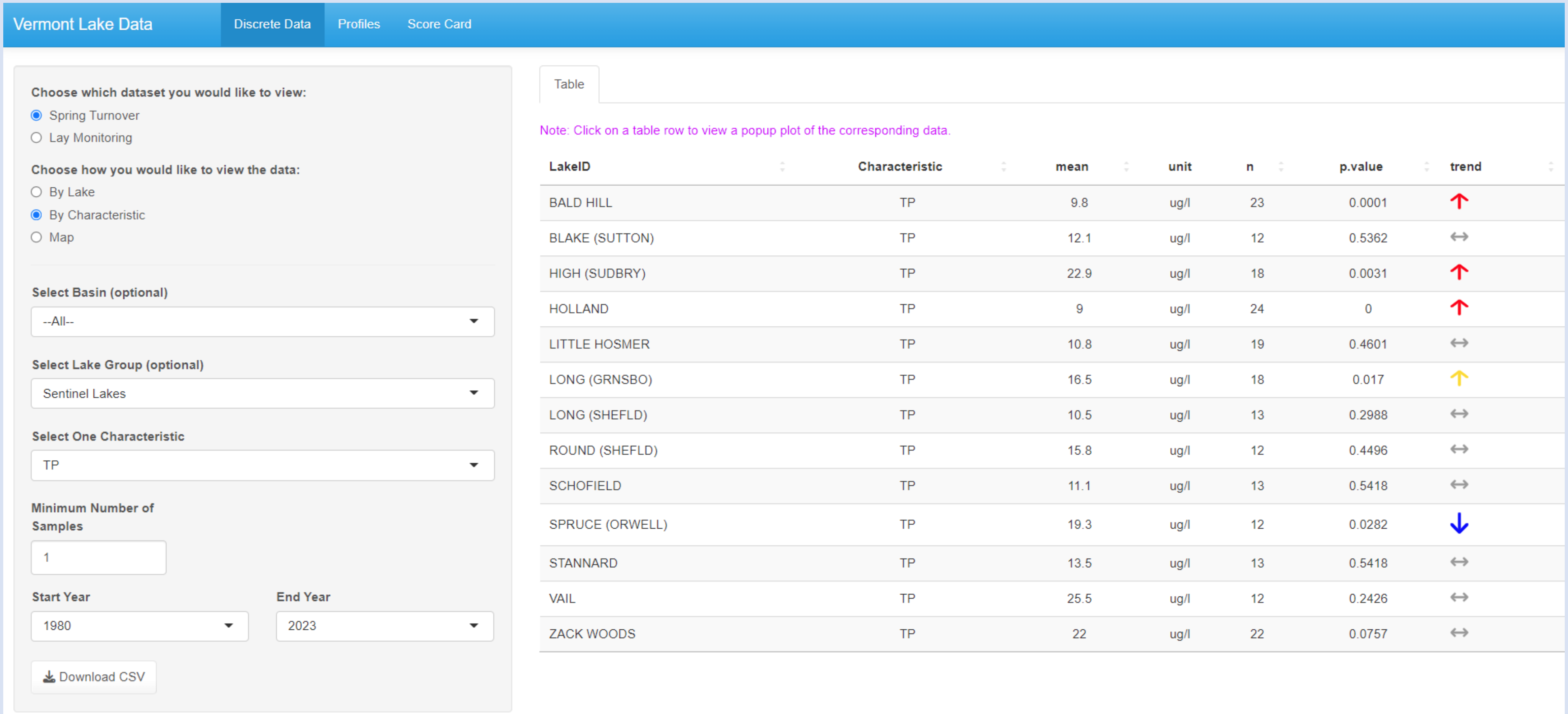
Select a Lake

ZACK WOODS

Metric	Value
Survey Date	07/05/2016
Number of Sites Surveyed	41
Number of Sites Colonized	2
Maximum Depth of Colonization	23 ft
Number of Sites Shallower than Max Depth of Colonization	29
Percentage of Sites Shallower than Max Depth of Colonization Where Plants Were Observed	6.9%
Species Richness	1
Species Richness Including Visuals	1
Simpson's Diversity	0
Evenness	NaN

Trends in Water Chemistry Across the Sentinel Lakes

- Explore the trend data for a suite of parameters (Total Phosphorus, Total Nitrogen, Secchi, Alkalinity, Total Chloride, Chlorophyll a, Dissolved Organic Carbon, Total Calcium, Total Iron, Total Manganese and Total Magnesium) across the sentinel lakes. Visit https://vermont-lakes-and-ponds.shinyapps.io/vt-lake-data/ and select ‘Spring Turnover’, ‘By Characteristic’ and ‘Sentinel Lakes’. Below are the trend data for spring total phosphorus, total nitrogen, water clarity (secchi), alkalinity, total chloride, chlorophyll *a* and dissolved organic carbon.



LakeID	Characteristic	mean	unit	n	p.value	trend
BALD HILL	TP	9.8	ug/l	23	0.0001	↑
BLAKE (SUTTON)	TP	12.1	ug/l	12	0.5362	↔
HIGH (SUDBRY)	TP	22.9	ug/l	18	0.0031	↑
HOLLAND	TP	9	ug/l	24	0	↑
LITTLE HOSMER	TP	10.8	ug/l	19	0.4601	↔
LONG (GRNSBO)	TP	16.5	ug/l	18	0.017	↑
LONG (SHEFLD)	TP	10.5	ug/l	13	0.2988	↔
ROUND (SHEFLD)	TP	15.8	ug/l	12	0.4496	↔
SCHOFIELD	TP	11.1	ug/l	13	0.5418	↔
SPRUCE (ORWELL)	TP	19.3	ug/l	12	0.0282	↓
STANNARD	TP	13.5	ug/l	13	0.5418	↔
VAIL	TP	25.5	ug/l	12	0.2426	↔
ZACK WOODS	TP	22	ug/l	22	0.0757	↔

Vermont Lake Data | Discrete Data | Profiles | Score Card

Choose which dataset you would like to view:

- (•) Spring Turnover
- ( ) Lay Monitoring

Choose how you would like to view the data:

- ( ) By Lake
- (•) By Characteristic
- ( ) Map

Select Basin (optional)

--All--

Select Lake Group (optional)

Sentinel Lakes

Select One Characteristic

TN

Minimum Number of Samples

1

Start Year

1980

End Year

2023

Download CSV

Table

Note: Click on a table row to view a popup plot of the corresponding data.

LakeID	Characteristic	mean	unit	n	p.value	trend
BALD HILL	TN	0.4	mg/l	18	0.4264	↔
BLAKE (SUTTON)	TN	0.4	mg/l	12	0.0031	↓
HIGH (SUDBRY)	TN	0.3	mg/l	15	0.8046	↔
HOLLAND	TN	0.3	mg/l	17	0.1606	↔
LITTLE HOSMER	TN	0.4	mg/l	14	0.0414	↓
LONG (GRNSBO)	TN	0.3	mg/l	15	0.4002	↔
LONG (SHEFLD)	TN	0.3	mg/l	13	0.1265	↔
ROUND (SHEFLD)	TN	0.3	mg/l	12	0.9452	↔
SCHOFIELD	TN	0.2	mg/l	13	0.0763	↔
SPRUCE (ORWELL)	TN	0.5	mg/l	12	0.2171	↔
STANNARD	TN	0.3	mg/l	13	0.5351	↔
VAIL	TN	0.4	mg/l	12	0.1916	↔
ZACK WOODS	TN	0.2	mg/l	16	0.9641	↔

Vermont Lake Data | Discrete Data | Profiles | Score Card

Choose which dataset you would like to view:

- (•) Spring Turnover
- ( ) Lay Monitoring

Choose how you would like to view the data:

- ( ) By Lake
- (•) By Characteristic
- ( ) Map

Select Basin (optional)

--All--

Select Lake Group (optional)

Sentinel Lakes

Select One Characteristic

Secchi

Minimum Number of Samples

1

Start Year

1980

End Year

2023

Download CSV

Table

Note: Click on a table row to view a popup plot of the corresponding data.

LakeID	Characteristic	mean	unit	n	p.value	trend
BALD HILL	Secchi	4.7	m	23	0.3409	↔
BLAKE (SUTTON)	Secchi	3.9	m	10	0.3692	↔
HIGH (SUDBRY)	Secchi	5.3	m	17	0.3866	↔
HOLLAND	Secchi	3.2	m	23	0.1938	↔
LONG (GRNSBO)	Secchi	3.4	m	18	0.2091	↔
LONG (SHEFLD)	Secchi	4.5	m	13	0.5014	↔
ROUND (SHEFLD)	Secchi	4.2	m	12	1	↔
SCHOFIELD	Secchi	3	m	13	0.3248	↔
SPRUCE (ORWELL)	Secchi	2.9	m	11	0.0423	↑
STANNARD	Secchi	2.6	m	3		—
VAIL	Secchi	3.7	m	12	0.0982	↔
ZACK WOODS	Secchi	5.3	m	21	0.8088	↔

Vertmont Lake Data | Discrete Data | Profiles | Score Card

Choose which dataset you would like to view:

- (●) Spring Turnover
- ( ) Lay Monitoring

Choose how you would like to view the data:

- ( ) By Lake
- (●) By Characteristic
- ( ) Map

Select Basin (optional)

--All--

Select Lake Group (optional)

Sentinel Lakes

Select One Characteristic

RegAlk

Minimum Number of Samples

1

Start Year

1980

End Year

2023

Download CSV

Table

Note: Click on a table row to view a popup plot of the corresponding data.

LakeID	Characteristic	mean	unit	n	p.value	trend
BALD HILL	RegAlk	36.2	mg/l	18	0.0098	↑
BLAKE (SUTTON)	RegAlk	33.6	mg/l	10	0.3692	↔
HIGH (SUDBRY)	RegAlk	49.1	mg/l	16	0.4683	↔
HOLLAND	RegAlk	8.7	mg/l	16	0.2053	↔
LITTLE HOSMER	RegAlk	79	mg/l	13	0.3592	↔
LONG (GRNSBO)	RegAlk	45.5	mg/l	15	0.9208	↔
LONG (SHEFLD)	RegAlk	19.5	mg/l	11	0.3448	↔
ROUND (SHEFLD)	RegAlk	18.8	mg/l	10	0.1508	↔
SCHOFIELD	RegAlk	7	mg/l	12	0.0418	↑
SPRUCE (ORWELL)	RegAlk	15.5	mg/l	11	0.1739	↔
STANNARD	RegAlk	18	mg/l	12	0.0622	↔
VAIL	RegAlk	52.2	mg/l	11	0.1367	↔
ZACK WOODS	RegAlk	50.8	mg/l	15	0.3975	↔

Vertmont Lake Data | Discrete Data | Profiles | Score Card

Choose which dataset you would like to view:

- (●) Spring Turnover
- ( ) Lay Monitoring

Choose how you would like to view the data:

- ( ) By Lake
- (●) By Characteristic
- ( ) Map

Select Basin (optional)

--All--

Select Lake Group (optional)

Sentinel Lakes

Select One Characteristic

TCI

Minimum Number of Samples

1

Start Year

1980

End Year

2023

Download CSV

Table

Note: Click on a table row to view a popup plot of the corresponding data.

LakeID	Characteristic	mean	unit	n	p.value	trend
BALD HILL	TCI_bottom	2	mg/l	15		↔
BALD HILL	TCI_surface	2	mg/l	15		↔
BLAKE (SUTTON)	TCI_bottom	2	mg/l	10		↔
BLAKE (SUTTON)	TCI_surface	2	mg/l	10		↔
HIGH (SUDBRY)	TCI_bottom	2	mg/l	12		↔
HIGH (SUDBRY)	TCI_surface	2	mg/l	12		↔
HOLLAND	TCI_bottom	2	mg/l	13		↔
HOLLAND	TCI_surface	2	mg/l	13		↔
LITTLE HOSMER	TCI_surface	2	mg/l	12	0.0687	↔
LONG (GRNSBO)	TCI_bottom	2	mg/l	12		↔
LONG (GRNSBO)	TCI_surface	2	mg/l	12		↔
LONG (SHEFLD)	TCI_bottom	2	mg/l	11		↔
LONG (SHEFLD)	TCI_surface	2	mg/l	11		↔
ROUND (SHEFLD)	TCI_bottom	2	mg/l	10		↔
ROUND (SHEFLD)	TCI_surface	2	mg/l	10		↔
SCHOFIELD	TCI_bottom	2	mg/l	12		↔
SCHOFIELD	TCI_surface	2	mg/l	12		↔

Vermont Lake Data | Discrete Data | Profiles | Score Card

Choose which dataset you would like to view:

- (●) Spring Turnover
- ( ) Lay Monitoring

Choose how you would like to view the data:

- ( ) By Lake
- (●) By Characteristic
- ( ) Map

Select Basin (optional)

--All--

Select Lake Group (optional)

Sentinel Lakes

Select One Characteristic

Chla

Minimum Number of Samples

1

Start Year

1980

End Year

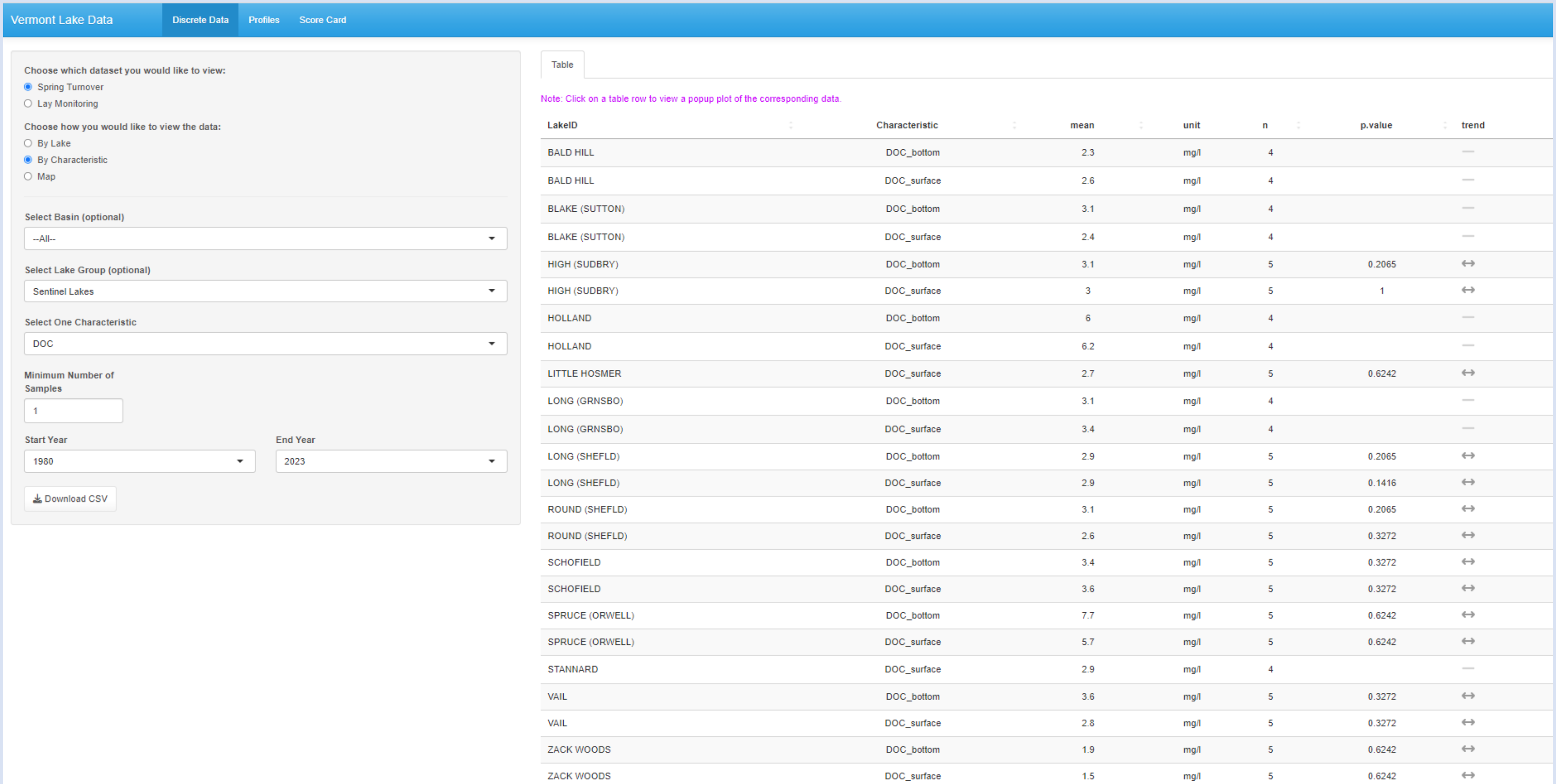
2023

Download CSV

Table

Note: Click on a table row to view a popup plot of the corresponding data.

LakeID	Characteristic	mean	unit	n	p.value	trend
BALD HILL	Chla	4.7	ug/l	3		—
BLAKE (SUTTON)	Chla	6.2	ug/l	4		—
HIGH (SUDBRY)	Chla	29.7	ug/l	4		—
HOLLAND	Chla	4.1	ug/l	4		—
LITTLE HOSMER	Chla	2.6	ug/l	4		—
LONG (GRNSBO)	Chla	9.7	ug/l	4		—
LONG (SHEFLD)	Chla	3	ug/l	4		—
ROUND (SHEFLD)	Chla	5.3	ug/l	4		—
SCHOFIELD	Chla	4.6	ug/l	4		—
SPRUCE (ORWELL)	Chla	7.8	ug/l	4		—
STANNARD	Chla	4.4	ug/l	4		—
VAIL	Chla	10.2	ug/l	4		—
ZACK WOODS	Chla	4.1	ug/l	4		—



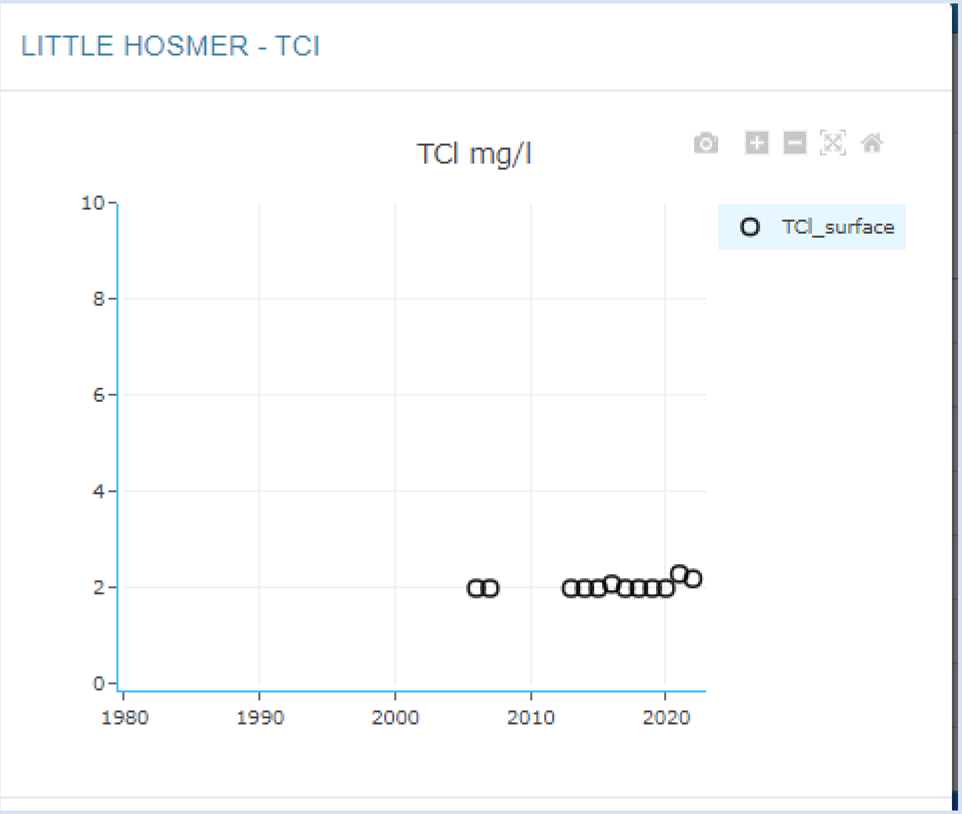
LakeID	Characteristic	mean	unit	n	p.value	trend
BALD HILL	DOC_bottom	2.3	mg/l	4		—
BALD HILL	DOC_surface	2.6	mg/l	4		—
BLAKE (SUTTON)	DOC_bottom	3.1	mg/l	4		—
BLAKE (SUTTON)	DOC_surface	2.4	mg/l	4		—
HIGH (SUDBRY)	DOC_bottom	3.1	mg/l	5	0.2065	↔
HIGH (SUDBRY)	DOC_surface	3	mg/l	5	1	↔
HOLLAND	DOC_bottom	6	mg/l	4		—
HOLLAND	DOC_surface	6.2	mg/l	4		—
LITTLE HOSMER	DOC_surface	2.7	mg/l	5	0.6242	↔
LONG (GRNSBO)	DOC_bottom	3.1	mg/l	4		—
LONG (GRNSBO)	DOC_surface	3.4	mg/l	4		—
LONG (SHEFLD)	DOC_bottom	2.9	mg/l	5	0.2065	↔
LONG (SHEFLD)	DOC_surface	2.9	mg/l	5	0.1416	↔
ROUND (SHEFLD)	DOC_bottom	3.1	mg/l	5	0.2065	↔
ROUND (SHEFLD)	DOC_surface	2.6	mg/l	5	0.3272	↔
SCHOFIELD	DOC_bottom	3.4	mg/l	5	0.3272	↔
SCHOFIELD	DOC_surface	3.6	mg/l	5	0.3272	↔
SPRUCE (ORWELL)	DOC_bottom	7.7	mg/l	5	0.6242	↔
SPRUCE (ORWELL)	DOC_surface	5.7	mg/l	5	0.6242	↔
STANNARD	DOC_surface	2.9	mg/l	4		—
VAIL	DOC_bottom	3.6	mg/l	5	0.3272	↔
VAIL	DOC_surface	2.8	mg/l	5	0.3272	↔
ZACK WOODS	DOC_bottom	1.9	mg/l	5	0.6242	↔
ZACK WOODS	DOC_surface	1.5	mg/l	5	0.6242	↔

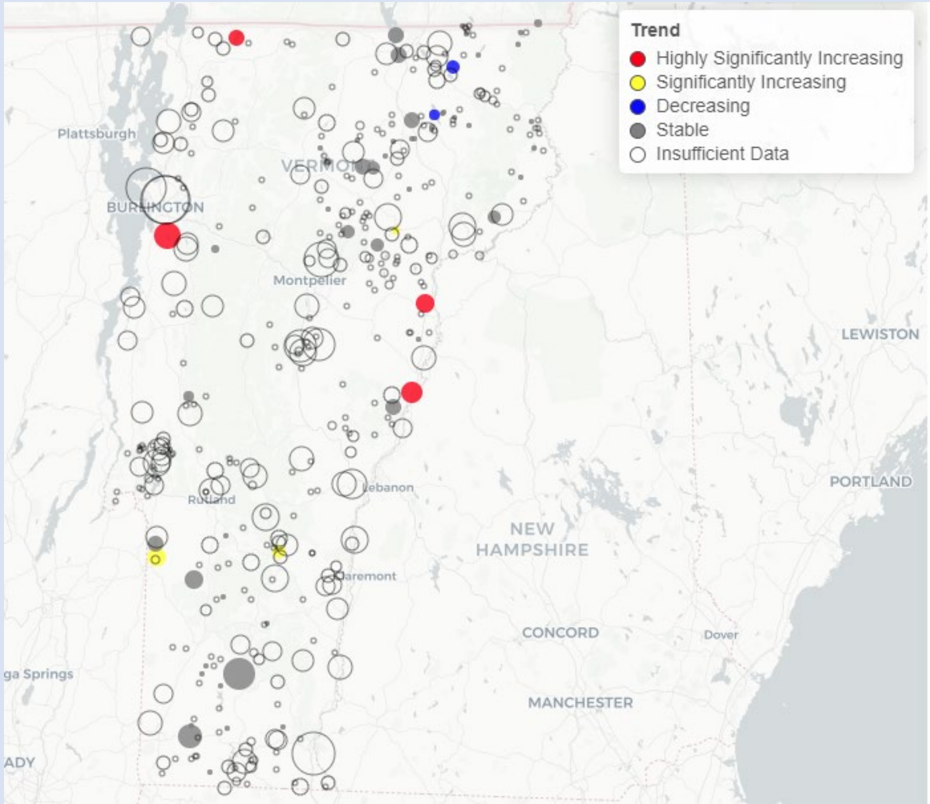
Help us Monitor the Sentinel Lakes, Volunteer to Be a Lay Monitor!

- Only two of the sentinel lakes have summer volunteers monitoring them as part of the Lay Monitoring Program. Want an excuse to get out to these lakes at least five times a summer, consider becoming a lay monitor on them by visiting the LMP website.

Total Chloride: Indicator of Road Salt Pollution

- The detection limit for Total Chloride is 2 mg/L. All but two total chloride readings taken across the sentinel lakes during spring turnover since 2006 have been at the detection limit, the lowest readings possible. In 2021 and 2022 total chloride was slightly above the detection limit on Little Hosmer Pond. Of the 395 inland lakes in the state with total chloride data, 47% have readings over the detection limit, suggesting that road salt pollution may be widespread in the state. The sentinel lakes serve as a reference to help determine if more than local anthropogenic causes (like road salt or water softeners) are contributing to increases in total chloride in Vermont lakes.





Bald Hill Pond, Westmore, VT
in the [Bald Hill Wildlife Management Area]

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use

Blake Pond, Sutton, VT **is in the Willoughby State Forest**

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use

High Pond, Sudbury, VT **is in the Nature Conservancy's [High Pond Natural Area]**

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use

Holland Pond, Holland, VT **is in the Bill Sladyk Wildlife Management Area**

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use

Little Hosmer, Craftsbury, VT

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use (not available)

Long Pond, Greensboro, VT **is in the Nature Conservancy's Long Pond Natural Area**

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use

Long Pond, Sheffield, VT **is in** **Holbrook State Park**

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use (not available)

Round Pond, Sheffield, VT **is in** **Holbrook State Park**

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use

Schofield Pond, Hyde Park, VT is in **Green River Reservoir State Park**

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use

Spruce Pond, Orwell, VT is in the **Pond Woods Wildlife Management Area**

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use

Stannard Pond, Stannard, VT **is in the [Steam Mill Brook Wildlife Management Area]**

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use

Vail Pond, Sutton, VT **is in the Willoughby State Forest**

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use

Zack Woods Pond, Hyde Park, VT **is in** **Green River Reservoir State Park**

- Lake Score Card
- 2011 Next Generation Lake Assessment
- 2017 Next Generation Lake Assessment
- High Resolution Land Cover & Land Use