



# Volunteer Lake Assessment Program Individual Lake Reports

## WINNISQUAM, LACONIA, NH

### MORPHOMETRIC DATA

Watershed Area (Ac.):	291,649	Max. Depth (m):	53	Flushing Rate (yr <sup>-1</sup> )	2.2
Surface Area (Ac.):	4264	Mean Depth (m):	15.2	P Retention Coef:	
Shore Length (m):	45,400	Volume (m <sup>3</sup> ):	262,306,500	Elevation (ft):	482

### TROPHIC CLASSIFICATION

Year	Trophic class
1984	OLIGOTROPHIC
1994	OLIGOTROPHIC

### KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2018 305(b) report on the status of N.H. waters, and are based on data collected from 2008-2017. Detailed waterbody assessment and report card information can be found at [www.des.nh.gov/organization/divisions/water/wmb/swqa/index.htm](http://www.des.nh.gov/organization/divisions/water/wmb/swqa/index.htm)

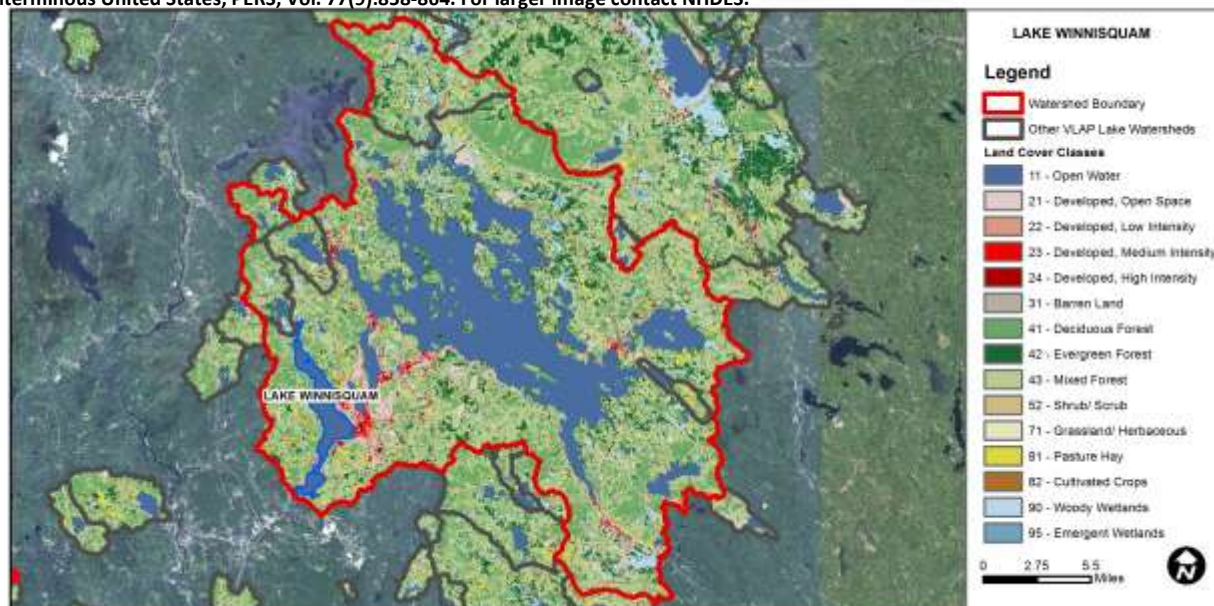
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	Sampling data is better than the water quality standards or thresholds for this parameter.
	pH	Slightly Bad	Data periodically exceed water quality standards or thresholds for this parameter by a small margin.
	Oxygen, Dissolved	Very Good	All sampling data meet water quality standards or thresholds for this parameter.
	Dissolved oxygen saturation	Encouraging	Limited data for this parameter predicts water quality standards or thresholds are being met; however more data are necessary to fully assess the parameter.
	Chlorophyll-a	Good	Sampling data is better than the water quality standards or thresholds for this parameter.
Primary Contact Recreation	Escherichia coli	Very Good	All sampling data meet water quality standards or thresholds for this parameter.
	Chlorophyll-a	Very Good	All sampling data meet water quality standards or thresholds for this parameter.

### BEACH PRIMARY CONTACT ASSESSMENT STATUS

LAKE WINNISQUAM - BELMONT TOWN BEACH	Escherichia coli	Cautionary	Limited data for this parameter predicts exceedance of water quality standards or thresholds; however more data are necessary to fully assess the parameter.
LAKE WINNISQUAM - AHERN STATE PARK	Escherichia coli	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large margin.
LAKE WINNISQUAM - BARTLETTS BEACH	Escherichia coli	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large margin.
LAKE WINNISQUAM - SANBORNTON TOWN BEACH	Escherichia coli	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large margin.

### WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	21.4	Barren Land	0.11	Grassland/Herbaceous	0.51
Developed-Open Space	4.8	Deciduous Forest	17.08	Pasture Hay	1.83
Developed-Low Intensity	1.65	Evergreen Forest	11.12	Cultivated Crops	0.52
Developed-Medium Intensity	0.7	Mixed Forest	32.34	Woody Wetlands	3.2
Developed-High Intensity	0.23	Shrub-Scrub	2.67	Emergent Wetlands	0.57



# VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

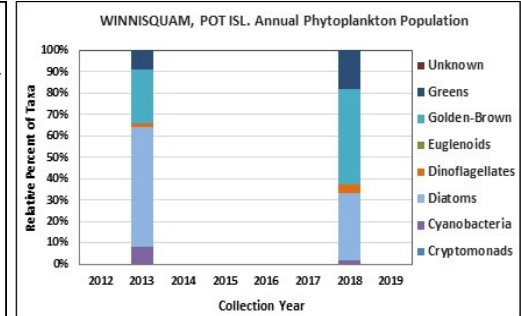
## LAKE WINNISQUAM, POT ISLAND, LACONIA

### 2019 DATA SUMMARY

**RECOMMENDED ACTIONS:** Lake quality was representative of high quality conditions. However, phosphorus and turbidity levels increased following a significant storm event in May. This highlights the importance of managing stormwater runoff throughout the watershed. Consider partnering with Soak Up the Rain NH to identify areas prone to stormwater runoff and implement projects designed to capture and infiltrate stormwater prior to reaching the lake. For more information visit [www.soaknh.org](http://www.soaknh.org). Conductivity levels have increased since monitoring began and chloride levels indicate road salt is likely impacting the lake. Encourage local winter maintenance companies that apply de-icing materials to roads, parking lots, walkways, and driveways to obtain NH Voluntary Salt Applicator licenses through UNH Technology Transfer Center's Green SnowPro certification program. Keep up the great work!

#### OBSERVATIONS (Refer to Table 1 and Historical Deep Spot Data Graphics)

- ◆ **CHLOROPHYLL-A:** Chlorophyll level was slightly elevated in May, decreased to a low level in June, remained stable through August, and then increases lightly in September. Average chlorophyll level increased from 2018 but remained less than the state median and threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.
- ◆ **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) conductivity levels remained slightly elevated and greater than the state median. Epilimnetic chloride levels were greater than the state median, yet much less than the state chronic chloride standard. However, historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began.
- ◆ **COLOR:** Apparent color measured in the epilimnion indicates the water was clear with little to no tea, or brown, coloring.
- ◆ **TOTAL PHOSPHORUS:** Epilimnetic and Metalimnetic phosphorus levels were moderate in May when algal growth was higher and following a storm event, and then decreased to a low level and remained stable through September. Average epilimnetic phosphorus level increased from 2018 but remained less than the state median and threshold for oligotrophic lakes. Hypolimnetic phosphorus levels fluctuated within a low range. Historical trend analysis indicates significantly decreasing (improving) epilimnetic and hypolimnetic phosphorus levels since monitoring began. We hope to see this continue!
- ◆ **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was below average (worse) in May due to waves, increased (improved) to an average range in June, decreased slightly in July due to waves, increased greatly in August, and then decreased in September. Average NVS transparency decreased from 2018 but remained higher (better) than the state median. Historical trend analysis indicates stable transparency since monitoring began.
- ◆ **TURBIDITY:** Epilimnetic and Metalimnetic turbidity levels were within a low range and were highest in May following a significant storm event and when algal growth was higher, and then decreased as the summer progressed. Hypolimnetic turbidity levels were low.
- ◆ **pH:** Epilimnetic, Metalimnetic and Hypolimnetic pH levels were within the desirable range 6.5-8.0 units. Historical trend analysis indicates stable epilimnetic pH levels since monitoring began.



Station Name	Table 1. 2019 Average Water Quality Data for LAKE WINNISQUAM, POT ISL.									
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Color pcu	Cond. us/cm	Total P mg/l	Trans. m		Turb. ntu	pH
							NVS	VS		
Epilimnion	9.1	2.15	24	20	106.8	6	6.26	7.02	0.46	6.91
Metalimnion					107.2	6			0.42	7.07
Hypolimnion					109.9	6			0.28	6.67

**NH Median Values:** Median values for specific parameters generated from historic lake monitoring data.

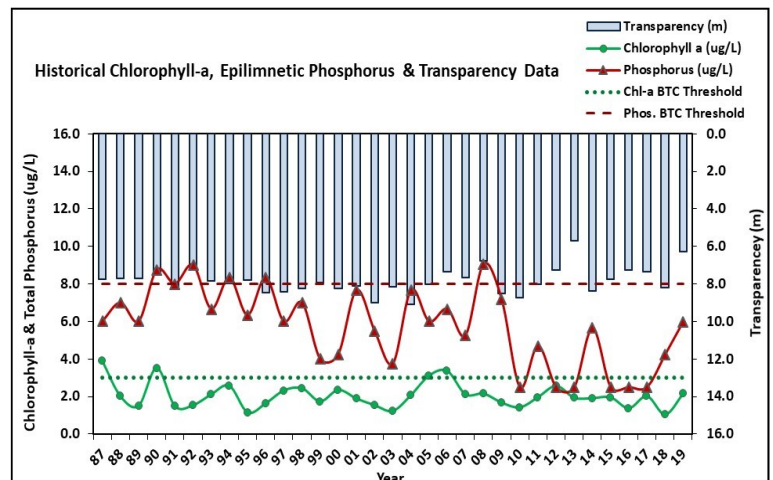
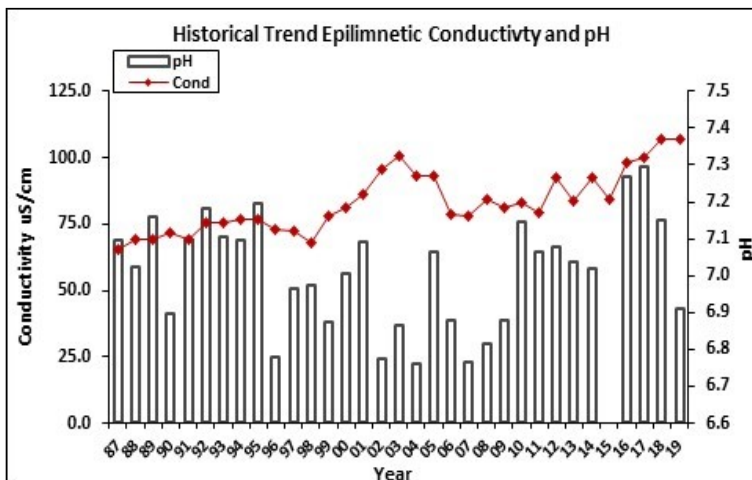
**Alkalinity:** 4.5 mg/L  
**Chlorophyll-a:** 4.39 ug/L  
**Conductivity:** 42.3 uS/cm  
**Chloride:** 5 mg/L  
**Total Phosphorus:** 11 ug/L  
**Transparency:** 3.3 m  
**pH:** 6.6

**NH Water Quality Standards:** Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

**Chloride:** > 230 mg/L (chronic)  
**E. coli:** > 88 cts/100 mL – public beach  
**E. coli:** > 406 cts/100 mL – surface waters  
**Turbidity:** > 10 NTU above natural level  
**pH:** between 6.5-8.0 (unless naturally occurring)

#### HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data show low variability.	Transparency	Stable	Trend not significant; data show low variability.
			Phosphorus (epilimnion)	Improving	Data significantly decreasing.





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## WINNISQUAM, LACONIA, NH

### MORPHOMETRIC DATA

Watershed Area (Ac.):	291,649	Max. Depth (m):	53	Flushing Rate (yr <sup>-1</sup> )	2.2
Surface Area (Ac.):	4264	Mean Depth (m):	15.2	P Retention Coef:	
Shore Length (m):	45,400	Volume (m <sup>3</sup> ):	262,306,500	Elevation (ft):	482

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Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2018 305(b) report on the status of N.H. waters, and are based on data collected from 2008-2017. Detailed waterbody assessment and report card information can be found at [www.des.nh.gov/organization/divisions/water/wmb/swqa/index.htm](http://www.des.nh.gov/organization/divisions/water/wmb/swqa/index.htm)

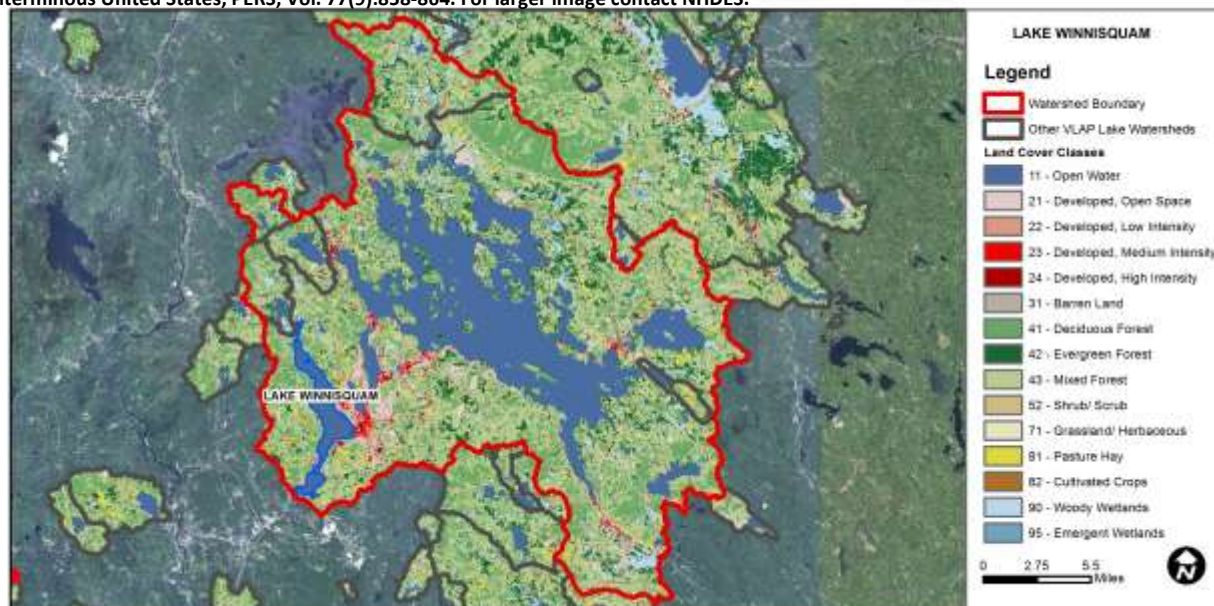
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Aquatic Life	Phosphorus (Total)	Good	Sampling data is better than the water quality standards or thresholds for this parameter.
	pH	Slightly Bad	Data periodically exceed water quality standards or thresholds for this parameter by a small margin.
	Oxygen, Dissolved	Very Good	All sampling data meet water quality standards or thresholds for this parameter.
	Dissolved oxygen saturation	Encouraging	Limited data for this parameter predicts water quality standards or thresholds are being met; however more data are necessary to fully assess the parameter.
	Chlorophyll-a	Good	Sampling data is better than the water quality standards or thresholds for this parameter.
Primary Contact Recreation	Escherichia coli	Very Good	All sampling data meet water quality standards or thresholds for this parameter.
	Chlorophyll-a	Very Good	All sampling data meet water quality standards or thresholds for this parameter.

### BEACH PRIMARY CONTACT ASSESSMENT STATUS

LAKE WINNISQUAM - BELMONT TOWN BEACH	Escherichia coli	Cautionary	Limited data for this parameter predicts exceedance of water quality standards or thresholds; however more data are necessary to fully assess the parameter.
LAKE WINNISQUAM - AHERN STATE PARK	Escherichia coli	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large margin.
LAKE WINNISQUAM - BARTLETTS BEACH	Escherichia coli	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large margin.
LAKE WINNISQUAM - SANBORNTON TOWN BEACH	Escherichia coli	Bad	Data periodically exceed water quality standards or thresholds for this parameter by a large margin.

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Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
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Developed-Low Intensity	1.65	Evergreen Forest	11.12	Cultivated Crops	0.52
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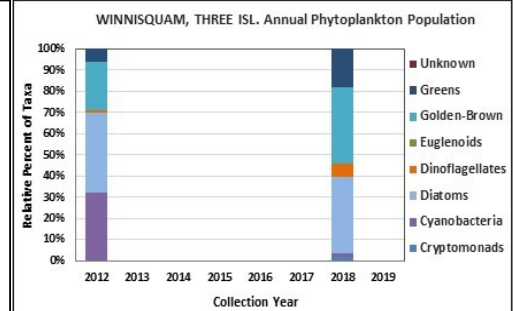
## LAKE WINNISQUAM, THREE ISLAND, LACONIA

### 2019 DATA SUMMARY

**RECOMMENDED ACTIONS:** Lake quality remained representative of high quality conditions, however hypolimnetic phosphorus levels indicate an internal load of phosphorus that is released from bottom sediments as the summer progresses. This could potentially fuel algal and cyanobacteria growth which highlights the importance of reducing phosphorus inputs from external sources such as fertilizers, stormwater runoff and agricultural practices. Consider partnering with Soak Up the Rain NH to identify areas prone to stormwater runoff and implement projects designed to capture and infiltrate stormwater prior to reaching the lake. For more information visit [www.soaknh.org](http://www.soaknh.org). Collect monthly temperature and dissolved oxygen profiles to track dissolved oxygen levels in the hypolimnion as the summer progresses. Keep an eye on chloride levels which indicate road salt is likely impacting the lake. Encourage local winter maintenance companies that apply de-icing materials to roads, parking lots, walkways, and driveways to obtain NH Voluntary Salt Applicator licenses through UNH Technology Transfer Center's Green SnowPro certification program. Keep up the great work!

#### OBSERVATIONS (Refer to Table 1 and Historical Deep Spot Data Graphics)

- **CHLOROPHYLL-A:** Chlorophyll level was slightly elevated in May, decreased to a low level in June, remained stable through August, and then increased slightly in September. Average chlorophyll level increased from 2018 but remained less than the state median and the threshold for oligotrophic lakes. Historical trend analysis indicates relatively stable chlorophyll levels since monitoring began.
- **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) conductivity levels remained slightly elevated and greater than the state median. Epilimnetic chloride levels were greater than the state median, yet much less than the state chronic chloride standard. However, historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity levels since monitoring began.
- **COLOR:** Apparent color measured in the epilimnion indicates the water was clear with little to no tea, or brown, coloring.
- **TOTAL PHOSPHORUS:** Epilimnetic and Metalimnetic phosphorus levels fluctuated within a low range from May through September. Average epilimnetic phosphorus level remained stable with 2018 and was much less than the state median and the threshold for oligotrophic lakes. Historical trend analysis indicates significantly decreasing (improving) epilimnetic phosphorus levels since monitoring began. Hypolimnetic phosphorus level was low from May through July and then increased to slightly elevated levels in August and September.
- **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was below average (worse) in May due to waves, increased (improved) in June, remained stable in July, increased again in August, and then decreased slightly in September. Average NVS transparency decreased from 2018 but remained higher (better) than the state median. Historical trend analysis indicates stable, yet variable, transparency since monitoring began.
- **TURBIDITY:** Epilimnetic, Metalimnetic and Hypolimnetic turbidity levels fluctuated within a low range from May through September.
- **pH:** Epilimnetic, Metalimnetic and Hypolimnetic pH levels were within the desirable range 6.5-8.0 units. Historical trend analysis indicates stable epilimnetic pH levels since monitoring began.



Station Name	Table 1. 2019 Average Water Quality Data for LAKE WINNISQUAM, THREE ISL.								
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Color pcu	Cond. us/cm	Total P mg/l	Trans. m	Turb. ntu	pH
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Epilimnion	9.2	2.36	23	20	107.9	5	6.13	7.11	0.40
Metalimnion					108.4	8			0.50
Hypolimnion					109.4	10			0.63

**NH Median Values:** Median values for specific parameters generated from historic lake monitoring data.

**Alkalinity:** 4.5 mg/L

**Chlorophyll-a:** 4.39 ug/L

**Conductivity:** 42.3 uS/cm

**Chloride:** 5 mg/L

**Total Phosphorus:** 11 ug/L

**Transparency:** 3.3 m

**pH:** 6.6

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**Chloride:** > 230 mg/L (chronic)

**E. coli:** > 88 cts/100 mL – public beach

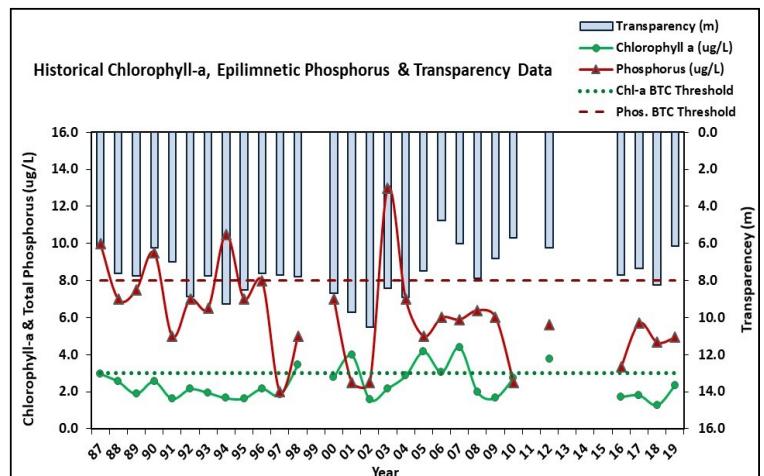
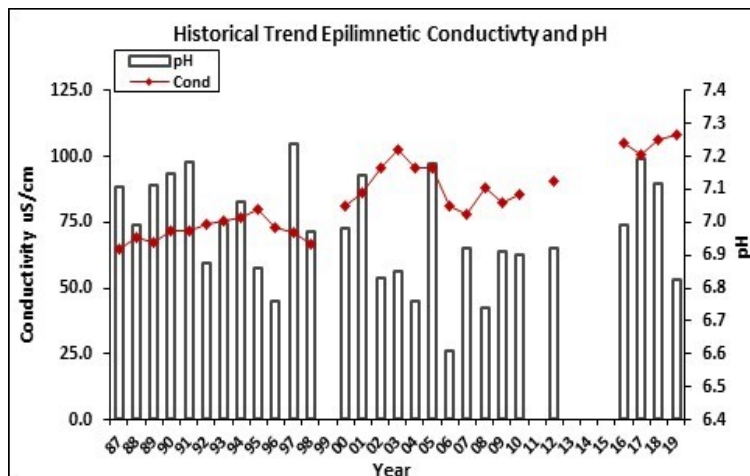
**E. coli:** > 406 cts/100 mL – surface waters

**Turbidity:** > 10 NTU above natural level

**pH:** between 6.5-8.0 (unless naturally occurring)

#### HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
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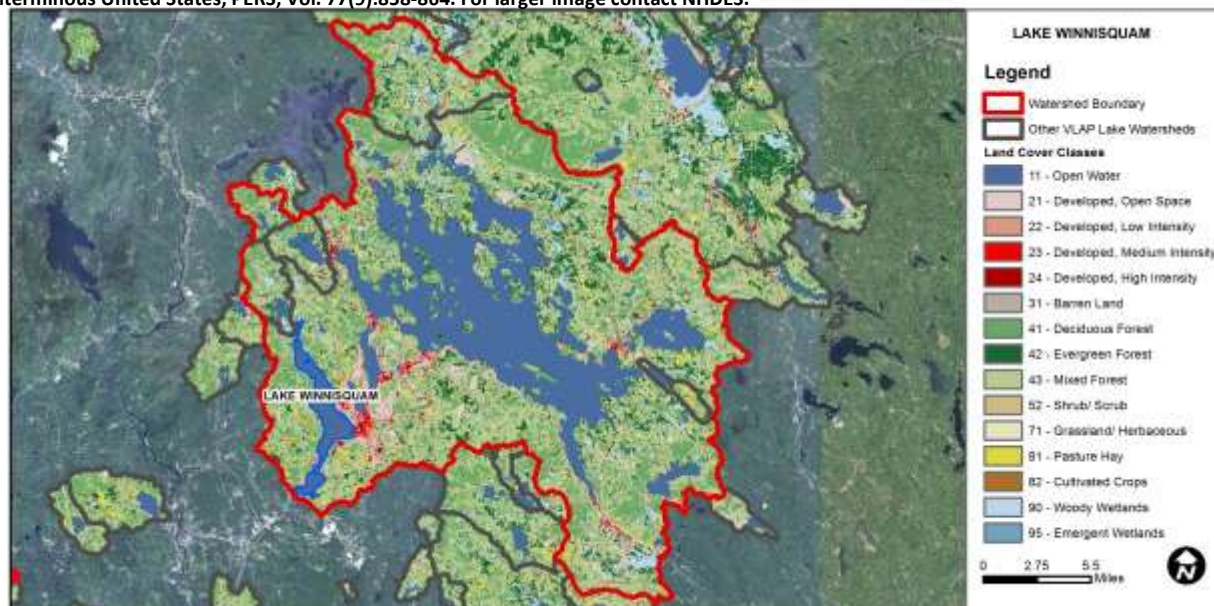
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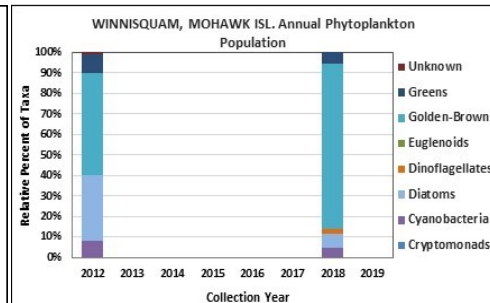
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**RECOMMENDED ACTIONS:** Lake quality remained representative of high quality conditions, however Hypolimnetic phosphorus levels indicate an internal load of phosphorus that is released from bottom sediments as the summer progresses. This could potentially fuel algal and cyanobacteria growth which highlights the importance of reducing phosphorus inputs from external sources such as fertilizers, stormwater runoff and agricultural practices. Consider partnering with Soak Up the Rain NH to identify areas prone to stormwater runoff and implement projects designed to capture and infiltrate stormwater prior to reaching the lake. For more information visit [www.soaknh.org](http://www.soaknh.org). Collect monthly temperature and dissolved oxygen profiles to track dissolved oxygen levels in the Hypolimnion as the summer progresses. Keep an eye on chloride levels which indicate road salt is likely impacting the lake. Encourage local winter maintenance companies that apply de-icing materials to roads, parking lots, walkways, and driveways to obtain NH Voluntary Salt Applicator licenses through UNH Technology Transfer Center's Green SnowPro certification program. Keep up the great work!

#### OBSERVATIONS (Refer to Table 1 and Historical Deep Spot Data Graphics)

- ◆ **CHLOROPHYLL-A:** Chlorophyll levels fluctuated within a low range from May through September. Average chlorophyll level increased slightly from 2018 but remained much less than the state median and the threshold for oligotrophic lakes. Visual inspection of historical data indicates variable chlorophyll levels since monitoring began.
- ◆ **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) conductivity levels remained slightly elevated and greater than the state median. Epilimnetic chloride levels were also greater than the state median, yet much less than the state chronic chloride standard. Visual inspection of historical data indicates increasing (worsening) epilimnetic conductivity levels since monitoring began.
- ◆ **COLOR:** Apparent color measured in the epilimnion indicates the water was clear with little to no tea, or brown, coloring.
- ◆ **TOTAL PHOSPHORUS:** Epilimnetic phosphorus levels fluctuated within a low range and decreased as the summer progressed. Average epilimnetic phosphorus level increased from 2018 but remained less than the state median and the threshold for oligotrophic lakes. Visual inspection of historical data indicates variable phosphorus levels since monitoring began. Metalimnetic phosphorus levels were moderate and stable between May and July, increased slightly in August potentially due to a layer of algae, and then decreased to a low level in September. Hypolimnetic phosphorus levels were moderate in May, increased to an elevated level and remained stable from June through August, and then increased greatly in September indicating release of phosphorus from bottom sediments under anoxic (no dissolved oxygen) conditions.
- ◆ **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was below average (worse) in May due to wave conditions, increased (improved) in June, decreased slightly in July and August, and then increased greatly in September. Average NVS transparency decreased from 2018 but remained higher (better) than the state median. Visual inspection of historical data indicates relatively stable transparency since monitoring began.
- ◆ **TURBIDITY:** Epilimnetic and Metalimnetic turbidity levels fluctuated within a low range. Hypolimnetic turbidity levels were slightly elevated from July through September likely due to the formation and accumulation of organic compounds under anoxic (no dissolved oxygen) conditions.
- ◆ **pH:** Epilimnetic and Metalimnetic pH levels were within the desirable range 6.5-8.0 units. Visual inspection of historical data indicates relatively stable epilimnetic pH levels since monitoring began. Hypolimnetic pH levels were approximately equal to the low end of the desirable range.



Station Name	Table 1. 2019 Average Water Quality Data for LAKE WINNISQUAM, MOHAWK ISL.									
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Color pcu	Cond. us/cm	Total P mg/l	Trans. m		Turb. ntu	pH
							NVS	VS		
Epilimnion	9.3	1.92	24	20	108.8	7	5.50	5.88	0.57	6.97
Metalimnion					108.8	9			0.59	6.90
Hypolimnion					115.4	46			3.66	6.46

**NH Median Values:** Median values for specific parameters generated from historic lake monitoring data.

**Alkalinity:** 4.5 mg/L

**Chlorophyll-a:** 4.39 ug/L

**Conductivity:** 42.3 us/cm

**Chloride:** 5 mg/L

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**Transparency:** 3.3 m

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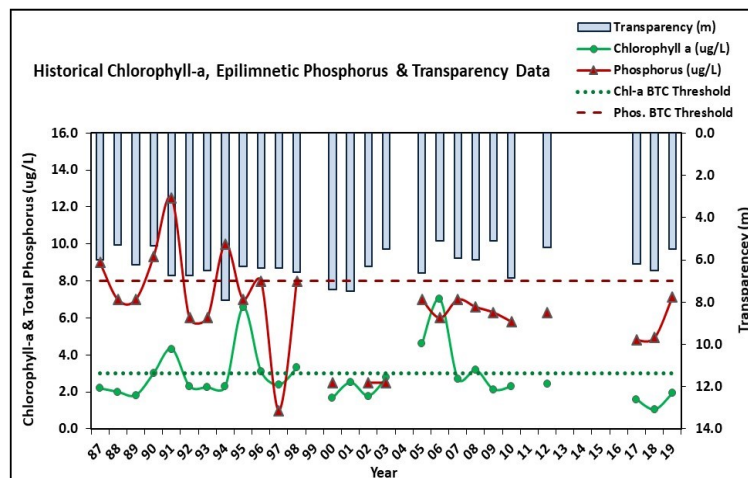
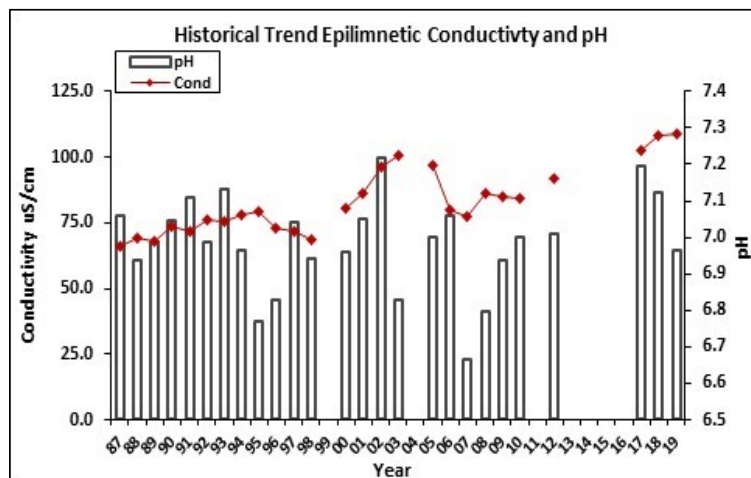
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#### HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	N/A	Ten consecutive years of data necessary for analysis.	Chlorophyll-a	N/A	Ten consecutive years of data necessary for analysis.
pH (epilimnion)	N/A	Ten consecutive years of data necessary for analysis.	Transparency	N/A	Ten consecutive years of data necessary for analysis.
			Phosphorus (epilimnion)	N/A	Ten consecutive years of data necessary for analysis.



# NH Department of Environmental Services Volunteer Lake Assessment Program

## Current Year Chemical and Biological Data

LAKE WINNISQUAM - LACONIA

5/29/2020

Station ID	Station Name	Zone	Depth	Startdate	Activity ID	Color	Cl	Chl-a	ANC	PH	TP	Secchi	Cond	Turb
												NVS		
WSQ10WL	Lake Winnisquam-10 Waldron	Comp	6M	9/9/2019	2019-4933			2.61						
			8M	5/22/2019	2019-420			4.63						
				8/19/2019	2019-4304			1.83						
		Epi	6M	9/9/2019	2019-4932	20	22			6.98	0.0060	7.50	107.60	0.32
			7.5M	7/22/2019	2019-2850	30	23.50	1.90		7.08	0.0088	5.50	109.70	0.86
			8M	5/22/2019	2019-419	20	25.90			6.93	0.0090	5	105.80	
				6/17/2019	2019-1125	30	25	1.26	9	6.74	0.0154	8	104.40	0.46
				8/19/2019	2019-4303	30	30.10		9.10	6.20	0.0090	8.25	106.20	0.87
WSQ30BL	Lake Winnisquam-30 Bartlett	Comp	6M	9/9/2019	2019-4935			2.52						
			8M	5/22/2019	2019-422			3.94						
			8.5M	8/19/2019	2019-4306			1.92						
		Epi		9/9/2019	2019-4934	20	22.60			7.11	0.0065	7.50	107.50	0.49
			7M	6/17/2019	2019-1124	20	23.90	0.88	8.90	6.96	0.0086	7.50	104.70	0.44
			8M	5/22/2019	2019-421	20	25.70			7.04	0.0087	4.50	105.10	
				7/22/2019	2019-2848	20	23.10	1.35		7.04	0.0061	5.50	105.80	0.93
			8.5M	8/19/2019	2019-4305	20	27.40		9	6.39	0.0068	8.25	105.80	0.52

Please Note: pH (units), TP (mg/L) (ND = < 0.005 mg/L), Cond (UMHOS/cm), Secchi (M) VS = ViewScope, NVS=NonViewScope, EC = E. coli (cts/100mL), Turbidity (NTU), ANC (mg/L), Chloride (mg/L), Chl-A (mg/M3), Color is Apparent Color (PCU)

**NH Department of Environmental Services Volunteer Lake Assessment Program  
Current Year Chemical and Biological Data**

LAKE WINNISQUAM - LACONIA

5/29/2020

Please Note: pH (units), TP (mg/L) (ND = < 0.005 mg/L), Cond (UMHOS/cm), Secchi (M) VS = ViewScope, NVS=NonViewScope, EC = E. coli (cts/100mL), Turbidity (NTU),  
ANC (mg/L), Chloride (mg/L), Chl-A (mg/M3), Color is Apparent Color (PCU)