



2023 VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

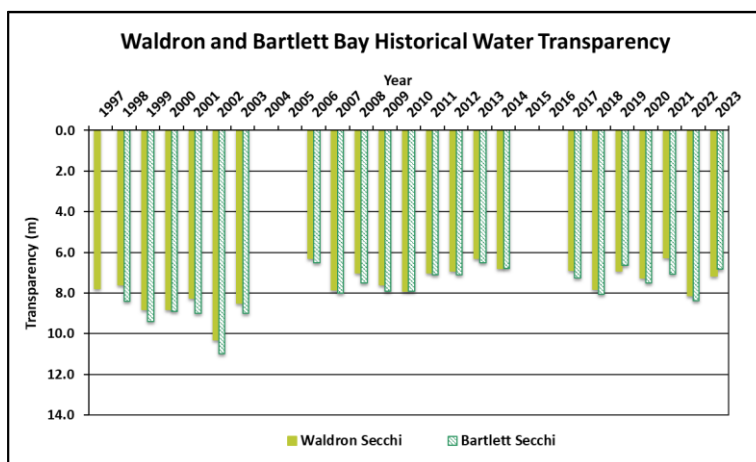
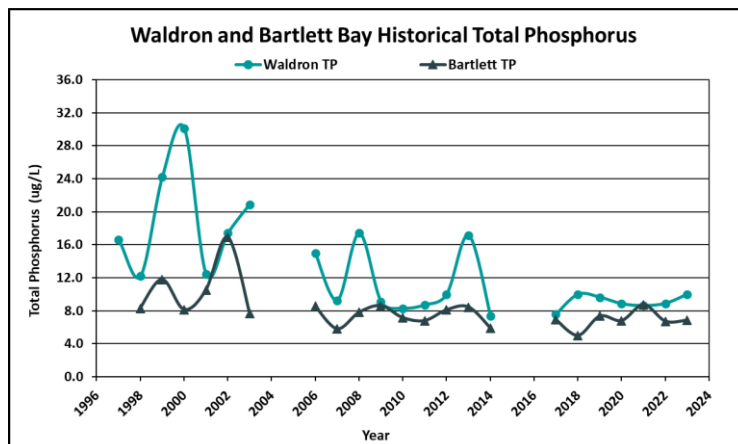
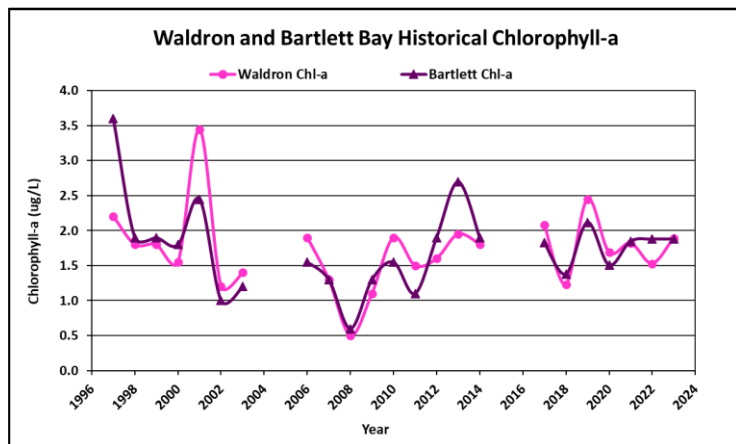
LAKE WINNISQUAM, BARTLETT AND WALDRON BAYS

Recommended Actions: Phosphorus levels at both Bays have improved since monitoring began, which is encouraging. However, water clarity (transparency) has declined (worsened) since monitoring began, and algal growth (chlorophyll) appears to be increasing since 2006. The declining clarity is likely a result of a combination of increased algal growth and the increased frequency and intensity of storm events resulting in stormwater runoff and flushing of waters rich in dissolved organic matter, and a potential increase in boating activities. Excessive summer rainfall in 2023 resulted in higher turbidity levels, poor water clarity, and elevated phosphorus levels at Waldron Bay. This highlights the importance of managing and reducing stormwater runoff to the lake. 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. Keep an eye on chloride levels which indicate road salt is likely impacting the lake. Encourage road agents and winter maintenance companies that apply de-icing materials to roads, parking lots, walkways, and driveways to obtain [Green SnowPro Certification](#). Evaluate culverts and roadside ditches close to the lake in the spring and identify areas in need of cleanup from the application of winter salt/sand mixtures. Encourage cleanup of these areas to prevent runoff into the lake. Keep up the great work!

HISTORICAL WATER QUALITY TREND ANALYSIS

PARAMETER	TREND	PARAMETER	TREND
Conductivity	Stable	Chlorophyll-a	Stable
pH (epilimnion)	Stable	Transparency	Stable
		Phosphorus (epilimnion)	Stable

HISTORICAL WATER QUALITY GRAPHICS





2023 VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

LAKE WINNISQUAM, BARTLETT AND WALDRON BAYS

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

- ◆ **CHLOROPHYLL-A:** Chlorophyll levels at both stations were very low in June, increased in July and remained stable in August. Average chlorophyll levels remained stable at Bartlett Bay and increased slightly at Waldron Bay and were much less than the state median and the threshold for oligotrophic lakes. Visual inspection of historical data indicates stable, yet variable, chlorophyll levels since 1997.
- ◆ **CONDUCTIVITY/CHLORIDE:** Bartlett and Waldron Bay conductivity levels were slightly elevated and greater than the state median. Average conductivity levels decreased at both stations from 2022. Chloride levels were greater than the state median and higher than expected for undisturbed surface waters, but levels did not exceed the state chronic chloride standard.
- ◆ **COLOR:** Apparent color levels at Bartlett and Waldron Bays indicated the water was clear with little to no tea, or brown, coloring.
- ◆ **TOTAL PHOSPHORUS:** Bartlett Bay phosphorus level was within a low range in June and increased gradually through August but remained within a low range. Average Bartlett Bay phosphorus level remained stable with 2022 and was less than the state median and the threshold for oligotrophic lakes. Waldron Bay phosphorus level was low in June, increased to an elevated level in July, and decreased slightly in August. Average Waldron Bay phosphorus level increased from 2022, was slightly less than the state median, and was slightly greater than the threshold for oligotrophic lakes. Visual inspection of historical data indicates decreasing phosphorus levels at both stations.
- ◆ **TRANSPARENCY:** Transparency measured at both stations was high (good) in June, decreased (worsened) to a below average level in July following significant rainfall, and increased (improved) slightly in August. Average transparency at Bartlett and Waldron Bays decreased (worsened) from 2022 but remained much higher (better) than the state median. However, visual inspection of historical data indicates decreasing (worsening) transparency at both stations since monitoring began.
- ◆ **TURBIDITY:** Bartlett and Waldron Bay turbidity levels were slightly elevated in July following significant rainfall and average turbidity levels increased from 2022.
- ◆ **pH:** Bartlett and Waldron Bays pH levels were within the desirable range 6.5-8.0 units.

Table 1. 2023 Average Water Quality Data for LAKE WINNISQUAM, BARTLETT & WALDRON BAYS

Station Name	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Color pcu	Cond. us/cm	Total P ug/l	Trans. m	Turb. ntu	pH
Bartlett-Epilimnion	9.4	1.88	23	13	115.0	7	6.83	0.71	7.13
Waldron-Epilimnion	9.3	1.89	26	14	116.7	10	7.17	0.99	7.05

NH Median Values

Median values 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. Water quality violation if thresholds exceeded.

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



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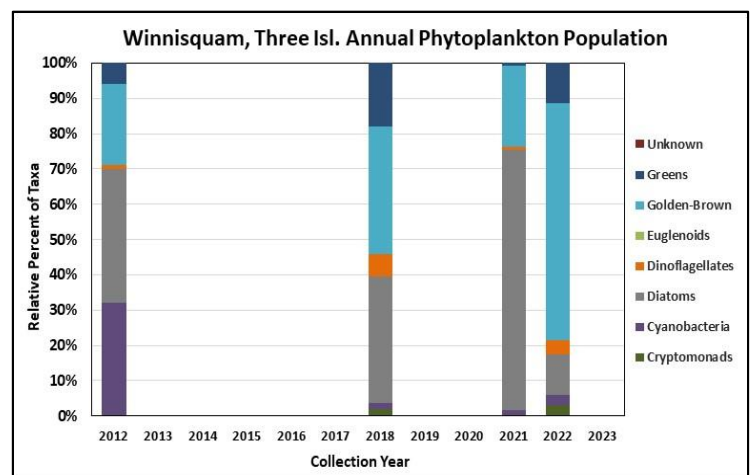
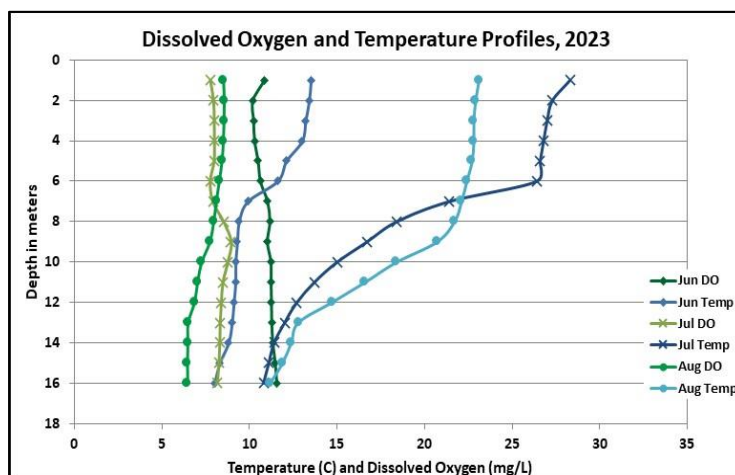
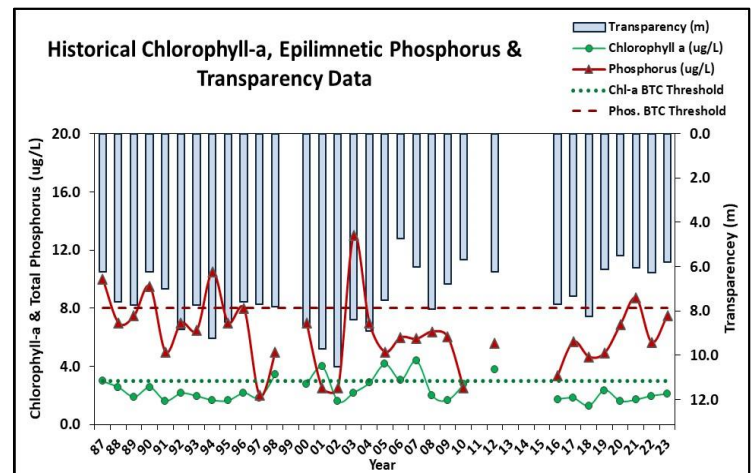
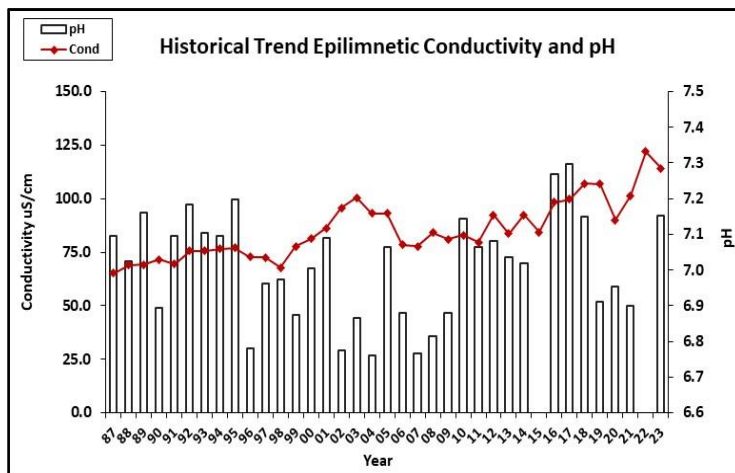
WINNISQUAM LAKE, THREE ISL., LACONIA

Recommended Actions: Great job sampling in 2023! Lake quality remained representative of high-quality conditions. However, phosphorus levels were higher in May following spring runoff and in July following excessive rainfall. Evaluate stormwater runoff and exotic species management activities within this sub-watershed and potential impacts on water quality. 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. 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 [Green SnowPro](#) certification. Evaluate culverts and roadside ditches close to the lake in the spring and identify areas in need of cleanup from application of winter salt/sand mixtures. Encourage cleanup of these areas to prevent runoff into the lake. Continue efforts to implement the watershed management plan. Keep up the great work!

HISTORICAL WATER QUALITY TREND ANALYSIS

PARAMETER	TREND	PARAMETER	TREND
Conductivity	Worsening	Chlorophyll-a	Stable
pH (epilimnion)	Stable	Transparency	Worsening
Phosphorus (hypolimnion)	Improving	Phosphorus (epilimnion)	Stable

HISTORICAL WATER QUALITY GRAPHICS





2023 VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

WINNISQUAM LAKE, THREE ISL., LACONIA

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

- ◆ **CHLOROPHYLL-A:** Chlorophyll level was low in May, decreased in June, increased in July, and decreased slightly in August. Average chlorophyll level remained stable with 2022 and was less than the state median and the threshold for oligotrophic lakes. Historical trend analysis indicates stable chlorophyll levels since monitoring began.
- ◆ **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) conductivity levels were 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. 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 phosphorus level was slightly elevated in May, decreased in June, increased in July, and decreased in August. Average epilimnetic phosphorus level increased from 2022 and was less than the state median and the threshold for oligotrophic lakes. Historical trend analysis indicates stable, yet variable, epilimnetic phosphorus levels since monitoring began. Metalimnetic phosphorus level was low and remained stable from May through August. Hypolimnetic phosphorus level fluctuated within a low range. Historical trend analysis indicates that significantly decreasing (improving) hypolimnetic phosphorus levels since monitoring began.
- ◆ **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was below average (worse) in May due to white cap conditions, increased (improved) greatly in June, decreased to below average range again in July due to high waves, and decreased slightly in August. Average NVS transparency decreased from 2022 but remained higher (better) than the state median. However, historical trend analysis indicates significantly decreasing (worsening) NVS transparency since monitoring began.
- ◆ **TURBIDITY:** Epilimnetic turbidity level fluctuated within a low range but was highest in July following significant rainfall. Metalimnetic and Hypolimnetic turbidity levels fluctuated within low ranges.
- ◆ **pH:** Epilimnetic, Metalimnetic and Hypolimnetic pH levels were within the desirable range 6.5-8.0 units and historical trend analysis indicates stable, yet variable, epilimnetic pH levels since monitoring began.

Table 1. 2023 Average Water Quality Data for LAKE WINNISQUAM, THREE ISL

Station Name	Alk. (mg/L)	Chlor-a (ug/L)	Chloride (mg/L)	Color (pcu)	Cond. (us/cm)	Total P (ug/L)	Trans. (m)		Turb. (ntu)	pH
							NVS	VS		
Epilimnion	9.2	2.10	24	19	116.30	7	5.81	6.92	0.51	6.94
Metalimnion	-	-	-	-	119.30	8	-	-	0.55	6.75
Hypolimnion	-	-	-	-	121.00	9	-	-	0.44	6.66

NH Median Values

Median values 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. Water quality violation if thresholds exceeded.

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



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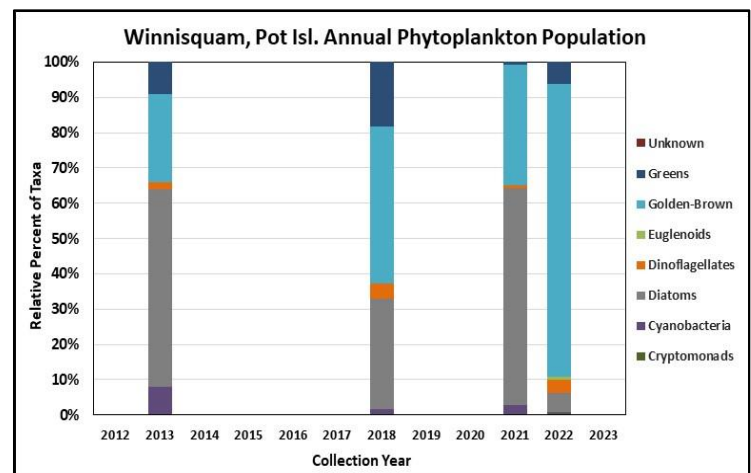
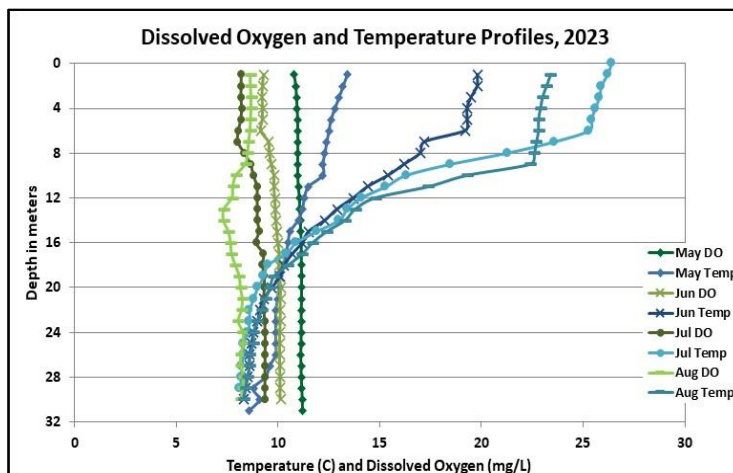
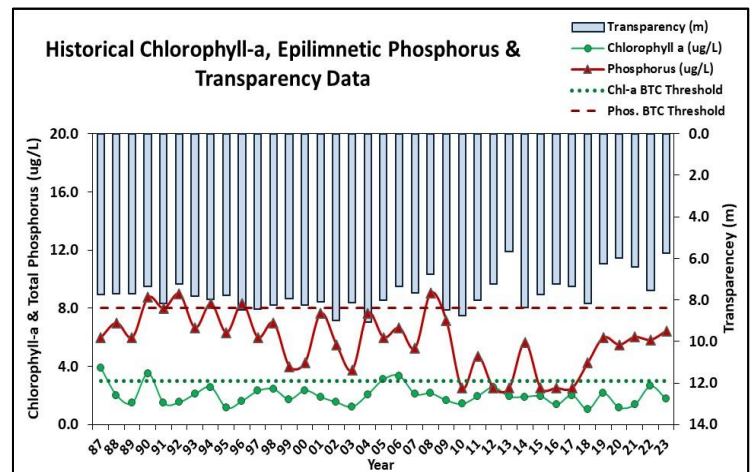
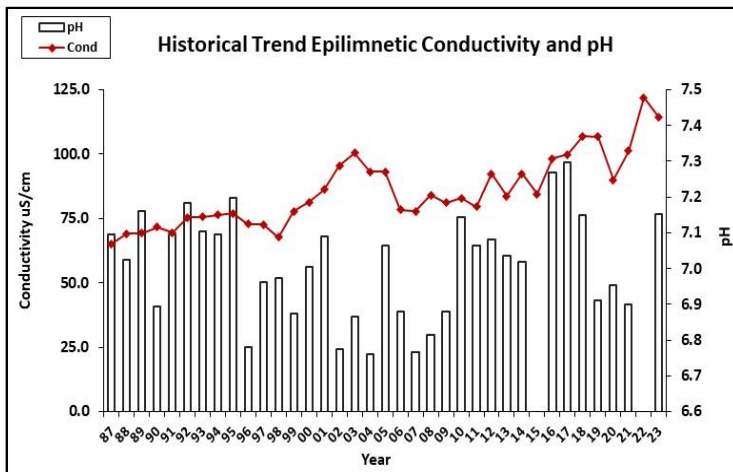
LAKE WINNISQUAM, POT ISL., LACONIA

Recommended Actions: Great job sampling in 2023! Lake quality remained representative of high-quality conditions despite the excessive summer rainfall. The improving epilimnetic and hypolimnetic phosphorus levels are encouraging. However, epilimnetic and hypolimnetic phosphorus levels have remained within a higher range since 2019. Lake water clarity (transparency) has significantly decreased, and turbidity levels have historically increased following storm events. 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. 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 [Green SnowPro](#) certification. Evaluate culverts and roadside ditches close to the lake in the spring and identify areas in need of cleanup from application of winter salt/sand mixtures. Encourage cleanup of these areas to prevent runoff into the lake. Continue efforts to implement the watershed management plan. Keep up the great work!

HISTORICAL WATER QUALITY TREND ANALYSIS

PARAMETER	TREND	PARAMETER	TREND
Conductivity	Worsening	Chlorophyll-a	Stable
pH (epilimnion)	Stable	Transparency	Worsening
Phosphorus (hypolimnion)	Improving	Phosphorus (epilimnion)	Improving

HISTORICAL WATER QUALITY GRAPHICS





2023 VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

LAKE WINNISQUAM, POT ISL., LACONIA

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

- ◆ **CHLOROPHYLL-A:** Chlorophyll level was low in May, decreased in June, and increased in July and August but remained within a low range. Average chlorophyll level decreased from 2022 and was less than the state median and the threshold for oligotrophic lakes. Historical trend analysis indicates stable chlorophyll levels since monitoring began.
- ◆ **CONDUCTIVITY/CHLORIDE:** Epilimnetic (upper water layer), Metalimnetic (middle water layer) and Hypolimnetic (lower water layer) conductivity levels were 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. 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 phosphorus level was slightly elevated in May, decreased to a low level in June, increased slightly in July, and decreased in August. Average epilimnetic phosphorus level increased slightly from 2022 but remained 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. Metalimnetic phosphorus level was stable and low. Hypolimnetic phosphorus level slightly elevated in May. Historical trend analysis indicates significantly decreasing (improving) hypolimnetic phosphorus levels since monitoring began.
- ◆ **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was below average (worse) in May due to white cap conditions, increased (improved) greatly in June, decreased to below average range again in July due to high waves, and increased slightly in August. Average NVS transparency decreased from 2022 but remained higher (better) than the state median. However, historical trend analysis indicates significantly decreasing (worsening) NVS transparency since monitoring began.
- ◆ **TURBIDITY:** Epilimnetic turbidity level fluctuated within a low range but was highest in July following significant rainfall. Metalimnetic and Hypolimnetic turbidity levels fluctuated within low ranges.
- ◆ **pH:** Epilimnetic, Metalimnetic and Hypolimnetic pH levels were within the desirable range 6.5-8.0 units and historical trend analysis indicates stable, yet variable, epilimnetic pH levels since monitoring began.

Table 1. 2023 Average Water Quality Data for LAKE WINNISQUAM, POT ISL

Station Name	Alk. (mg/L)	Chlor-a (ug/L)	Chloride (mg/L)	Color (pcu)	Cond. (us/cm)	Total P (ug/L)	Trans. (m)		Turb. (ntu)	pH
							NVS	VS		
Epilimnion	9.1	1.75	22	11	114.2	6	5.75	6.29	0.53	7.15
Metalimnion	-	-	-	-	119.4	8	-	-	0.52	6.86
Hypolimnion	-	-	-	-	120.4	8	-	-	0.58	6.75

NH Median Values

Median values 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. Water quality violation if thresholds exceeded.

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



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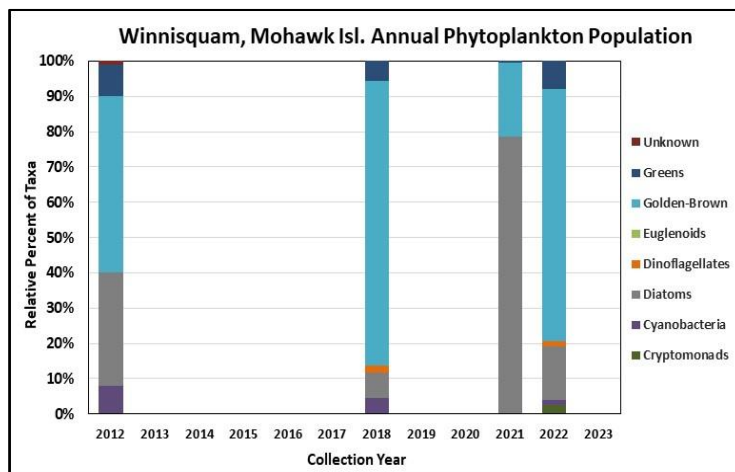
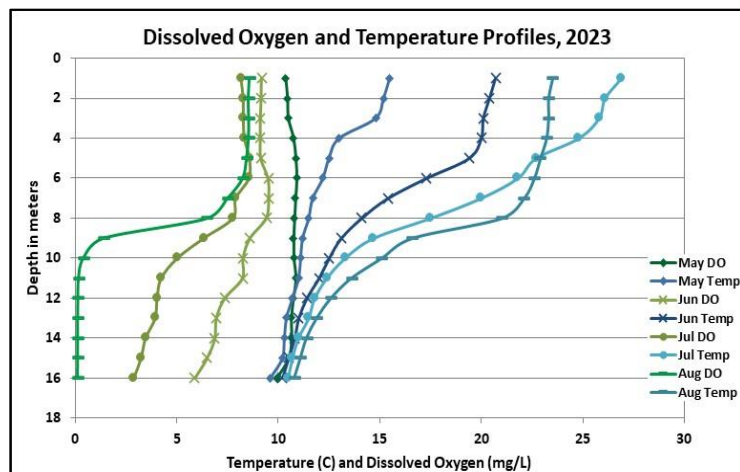
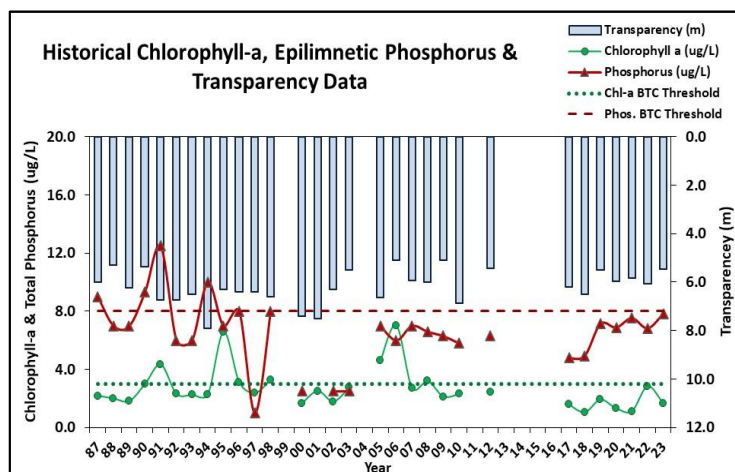
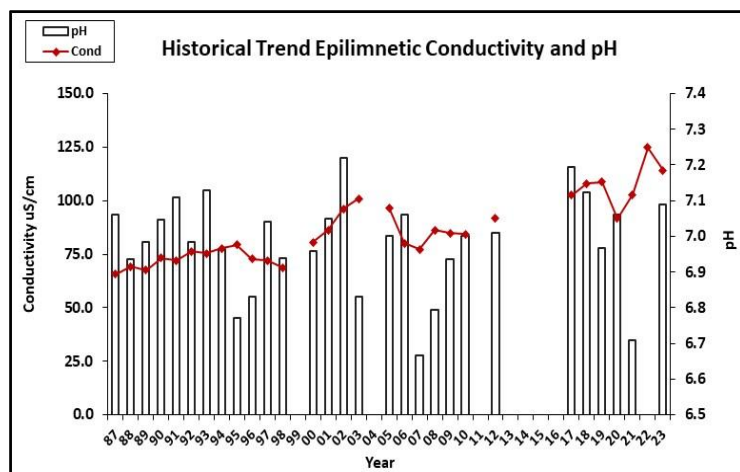
LAKE WINNISQUAM, MOHAWK ISL., BELMONT

Recommended Actions: Great job sampling in 2023! Lake quality remained representative of high-quality conditions despite the excessive summer rainfall. However, Hypolimnetic phosphorus levels indicate a potential internal load of phosphorus that is released from bottom sediments in late summer when dissolved oxygen levels are depleted below 1.0 mg/L as indicated in the August dissolved oxygen profile. An internal load of phosphorus 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. 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 [Green SnowPro](#) certification. Evaluate culverts and roadside ditches close to the lake in the spring and identify areas in need of cleanup from application of winter salt/sand mixtures. Encourage cleanup of these areas to prevent runoff into the lake. Keep up the great work!

HISTORICAL WATER QUALITY TREND ANALYSIS

PARAMETER	TREND	PARAMETER	TREND
Conductivity	Worsening	Chlorophyll-a	Stable
pH (epilimnion)	Stable	Transparency	Stable
Phosphorus (hypolimnion)	Stable	Phosphorus (epilimnion)	Stable

HISTORICAL WATER QUALITY GRAPHICS





2023 VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS

LAKE WINNISQUAM, MOHAWK ISL., BELMONT

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

- ◆ **CHLOROPHYLL-A:** Chlorophyll level was low in May, decreased in June, increased in July, and decreased in August. Average chlorophyll level decreased from 2022 and was 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 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 fluctuated within a clear range with little to no tea, or brown, coloring.
- ◆ **TOTAL PHOSPHORUS:** Epilimnetic phosphorus level was slightly elevated in May, decreased to a low level in June, increased slightly in July, and remained stable in August. Average epilimnetic phosphorus level increased from 2022, was less than the state median, and was approximately equal to the threshold for oligotrophic lakes. Metalimnetic and Hypolimnetic phosphorus levels were slightly elevated in July and elevated in August potentially indicating a layer of algal/cyanobacteria growth in Metalimnetic waters and/or release of phosphorus from bottom sediments under anoxic (low dissolved oxygen) conditions. Historical trend analysis indicates stable, yet variable, epilimnetic and hypolimnetic phosphorus levels since monitoring began.
- ◆ **TRANSPARENCY:** Transparency measured with (VS) and without (NVS) the viewscope was below average (worse) in May due to white cap conditions, increased (improved) greatly in June, decreased to below average range again in July due to high waves, and increased in August. Average NVS transparency decreased from 2022 but remained higher (better) than the state median. Historical trend analysis indicates stable NVS transparency since monitoring began.
- ◆ **TURBIDITY:** Epilimnetic turbidity levels fluctuated within a low range but were highest in May and July when wave action was high. Metalimnetic turbidity level was elevated in August likely due to a layer of algal/cyanobacteria growth. Hypolimnetic turbidity level was also elevated in August likely due to formation and accumulation of organic compounds under anoxic conditions.
- ◆ **pH:** Epilimnetic, Metalimnetic and Hypolimnetic pH levels were within the desirable range 6.5-8.0 units. Historical trend analysis indicates stable, yet variable, epilimnetic pH levels since monitoring began.

Table 1. 2023 Average Water Quality Data for LAKE WINNISQUAM, MOHAWK ISL

Station Name	Alk. (mg/L)	Chlor-a (ug/L)	Chloride (mg/L)	Color (pcu)	Cond. (us/cm)	Total P (ug/L)	Trans. (m)		Turb. (ntu)	pH
							NVS	VS		
Epilimnion	9.2	1.68	23	8	114.2	8	5.48	6.06	0.56	7.09
Metalimnion	-	-	-	-	122.7	11	-	-	1.00	6.72
Hypolimnion	-	-	-	-	123.3	13	-	-	1.58	6.52

NH Median Values

Median values generated from historic lake monitoring data.

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pH: between 6.5-8.0 (unless naturally occurring)