



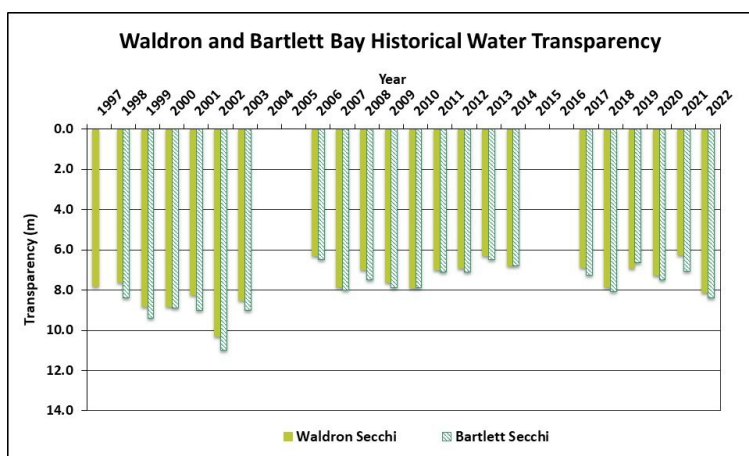
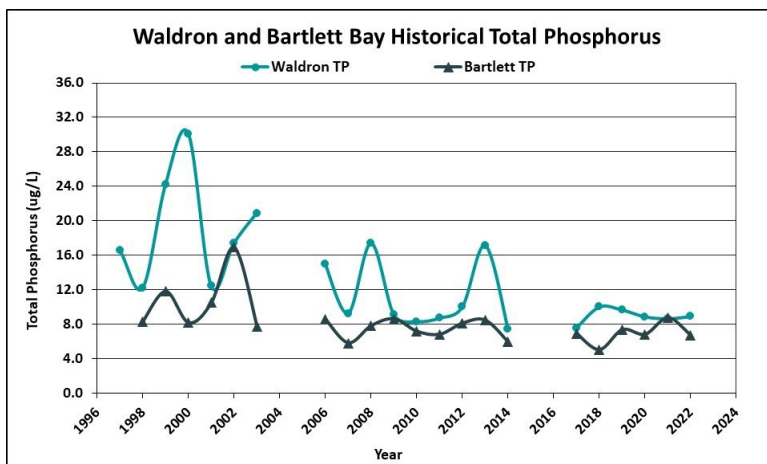
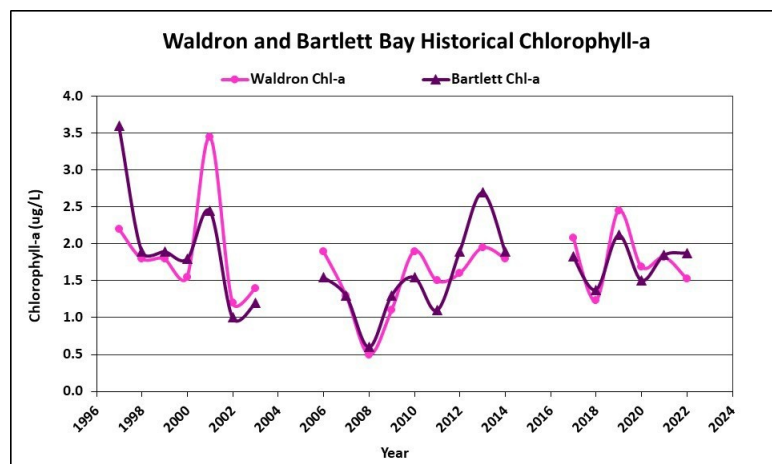
Volunteer Lake Assessment Program Individual Lake Reports

Lake Winnisquam, Bartlett and Waldron Bays

2022 Data Summary

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 that impart a brown or tea color to the water. Drought conditions in 2022 saw lighter water color and improved water clarity. 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 clean up of these areas to prevent runoff into the lake. Keep up the great work!

Historical Water Quality Graphics



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

- **Chlorophyll-a:** Chlorophyll levels at Bartlett and Waldron Bays were within a low range in July and increased slightly in August but remained within a low range. Average chlorophyll levels at Bartlett Bay remained stable with 2021. Average chlorophyll level at Waldron Bay decreased from 2021. Average levels at both stations were 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 increased at both stations from 2021. 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 coloring.
- **Total Phosphorus:** Bartlett Bay phosphorus level was within a low range in July and remained stable in August. Average Bartlett Bay phosphorus level decreased from 2021 and was less than the state median and the threshold for oligotrophic lakes. Waldron Bay phosphorus level was slightly elevated in July and decreased to a low level in August. Average Waldron Bay phosphorus level remained stable with 2021, 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 within an above average (good) range in July and increased (improved) in August. Average transparency at Bartlett and Waldron Bays increased (improved) from 2021 and 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 fluctuated within a low to average range for those stations and remained stable with 2021.
- **pH:** Bartlett and Waldron Bays pH levels were within the desirable range 6.5-8.0 units.

Station Name	Table 1. 2020 Average Water Quality Data for LAKE WINNISQUAM, BARTLETT & WALDRON BAYS								
	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	9.2	1.88	29	10	123.8	7	8.38	0.52	7.30
Waldron-Epilimnion	9.3	1.53	26	10	121.1	9	8.13	0.41	7.27

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)



Volunteer Lake Assessment Program Individual Lake Reports

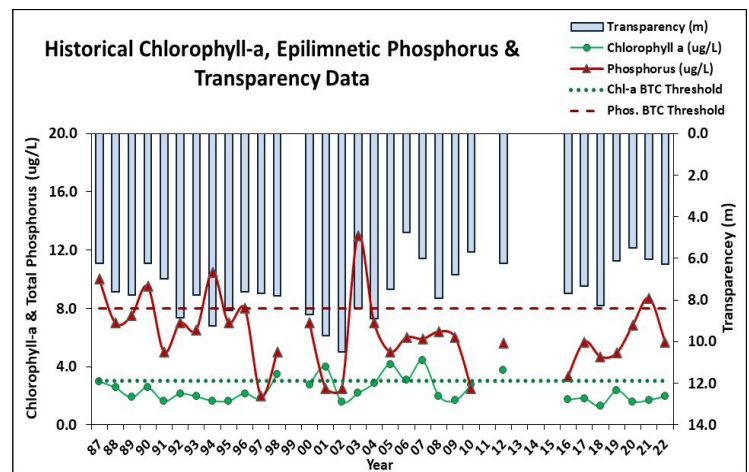
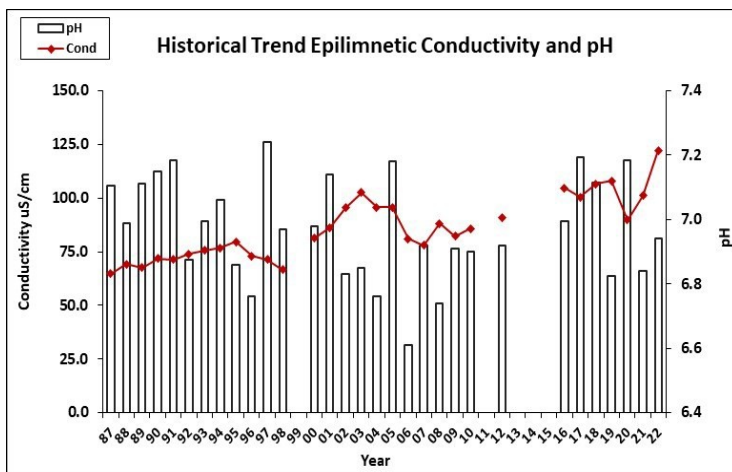
Winnisquam Lake, Three Isl., Laconia

2022 Data Summary

Recommended Actions: Great job sampling in 2022! Lake quality remained representative of high quality conditions. However, phosphorus levels were generally elevated in May following spring runoff and during high water levels. 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 clean up of these areas to prevent runoff into the lake. Continue efforts to implement the watershed management plan. Keep up the great work!

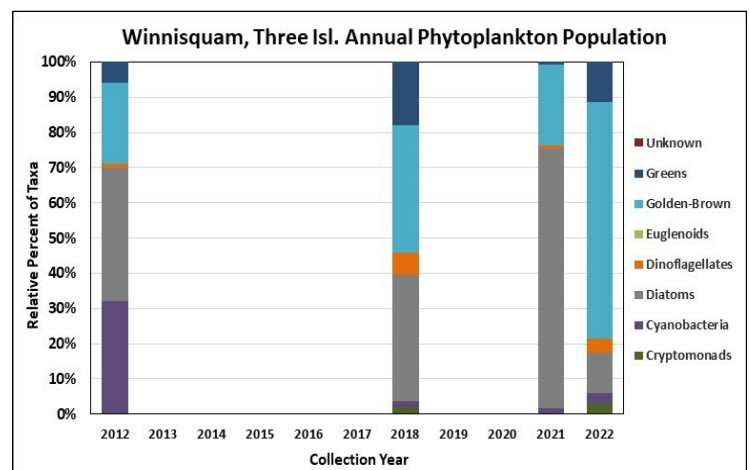
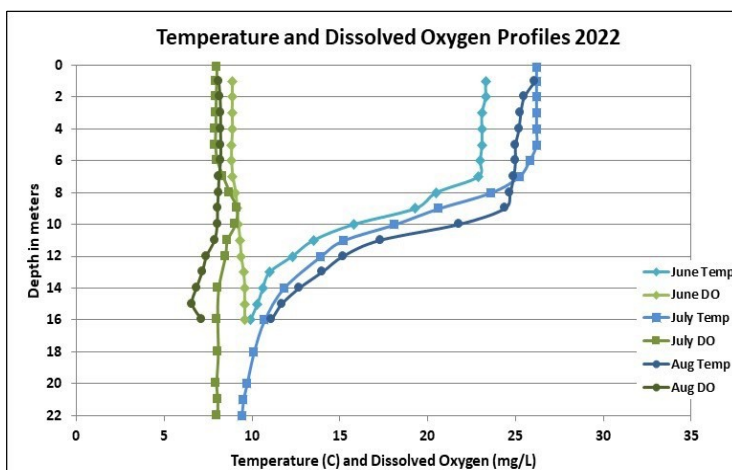
Historical Water Quality Trend Analysis

Parameter	Trend	Parameter	Trend
Conductivity	Worsening	Chlorophyll-a	Stable
pH (epilimnion)	Stable	Transparency	Stable
		Phosphorus (epilimnion)	Stable



Dissolved Oxygen and Phytoplankton

(Note: Information may not be collected annually)





Volunteer Lake Assessment Program Individual Lake Reports

Winnisquam Lake, Three Isl., Laconia

2022 Data Summary

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

- **Chlorophyll-a:** Chlorophyll level was within a low range in May, increased slightly in June, decreased slightly in July, and increased slightly in August but remained within a low range. Average chlorophyll level increased slightly from 2021 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 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 to low level in June, decreased further in July, and increased slightly in August but remained within a low range. Average epilimnetic phosphorus level decreased from 2021 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 elevated in May, decreased to a low level in June, increased slightly in July, and remained stable in August. Hypolimnetic phosphorus level fluctuated within a low range.
- **Transparency:** Transparency measured without the viewscope (NVS) was within an average (good) range in May, decreased (worsened) to a below average range in June due to wave conditions, increased (improved) in July, and decreased in August. Average NVS transparency increased slightly from 2021 and was higher (better) than the state median. Historical trend analysis indicates stable, yet variable, NVS transparency since monitoring began. Viewscope (VS) transparency was much higher (better) than NVS transparency and a better measure of actual conditions.
- **Turbidity:** Epilimnetic, Metalimnetic and Hypolimnetic turbidity levels fluctuated within a low range.
- **pH:** Epilimnetic, Metalimnetic and Hypolimnetic pH levels were within the desirable range 6.5-8.0 units. Historical trend analysis indicates relatively stable epilimnetic pH levels since monitoring began.

Station Name	Table 1. 2022 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 (ug/L)	Trans. (m)		Turb. (ntu)	pH
							NVS	VS		
Epilimnion	8.9	1.96	25	15	122.2	6	6.26	8.03	0.31	6.94
Metalimnion					123.3	9			0.44	6.78
Hypolimnion					122.2	8			0.38	6.62

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)

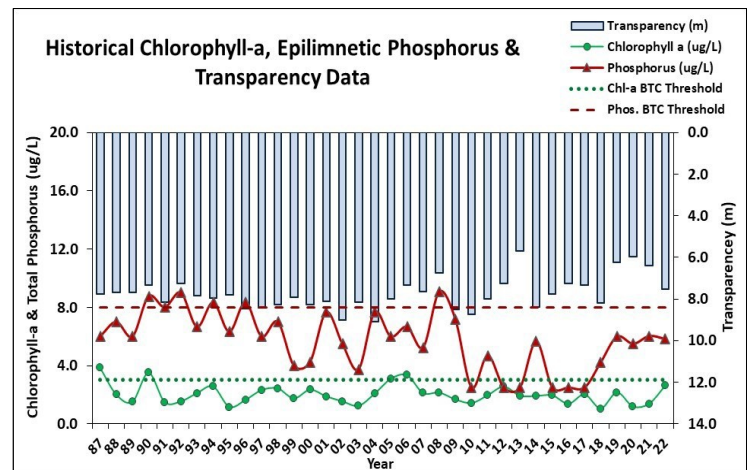
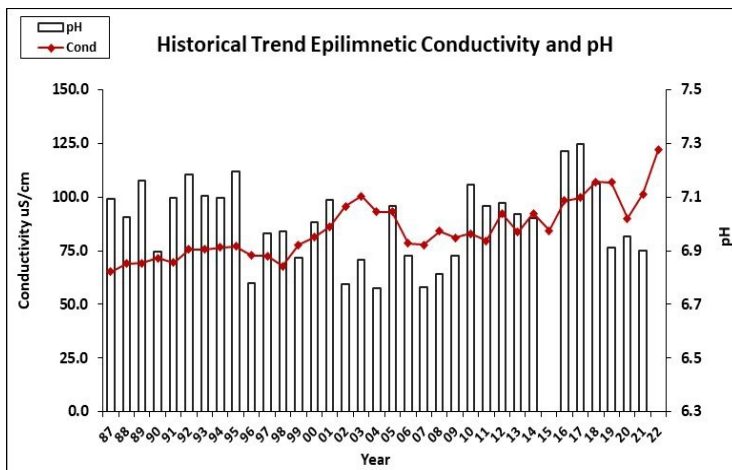


Volunteer Lake Assessment Program Individual Lake Reports Winnisquam Lake, Pot Isl., Laconia 2022 Data Summary

Recommended Actions: Great job sampling in 2022! Lake quality remained representative of high quality conditions. The improving phosphorus levels, particularly since 2010, are encouraging. However Epilimnetic phosphorus levels have remained within a higher range since 2019, and Epilimnetic and Metalimnetic phosphorus levels were elevated in May following spring runoff and when lake water levels were high. 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 clean up of these areas to prevent runoff into the lake. Continue efforts to implement the watershed management plan. Keep up the great work!

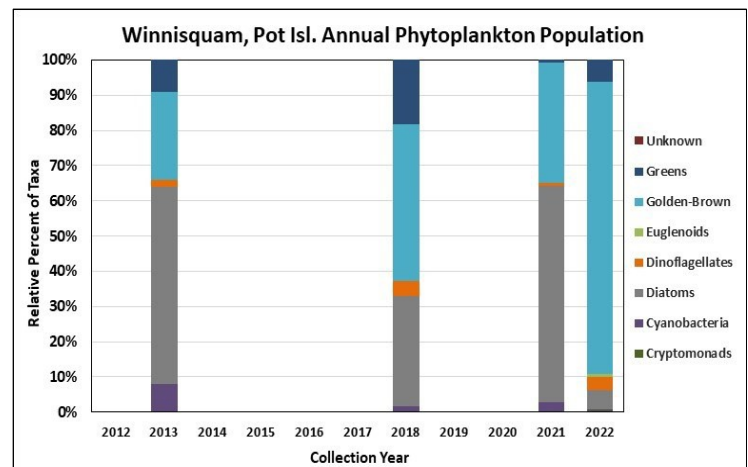
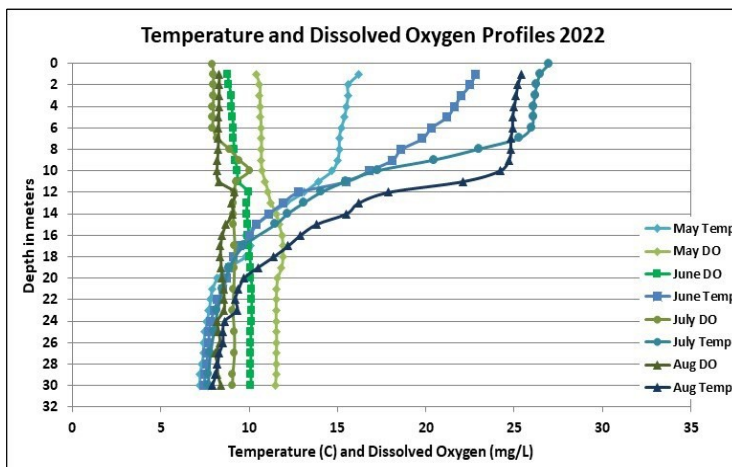
Historical Water Quality Trend Analysis

Parameter	Trend	Parameter	Trend
Conductivity	Worsening	Chlorophyll-a	Stable
pH (epilimnion)	Stable	Transparency	Worsening
		Phosphorus (epilimnion)	Improving



Dissolved Oxygen and Phytoplankton

(Note: Information may not be collected annually)





Volunteer Lake Assessment Program Individual Lake Reports

Winnisquam Lake, Pot Isl., Laconia

2022 Data Summary

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

- **Chlorophyll-a:** Chlorophyll level was elevated in May, decreased to a low level in June, remained stable in July, and increased slightly in August. Average chlorophyll level increased from 2021 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, decreased in July, and increased slightly in August. Average epilimnetic phosphorus level remained stable with 2021 and was 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 elevated in May and decreased gradually to a low level as the summer progressed. Hypolimnetic phosphorus level was slightly elevated in May, decreased to a low level in June, and increased gradually through August but remained within a low range.
- **Transparency:** Transparency measured without the viewscope (NVS) was slightly below average (worse) in May due to wave conditions, remained stable in June, and then increased (improved) to an average range in July and August. Average NVS transparency increased (improved) from 2021 and was higher (better) than the state median. Historical trend analysis indicates significantly decreasing (worsening) NVS transparency since monitoring began. Viewscope (VS) transparency was generally much higher (better) than NVS transparency and a better measure of actual conditions.
- **Turbidity:** Epilimnetic turbidity level was slightly above average in May due to elevated algal growth and then decreased to low levels through August. Metalimnetic and Hypolimnetic turbidity levels fluctuated within a low range.
- **pH:** Epilimnetic pH data were invalidated due to a laboratory instrument error and we apologize for the inconvenience. Metalimnetic and Hypolimnetic pH levels were within the desirable range 6.5-8.0 units. Historical trend analysis indicates relatively stable epilimnetic pH levels since monitoring began.

Station Name	Table 1. 2022 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 (ug/L)	Trans. (m)		Turb. (ntu)	pH
							NVS	VS		
Epilimnion	9.1	2.64	25	15	122.0	6	7.54	8.46	0.38	
Metalimnion					122.4	10			0.33	6.96
Hypolimnion					121.3	7			0.22	6.67

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)

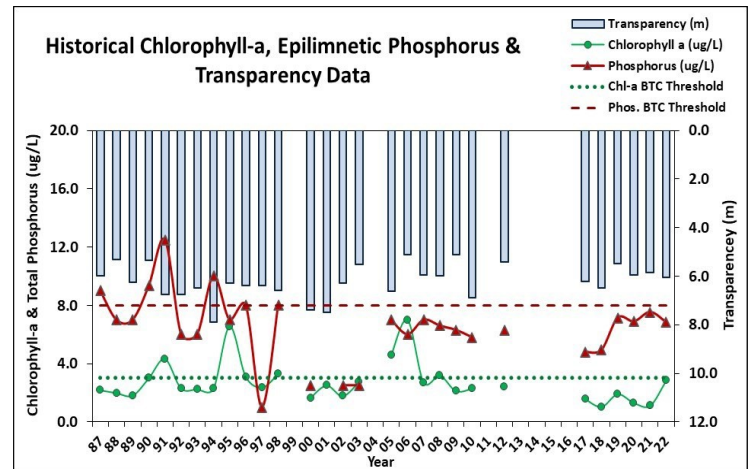
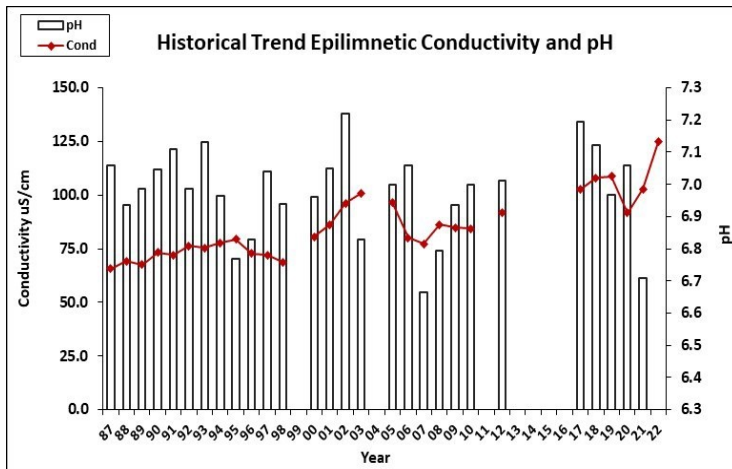


Volunteer Lake Assessment Program Individual Lake Reports Winnisquam Lake, Mohawk Isl., Belmont 2022 Data Summary

Recommended Actions: Great job sampling in 2022! Lake quality remained representative of high quality conditions, 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 clean up of these areas to prevent runoff into the lake. Keep up the great work!

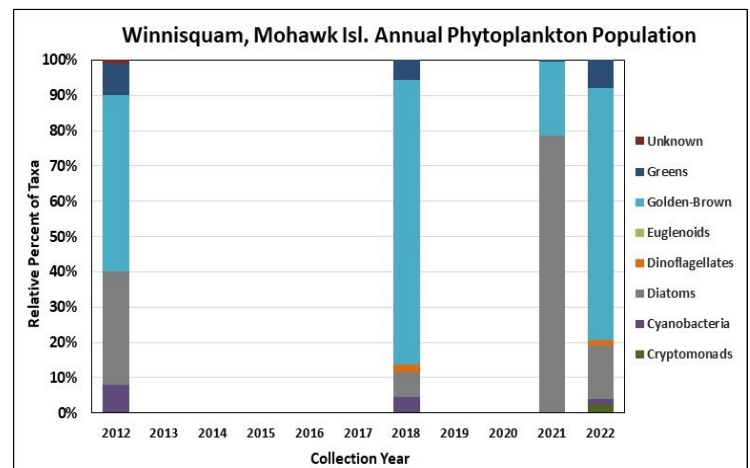
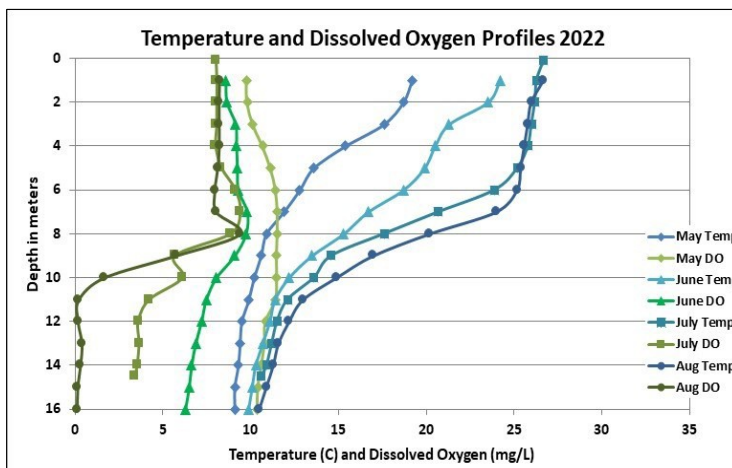
Historical Water Quality Trend Analysis

Parameter	Trend	Parameter	Trend
Conductivity	N/A	Chlorophyll-a	N/A
pH (epilimnion)	N/A	Transparency	N/A
		Phosphorus (epilimnion)	N/A



Dissolved Oxygen and Phytoplankton

(Note: Information may not be collected annually)





Volunteer Lake Assessment Program Individual Lake Reports

Winnisquam Lake, Mohawk Isl., Belmont

2022 Data Summary

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

- **Chlorophyll-a:** Chlorophyll level was within a very low range in May, increased slightly in June, increased to an elevated level in July, and then decreased to a low level in August. Average chlorophyll level increased from 2021, was less than the state median, and was approximately equal to 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 greater than the state median, yet less than the state chronic chloride standard. However, 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 level was slightly elevated in May, decreased to a low level in June, remained stable in July, and increased slightly in August. Average epilimnetic phosphorus level decreased slightly from 2021 and was less than the state median and the threshold for oligotrophic lakes. Visual inspection of historical data indicates relatively stable epilimnetic phosphorus levels since monitoring began. Metalimnetic phosphorus level was elevated in May but decreased to moderate levels from June through August. Hypolimnetic phosphorus level was elevated in August and the turbidity of the sample was also slightly elevated suggesting a potential internal load of phosphorus from bottom sediments under anoxic (low dissolved oxygen) conditions.
- **Transparency:** Transparency measured without the viewscope (NVS) was above average (good) in May, decreased to an average level in June, decreased (worsened) in July when algal growth was elevated, and increased (improved) slightly in August. Average NVS transparency increased (improved) slightly from 2021 and was higher (better) than the state median. Visual inspection of historical data indicates stable NVS transparency since monitoring began. Viewscope (VS) transparency was generally higher (better) than NVS transparency and a better measure of actual conditions.
- **Turbidity:** Epilimnetic and Metalimnetic turbidity levels fluctuated within a low range. Hypolimnetic turbidity level was slightly elevated in August indicating the formation and accumulation of organic compounds under anoxic conditions.
- **pH:** Epilimnetic pH data was invalidated due to a laboratory instrument error and we apologize for the inconvenience. Metalimnetic pH level was within the desirable range 6.5-8.0 units. Hypolimnetic pH level was slightly less than desirable.

Station Name	Table 1. 2022 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 (ug/L)	Trans. (m)		Turb. (ntu)	pH
							NVS	VS		
Epilimnion	9.2	2.84	25	12	124.9	7	6.06	6.91	0.36	
Metalimnion					122.6	12			0.56	6.78
Hypolimnion					124.7	13			1.07	6.38

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)