

# Hattie 11-0232-00

MN Lake ID: 11-0232-00  
 County: Cass  
 Ecoregion: Northern Lakes and Forests  
 Major Drainage Basin: Upper Mississippi River  
 Latitude/Longitude: N/A  
 Water Body Type: Public Waters  
 Monitored Sites (Primary): 202  
 Monitored Sites (Secondary): 201, 203, 204, 205

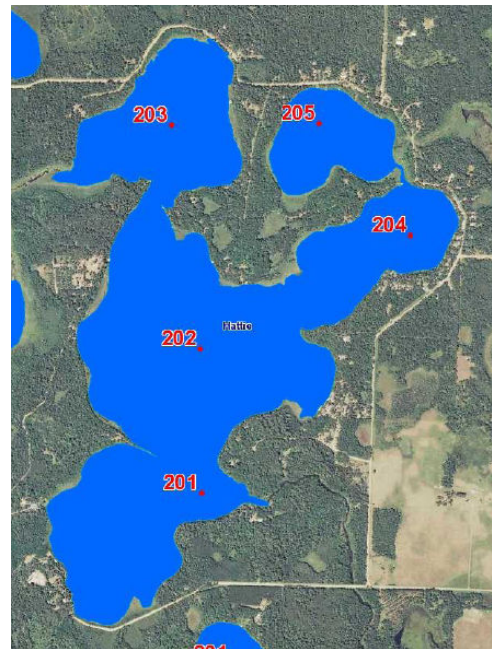
## Physical Characteristics

Surface area (acres): 484  
 Littoral area (acres): 198  
 % Littoral area: 41  
 Max depth (ft): 30 (m): 9.1  
 Mean depth (ft): N/A (m): N/A  
 Watershed size (acres): N/A

## Water Quality Characteristics - Historical Means

Years monitored: 2007-2009

Parameters	Primary Site 202
<b>Total Phosphorus Mean:</b>	18.9
<b>Total Phosphorus Min:</b>	12
<b>Total Phosphorus Max:</b>	37
<b>Number of Observations:</b>	14
<b>Chlorophyll-a Mean:</b>	8.3
<b>Chlorophyll-a Min:</b>	2
<b>Chlorophyll-a Max:</b>	18
<b>Number of Observations:</b>	14
<b>Secchi Depth Mean:</b>	9.7
<b>Secchi Depth Min:</b>	5.5
<b>Secchi Depth Max:</b>	16
<b>Number of Observations:</b>	13
<b>Trophic State Index Mean (Primary Site):</b>	46.8
<b>Trophic State:</b>	Mesotrophic



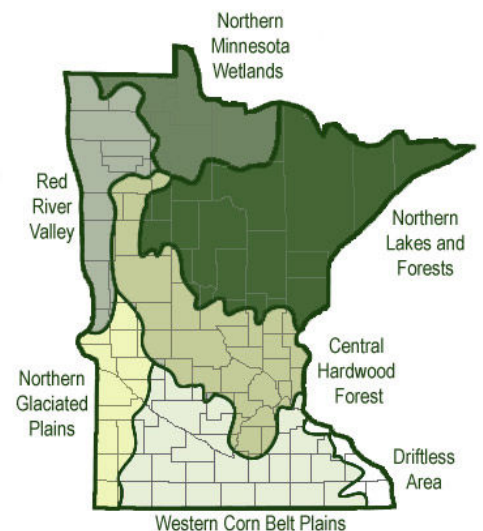
## Ecoregion Comparisons

Minnesota is divided into 7 ecoregions based on land use, vegetation, precipitation and geology. The MPCA has developed a way to determine the "average range" of water quality expected for lakes in each ecoregion.

From 1985-1988, the MPCA evaluated the lake water quality for chosen reference lakes. These reference lakes are not considered pristine, but are considered to have little human impact and therefore are representative of the typical lakes within the ecoregion. The "average range" refers to the 25<sup>th</sup> - 75<sup>th</sup> percentile range for data within each ecoregion.

Cass County is in the Northern Lakes and Forests Ecoregion. **Lake Hattie (Site 202)** compares to the ecoregion average ranges as indicated below:

Total Phosphorus:	Within expected range, which indicates expected water quality for the area
Chlorophyll-a:	Within expected range, which indicates expected water quality for the area
Secchi Depth:	Within expected range, which indicates expected water quality for the area



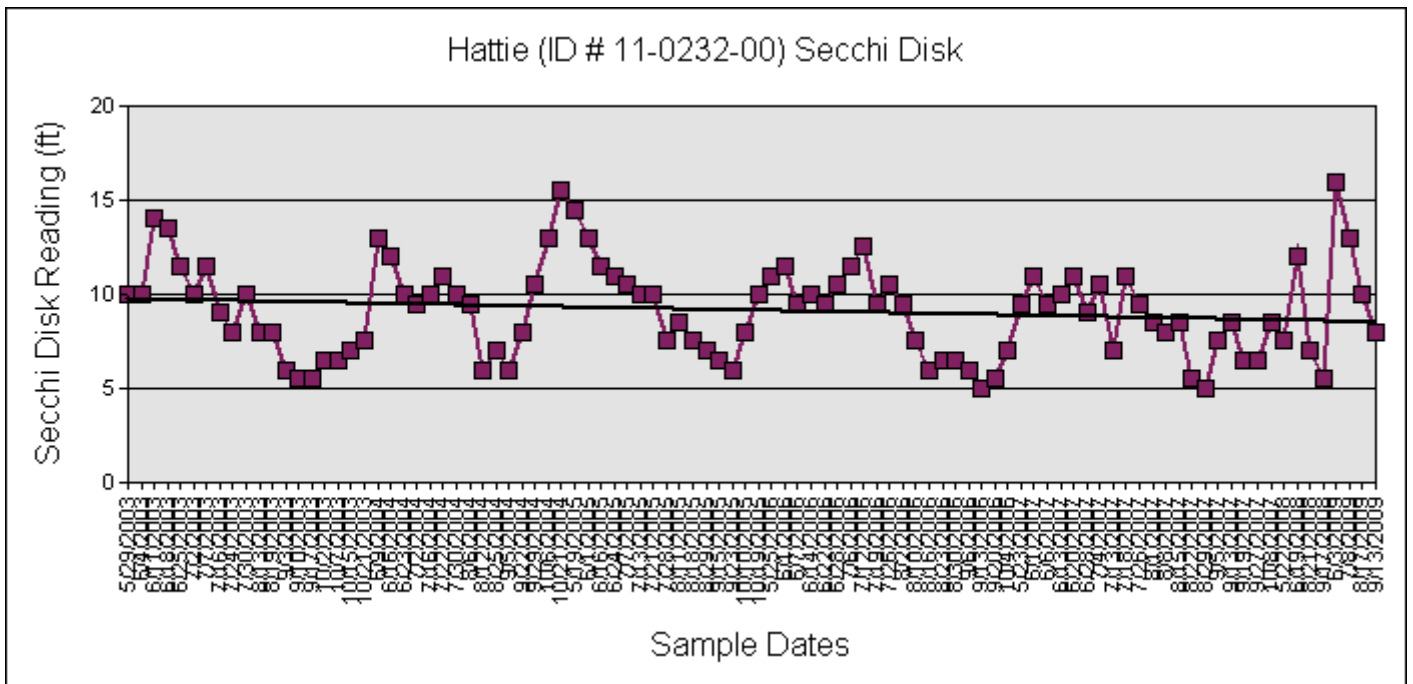
# Trend Analysis Report

For detecting trends, a minimum of 8-10 years of data with 4 or more readings per season are recommended. Minimum confidence accepted by the MPCA is 90%. This means that there is a 90% chance that the data are showing a true trend and a 10% chance that the trend is a random result of the data. Only short-term trends can be determined with just a few years of data, because there can be different wet years and dry years, water levels, weather, etc., that affect the water quality naturally.

There is not enough historical data to perform trend analysis for total phosphorus or chlorophyll *a* on Lake Hattie. Site 202 had enough transparency data to perform a long-term Secchi depth trend analysis. The data was analyzed using the Mann Kendall Trend Analysis.

County	MN Lake ID	Lake	Site	Data Evaluated	Date Range	Data Source
Cass	11-0232-00	Hattie	202 (Primary)	Secchi Disk	05-01-2003 - 09-30-2009	All Historical

**The probability that a true significant trend exists is 90%  
Secchi Disk is decreasing, which indicates declining water quality.**



## Individual Lake Data Summary

County	MN Lake ID	Lake	Site	Date Range	Data Source
Cass	11-0232-00	Hattie	202 (Primary)	05-01-2007 - 09-30-2009	RMB Lab

Historical Mean						18.9	8.3	9.7	45	49	45	46
Date	Time	Site	Sampler	Lab Code	Data Source	TP ug/L	ChlA ug/L	Secchi Ft.	TSI Phos.	TSI ChlAL	TSI Secchi Ft.	TSI Avg.
<a href="#">5/23/2007</a>	2:10 PM	202	Johnson / Anderson	61669	RMB Lab	15	7	9.5	43	50	45	46
<a href="#">6/20/2007</a>	11:10 AM	202	Johnson / Anderson	63560	RMB Lab	16	5	11	44	46	43	44
<a href="#">7/18/2007</a>	11:15 AM	202	Johnson / Anderson	65438	RMB Lab	16	3	11	44	41	43	43
<a href="#">8/15/2007</a>	11:10 AM	202	Johnson / Anderson	66748	RMB Lab	23	10	8.5	49	53	46	49
<a href="#">9/19/2007</a>	10:40 AM	202	Johnson / Anderson	68828	RMB Lab	22	18	6.5	49	59	50	53
Annual Mean						18.4	8.6	9.3	45	49	45	47
Date	Time	Site	Sampler	Lab Code	Data Source	TP ug/L	ChlA ug/L	Secchi Ft.	TSI Phos.	TSI ChlAL	TSI Secchi Ft.	TSI Avg.
<a href="#">5/22/2008</a>	1:15 PM	202	Johnson / Anderson	75742	RMB Lab	12	7	7.5	40	50	48	46
<a href="#">6/19/2008</a>	11:05 AM	202	Johnson / Anderson	79863	RMB Lab	18	6	12	46	48	41	45
<a href="#">7/23/2008</a>	11:05 AM	202	Johnson / Anderson	83365	RMB Lab	12	8	N/A	40	51	N/A	46
<a href="#">8/21/2008</a>	11:00 AM	202	Johnson / Anderson	85834	RMB Lab	21	13	7	48	56	49	51
<a href="#">9/17/2008</a>	11:05 AM	202	Johnson / Anderson	88163	RMB Lab	23	16	5.5	49	58	53	53
Annual Mean						17.2	10	8	44	52	47	48
Date	Time	Site	Sampler	Lab Code	Data Source	TP ug/L	ChlA ug/L	Secchi Ft.	TSI Phos.	TSI ChlAL	TSI Secchi Ft.	TSI Avg.
<a href="#">6/3/2009</a>	11:50 AM	202	Johnson / Anderson	99040	RMB Lab	37	5	16	56	46	37	46
<a href="#">7/8/2009</a>	11:15 AM	202	Johnson / Anderson	103143	RMB Lab	14	2	13	42	37	40	40
<a href="#">8/17/2009</a>	10:50 AM	202	Johnson / Anderson	108273	RMB Lab	14	6	10	42	48	44	45
<a href="#">9/13/2009</a>	3:55 PM	202	Johnson / Anderson	110814	RMB Lab	22	10	8	49	53	47	50
Annual Mean						21.8	5.8	11.8	47	46	42	45

Report prepared by RMB Environmental Laboratories, Inc.  
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