Long (Main) 11-0142-02

MN Lake ID:	11-0142-02
County:	Cass
Ecoregion:	Northern Lakes and Forests
Major Drainage Basin:	Upper Mississippi River
Latitude/Longitude:	47.02527778 / -94.17222222
Water Body Type:	Public Waters
Monitored Sites (Primary):	101
Monitored Sites (Secondary):	102

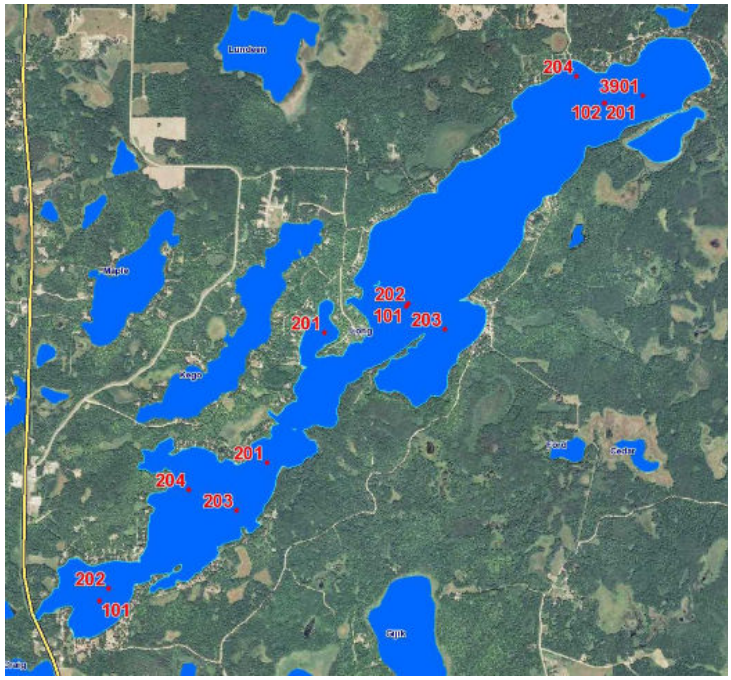
Physical Characteristics

Surface area (acres):	642		
Littoral area (acres):	N/A		
% Littoral area:	N/A		
Max depth (ft):	115	(m):	35.1
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 101	Site 102
Total Phosphorus Mean:	12.4	18
Total Phosphorus Min:	5	11
Total Phosphorus Max:	25	27
Number of Observations:	15	5
Chlorophyll-a Mean:	3.1	2.6
Chlorophyll-a Min:	1	1
Chlorophyll-a Max:	6	5
Number of Observations:	15	5
Secchi Depth Mean:	20.3	17.9
Secchi Depth Min:	14	12
Secchi Depth Max:	25	22
Number of Observations:	15	5
Trophic State Index Mean (Primary Site):	38.3	
Trophic State:	Oligotrophic	



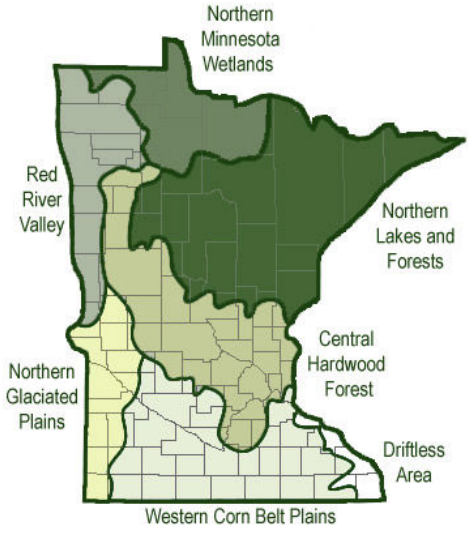
Ecoregion Comparisons

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 25th - 75th percentile range for data within each ecoregion.

Cass County is in the Northern Lakes and Forests Ecoregion.
Long Lake – Main Basin (Site 101) compares to the ecoregion average ranges as indicated below:

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



Individual Lake Data Summary

County	MN Lake ID	Lake	Site	Date Range	Data Source
Cass	11-0142-02	Long (Main)	101 (Primary)	06-01-2007 - 09-30-2009	RMB Lab

Historical Mean						**12.4**	**3.1**	**20.3**	**39**	**40**	**33**	**37**
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.
6/4/2007	9:31 AM	101	Alley/Lerom	62147	RMB Lab	10	4	23	37	44	32	38
6/15/2007	9:05 AM	101	Alley/Lerom	63195	RMB Lab	7	1	23	32	31	32	32
7/15/2007	10:05 AM	101	Jerry Lerom	65186	RMB Lab	11	2	21	39	37	33	36
8/19/2007	2:35 PM	101	Alley/Lerom	66999	RMB Lab	10	6	18.5	37	48	35	40
9/17/2007	8:46 AM	101	Jerry Lerom	68585	RMB Lab	11	6	17.5	39	48	36	41
Annual Mean						**9.8**	**3.8**	**20.6**	**36**	**41**	**33**	**37**
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.
6/8/2008	12:55 PM	101	Alley/Lerom	78443	RMB Lab	12	1	25	40	31	31	34
6/30/2008	9:20 AM	101	Alley/Lerom	80747	RMB Lab	11	1	25	39	31	31	34
7/28/2008	9:10 AM	101	Alley/Lerom	83600	RMB Lab	15	2	22	43	37	33	38
8/18/2008	7:20 AM	101	Jerry Lerom	85401	RMB Lab	13	4	17	41	44	36	40
9/8/2008	10:10 AM	101	Loeffler/Alley	86959	RMB Lab	5	3	20	27	41	34	34
Annual Mean						**11.2**	**2.2**	**21.8**	**38**	**36**	**33**	**36**
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.
5/31/2009	11:15 AM	101	Alley/Lerom	98182	RMB Lab	10	4	20	37	44	34	38
6/22/2009	9:30 AM	101	Alley/Lerom/Loeffler	101111	RMB Lab	25	3	23	51	41	32	41
7/13/2009	8:55 AM	101	Lerom/Loeffler	103443	RMB Lab	11	2	17	39	37	36	37
8/10/2009	9:08 AM	101	Lerom/Loeffler	107108	RMB Lab	17	4	14	45	44	39	43
9/14/2009	9:58 AM	101	Loeffler/Alley	110789	RMB Lab	18	4	18	46	44	35	42
Annual Mean						**16.2**	**3.4**	**18.4**	**43**	**42**	**35**	**40**

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 for to perform trend analysis for total phosphorus, chlorophyll *a*, or Secchi depth on Long Lake – Main Basin (Site 101).

Report prepared by RMB Environmental Laboratories, Inc.
218-846-1465, lakes.rmbel@eot.com