

ANNEX XI: APPENDIX D LIGHT ATTENUATION DATA

Figures

Figure D-1	Light Profiles as a Percentage of Surface Irradiance at Deep Stations (Lac du Sauvage Sub-Basins Aa, Ab, Ac, Ad, and Ae), 2013	1
Figure D-2	Light Profiles as a Percentage of Surface Irradiance at Duchess Lake (Lac du Sauvage Sub-Basin Af), 2013.....	2
Figure D-3	Light Profiles as a Percentage of Surface Irradiance at Deep Station in Lake Af1, 2013	3
Figure D-4	Light Profiles as a Percentage of Surface Irradiance at Deep Station in Sub-Basin Lake E-L1, 2013	3
Figure D-5	Light Profiles as a Percentage of Surface Irradiance at the Deep Station in Paul Lake, 2013	4

Tables

Table D-1	Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013	5
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Abbreviations

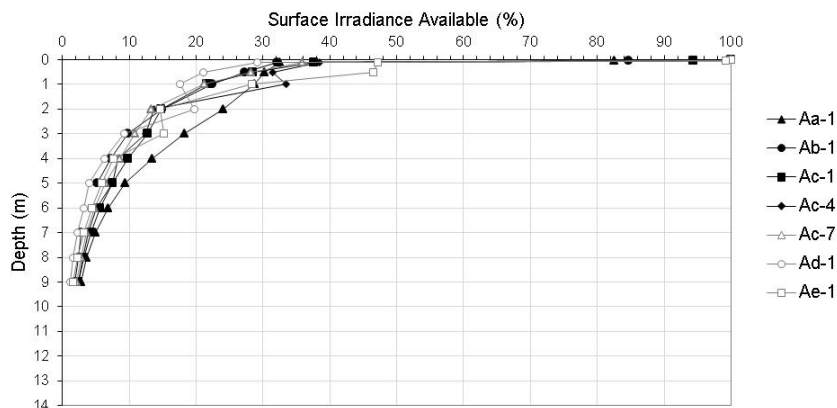
Abbreviation	Definition
n/a	not applicable

Units of Measure

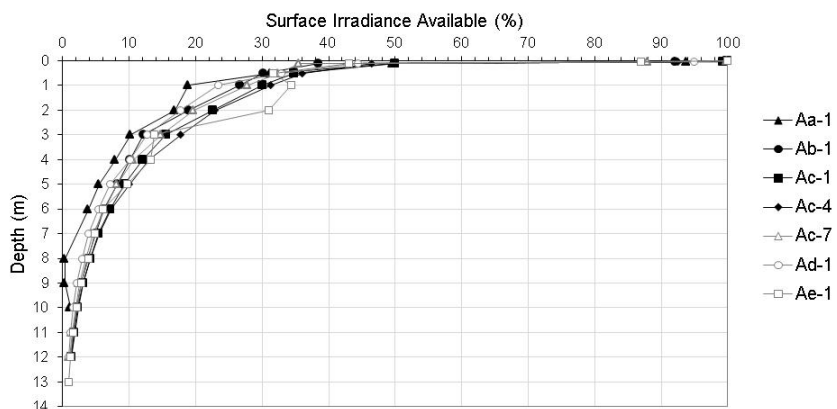
Unit	Definition
%	percent
% SI	percent surface irradiance
d	depth
kd	attenuation coefficient from the Beer-Lambert equation
I _d	irradiance ($\mu\text{mol photons/s/m}^2$) at depth d (metres)
ln	natural log
I ₀	irradiance ($\mu\text{mol photons/s/m}^2$) at the surface
m	metre
$\mu\text{mol/s/m}^2$	micromoles per second per square metre

Figure D-1 Light Profiles as a Percentage of Surface Irradiance at Deep Stations (Lac du Sauvage Sub-Basins Aa, Ab, Ac, Ad, and Ae), 2013

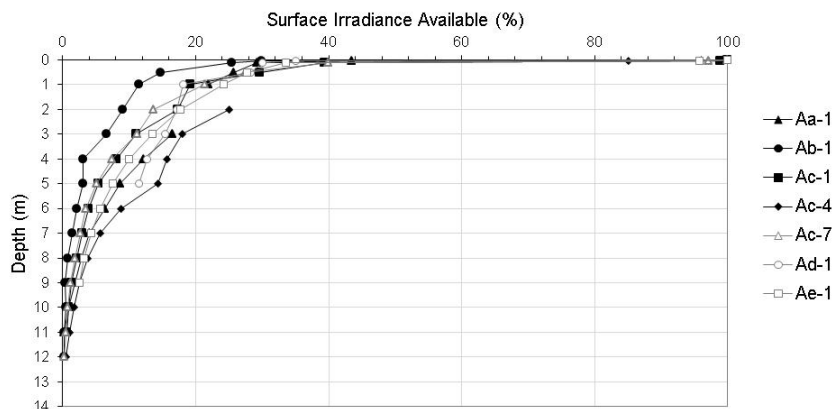
Late Spring



Summer



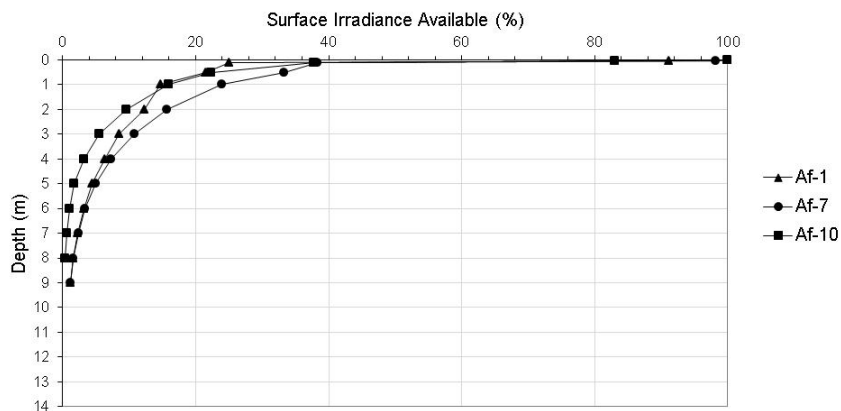
Fall



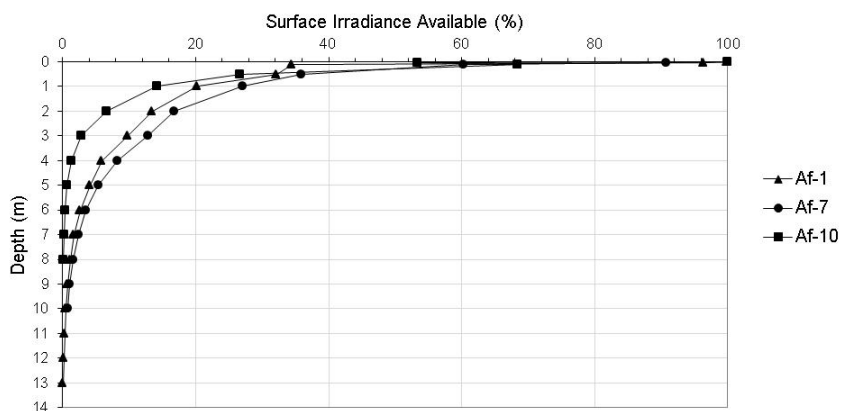
m= metre; % = percent.

**Figure D-2 Light Profiles as a Percentage of Surface Irradiance at Duchess Lake
(Lac du Sauvage Sub-Basin Af), 2013**

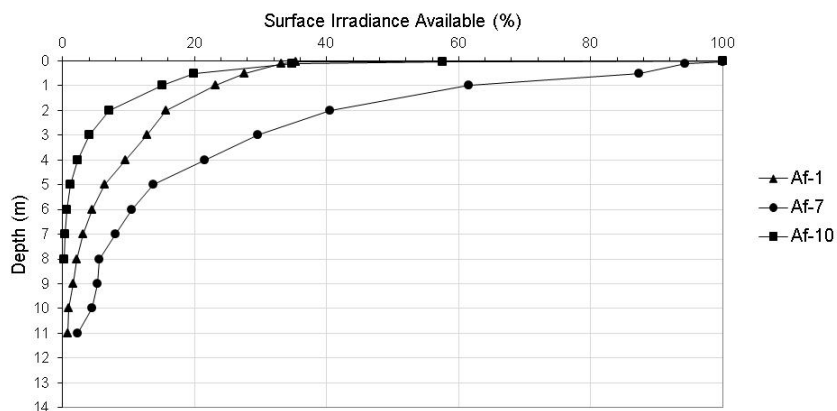
Late Spring



Summer



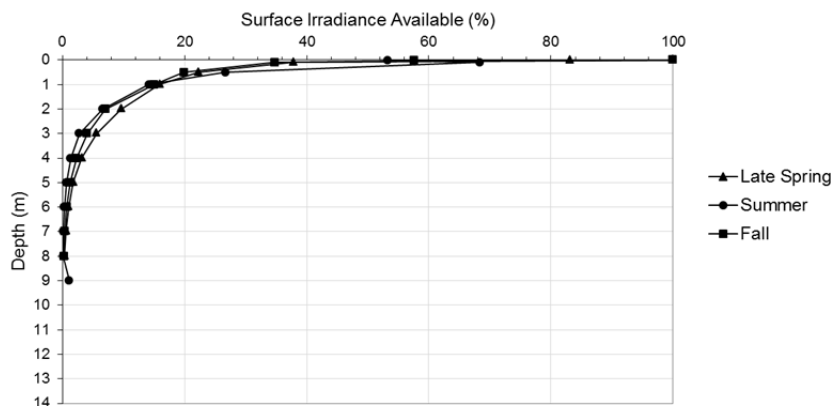
Fall



m= metre; % = percent.

Figure D-3 Light Profiles as a Percentage of Surface Irradiance at Deep Station in Lake Af1, 2013

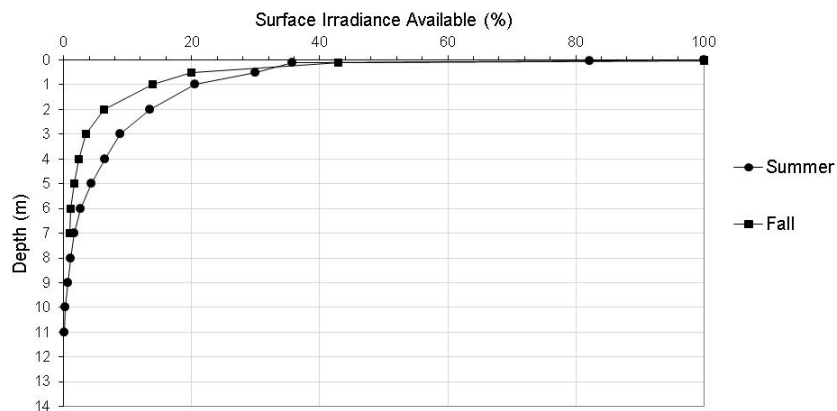
**Late Spring,
Summer, and
Fall**



m= metre; % = percent.

Figure D-4 Light Profiles as a Percentage of Surface Irradiance at Deep Station in Sub-Basin Lake E-L1, 2013

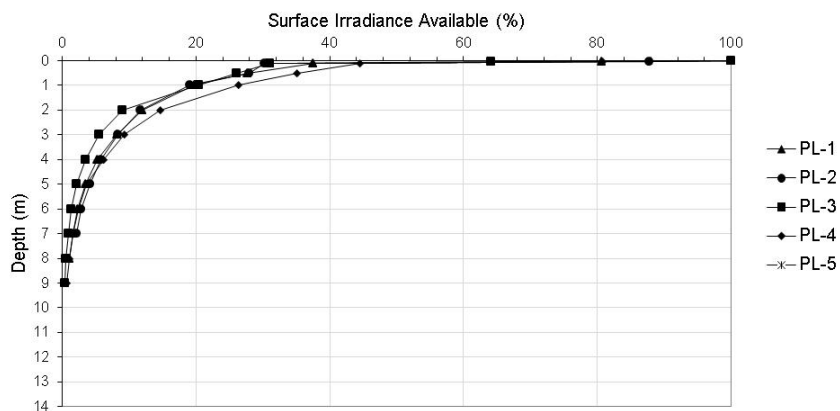
**Summer and
Fall**



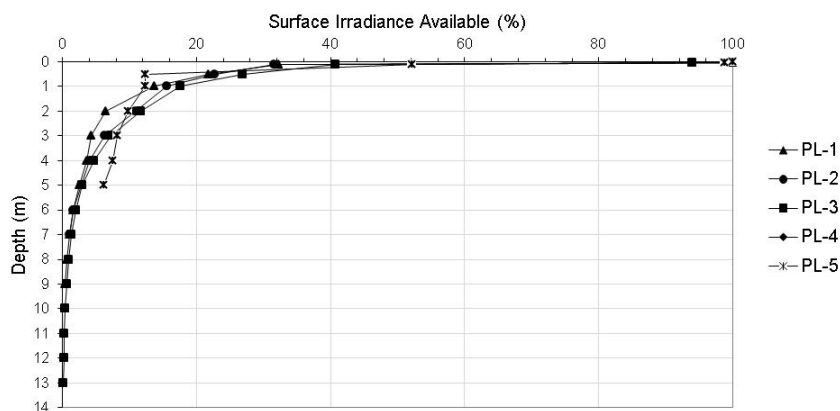
m= metre; % = percent.

Figure D-5 Light Profiles as a Percentage of Surface Irradiance at the Deep Station in Paul Lake, 2013

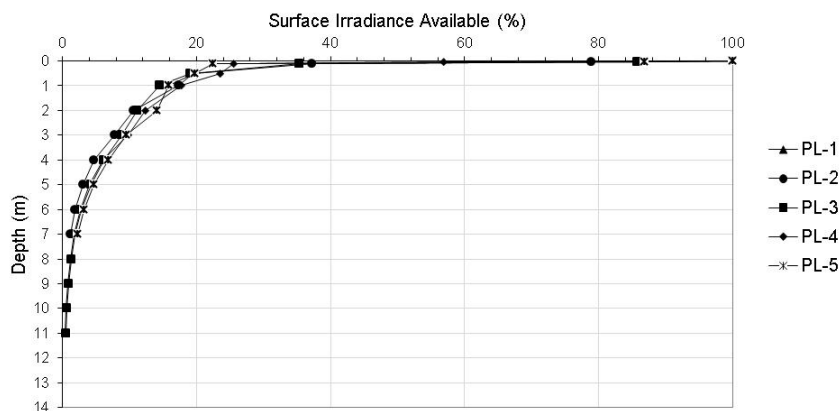
Late Spring



Summer



Fall



m= metre; % = percent.

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Lac du Sauvage	Aa-1	July	Surface	4.7	Bottom	503.7	100	Bottom	n/a
			0.03			415.8	83		7.67
			0.1			163.8	33		11.23
			0.5			152.0	30		2.40
			1.0			144.8	29		1.25
			2.0			121.0	24		0.71
			3.0			91.8	18		0.57
			4.0			67.5	13		0.50
			5.0			47.4	9		0.47
			6.0			34.2	7		0.45
			7.0			25.2	5		0.43
			8.0			18.4	4		0.41
			9.0			13.8	3		0.40
		August	Surface	6.8	Bottom	3,379.0	100	10.0	n/a
			0.03			3,169.0	94		2.57
			0.1			1,680.0	50		6.99
			0.5			1,056.0	31		2.33
			1.0			638.0	19		1.67
			2.0			573.4	17		0.89
			3.0			348.9	10		0.76
			4.0			266.8	8		0.63
			5.0			188.7	6		0.58
			6.0			130.2	4		0.54
			7.0			—	—		—
			8.0			12.9	0		0.70
			9.0			12.7	0		0.62
			10.0			41.2	1		0.44
		September	Surface	6.5	Bottom	1,254.0	100	10.0	n/a
			0.03			544.4	43		33.38
			0.1			367.1	29		12.28
			0.5			323.1	26		2.71
			1.0			274.4	22		1.52
			2.0			—	—		—
			3.0			207.7	17		0.60
			4.0			152.6	12		0.53
			5.0			108.9	9		0.49
			6.0			79.5	6		0.46
			7.0			51.2	4		0.46
			8.0			35.5	3		0.45
			9.0			22.9	2		0.44
			10.0			10.9	1		0.47
			11.0			3.8	0		0.53

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Lac du Sauvage	Ab-1	July	Surface	7.3	Bottom	3,786.0	100	Bottom	n/a
			0.03			3,206.0	85		6.65
			0.1			1,213.0	32		11.38
			0.5			1,032.0	27		2.60
			1.0			848.4	22		1.50
			2.0			563.4	15		0.95
			3.0			368.0	10		0.78
			4.0			275.5	7		0.66
			5.0			199.2	5		0.59
			7.0			103.6	3		0.51
			8.0			91.0	2		0.47
			9.0			68.3	2		0.45
		August	Surface	9.5	Bottom	3,335.0	100	Bottom	n/a
			0.03			3,070.0	92		3.31
			0.1			1,280.0	38		9.58
			0.5			1,005.0	30		2.40
			1.0			888.1	27		1.32
			2.0			631.2	19		0.83
			3.0			405.9	12		0.70
			4.0			337.2	10		0.57
			5.0			274.7	8		0.50
			6.0			205.9	6		0.46
			7.0			166.0	5		0.43
			8.0			123.7	4		0.41
			9.0			94.7	3		0.40
			10.0			72.5	2		0.38
			11.0			55.4	2		0.37
			12.0			43.4	1		0.36
		September	Surface	7.3	Bottom	1,388.0	100	7.0	n/a
			0.03			416.0	30		48.20
			0.1			353.0	25		13.69
			0.5			204.9	15		3.83
			1.0			159.7	12		2.16
			2.0			125.3	9		1.20
			3.0			91.4	7		0.91
			4.0			43.7	3		0.86
			5.0			43.3	3		0.69
			6.0			28.8	2		0.65
			7.0			20.5	1		0.60
			8.0			11.3	1		0.60
			9.0			4.6	0		0.63
			10.0			6.3	0		0.54
			11.0			4.0	0		0.53
			12.0			4.0	0		0.49

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Lac du Sauvage	Ac-1	July	Surface	5.7	11.4	1,263.0	100	Bottom	n/a
			0.03			1,192.0	94		2.31
			0.1			475.2	38		9.78
			0.5			360.1	29		2.51
			1.0			273.8	22		1.53
			2.0			186.7	15		0.96
			3.0			161.4	13		0.69
			4.0			124.1	10		0.58
			5.0			94.1	7		0.52
			6.0			70.5	6		0.48
			7.0			53.3	4		0.45
			8.0			40.8	3		0.43
			9.0			30.8	2		0.41
		August	Surface	10.30	Bottom	3,628.0	100	Bottom	n/a
			0.03			3,603.0	99		0.28
			0.1			1,813.0	50		6.94
			0.5			1,260.0	35		2.12
			1.0			1,091.0	30		1.20
			2.0			819.3	23		0.74
			3.0			566.3	16		0.62
			4.0			435.8	12		0.53
			5.0			339.3	9		0.47
			6.0			257.7	7		0.44
			7.0			193.5	5		0.42
			8.0			150.5	4		0.40
			9.0			113.0	3		0.39
			10.0			83.8	2		0.38
			11.0			60.5	2		0.37
			12.0			47.3	1		0.36
		September	Surface	6.7	Bottom	4,285.0	100	9.0	n/a
			0.03			4,235.0	99		0.47
			0.1			1,688.0	39		9.32
			0.5			1,268.0	30		2.44
			1.0			823.1	19		1.65
			2.0			743.4	17		0.88
			3.0			477.2	11		0.73
			4.0			347.9	8		0.63
			5.0			231.5	5		0.58
			6.0			168.9	4		0.54
			7.0			124.3	3		0.51
			8.0			93.2	2		0.48
			9.0			58.0	1		0.48
			10.0			40.2	1		0.47
			11.0			28.7	1		0.46

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Lac du Sauvage	Ac-4	July	Surface	7.7	Bottom	3,745.0	100	Bottom	n/a
			0.03			3,746.0	n/a		n/a
			0.1			1,438.0	38		9.57
			0.5			1,179.0	31		2.31
			1.0			1,253.0	33		1.09
			2.0			513.0	14		0.99
			3.0			466.5	12		0.69
			4.0			311.4	8		0.62
			5.0			278.4	7		0.52
			6.0			188.4	5		0.50
			7.0			143.6	4		0.47
			8.0			115.3	3		0.44
			9.0			87.2	2		0.42
		August	Surface	10.2	Bottom	3,495.0	100	Bottom	n/a
			0.03			3,239.0	93		3.04
			0.1			1,627.0	47		7.65
			0.5			1,263.0	36		2.04
			1.0			1,099.0	31		1.16
			2.0			805.3	23		0.73
			3.0			621.9	18		0.58
			4.0			453.1	13		0.51
			5.0			353.4	10		0.46
			6.0			252.7	7		0.44
			7.0			194.0	6		0.41
			8.0			147.3	4		0.40
			9.0			109.8	3		0.38
			10.0			83.9	2		0.37
			11.0			63.3	2		0.36
			12.0			46.5	1		0.36
		September	Surface	6.7	Bottom	1,841.0	100	11.0	n/a
			0.03			1,556.0	85		6.73
			0.1			545.7	30		12.16
			0.5			—	—		—
			1.0			—	—		—
			2.0			460.7	25		0.69
			3.0			332.1	18		0.57
			4.0			287.5	16		0.46
			5.0			265.0	14		0.39
			6.0			160.9	9		0.41
			7.0			105.3	6		0.41
			8.0			68.7	4		0.41
			9.0			46.5	3		0.41
			10.0			30.9	2		0.41
			11.0			18.2	1		0.42
			12.0			10.6	1		0.43

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Lac du Sauvage	Ac-7	July	Surface	5.7	Bottom	1,096.0	100	Bottom	n/a
			0.03			1,099.0	100		—0.11
			0.1			393.0	36		10.26
			0.5			309.6	28		2.53
			1.0			232.0	21		1.55
			2.0			146.2	13		1.01
			3.0			119.5	11		0.74
			4.0			94.0	9		0.61
			5.0			70.1	6		0.55
			6.0			53.3	5		0.50
			7.0			39.9	4		0.47
			8.0			30.7	3		0.45
			9.0			23.1	2		0.43
		August	Surface	10.0	Bottom	3,424.0	100	11.0	n/a
			0.03			3,013.0	88		5.11
			0.1			1,221.0	36		10.31
			0.5			1,111.0	32		2.25
			1.0			952.5	28		1.28
			2.0			675.2	20		0.81
			3.0			507.6	15		0.64
			4.0			365.8	11		0.56
			5.0			284.1	8		0.50
			6.0			215.2	6		0.46
			7.0			158.9	5		0.44
			8.0			118.4	3		0.42
			9.0			89.1	3		0.41
			10.0			66.8	2		0.39
			11.0			50.0	1		0.38
			12.0			37.5	1		0.38
		September	Surface	6.2	Bottom	3,276.0	100	9.0	n/a
			0.03			3,179.0	97		1.20
			0.1			1,310.0	40		9.17
			0.5			899.7	27		2.58
			1.0			701.1	21		1.54
			2.0			446.3	14		1.00
			3.0			368.9	11		0.73
			4.0			241.3	7		0.65
			5.0			169.7	5		0.59
			6.0			114.8	4		0.56
			7.0			86.1	3		0.52
			8.0			60.3	2		0.50
			9.0			38.1	1		0.49
			10.0			27.1	1		0.48
			11.0			16.2	0		0.48
			12.0			9.8	0		0.48

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Lac du Sauvage	Ad-1	July	Surface	6.8	Bottom	3,309.0	100	8.0	n/a
			0.03			3,407.0	n/a		n/a
			0.1			966.6	29		12.31
			0.5			699.5	21		3.11
			1.0			580.3	18		1.74
			2.0			654.7	20		0.81
			3.0			303.8	9		0.80
			4.0			207.3	6		0.69
			5.0			133.1	4		0.64
			6.0			104.7	3		0.58
			7.0			72.5	2		0.55
			8.0			53.7	2		0.52
			9.0			39.3	1		0.49
		August	Surface	7.0	Bottom	3,284.0	100	11.0	n/a
			0.03			3,116.0	95		2.10
			0.1			1,456.0	44		8.13
			0.5			1,078.0	33		2.23
			1.0			768.8	23		1.45
			2.0			581.3	18		0.87
			3.0			417.1	13		0.69
			4.0			334.4	10		0.57
			5.0			235.5	7		0.53
			6.0			176.2	5		0.49
			7.0			127.3	4		0.46
			8.0			96.7	3		0.44
			9.0			70.5	2		0.43
			10.0			50.9	2		0.42
			11.0			40.1	1		0.40
			12.0			29.4	1		0.39
		September	Surface	—	—	666.1	100	Bottom	n/a
			0.03			233.7	35		41.90
			0.1			200.3	30		12.02
			0.5			188.5	28		2.52
			1.0			120.9	18		1.71
			2.0			114.1	17		0.88
			3.0			102.6	15		0.62
			4.0			84.5	13		0.52
			5.0			76.8	12		0.43
			6.0			59.2	9		0.40
			7.0			48.5	7		0.37
			8.0			33.7	5		0.37
			9.0			22.8	3		0.37
			10.0			19.6	3		0.35
			11.0			14.9	2		0.35
			12.0			13.5	2		0.32

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Lac du Sauvage	Ae-1	July	Surface	6.6	Bottom	3,726.0	100	Bottom	n/a
			0.03			3,695.0	99		0.33
			0.1			1,759.0	47		7.51
			0.5			1,733.0	47		1.53
			1.0			1,056.0	28		1.26
			2.0			542.9	15		0.96
			3.0			566.9	15		0.63
			4.0			286.0	8		0.64
			5.0			220.6	6		0.57
			6.0			164.1	4		0.52
			7.0			116.7	3		0.49
			8.0			86.5	2		0.47
			9.0			61.1	2		0.46
		August	Surface	—	—	3,404.0	100	12.0	n/a
			0.03			2,957.0	87		5.63
			0.1			1,464.0	43		8.44
			0.5			1,078.0	32		2.30
			1.0			1,169.0	34		1.07
			2.0			1,055.0	31		0.59
			3.0			468.3	14		0.66
			4.0			450.0	13		0.51
			5.0			328.7	10		0.47
			6.0			206.2	6		0.47
			7.0			166.1	5		0.43
			8.0			131.0	4		0.41
			9.0			98.0	3		0.39
			10.0			70.5	2		0.39
			11.0			54.0	2		0.38
			12.0			38.8	1		0.37
			13.0			30.0	1		0.36
		September	Surface	5.5	Bottom	1,358.0	100	Bottom	n/a
			0.03			1,301.0	96		1.72
			0.1			455.0	34		10.93
			0.5			377.0	28		2.56
			1.0			328.0	24		1.42
			2.0			241.0	18		0.86
			3.0			183.0	13		0.67
			4.0			135.0	10		0.58
			5.0			103.0	8		0.52
			6.0			77.0	6		0.48
			7.0			59.0	4		0.45
			8.0			44.0	3		0.43
			9.0			34.0	3		0.41

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Duchess Lake	Af-1	July	Surface	4.1	8.2	931.3	100	Bottom	n/a
			0.03			849.3	91		3.69
			0.1			233.2	25		13.85
			0.5			200.9	22		3.07
			1.0			137.8	15		1.91
			2.0			113.9	12		1.05
			3.0			79.3	9		0.82
			4.0			59.0	6		0.69
			5.0			41.6	4		0.62
			6.0			29.9	3		0.57
			7.0			21.3	2		0.54
			8.0			15.0	2		0.52
			9.0			10.5	1		0.50
		August	Surface	6.0	12.0	3,604.0	100	8.0	n/a
			0.03			3,475.0	96		1.46
			0.1			1,244.0	35		10.64
			0.5			1,160.0	32		2.27
			1.0			733.4	20		1.59
			2.0			485.6	13		1.00
			3.0			356.9	10		0.77
			4.0			215.0	6		0.70
			5.0			149.1	4		0.64
			6.0			97.3	3		0.60
			7.0			63.4	2		0.58
			8.0			42.2	1		0.56
			9.0			27.6	1		0.54
			10.0			19.6	1		0.52
			11.0			12.8	0		0.51
			12.0			8.4	0		0.51
			13.0			5.6	0		0.50
		September	Surface	3.6	7.2	290.5	100	10.0	n/a
			0.03			102.6	35		41.63
			0.1			96.4	33		11.03
			0.5			79.9	28		2.58
			1.0			67.4	23		1.46
			2.0			45.6	16		0.93
			3.0			37.2	13		0.69
			4.0			27.7	10		0.59
			5.0			18.5	6		0.55
			6.0			12.8	4		0.52
			7.0			9.0	3		0.50
			8.0			6.4	2		0.48
			9.0			4.6	2		0.46
			10.0			2.5	1		0.48
			11.0			2.4	1		0.44

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	μmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Duchess Lake	Af-7	July	Surface	4.5	Bottom	1,628.0	100	Bottom	n/a
			0.03			1,598.0	98		0.74
			0.1			623.6	38		9.60
			0.5			542.7	33		2.20
			1.0			390.0	24		1.43
			2.0			254.3	16		0.93
			3.0			175.5	11		0.74
			4.0			118.7	7		0.65
			5.0			81.3	5		0.60
			6.0			54.7	3		0.57
			7.0			38.2	2		0.54
			8.0			26.4	2		0.52
			9.0			18.4	1		0.50
		August	Surface	—	—	3,589.0	100	9.0	n/a
			0.03			3,254.0	91		3.92
			0.1			2,162.0	60		5.07
			0.5			1,287.0	36		2.05
			1.0			972.8	27		1.31
			2.0			602.6	17		0.89
			3.0			461.2	13		0.68
			4.0			293.6	8		0.63
			5.0			192.1	5		0.59
			6.0			125.8	4		0.56
			7.0			85.6	2		0.53
			8.0			55.5	2		0.52
			9.0			36.9	1		0.51
			10.0			30.2	1		0.48
		September	Surface	4.6	9.2	155.9	100	Bottom	n/a
			0.03			155.9	100		n/a
			0.1			147.0	94		0.59
			0.5			136.1	87		0.27
			1.0			96.0	62		0.48
			2.0			63.2	41		0.45
			3.0			46.1	30		0.41
			4.0			33.6	22		0.38
			5.0			21.4	14		0.40
			6.0			16.4	11		0.38
			7.0			12.6	8		0.36
			8.0			8.7	6		0.36
			9.0			8.2	5		0.33
			10.0			7.0	4		0.31
			11.0			3.5	2		0.35

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	μmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Lake Af1	Af-10	July	Surface	2.6	5.2	736.2	100	6.0	n/a
			0.03			611.5	83		7.42
			0.1			278.4	38		9.72
			0.5			164.0	22		3.00
			1.0			117.4	16		1.84
			2.0			70.7	10		1.17
			3.0			41.0	6		0.96
			4.0			23.5	3		0.86
			5.0			13.1	2		0.81
			6.0			7.6	1		0.76
			7.0			4.4	1		0.73
			8.0			2.6	0		0.71
		August	Surface	1.8	3.6	3,614.0	100	4.0	n/a
			0.03			1,927.0	53		25.15
			0.1			2,470.0	68		3.81
			0.5			963.6	27		2.64
			1.0			512.8	14		1.95
			2.0			237.4	7		1.36
			3.0			100.4	3		1.19
			4.0			48.4	1		1.08
			5.0			23.2	1		1.01
			6.0			11.2	0		0.96
			7.0			6.4	0		0.91
			8.0			4.9	0		0.83
		September	Surface	2.0	4.0	1,674.0	100	5.0	n/a
			0.03			964.1	58		22.07
			0.1			582.9	35		10.55
			0.5			333.3	20		3.23
			1.0			252.2	15		1.89
			2.0			117.7	7		1.33
			3.0			67.9	4		1.07
			4.0			38.0	2		0.95
			5.0			21.1	1		0.87
			6.0			11.8	1		0.83
			7.0			6.9	0		0.78
			8.0			4.4	0		0.74

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Sub-Basin Lake E1	E-L1-1	July	—	—	—	—	—	—	—
		August	Surface	4.0	8.0	688.3	100	8.0	n/a
			0.03			565.5	82		7.86
			0.1			246.0	36		10.29
			0.5			206.6	30		2.41
			1.0			141.6	21		1.58
			2.0			92.6	13		1.00
			3.0			61.3	9		0.81
			4.0			44.4	6		0.69
			5.0			29.8	4		0.63
			6.0			18.1	3		0.61
			7.0			11.7	2		0.58
			8.0			7.3	1		0.57
			9.0			4.4	1		0.56
			10.0			2.0	0		0.58
			11.0			0.8	0		0.61
		September	Surface	3.5	Bottom	3,316.0	100	6.0	n/a
			0.03			3,316.0	100		0.00
			0.1			1,423.0	43		8.46
			0.5			662.4	20		3.22
			1.0			463.0	14		1.97
			2.0			210.0	6		1.38
			3.0			114.8	3		1.12
			4.0			79.9	2		0.93
			5.0			53.0	2		0.83
			6.0			34.7	1		0.76
			7.0			30.1	1		0.67

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Paul Lake	PL-1	July	Surface	3.75	7.5	1,142.0	100	Bottom	n/a
			0.03			921.0	81		8.60
			0.1			428.7	38		9.80
			0.5			315.9	28		2.57
			1.0			225.0	20		1.62
			2.0			136.5	12		1.06
			3.0			93.8	8		0.83
			4.0			59.8	5		0.74
			5.0			39.9	3		0.67
			6.0			26.5	2		0.63
			7.0			17.5	2		0.60
			8.0			12.3	1		0.57
		August	Surface	3.5	7.0	2,177.0	100	6.0	n/a
			0.03			2,177.0	100		n/a
			0.1			701.7	32		11.32
			0.5			472.3	22		3.06
			1.0			296.9	14		1.99
			2.0			139.6	6		1.37
			3.0			92.6	4		1.05
			4.0			77.6	4		0.83
			5.0			54.9	3		0.74
			6.0			34.9	2		0.69
			7.0			21.6	1		0.66
			8.0			13.7	1		0.63
			9.0			8.7	0		0.61
		September	—	—	—	—	—	—	—

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	μmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Paul Lake	PL-2	July	Surface	3.8	Bottom	1,635.0	100	Bottom	n/a
			0.03			1,435.0	88		5.22
			0.1			493.6	30		11.98
			0.5			457.0	28		2.55
			1.0			312.3	19		1.66
			2.0			191.7	12		1.07
			3.0			135.0	8		0.83
			4.0			94.8	6		0.71
			5.0			67.7	4		0.64
			6.0			46.0	3		0.60
			7.0			34.3	2		0.55
		August	Surface	3.5	Bottom	2,685.0	100	Bottom	n/a
			0.03			2,685.0	100		n/a
			0.1			847.9	32		11.53
			0.5			610.7	23		2.96
			1.0			418.2	16		1.86
			2.0			292.5	11		1.11
			3.0			167.1	6		0.93
			4.0			108.6	4		0.80
			5.0			73.8	3		0.72
			6.0			44.1	2		0.68
			7.0			26.3	1		0.66
		September	Surface	3.0	6.0	869.4	100	Bottom	n/a
			0.03			686.0	79		9.48
			0.1			323.5	37		9.89
			0.5			169.5	19		3.27
			1.0			150.3	17		1.76
			2.0			92.5	11		1.12
			3.0			67.0	8		0.85
			4.0			40.8	5		0.76
			5.0			26.4	3		0.70
			6.0			16.3	2		0.66
			7.0			10.6	1		0.63

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Paul Lake	PL-3	July	Surface	5.4	Bottom	3,378.0	100	6.0	n/a
			0.03			2,167.0	64		17.76
			0.1			1,050.0	31		11.68
			0.5			881.0	26		2.69
			1.0			690.9	20		1.59
			2.0			304.9	9		1.20
			3.0			187.3	6		0.96
			4.0			115.8	3		0.84
			5.0			71.3	2		0.77
			6.0			44.2	1		0.72
			7.0			28.9	1		0.68
			8.0			18.7	1		0.65
			9.0			12.6	0		0.62
		August	Surface	3.9	7.8	2,067.0	100	7.0	n/a
			0.03			1,941.0	94		2.52
			0.1			842.4	41		8.98
			0.5			554.6	27		2.63
			1.0			364.0	18		1.74
			2.0			242.5	12		1.07
			3.0			150.4	7		0.87
			4.0			95.8	5		0.77
			5.0			60.7	3		0.71
			6.0			40.1	2		0.66
			7.0			28.1	1		0.61
			8.0			18.6	1		0.59
			9.0			12.5	1		0.57
			10.0			8.7	0		0.55
			11.0			6.0	0		0.53
			12.0			4.2	0		0.52
			13.0			3.1	0		0.50
		September	Surface	3.5	7.0	1,177.0	100	8.0	n/a
			0.03			1,010.0	86		6.12
			0.1			415.1	35		10.42
			0.5			224.7	19		3.31
			1.0			170.4	14		1.93
			2.0			131.7	11		1.10
			3.0			104.3	9		0.81
			4.0			72.7	6		0.70
			5.0			49.9	4		0.63
			6.0			33.5	3		0.59
			7.0			22.5	2		0.57
			8.0			15.2	1		0.54
			9.0			11.1	1		0.52
			10.0			7.5	1		0.51
			11.0			6.0	1		0.48

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	µmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Paul Lake	PL-4	July	Surface	5.9	Bottom	3,038.0	100	8.0	n/a
			0.03			2,454.0	81		8.54
			0.1			1,351.0	44		8.10
			0.5			1,066.0	35		2.09
			1.0			798.0	26		1.34
			2.0			445.2	15		0.96
			3.0			281.9	9		0.79
			4.0			186.3	6		0.70
			5.0			111.0	4		0.66
			6.0			73.3	2		0.62
			7.0			48.8	2		0.59
			8.0			32.0	1		0.57
			9.0			21.4	1		0.55
		August	—	—	—	—	—	—	—
		September	Surface	3.6	7.2	1,266.0	100	8.0	n/a
			0.03			718.9	57		22.64
			0.1			323.4	26		13.65
			0.5			297.4	23		2.90
			1.0			223.9	18		1.73
			2.0			155.9	12		1.05
			3.0			123.7	10		0.78
			4.0			75.9	6		0.70
			5.0			49.9	4		0.65
			6.0			33.6	3		0.60
			7.0			22.5	2		0.58
			8.0			15.0	1		0.55
			9.0			10.4	1		0.53
			10.0			7.2	1		0.52
			11.0			5.2	0		0.50

Table D-1 Light Data From Lac du Sauvage, Duchess Lake, Lake Af1, Sub-Basin Lake E-L1, and Paul Lake During the Open-Water Period, 2013

Parameter				Secchi Depth	Euphotic Depth ^(a)	Calculated Depth of Light Penetration	Percent Surface Irradiance Available	Euphotic Depth ^(b)	Light Attenuation
Unit				m	m	μmol/s/m ²	% SI = (I _d /I ₀) × 100	m	kd = -[ln(I _d /I ₀)]/d
Location	Sample Name	Sample Date	Start Depth						
Paul Lake	PL-5	July	—	—	—	—	—	—	—
		August	Surface	3.9	Bottom	3,445.0	100	Bottom	n/a
			0.03			3,403.0	99		0.49
			0.1			1,795.0	52		6.52
			0.5			426.6	12		4.18
			1.0			424.1	12		2.09
			2.0			334.9	10		1.17
			3.0			279.4	8		0.84
			4.0			259.5	8		0.65
			5.0			210.8	6		0.56
		September	Surface	3.3	6.6	542.0	100	Bottom	n/a
			0.03			470.7	87		5.64
			0.1			121.6	22		14.95
			0.5			107.1	20		3.24
			1.0			85.5	16		1.85
			2.0			76.1	14		0.98
			3.0			51.5	10		0.78
			4.0			37.1	7		0.67
			5.0			25.2	5		0.61
			6.0			17.1	3		0.58
			7.0			12.2	2		0.54

a) Euphotic zone depth based on two times the Secchi depth.

b) Euphotic zone depth based on LI-COR light readings.

— = not sampled; n/a = not applicable; m = metre; μmol/s/m² = micromoles per second per square metre; % SI = percent surface irradiance;

% SI = (I_d/I₀) × 100, where I_d and I₀ are irradiance at depth (d) and at the surface.

kd = -[ln(I_d/I₀)]/d, where kd is the attenuation coefficient at depth (d) and I_d and I₀ are irradiance at depth d and at the surface.