Chapter Seven
Biometric and VIRIS Data
2011 Needles

The following pages present data gleaned from samples submitted to UNH and measurements made and analyzed by students.

Spectral curves show mean reflectances with standard deviations (+and) of each school's samples, as calculated by the Visible Infrared Intelligent Spectrophotometer (VIRIS). Reflectance is measured by a GER 2600 and processed with Pro-VIRIS, a software developed by Forest Watch.

Biometrics are recorded on Excel and summarized here. Forest Watch maintains all data submitted since 1992. As the charts show, Forest Watch students engage in precise measurements, careful recording of data, and numerous mathematical calculations and summations as they prepare biometric reports.

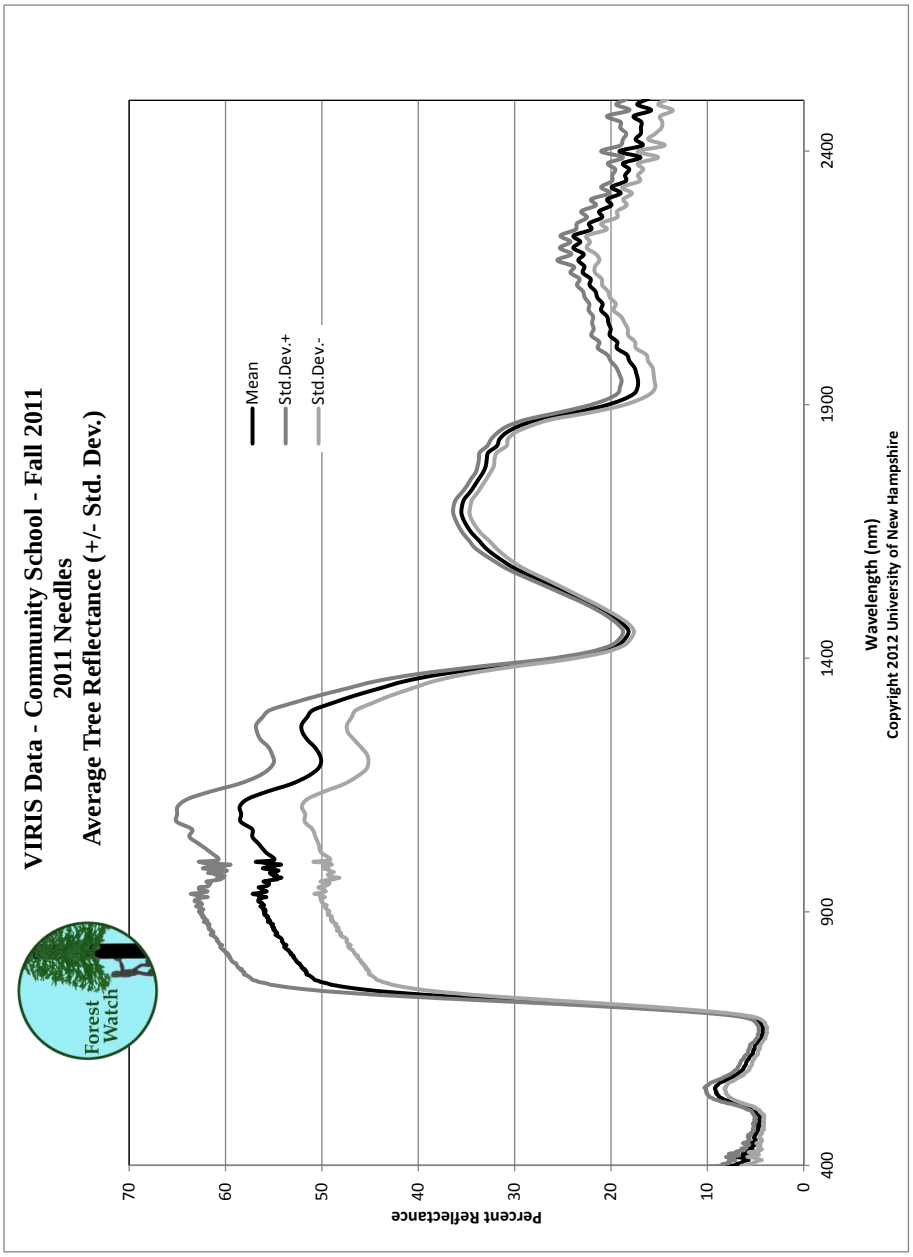
In addition to the following charts and graphs, each school receives an Excel file containing all data from spectral scans, graphs of each tree's reflectance and explanations of spectral indices.

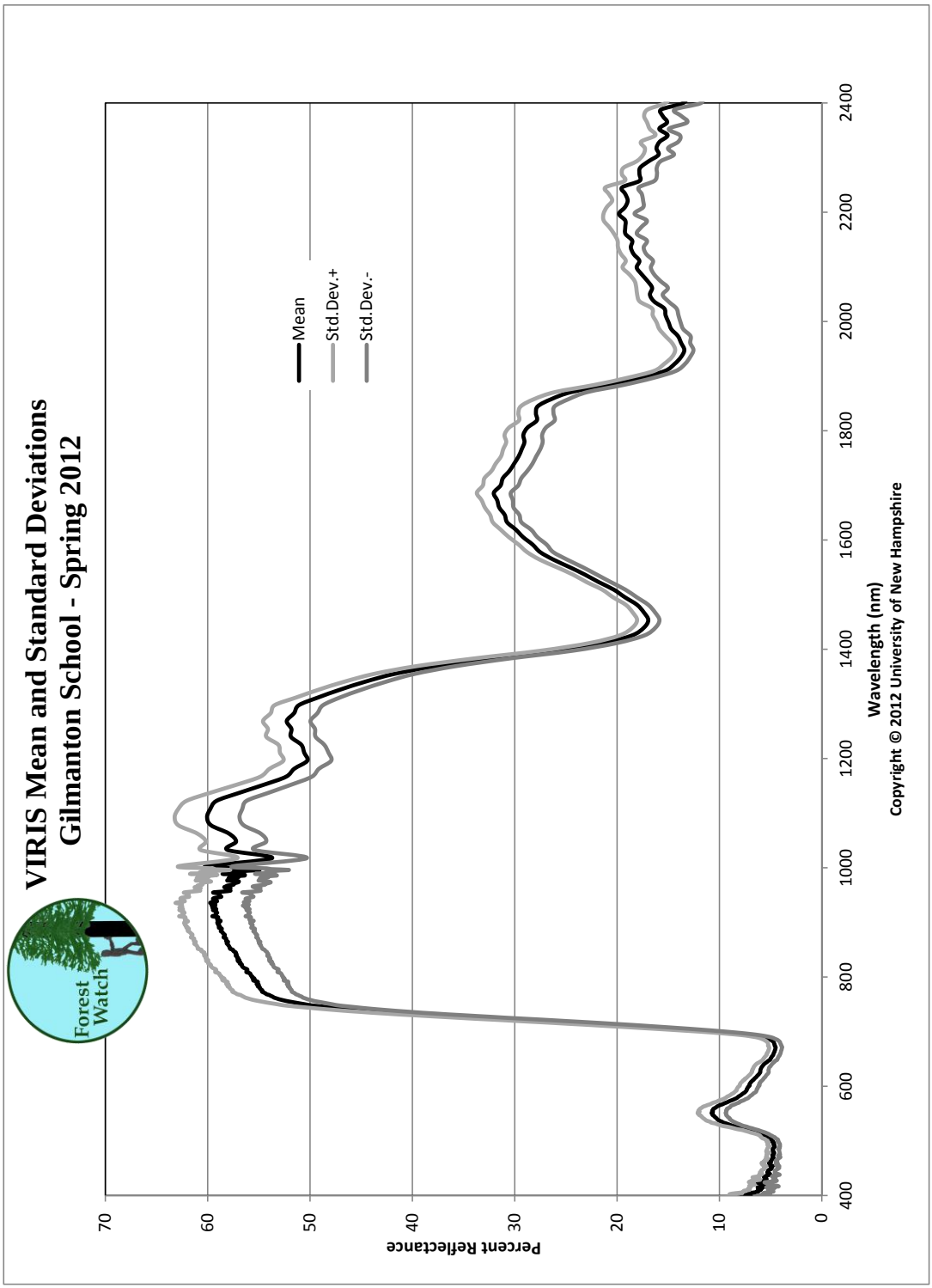
As these charts show, each school adapts Forest Watch to their curricula. Some do a complete array of field and laboratory measurements. Others incorporate collection of samples in other ecology activities.

Students in many schools use their own data and UNH spectral reports to build hypotheses and make comparisons of data which might explain change in white pine health, tree to tree and year to year, school to school or state to state. Students build posters which display their studies and findings. On May 31, 2013, Forest Watch will display these student research projects in the third Forest Watch Student Convention. Please join us.

Community School, South Tamworth, NH
Spectral Data from Samples Submitted by Kathy Flaccus

Index	1031N	1031S	1032N	1032S	1033N	1033S	1034N	1035N	1035S
REIP	727	725.4	723.9	727	723.9	723.9	720.8	723.9	722.4
NDVI	0.83	0.837	0.849	0.858	0.835	0.841	0.845	0.847	0.838
TM54	0.681	0.674	0.584	0.557	0.696	0.741	0.538	0.579	0.581
NIR31	0.981	0.978	0.894	0.907	0.984	0.953	0.886	0.91	0.896

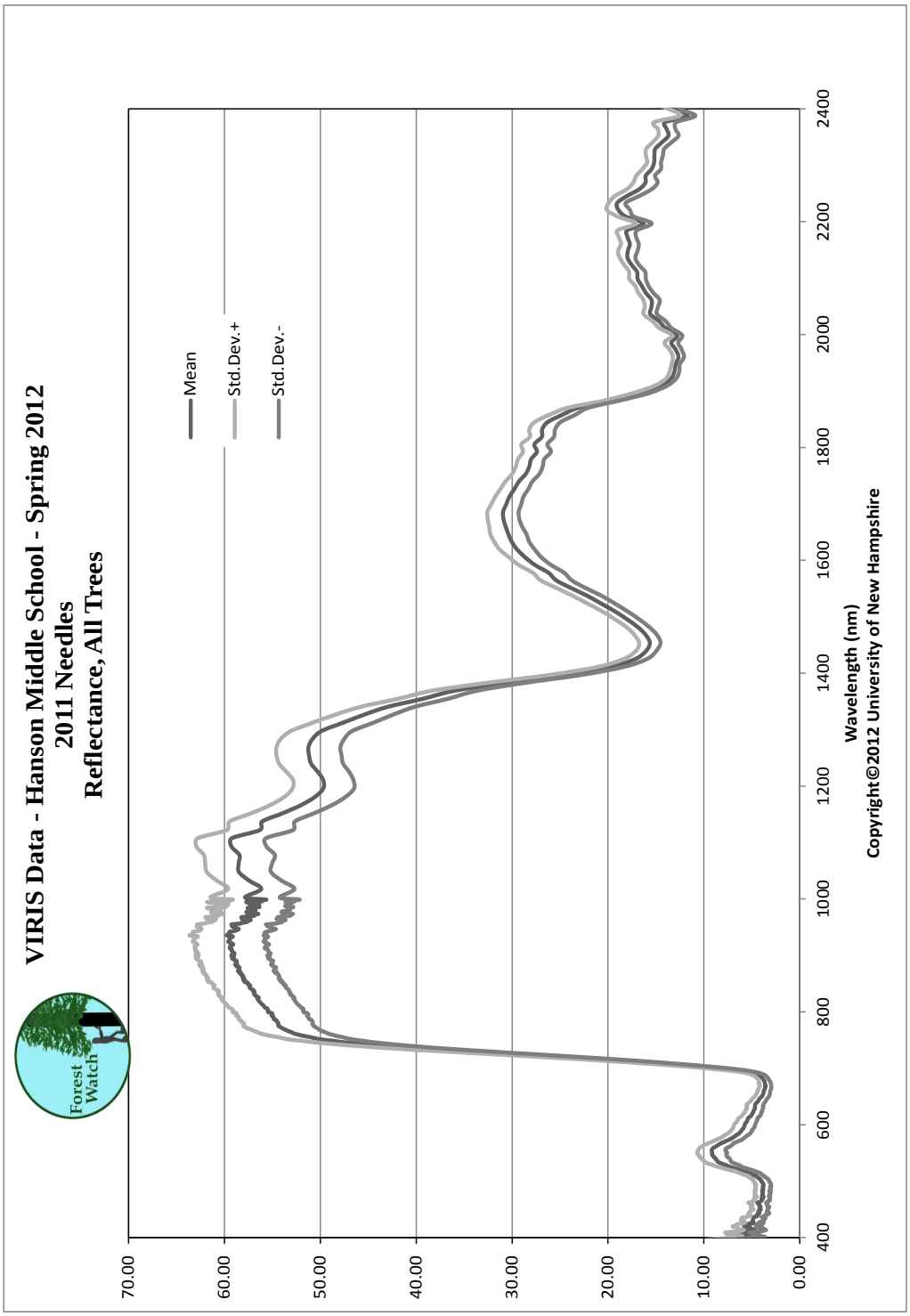




	First Year Needles										Old Site behind ball field		
Index	1906n	1906s	1907n	1907s	1908n	1908s	1909n	1909s	1910n	1910s	old1	old2	old3
REIP	719.3	723.9	725.4	731.6	719.3	723.9	723.9	723.9	719.3	719.3	723.9	731.6	714.6
NDVI	0.808	0.827	0.85	0.857	0.789	0.845	0.845	0.85	0.851	0.842	0.826	0.84	0.847
TM54	0.568	0.562	0.512	0.493	0.566	0.518	0.493	0.483	0.514	0.539	0.576	0.487	0.548
NIR31	0.902	0.925	0.885	0.845	0.922	0.875	0.86	0.83	0.874	0.884	0.951	0.841	0.912

Gilmanton School
Biometric and Spectral Data

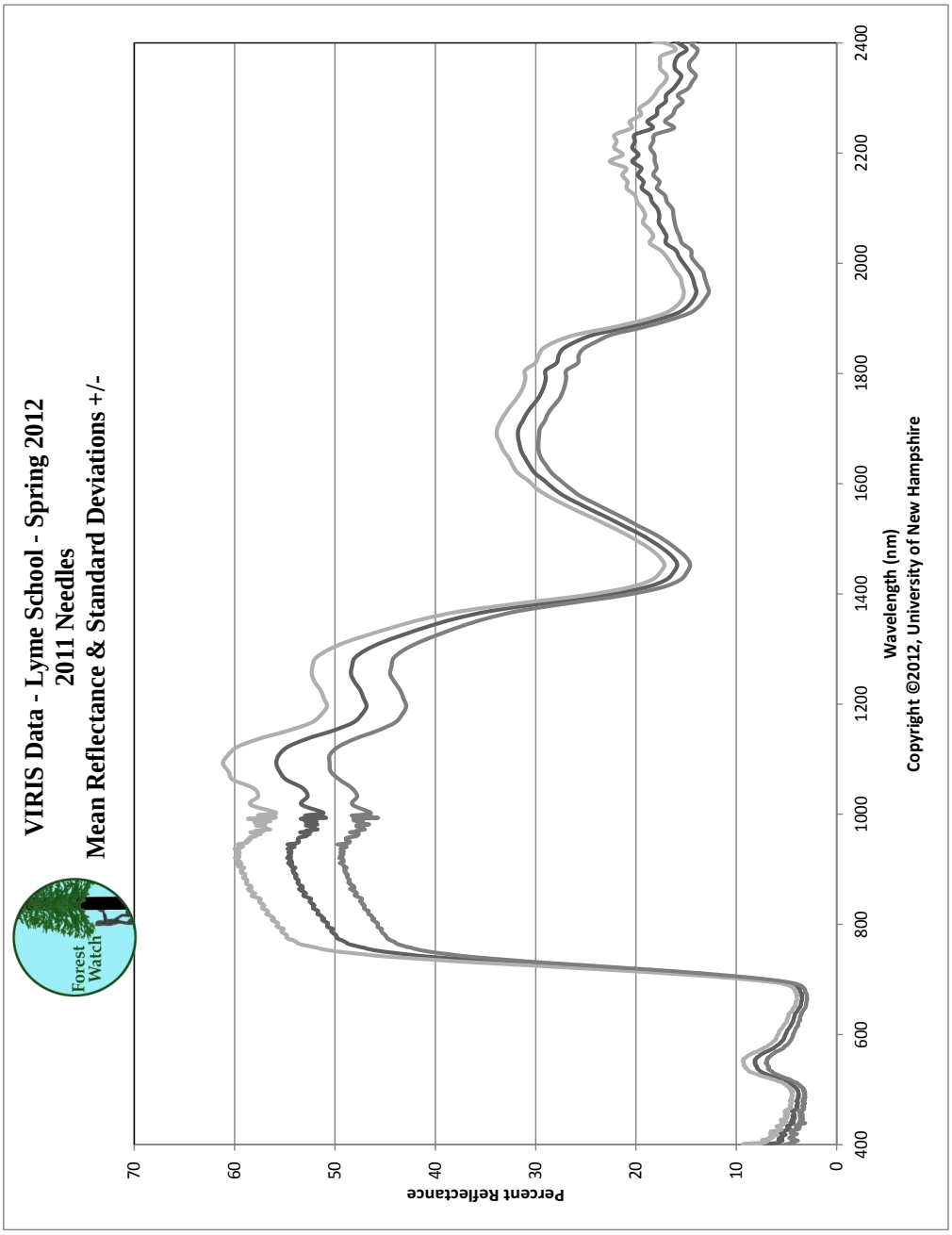
NeedleYear	2011	CollectionDate	4/16/2012		
Submitted By	Mary	Fougere			
TreeNumber	**1906**	**1907**	**1908**	**1909**	**1910**
DBH (cm)	5.3	7.1	11.1	4.1	3.5
CrownHeight (m)	2.7	3.1	4.8	2.2	2.4
TreeHeight (m)	2.8	3.4	5.3	2.4	2.5
N-Coll-Ht (m)	1.6	1.8	1.7	0.9	1.3
S-Coll-Ht (m)	1.4	1.3	2.5	1.2	1.1
N-Fas-Len (mm)	8.7	7.1	8.5	7.1	6.3
S-Fas-Len (mm)	6.4	6.4	9.2	5	5.2
N-Need-Ret (year)	2	2	2	2	2
S-Need-Ret (year)	2	2	2	2	2
N-Water (%)	50	50	54.2	63.3	53.3
S-Water (%)	53	51.8	54.8	51.8	52.2
N-NumNeedles	30	30	30	30	30
S-NumNeedles	30	30	30	30	30
N-AvgNeed-Len (mm)	68	53	86	72	67
S-AvgNeed-Len (mm)	67	66	88	56	66
N-PerTipNec	37	37	47	23	50
S-PerTipNec	3	47	47	23	57
N-PerChlMot	17	17	30	33	10
S-PerChlMot	0	30	20	20	20
N-AvgTotDamg-Len	5.4	1.2	5.2	4.1	3
S-AvgTotDamg-Len	0.4	3.6	1.8	3.3	1.6
N-PerNeedBothSymp	16.7	3.3	20	10	3.3
S-PerNeedBothSymp	0	26.7	20	10	13.3
N-AvgPerDamage	6.7	2.3	6.5	6.2	4.3
S-AvgPerDamage	-0.9	5.8	2.1	6.5	2.5
N-avg%Damage by Len.	7.90	2.30	6.00	5.70	4.50
S-avg%Damage by Len.	0.6	5.5	2	5.9	2.4



Index	1661N	1661S	1662N	1662S	1663N	1663S	1664N	1664S	1665N	1665S
REIP	722.4	730.1	722.4	731.6	722.4	727	722.4	727	727	727
NDVI	0.838	0.867	0.874	0.865	0.856	0.868	0.889	0.87	0.867	0.889
TM54	0.505	0.475	0.489	0.49	0.514	0.531	0.549	0.545	0.513	0.507
NIR31	0.849	0.815	0.846	0.858	0.882	0.857	0.88	0.905	0.873	0.848

Hanson Middle School
Biometric and Spectral Data

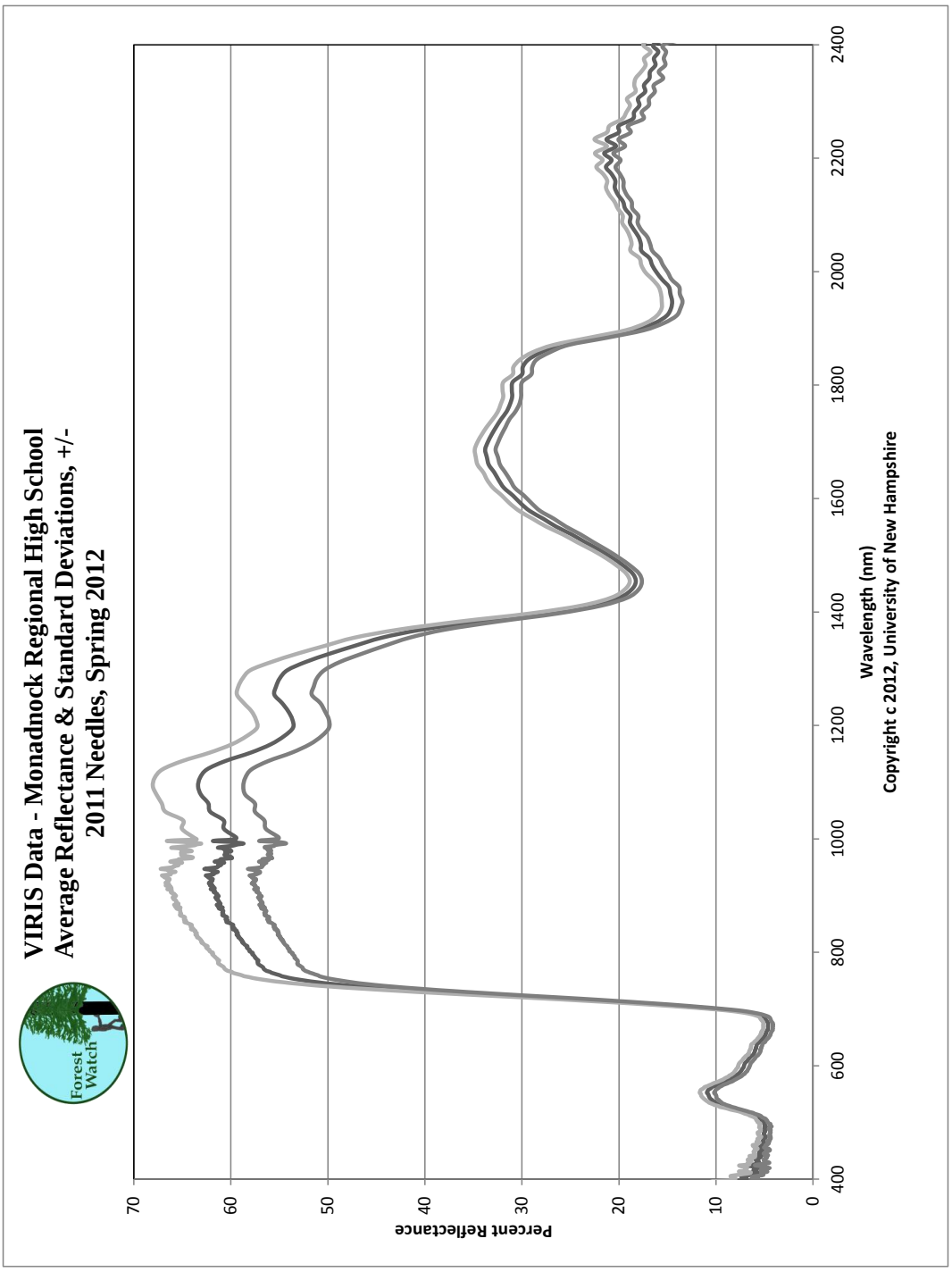
NeedleYear	2011	SubmittedBy Wes Blauss			
CollectionDate	5/25/2012				
TreeNumber	**1661**	**1662**	**1663**	**1664**	**1664**
DBH(cm)	30.9	32.5	26.8	31.2	35.6
CrownHeight (m)	9.5	13.9	8.7	10.1	10.9
TreeHeight (m)	12.3	16.1	10.6	11.7	17.1
N-Coll-Ht (m)	3	7	5	5	7
S-Coll-Ht (m)	3	7	5	5	7
N-Fas-Len (mm)	81	94	67	54	88
S-Fas-Len (mm)	84	92	71	47	79
N-Need-Ret (year)	1	2	2	2	2
S-Need-Ret (year)	2	2	1	2	2
N-NumNeedles	312	945	450	720	310
S-NumNeedles	254	678	600	596	245
N-AvgNeed-Len (mm)	82	87	74	84	88
S-AvgNeed-Len (mm)	88	83	68	56	93
N-PerTipNec	11	9	6	8	8
S-PerTipNec	9	12	6	6	6
N-PerChlMot	40	29	50	33	41
S-PerChlMot	33	44	26	40	53
N-AvgTotDamg-Len	4	1	2	1	4
S-AvgTotDamg-Len	1	2	1	1	2
N-PerNeedBothSymp	5	2	7	3	3
S-PerNeedBothSymp	1	5	2	3	2
N-AvgPerDamage	5	1	3	1	5
S-AvgPerDamage	1	3	1	2	2
N-avg%Damage by Len.	4.9	1.1	2.7	1.2	4.5
S-avg%Damage by Len.	1.1	2.4	1.5	1.8	2.2



Index	1901N	1901S	1902N	1902S	1903N	1903S	1904N	1904S	1905N	1905S
REIP	730.1	723.9	720.8	722.4	727	730.1	720.8	723.9	730.1	727
NDVI	0.881	0.883	0.863	0.853	0.856	0.875	0.855	0.865	0.866	0.856
TM54	0.596	0.592	0.56	0.646	0.604	0.519	0.517	0.57	0.578	0.577
NIR31	0.888	0.915	0.849	0.948	0.907	0.862	0.867	0.88	0.884	0.897

Lyme School
Biometric and Spectral Data

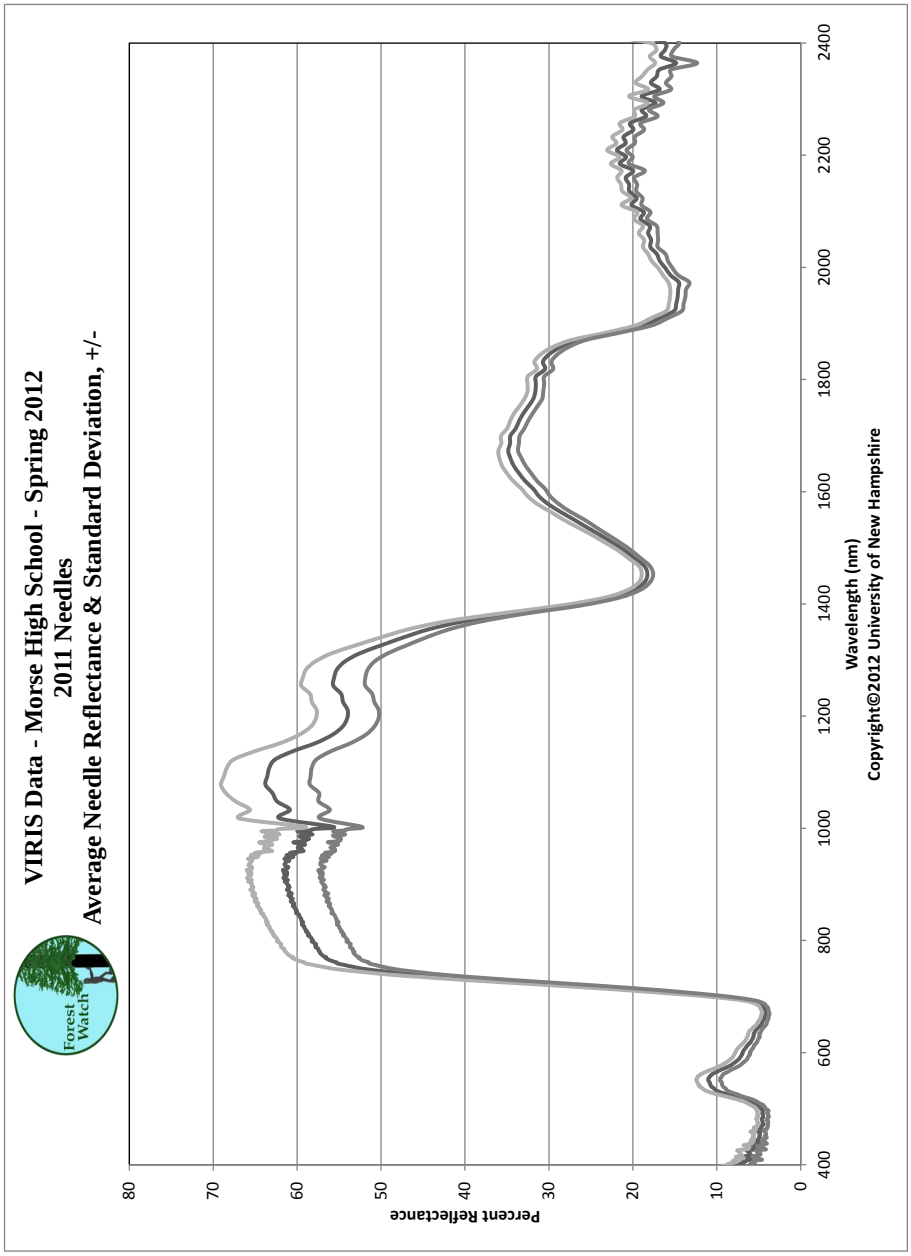
Needle Year: 2011	Submitted by Skip Pendleton				
CollectionDate	Spring 2012				
TreeNumber	**1901**	**1902**	**1903**	**1904**	**1905**
DBH (cm)	6.1	17.3	3.2	9.6	15.9
CrownHeight (m)	5	15.5	2.3	8.6	14.8
TreeHeight (m)	4.9	6.6	4.5	5.8	8
N-Coll-Ht (m)	4.4	4	3.1	4.3	4.4
S-Coll-Ht (m)	4.4	4.4	3.1	4.4	4.4
N-Fas-Len (mm)	92.3	75.3	93	113	96
S-Fas-Len (mm)	106	80	93	84.5	99
N-Need-Ret (year)	1	1	1	1	1
S-Need-Ret (year	1	1	1	1	1
N-NumNeedles	26	30	30	26	18
S-NumNeedles	30	30	27	30	30
N-AvgNeed-Len (mm)	92	75	93	113	96
S-AvgNeed-Len (mm)	106	81	93	85	99
N-PerTipNec	12	17	10	31	17
S-PerTipNec	3	13	11	10	17
N-PerChlMot	4	0	0	27	0
S-PerChlMot	3	10	0	3	13
N-AvgTotDamg-Len	4.7	6	1.5	8.7	4
S-AvgTotDamg-Len	2.3	11.5	1.5	3.4	4.5
N-PerNeedBothSymp	0	0	0	0	0
S-PerNeedBothSymp	0	0	0	3	3
N-AvgPerDamage	5	8	1.5	8	5
S-AvgPerDamage	2	12.5	1.6	4	4
N-avg%Damage by Len.	5.11	8.00	1.61	7.70	4.17
S-avg%Damage by Len.	2.17	14.20	1.61	4.00	4.55



Index	1266n	1266s	1267n	1267s	1268n	1268s	1269n	1269s	1270n	1270s
REIP	723.9	722.4	722.4	723.9	719.3	722.4	723.1	719.3	730.1	727
NDVI	0.852	0.835	0.84	0.846	0.819	0.843	0.845	0.844	0.84	0.852
TM54	0.505	0.553	0.511	0.591	0.524	0.511	0.56	0.526	0.528	0.556
NIR31	0.87	0.846	0.891	0.92	0.907	0.894	0.937	0.898	0.907	0.908

Monadnock Regional High School
Biometric and Spectral Data

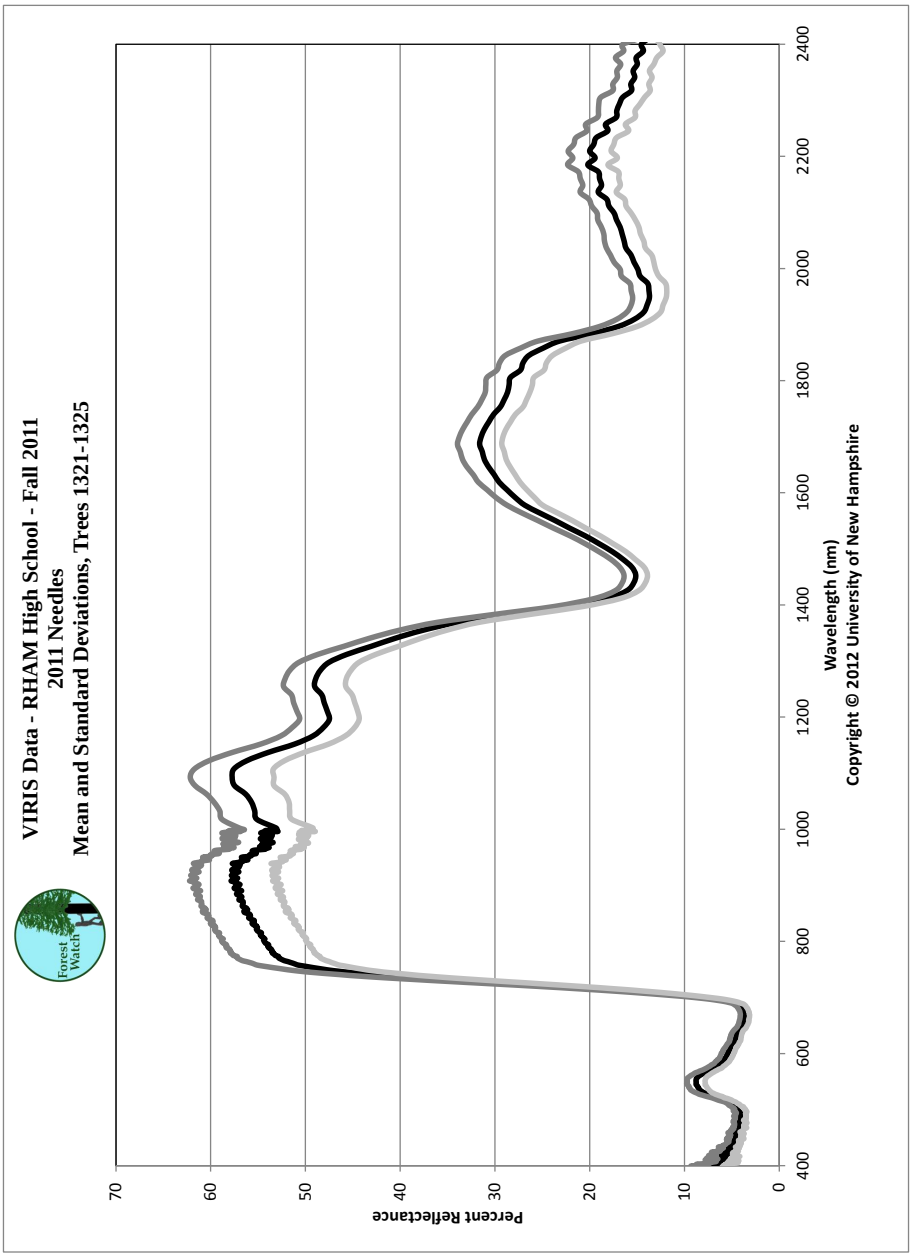
NeedleYear	**2011**	SubmittedBy	Gerry	Babonis	
CollectionDate	4/25/2012				
TreeNumber	**1266**	**1267**	**1268**	**1269**	**1270**
DBH	76.4	66.2			89.2
CrownHeight	3.60	7.50	6.80		2.30
TreeHeight	30.25	26.9	24.2		27.8
N-Coll-Ht (m)	10.50	10.50	10.50	10.50	10.50
S-Coll-Ht (m)	10.50	10.50	10.50	10.50	10.50
N-Fas-Len (mm)	79	73	76	70	75
S-Fas-Len (mm)	89	66	77	75	87
N-Need-Ret (year)	2	3	1	2	3
S-Need-Ret (year)	2	2	2	2	3
N-Water (%)	47.6	43.8	43.8	49	41.7
S-Water (%)	47.02	45	47	46.5	42.8
N-NumNeedles	30	30	30	30	30
S-NumNeedles	30	30	30	30	30
N-AvgNeed-Len (mm)	73	72.2	79.4	75	66
S-AvgNeed-Len (mm)	83	72.6	71	86	79.5
N-PerTipNec	70	6	36.6	56	70
S-PerTipNec	56	25	86.7		13.3
N-PerChlMot	47	20	26.6	26	70
S-PerChlMot	66	7.1	63.3		40
N-AvgTotDamg-Len	3.5	1.9	0.8	4.4	30
S-AvgTotDamg-Len	3	1	3		2
N-PerNeedBothSymp	33.3	0	16.6	16	70
S-PerNeedBothSymp	43		53.3		6.6
N-AvgPerDamage	4.1	2.6	1	6.5	70
S-AvgPerDamage	4.7	10.3	4.4		1.6
N-avg%Damage by Length	**4.79**	**2.63**	**1.01**	**5.87**	**45.45**
S-avg%Damage by Length	**3.61**	**1.38**	**4.23**	**0.00**	**2.52**



Index	1741N	1741S	1742N	1742S	1743N	1743S	1744N	1744S	1745N	1745S
REIP	725.4	725.4	725.4	727	722.4	725.4	725.4	725.4	727	727
NDVI	0.835	0.848	0.856	0.852	0.841	0.835	0.855	0.858	0.864	0.879
TM54	0.585	0.551	0.543	0.546	0.601	0.518	0.573	0.548	0.534	0.525
NIR31	0.907	0.902	0.907	0.912	0.903	0.866	0.915	0.882	0.912	0.909

Morse High School
Spectral Data

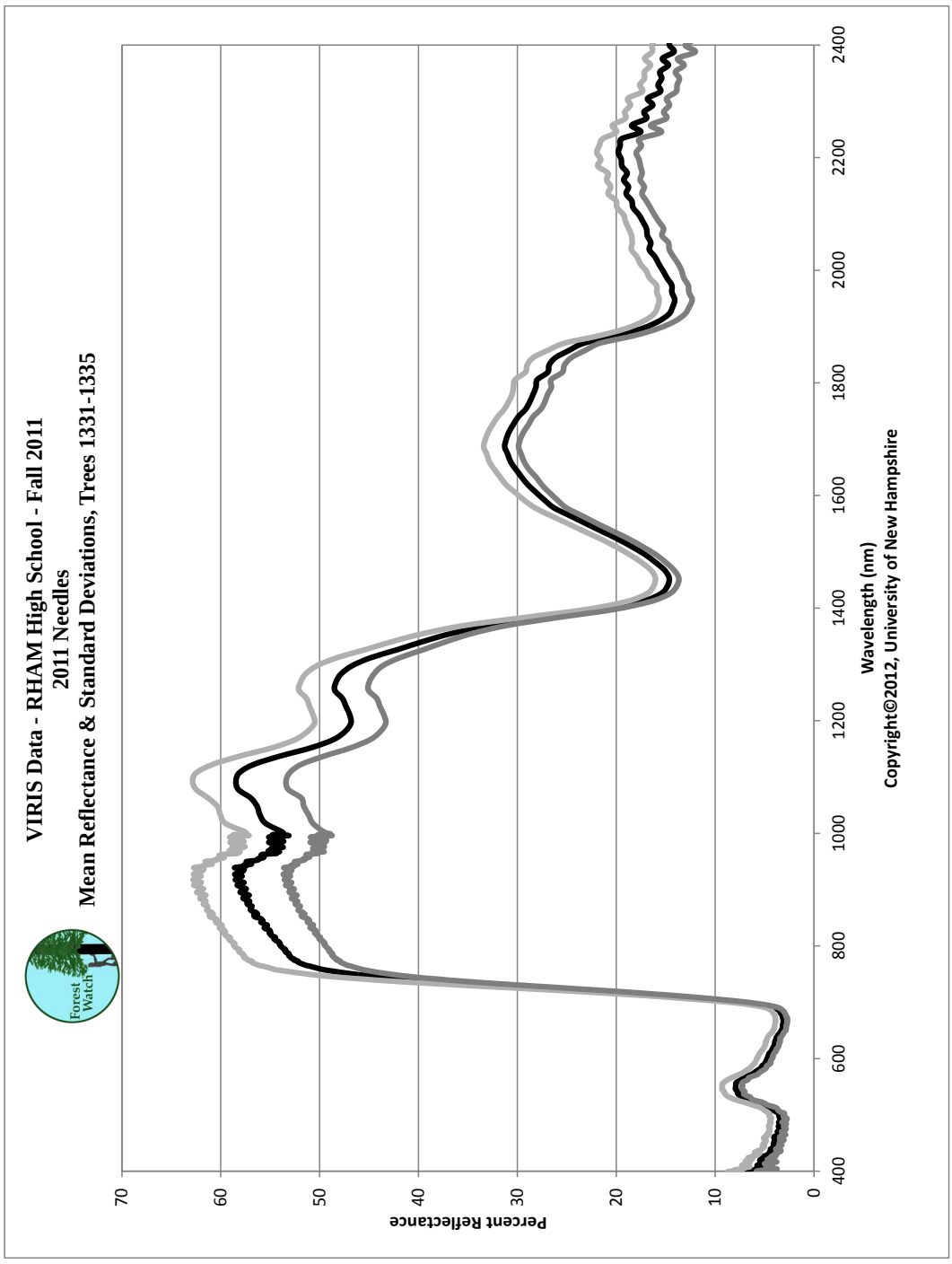
Needle Year	2011				
Collection Date	6/4/2012				
Submitted by	Carolyn	Nichols			
Tree Number	**1741**	**1742**	**1743**	**1744**	**1745**
N-NumNeedles	30	30	30	30	30
S-NumNeedles	30	30	30	30	30
N-AvgNeed-Len (mm)	83.2	105	58.6	72.9	67.7
S-AvgNeed-Len (mm)	87.5	85	82.4	98.2	74.7
N-PerTipNec	0.5	27	0	2	33
S-PerTipNec	0	14	30	80	3
N-PerChlMot	0	27	0.2	6.6	77
S-PerChlMot	0.2	12	30	36.7	63
N-AvgTotDamg-Len	0.4	2.8	0.5	1.6	20.6
S-AvgTotDamg-Len	0.2	7.3	3.8	2.2	9.7
N-PerNeedBothSymp	0	3	0	0	33
S-PerNeedBothSymp	0	16	16.7	33	3
N-AvgPerDamage	0.5	2.8	0.8	2.2	28.3
S-AvgPerDamage	0.2	9.2	4.6	2.5	13.5
N-avg%Damage by Len.	0.0	2.7	1.0	2.0	30.0
S-avg%Damage by Len.	0.0	8.6	4.6	2.2	12.9



Index	1321n	1321s	1322n	1322s	1323n	1323s	1324n	1324s	1325n	1325s
REIP	719.3	727	730.1	728.5	728.5	723.9	728.5	728.5	725.4	727
NDVI	0.878	0.88	0.863	0.883	0.862	0.861	0.87	0.852	0.859	0.851
TM54	0.569	0.495	0.521	0.597	0.488	0.485	0.531	0.564	0.515	0.57
NIR31	0.855	0.832	0.812	0.869	0.833	0.841	0.844	0.85	0.83	0.871

RHAM High School
Biometric and Spectral Data, Trees 1321-1325

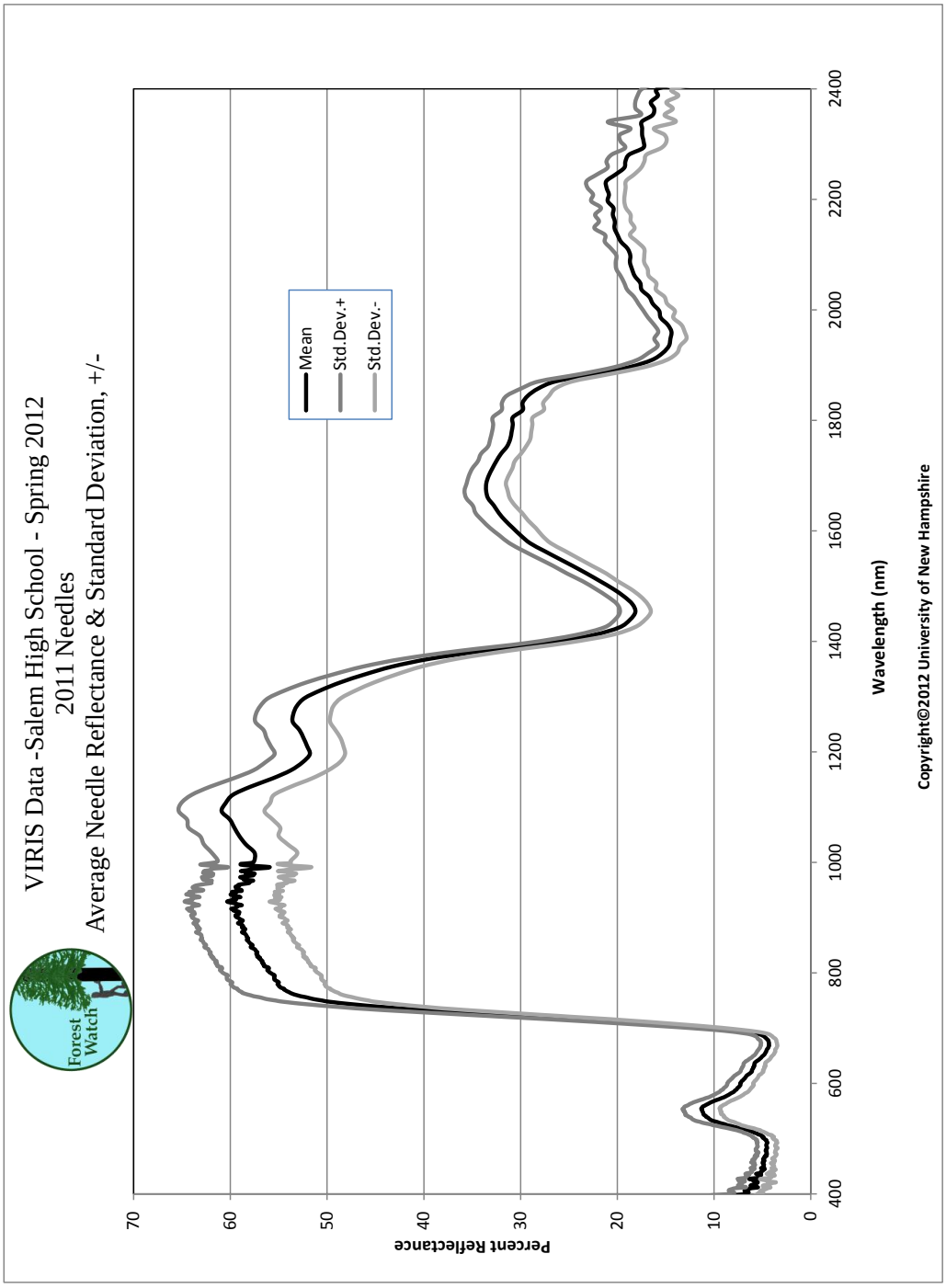
		Submitted by Frank Schmidt			
Needle Year	2011				
Collection Date	10/4/2011				
TreeNumber	**1321**	**1322**	**1323**	**1324**	**1325**
DBH (cm)	4.7	12.2	18.04	13.58	20.1
CrownHeight (m)	2	2.6	4.5	4.5	3.2
TreeHeight (m)	3.71	5.5	8.36	7.56	5.56
N-Coll-Ht (m)	3	3	4.5	4.8	3.2
S-Coll-Ht (m)	3	3	4.5	4.8	3.2
N-Fas-Len (mm)	68.9	65	107.4	59.5	93.3
S-Fas-Len (mm)	81.7	65	84.3	97.4	109.7
N-Need-Ret (year)	3	3	3	3	2
S-Need-Ret (year)	3	3	2	3	3
N-Water (%)	71	60	65.5	65.8	65.7
S-Water (%)	71	68.5	66.3	64.9	69.3
N-NumNeedles	30	30	30	30	30
S-NumNeedles	30	30	30	30	30
N-AvgNeed-Len (mm)	71	58	82	79	103
S-AvgNeed-Len (mm)	76	61	85	94	106
N-PerTipNec	13.3	3	10	13	3
S-PerTipNec	11.2	0	13	3	3
N-PerChlMot	3.3	3	20	3	2
S-PerChlMot	13.3	3	13	0	2
N-AvgTotDamg-Len	6.1	0	0.27	6	3.5
S-AvgTotDamg-Len	0.6	0	0.5	0	0
N-PerNeedBothSymp	3.3	0.6	0	0	3.3
S-PerNeedBothSymp	10	0	0	0	0
N-AvgPerDamage	1.7	1.7	2.7	5.5	2.2
S-AvgPerDamage	6.7	0	2.7	0	0.3
N-avg%Damage by Length	8.6	0	0	7.6	3.4
S-avg%Damage by Length	0.8	0	0.6	0	0



Index	1331n	1331s	1332n	1332s	1333n	1333s	1334n	1334s	1335n	1335s
REIP	728.5	733.2	728.5	728.5	720.8	728.5	727	730.1	728.5	722.4
NDVI	0.888	0.906	0.89	0.902	0.864	0.87	0.865	0.88	0.882	0.882
TM54	0.509	0.484	0.483	0.458	0.625	0.581	0.536	0.498	0.545	0.563
NIR31	0.831	0.802	0.796	0.803	0.863	0.826	0.846	0.813	0.87	0.856

RHAM High School
Biometric and Spectral Data, Trees 1331-1335

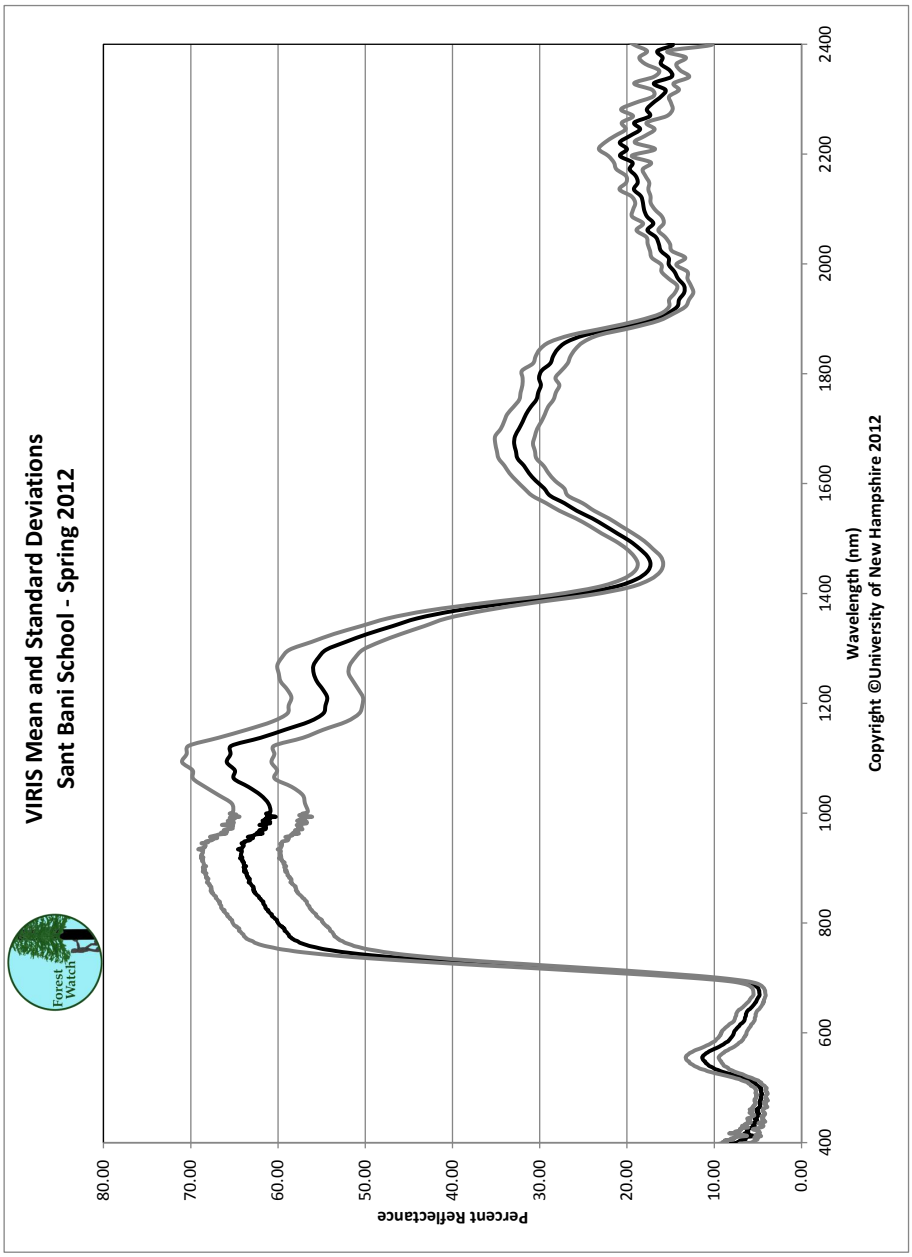
Needle Year	2011	Submitted by Frank Schmidt			
Collection Date	10/4/2011				
Tree Number	**1331**	**1332**	**1333**	**1334**	**1335**
DBH (cm)	16.03	6.6	26.64	38.22	30.2
CrownHeight (m)	6.2	3.4	8.7	10.2	10.7
TreeHeight (m)	8.84	6.86	13.67	16.25	14/89
N-Coll-Ht (m)	4.5	4	8	8	5.3
S-Coll-Ht (m)	4.5	4	8	8	5.3
N-Fas-Len (mm)	92.7	79.3	63.8	85	83.2
S-Fas-Len (mm)	78.1	74.7	80.5	83	87
N-Need-Ret (year)	3	3	4	3	3
S-Need-Ret (year)	3	3	3	3	3
N-Water (%)	68.1		64	61	70
S-Water (5)	64.3		66	60	70
N-NumNeedles	30	30	30	30	30
S-NumNeedles	30	30	30	30	30
N-AvgNeed-Len (mm)	84	89	88	82	77
S-AvgNeed-Len (mm)	96	90	73	88	76
N-PerTipNec	0	0.13	20	10	0
S-PerTipNec	3.3	0.13	20	10	13
N-PerChlMot	0	0.6	16	13	13
S-PerChlMot	6.6	0.4	17	3	2.6
N-AvgTotDamg-Len		2.1	1.4	0.02	1.8
S-AvgTotDamg-Len	1.6	0.02	5.9	2.2	3
N-PerNeedBothSymp	0	0.6	0	0	0
S-PerNeedBothSymp	3	0.1	6	0	6.6
N-AvgPerDamage		0.02	0.3	2	2.1
S-AvgPerDamage	1.6	0.01	3.3	2.5	4.2
N-avg%Damage by Length	0	2.4	1.6	0	2.3
Savg%Damage by Length	1.7	0	8.1	2.5	4



	1351N	1351S	1353N	1353S	1354N	1354S	1355N	1355S	1504N	1504S
REIP	725.4	720.8	719.3	722.4	719.3	723.9	719.3	717.7	717.7	727
NDVI	0.84	0.806	0.858	0.822	0.852	0.854	0.858	0.845	0.85	0.836
TM54	0.564	0.523	0.545	0.552	0.556	0.586	0.538	0.535	0.565	0.566
NIR31	0.925	0.85	0.894	0.875	0.876	0.918	0.904	0.899	0.948	0.943

Salem High School
Biometric and Spectral Data

NeedleYear	2011	Submitted	Norma	Bursaw	
CollectionDate	5/7/2011				
TreeNumber	**1351**	**1353**	**1354**	**1355**	**1504**
CrownHeight (m)	6.1	6.6	7.9	8.5	6.3
Tree Height (m)	7.7	7.3	9.2	10.1	7.8
N-Coll-Ht (m)	5.9	4.6	4.7	5.4	5.4
S-Coll-Ht (m)	5.6	4.8	4.7	4.6	5.4
N-Fas-Len (mm)	7.7	7.1	8	6.8	7.3
S-Fas-Len (mm)	8.7	7	9.4	7.7	7.3
N-Need-Ret (year)	3	2	2	2	2
S-Need-Ret (year)	2	2	2	2	2
N-Water (%)	42	43	47	37	44
S-Water (%)	42	52	44	45	45
N-NumNeedles	30	30	30	30	30
S-NumNeedles	30	30	30	30	30
N-AvgNeed-Len (mm)	64	64	88	68	69
S-AvgNeed-Len (mm)	84	67	97	70	70
N-PerTipNec	3	3	10	43	0
S-PerTipNec	7	3	7	13	13
N-PerChlMot	50	50	63	20	37
S-PerChlMot	27	53	40	30	60
N-AvgTotDamg-Len	1	1	1	1	5
S-AvgTotDamg-Len	3	1	6	1	4
N-PerNeedBothSymp	0	0	7	13	0
S-PerNeedBothSymp	0	0	3	7	10
N-AvgPerDamage	1	1	2	1	7
S-AvgPerDamage	4	2	6	1	6
N-avg%Damage by Len	1.6	1.6	1.1	1.5	7.4
S-avg%Damage by Len	3.6	1.5	6.2	1.4	5.7

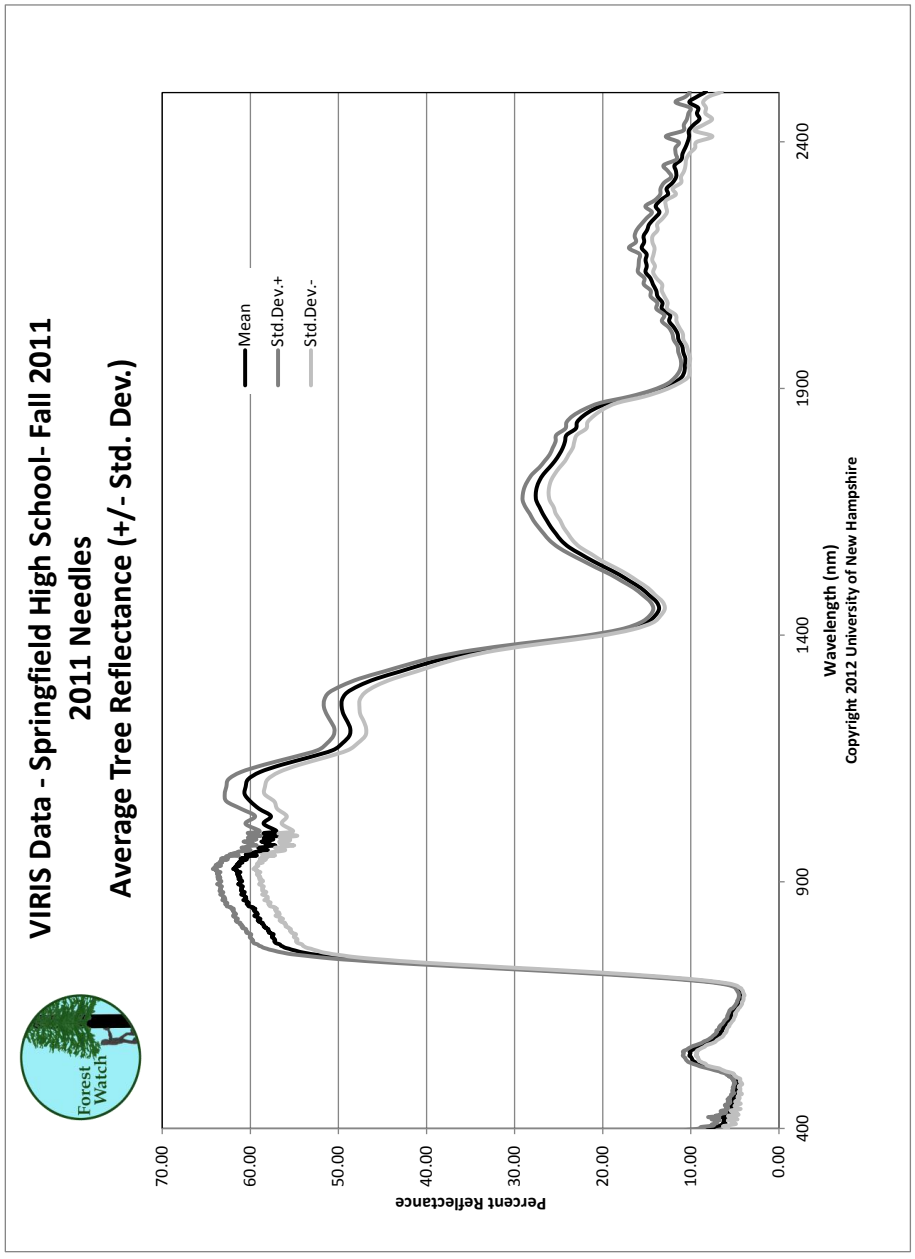


Index	96N	96S	97N	97S	98N	98S	99S	99W	100S	100W
REIP	727	727	730.1	716.2	722.4	706.9	722.4	720.8	725.4	722.4
NDVI	0.865	0.825	0.841	0.836	0.836	0.809	0.862	0.815	0.86	0.824
TM54	0.505	0.543	0.518	0.505	0.48	0.479	0.472	0.518	0.514	0.511
NIR31	0.853	0.9	0.896	0.845	0.851	0.852	0.857	0.875	0.887	0.879

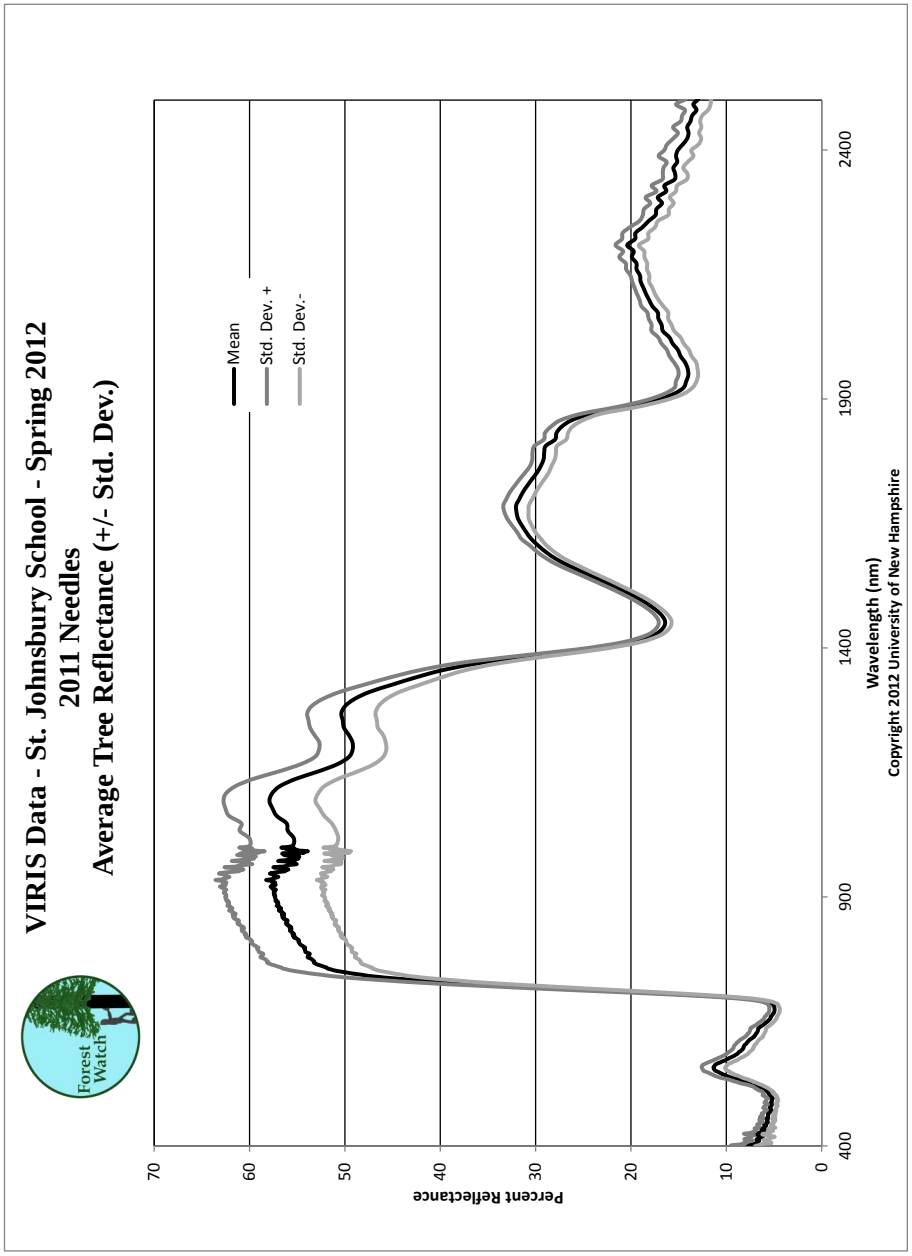
Sant Bani School
Biometric and Spectral Data

Needle Year	2011	Collection Date	6/1/2012		
Submitted by	Robert	Schongalla			
Tree #	96	97	98	99	100
Elevation: 850'	Canopy	65.00%	Ground	95.90%	
DBH (cm)	55.7	77.3	72.3	65.4	45.1
Crown Hgt (m)	18.3	18.2	19.3	22.8	17.7
TreeHeight (m)	21.8	21.2	22.8	26.8	22.2
N-Coll-Ht (m)	4.5	3.5	4.5	4	4.5
S-Coll-Ht (m)	3.5	3	3.5	4.5	5
N-Fas.Len (mm)	83	98	87	83	93
S-Fas.Len (mm)	78	90	85	88	90
N-Need-Ret (year)	2	2	2	1	3
S-Need-Ret (year)	1	2	2	1	2
N-Water (%)	51.8	54.1	51.6	53.5	49.8
S-Water (%)	51.8	52.2	52.2	52.3	52.4
N-NumNeedles	30	30	30	30	30
S-NumNeedles	30	30	30	30	30
N-AvgNeed-Len (mm)	82	84	84	89	82
S-AvgNeed-Len (mm)	75	83	82	82	100
N-PerTipNec	43	43	13	23	53
S-PerTipNec	33	37	20	20	50
N-PerChlMot	23	7	17	43	27
S-PerChlMot	23	27	3	7	13
N-AvgTotDamg-Len	1.8	14	8.6	2.9	11.1
S-AvgTotDamg-Len	14.8	8	4.8	6.2	19.5
N-PerNeedBothSymp	3	0	7	7	3
S-PerNeedBothSymp	3	3	0	0	13
N-AvgPerDamage	2.2	16.6	10.2	3.3	13.6
S-AvgPerDamage	19.8	9.6	5.8	7.5	19.6
N-avg%Damage by Len.	2.7	19.8	12.1	3.7	16.6
S-avg%Damage by Len.	26.4	11.6	7.1	9.1	19.6

Springfield High School, Springfield, MA
Spectral Data from Samples Submitted by Naomi Volain



Index	1736S	2071N	2071S	2072N	2072S	2073N	2073S	2076S
REIP	723.9	731.6	731.6	731.6	723.9	727	723.9	725.4
NDVI	0.843	0.85	0.863	0.865	0.842	0.852	0.86	0.852
TM54	0.441	0.422	0.419	0.432	0.448	0.441	0.431	0.454
NIR31	0.8	0.78	0.784	0.79	0.813	0.787	0.786	0.813

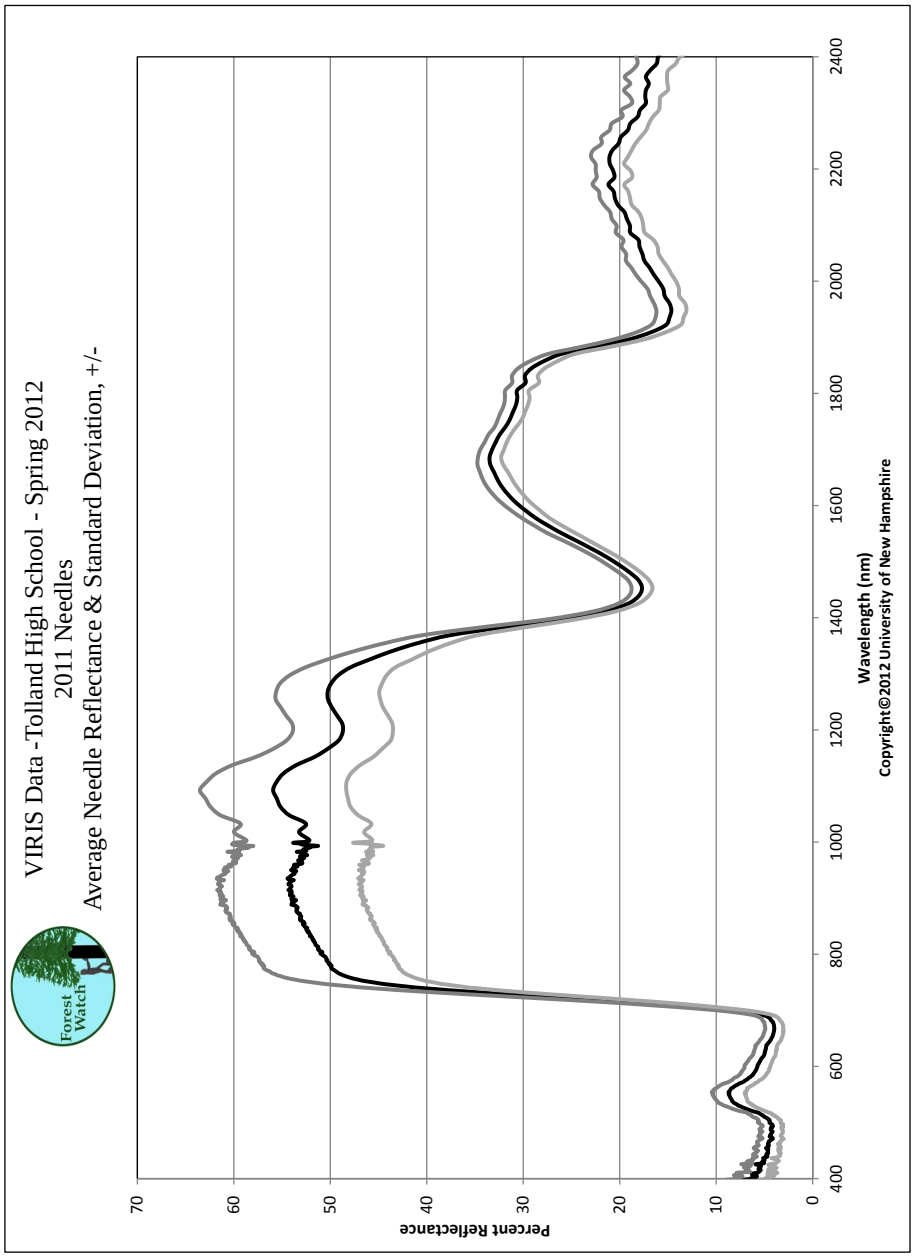


March 2012 readings										
	1806n	1806s	1807n	1807s	1808n	1808s	1809n	1809s	1810n	1810s
REIP	713.1	708.5	710	716.2	713.9	713.1	711.6	710	716.2	719.3
NDVI	0.816	0.82	0.81	0.828	0.817	0.816	0.784	0.825	0.808	0.845
TM54	0.529	0.538	0.571	0.559	0.635	0.6	0.533	0.512	0.498	0.484
NIR31	0.851	0.88	0.896	0.896	0.898	0.908	0.86	0.843	0.843	0.84

St. Johnsbury School, St. Johnsbury, VT
Biometric and Spectral Data

NeedleYear	2011				
CollectionDate	2/14/2012				
Submitted by	Otto	Wurzburg			
TreeNumber	**1551**	**1552**	**1553**	**1554**	**1555**
N-Coll-Ht (m)	9.2	9.2	9.2	9.2	9.2
S-Coll-Ht (m)	9.2	9.2	9.2	9.2	9.2
N-NumNeedles	30	30	30	30	30
S-NumNeedles	30	30	30	30	30
N-AvgNeed-Len (mm)	73	84	84	82.5	89
S-AvgNeed-Len (mm)	71	88	83	85.5	88
N-PerTipNec	6	16	6	0	0
S-PerTipNec	3	10	20	0.2	3
N-PerChlMot	13	13	3	0	0
S-PerChlMot	0	16	13	0	3
N-AvgTotDamg-Len	3	3	0.5	0	0
S-AvgTotDamg-Len	0.2	0.8	7	0	0.4
N-PerNeedBothSymp	3	6	0.3	0	0
S-PerNeedBothSymp	0	0	0	0	2
N-AvgPerDamage	4	3	1	0	0
S-AvgPerDamage	1	1	8	1	0
N-avg%Damage by Len.	4.1	3.6	1.0	0.0	0.0
S-avg%Damage by Len.	0.0	1.0	8.4	0.0	1.0

Tolland School, Tolland, CT
Spectral Data from Samples Submitted by Fred Szezciul



Index	1751N	1751S	1752N	1752S	1753N	1753S	1754N	1754S	1755N	1755S
REIP	723.9	723.9	723.9	728.5	720	716.2	728.5	723.9	731.6	720.8
NDVI	0.822	0.825	0.867	0.876	0.811	0.847	0.855	0.849	0.861	0.851
TM54	0.52	0.513	0.607	0.594	0.764	0.653	0.609	0.669	0.645	0.559
NIR31	0.884	0.869	0.949	0.909	0.978	0.99	0.937	0.933	0.986	0.932