DYNAMIC ASPEN DENSITY EXPERIMENT

ANNUAL REPORT
For 2011 and 2012
OF-06-P013

March 15, 2013

MIXEDWOOD MANAGEMENT ASSOCIATION

EXECUTIVE SUMMARY

The Dynamic Aspen Density Experiment is investigating white spruce growth response to varying aspen overstory densities at two ages of stand development. For this purpose, seven 17- and 22-year old stands were selected each that had aspen densities greater than 10,000 stem per ha and planted white spruce at densities of at least 1000 stems per ha. Five density treatments were installed in each stand, i.e. aspen densities were thinned to 0, 1000, 2500 or 5000 stems per ha and an un-thinned plot served as control. 400m^2 Permanent Sample Plots (PSPs) were installed in the center of each treatment and both aspen and spruce densities, height and diameter were measure pre- and post-thinning. Plots will be re-measured on 3 year intervals. Plots were installed in 2007, 2008 and 2009; the four treatment units installed in 2007 were re-measured in 2010, three treatment units installed in 2008 were re-measured in 2010 and five treatment units installed in 2009 are scheduled for re-measurement in the spring of 2013. Unfortunately, one treatment installed in 2007 and two treatment units installed in 2008 were lost due to an herbicide treatment for another project. A possible site for re-installation of the three lost units has been identified and layout of the treatment units will be attempted in May of 2013. If suitable, two or three treatment units will be installed during the summer and fall of 2013. If not suitable, another site search will commence immediately.

Trajectories of top height, density, basal area and volume were developed where re-measurements were completed and compared to model forecast by GYPSY and MGM. The models predict the growth parameters well with the exception of aspen basal area which is under-predicted, especially by GYPSY and to some degree by MGM. The models also tend to decrease aspen densities over time more severely than what was measured.

The models were also used to compare growth parameters between treatments. Generally the volume trends predict as expected, i.e. highest aspen density treatment predicts highest aspen volume and lowest spruce volume and lowest aspen density treatment predicts lowest aspen volume and highest spruce volume. The 2500 and 5000 stems per ha aspen density treatments had very similar spruce volumes although aspen volumes differed substantially. Curiously, MGM did not predict highest aspen volumes in the highest aspen density treatments but in the 2500 stems per ha treatment.

Table of Contents

1.0 DADE Project Background

The current Regeneration Standards of Alberta (RSA) mandate that the same forest type, same RSA stratum, should be created after harvest on the forested land base. One approach to regenerating aspen and white spruce mixedwoods (CD or DC broad cover groups) was to promote pure white spruce plantations on some portions of the harvested areas while the remaining portions of the cutblocks were allowed to regenerate to pure aspen with unknown effects of this species segregation (un-mixing of the mixedwoods) on timber production, habitat quality, and biodiversity values. The major reason for this species segregation are the poorly understood effects of aspen overstory on white spruce understory with respect to volume production and maintaining Annual Allowable Cuts.

Research in the boreal mixedwoods suggests that the effects of the overstory aspen (beneficial and competitive) on the shade tolerant white spruce will vary throughout the life of a stand. One major factor that affects the understory white spruce is the density of the overstory aspen. A set of Dynamic Density trials is required, where density management treatments are applied at different stand ages, to assess the role of aspen density related effects on understory white spruce at different stages of development in juvenile mixedwood stands.

1.1 DADE Project Initiation

In 2007, the Mixedwood Management Association of Alberta (MWMA), a co-operative of 10 Alberta forest companies, in collaboration with the University of Alberta and Alberta Sustainable Resource Development (SRD), initiated a 5-year project for the development of a Dynamic Aspen Density Experiment (DADE).

The objectives of the experiment are to:

- Identify the thresholds in aspen densities that determine stand condition (symbiotic, commensal, competitive) during each of two stand development stages (17 and 22 years of age).
- Determine the survival and growth of white spruce and aspen in different stand conditions during each of two stand development stages.
- Determine the opportunity cost to aspen production of optimizing spruce survival and growth.
- Provide credible data with which to evaluate and further improve the Reforestation Standards of Alberta for mixtures of spruce and aspen.

1.2 DADE Project Design

The original intent of the DADE project was to establish five installations in each combination of 17 and 22 year old stands in the Central Mixedwood, and Lower Foothills Ecoregions. This would have resulted in a total of 20 Installations (Table 1).

Table 1. DADE Project Design Table

		STAND AGE	
		17 Years	22 Years
ECOREGION	Central Mixedwood	1.	1.
		2.	2.
		3.	3.
		4.	4.
		5.	5.
	Lower Foothills	1.	1.
		2.	2.
		3.	3.
		4.	4.
		5.	5.

Following the 2009 Season, the MWMA members decided to drop the Lower Foothills Ecoregion from the project Matrix due to lack of suitable stands and to balance the Central Mixedwood Ecoregion part of the Matrix. As a result five new installations were added in the 17 years old blocks in the Central Mixedwood Ecoregion. Table 2 presents the Matrix at the end of the 2009 season, while the 2009 DADE Annual Report presents the steps taken in selecting these 5 installations.

Table 2. DADE Project Design e at the End of the 2009 Field Season

		STAND AGE	
		17 Years	22 Years
ECOREGION	Central Mixedwood	1. CM 17-1	1. CM 22-1
		2. CM 17-2	2. CM 22-2
		3. CM 17-3	3. CM 22-3
		4. CM 17-4	4. CM 22-4
		5. CM 17-5	5. CM 22-5
		6. CM 17-6	6. CM 22-6
		7. CM 17-7	7. CM 22-7

2.0 2011 and 2012 DADE Project Activities

This DADE Annual Report documents the activities that occurred during 2011 and 2012. For information on 2007, 2008, 2009, and 2010 activities and measurement protocol, please refer to the corresponding DADE Annual Report or DADE Project Manual.

2.1. Revision of DADE Project Manual

There were no revisions to the DADE Project Manual in 2011. The 2009 DADE Project Manual was used for all the 2011 re-measurements. The re-measurements planned for the fall of 2012 were postponed to the spring of 2013 due to the lack of contractor availability.

2.2. Personnel

- Willi Fast, The Forestry Corp.
  As Science Director, Willi Fast was the lead in project design and implementation for the Dynamic Aspen Density Experiment. As well, Willi was responsible for the daily project administration and management and was the contact for any questions by the field staff. He spent time in the field reviewing block selections, plot establishment and measurement/re-measurement procedures. Willi was also responsible for overseeing all reporting and data analysis following the field season.

- Gitte Grover, Alberta-Pacific Forest Industries Ltd. , Chair, Mixedwood Management Association
  Gitte Grover provided direction in block selection and design implementation and analysis. She accompanied Willi Fast during project review in the field.

- Stacy Bergheim, University of Alberta
  Stacy Bergheim was responsible for the daily office administration and accounting of the project. Stacy also assisted in the double-entry keypunching of the 2011 field data.

- Woodlands Forest Management
  Woodlands were hired to do all the field work for remeasuring 3 installations in 2011

- Yanguo Qin, The Forestry Corp.
  Yanguo Qin was responsible for updating the 2011 DADE database and writing the 2011 Annual Report. Yanguo also did all the analysis using the DADE database (GYPSY version 1.0 and MGM 2009A4 projections).

- Cosmin Tansanu, The Forestry Corp.
  Cosmin Tansanu was responsible for preparing the field tally sheets for the field crews, training and quality control.

2.3 Acquisition of Equipment

Supplies from the previous year were used in the 2011 field season (paint, tags, and wire).

2.4 Changes to Procedures in 2011 and 2012

The 2011 and 2012 protocol remained the same as the 2009 protocol.

2.4.1 Plot Re-Measurement

No changes were made in plot measurement/re-measurement procedures in 2011 or 2012. Three 2008 installations were re-measured in September to October 2011: CM-22-05, CM-22-06, and CM-22-07. Five installations from 2009 were scheduled for third year re-measurements during the fall of 2012. This work was not completed due to the lack of contractor availability and was re-scheduled to the spring of 2013. Three installations established in 2007 are scheduled for their 6 year re-measurements

in 2013. The work for these will be done in either fall 2013 or early 2014 depending on availability of funding and contractors.

2.4.2 Database

Following the 2011 field season (3 installations re-measured), new data were added to the 2010 database after some corrections were made. The cleaned 2011 database (DADE_DATABASE_20120515.mdb) includes measurements at establishment for all the installations as well as first re-measurements for 7 installations. The database was updated and is current to the end of December, 2011.

The following additional tasks were completed:

- Modifications were made to some of the database tables to accommodate the measurement number and measurement date.

2.5 Establishment of three new installations – herbicide damage

As described in the 2010 annual report, one of the 2007 installations and two of the 2008 installations were destroyed by an herbicide project. In 2010, a proposal was submitted and accepted by FRIAA to ensure funding ($115,000) for establishing three new installations and thus rebalance the DADE project. Finding suitable sites to establish three new installations has proven very difficult. We had potentially identified some stands during the 2011 season, but following a pre-location cruise of the area, these sites were ruled out as they were not large enough. During 2012, another potential stand was identified in the Whitecourt area. A cruise was done of the area during the fall of 2012 and the data showed highly variable aspen and spruce densities but possibilities for 2 installations. Unfortunately, winter conditions and heavy snow came early in the fall of 2012 before layout of the installations could be attempted. Layout, thinning and measurement of the new installations are planned for 2013. To date, the MWMA has used $8746.94 for the purpose of trying to locate suitable areas (Table 4).

3.0 2011 Installation Summaries

3.1 Installation Re-Measurement Reports

3.1.1. CM 22-5 South Harmon Valley MOF (Borrow Pit)

Installation Number/Local Name: CM 22-5 South Harmon Valley MOF - Borrow Pit.
Dates established: July 15 –18, 2008.
Dates thinned: September 16 - 23, 2008.
Measurement Dates: September 15 – 24, 2008.
First Re-Measurement Dates: September 28 - October 5, 2011

RE-MEASUREMENT PROTOCOL TABLE – September – October 2011					
Measurement Plots	**Thinning Treatment (stems/ha)**				
	0	1000	2500	5000	Control
Pretreatment Completed	yes	yes	yes	yes	yes
Post treatment Completed					
20 X 20 Main Plot					
Deciduous ≥5.1	yes	yes	yes	yes	yes
Conifer ≥ 1.3m	yes	yes	yes	yes	yes
10 X 10 Deciduous Subplot					
Deciduous 1.3m - 5.1cm	yes	yes	yes	yes	yes
Spruce Thinning/Spacing	yes	yes	yes	yes	yes

Work Remaining: None

Data Storage Location: Re-measurement data were appended to the DADE database.

3.1.2. CM 22-6 Kimewan Lake MOF

Installation Number/Local Name: CM 22-6 - Kimewan Lake MOF
Dates established: July 16, 2008-September 30, 2008
Dates thinned: September 29 – October 2, 2008
Measurement Dates: September 21 – October 5, 2008
First Re-Measurement Dates: October 17 – 30, 2011

RE-MEASUREMENT PROTOCOL TABLE – October 2011					
Measurement Plots	**Thinning Treatment (stems/ha)**				
	0	1000	2500	5000	Control
Pretreatment Completed	yes	yes	yes	yes	yes
Post treatment Completed					
20 X 20 Main Plot					
Deciduous ≥5.1	yes	yes	yes	yes	yes
Conifer ≥ 1.3m	yes	yes	yes	yes	yes
10 X 10 Deciduous Subplot					
Deciduous 1.3m - 5.1cm	yes	yes	yes	yes	yes
Spruce Thinning/Spacing	yes	yes	yes	yes	yes

Work Remaining: None

Data Storage Location: Re-measurement data were appended to the DADE database.

3.1.3. CM 22-7 South Harmon Valley MOF (North of Road)

Installation Number/Local Name: CM 22-7 South Harmon Valley MOF – North of Road
Dates established: October 1 - 2, 2008
Dates thinned: October 3 - 8, 2008
Measurement Dates: October 3 – 8, 2008
Re-Measurement Dates: October 12 – 20, 2011

RE-MEASUREMENT PROTOCOL TABLE – October 2011					
Measurement Plots	**Thinning Treatment (stems/ha)**				
	0	1000	2500	5000	Control
Pretreatment Completed	yes	yes	yes	yes	yes
Post treatment Completed					
20 X 20 Main Plot					
Deciduous ≥5.1	yes	yes	yes	yes	yes
Conifer ≥ 1.3m	yes	yes	yes	yes	yes
10 X 10 Deciduous Subplot					
Deciduous 1.3m - 5.1cm	yes	yes	yes	yes	yes
Spruce Thinning/ Spacing	yes	yes	yes	yes	yes

Work Remaining: None
Data Storage Location: Re-measurement data were appended to the DADE database.

3.2 Installation Maintenance Reports

In 2011 the three Installations that were established in 2008 (CM 22-05, CM 22-06, and CM 22-07) were re-measured. In addition, installations' tending and white spruce thinning were done to align the plots with the 2009 updated protocol. The installations were tended to remove the re-sprouting aspen (deciduous maintenance).

Tags were collected from white spruce (> 1.3 m) that were thinned per the 2009 updated protocol as well as from trees that were had died. .

In all three installations posts were checked to establish borderline trees, buffers were repainted, where missing, orange dots were painted on trees to indicate the direction of height measurement. Pictures were taken at each treatment unit within the three re-measured installations.

3.2.1 CM 22-5 South Harmon Valley MOF (Borrow Pit)

<u>Tag removal on thinned white spruce</u>
Date: September 28 - October 5, 2011
All the tags from additionally thinned white spruce were removed. Tags found on the ground as well as tags from dead and down trees were also collected.

<u>Tag/Wire Maintenance</u>
Date: September 28 - October 5, 2011

Wires were made larger on the deciduous trees and tags were moved onto a branch for the white spruce in each of the treatment units. Flagging tape was removed from the trees to avoid girdling.

Deciduous Maintenance
Date: September 28 - October 5, 2011
Deciduous sprouts growing post-thinning were cut using a hand ax in the treatment units as well as in the buffer area.

3.2.2 CM 22-6 Kimewan Lake MOF

Tag removal on thinned white spruce
Date: October 17 – 30, 2011
All the tags from additionally thinned white spruce were removed. Tags found on the ground as well as tags from dead and down trees were also collected.

Tag/Wire Maintenance
Date: October 17 – 30, 2011
Wires were made larger on the deciduous trees and tags were moved onto a branch for the white spruce in each of the treatment units. Flagging tape was removed from the trees to avoid girdling.

Maintenance
Date: October 17 – 30, 2011
Deciduous sprouts growing post-thinning were cut using a hand ax in all treatment units and adjacent buffer.
3.2.3 CM 22-7 South Harmon Valley MOF (North of Road)

Tag removal on thinned white spruce
Date: October 12 – 20, 2011
All the tags from additionally thinned white spruce were removed. Tags found on the ground as well as tags from dead and down trees were also collected.

Tag/Wire Maintenance
Date: October 12 – 20, 2011
Wires were made larger on the deciduous trees and tags were moved onto a branch for the white spruce in each of the treatment units. Flagging tape was removed from the trees to avoid girdling.

Maintenance
Date: October 12 – 20, 2011
Deciduous sprouts growing post-thinning were cut using a hand ax in all treatment units and adjacent buffer.

3.3 Summaries of 2011 Measurement Data

The data collected in the 2011 field season represented first re-measurements for three installations. The data were appended to the DADE database that was created in 2011. A separate document (DADE_Data_Assessment_Compilation_20110830.doc) was created in 2011 to describe the Access database that was built.

Due to the changes in protocol during the experiment establishment, a unique variable was defined to identify the trees that were initially measured but were no longer in the plot (i.e. thinned spruce trees, spruce < 1.3 m). The variable's name is 'Final_Flag' and it is located in the 'Post_Plot_Tree_Data' table of the Access database. All trees with Final_Flag = 'YES' represent trees that were no longer part of the project (i.e. <1.3 m, dead trees, thinned trees).

Appendix 1 presents the top height, basal area, dbh, and height graphs for the 3 installations re-measured in 2011.

3.4. Model Projections

Observed versus Projected Responses

For each treatment of each installation, the observed measurements for top height, stand density, basal area, and gross volume (0/0 utilization) at establishment and at the first re-measurement were plotted. These observed trajectories were overlaid on long term growth projections from each of two growth models, GYPSY and MGM, which used the observed conditions at establishment as the basis of projection. Individual graphs are presented for combinations of installation and treatment, and separately for each growth attribute as projected by each of GYPSY and MGM. Observed and projected trends can be compared on each graph.

All graphs for these projectons can be found in Appendix 2: Observed versus projected responses.

Overall both GYPSY and MGM project top height, density and volume well. Aspen basal area increments are underestimated substantially by GYPSY and subsequently there is some volume underestimation as well. MGM also predicts less basal area increment than actual, however, to a lesser degree than GYPSY. In the high aspen density treatment, the models tend to reduce aspen density more than it actually occurred.

Appendix 3 contains GYPSY and MGM projection comparisons by treatment.

GYPSY predicts both aspen and spruce volume increment over time as expected. Aspen volumes decrease with decreasing density and spruce volumes respond to aspen volumes reversely, highest spruce volume in the lowest aspen density treatment and decreasing with increasing aspen volumes. Interestingly, MGM does not forecast highest aspen volume in the highest density treatment, but reduces aspen volume in control and 5000 stems per hectare treatment over time below that of the 2500 stems per ha treatment. Again spruce volume development responds reversely to aspen volume. Another point to note is that forecasted spruce volumes in the 2500 and 5000 aspen stems per ha treatments are very similar in both GYPSY and MGM projections. These results could suggest an opportunity to grow more aspen volume without suppressing spruce growth.

MAI predictions follow the same trend as volume predictions.

Aspen top height predictions do not vary much by treatment. MGM predicts spruce top height to be highest in the 0 aspen density treatment; however, the top height increments in the other treatments do not necessarily predict in the order of aspen density treatments, lowest to highest. GYSPY predictions of spruce top height are very similar for all treatments with no particular trend.

3.5. Remeasurement Schedule

Table 3. Remeasurement Schedule

Installation Number	Company FMA	Location	Establishment Date	3-Year Measurement Date	6-Year Measurement Date	Herbicide Damage
CM 17-1	AlPac	Touchwood Lake Road	September, 2007	September, 2010	Fall 2013	
CM 17-2	AlPac	AlPac "C" Road - Marttinni	November, 2007	September, 2010	Fall 2013	
CM 17-3	Weyco	Sinkhole Lake, Drayton Valley	September, 2009	Fall 2012 or Spring 2013	Fall 2015	
CM 17-4	Weyco	Sinkhole Lake, Drayton Valley	September, 2009	Fall 2012 or Spring 2013	Fall 2015	
CM 17-5	Weyco	Sinkhole Lake, Drayton Valley	September, 2009	Fall 2012 or Spring 2013	Fall 2015	
CM 17-6	Weyco	Sinkhole Lake, Drayton Valley	October, 2009	Fall 2012 or Spring 2013	Fall 2015	
CM 17-7	Weyco	Sinkhole Lake, Drayton Valley	Sept/Oct, 2009	Fall 2012 or Spring 2013	Fall 2015	
CM 22-1	AlPac	AlPac 1000 Road	October, 2007	September, 2010	na	Basal Bark Application in Spring 2010
CM 22-2	AlPac	AlPac 1000 Road	October, 2007	September, 2010	Fall 2013	
CM 22-3	AlPac	AlPac 1000 Road	Sept/Oct, 2008	na	na	Basal Bark Application in Spring 2010
CM 22-4	AlPac	AlPac 1000 Road	Sept/Oct, 2008	na	na	Basal Bark Application in Spring 2010
CM 22-5	DMI	South Harmon Valley MOF	September, 2008	October, 2011	Fall 2014	
CM 22-6	DMI	Kimewan Lake MOF	October, 2008	October, 2011	Fall 2014	
CM 22-7	DMI	South Harmon Valley MOF	October, 2008	October, 2011	Fall 2014	

4.0 Reservation Notations

The reservation notations did not change in 2011 and there were no new installations added to the 14 existing ones. The following presents a complete list of Reservation numbers.

- CM 17-1 ISP 080201
- CM 17-2 ISP 080200
- CM 17-3 ISP 090393
- CM 17-4 ISP 090394
- CM 17-5 ISP 090394
- CM 17-6 ISP 090394
- CM 17-7 ISP 090395
- CM 22-1 ISP 080202
- CM 22-2 ISP 080203
- CM 22-3 ISP 080336
- CM 22-4 ISP 080337
- CM 22-5 ISP 080338
- CM 22-6 PNT 090007
- CM 22-7 ISP 080340

5.0 Overview of DADE Project Budget and Cost Information for 2011 and 2012.

2010 Surplus carried forward to 2011	$ 88,321.31
2011 MWMA Sponsorship	$ 24,000.00
2011 FRIAA Sponsorship	$ 85,500.00
2011 FRIAA Sponsorship to replace damaged plots	$ 115,000.00
Total funds available for 2011	$ 312,821.31
2011 Total Project Costs	$ 119,417.94
2012 Total Project Costs	$ 43,073.07
2012 Budget Surplus carried to 2013	$ 150,330.30

Please refer to Table 4 for a complete overview of the project funds from the beginning.

Table 4. Complete Budget overview to date

MWMA Dynamic Aspen Density Experiment		2006	2007	2008	2009	2010	2011	2012	2013
		Actual	Actual	Actual	Actual	Actual	Actual	Actual	Budget
Opening Balance			9,444.05	15,571.82	16,198.46	67,008.46	88,321.31	193,403.37	150,330.30
18739	MWMA Sponsership	10,000.00	56,500.00	124,500.00	153,500.00	24,000.00	24,000.00	0.00	0.00
	FRIAA Sponsorship		95,000.00	95,000.00	95,000.00	95,000.00	85,500.00		9,500.00
	FRIAA Damage $						115,000.00		
Total Revenue		**10,000.00**	**160,944.05**	**235,071.82**	**264,698.46**	**186,008.46**	**312,821.31**	**193,403.37**	**159,830.30**
Contractor/Purchase									
		Actual	Actual	Actual	Actual	Actual	Actual	Actual	Budget
Incremental Forest Technologies Ltd.		555.95							
Field Supplies			3,086.43	245.99		5.49			
The Forestry Corp			117,023.14	174,302.94	173,459.25	94,914.67	61,573.45	34,049.43	
Thinning Subcontract - Grover			22,495.67	27,511.95	15,694.77				
Thinning Subcontract - Helping hands				14,045.49	5,768.99				
Remeasurements - Woodlands							52,004.65		
U of A Overhead			2,766.99	2,766.99	2,766.99	2,766.99	5,839.84	276.70	
Establishment of replacement installations								8,746.94	112,000.00
2012 Remeasurements									38,330.30
Total Expenses		**555.95**	**145,372.23**	**218,873.36**	**197,690.00**	**97,687.15**	**119,417.94**	**43,073.07**	**150,330.30**
Balance		**9,444.05**	**15,571.82**	**16,198.46**	**67,008.46**	**88,321.31**	**193,403.37**	**150,330.30**	**9,500.00**

5.1 2011 and 2012 Actual Project Cost Information

The following summarizes the actual amounts charged to the project in 2011 and 2012. The project was under budget for both 2011 and 2012. This was due to the inability to locate appropriate areas to establish replacement installations for the damaged plots. Plot remeasurements and maintenance were completed for installations CM-22-5, CM-22-6 and CM-22-7. The budget surplus from 2011 and 2012 was carried forward to 2012 and 2013.

2011 Actual Project Costs

Remeasurement Contracts	$ 52,004.65
Data entry, analysis and compilation and Annual report	$ 51,643.43
Project Management	$ 9,930.02
U of A overhead	$ 5,839.84
Total Project Cost (2011)	$ 119,417.94

2012 Actual Project Costs

Project Management	$ 16,514.81
Data entry, analysis and compilation	$ 17,534.62
U of A overhead	$ 276.70
Cruise area for potential new installations (Grover Consulting and TimberNorth)	$ 8,746.94
Total Project Cost (2012)	$ 43,073.07

5.2 2013 DADE Proposed Budget

There were no new funds provided to the project in either 2011 or 2012.
The 2013 budget will be divided into the following general categories:

Remeasurement and Maintenance (Includes travel, accommodations and QC)	$ 38,330.30
New Installations to replace destroyed blocks	$ 112,000.00
Total	$ 150,330.30

5.3 MWMA Funding to DADE 2013

The MWMA is currently investigating the possibility of providing additional money in order to fund the remeasurement of existing installations for 2013.

Appendix 1. Plot Summaries/Compilations

All graphs included in this selection are made using the following criteria:

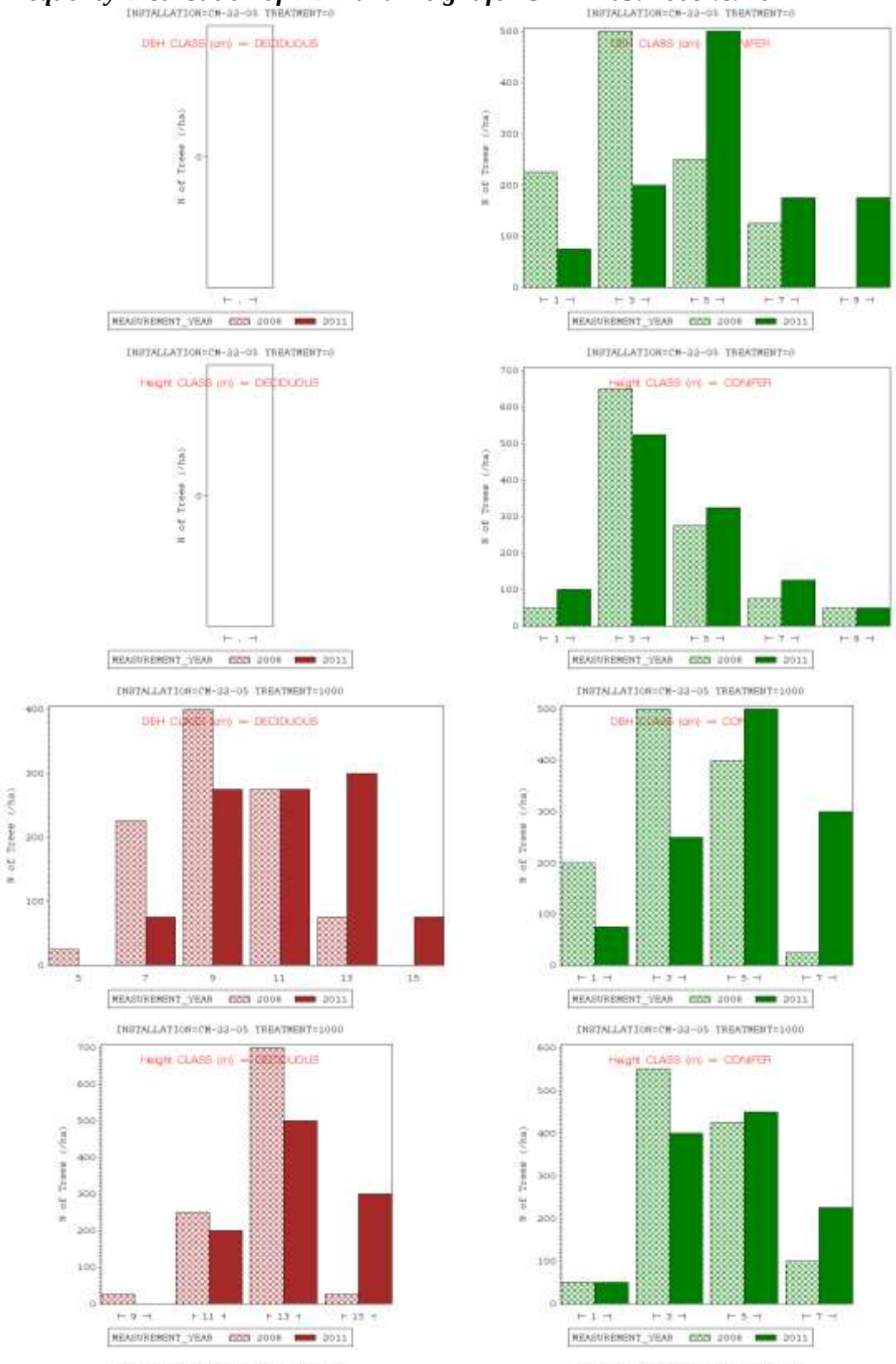
- Pre-harvest stems include all stems ≥ 1.3m in height.
- No dead trees are included in this data unless specified in the title.

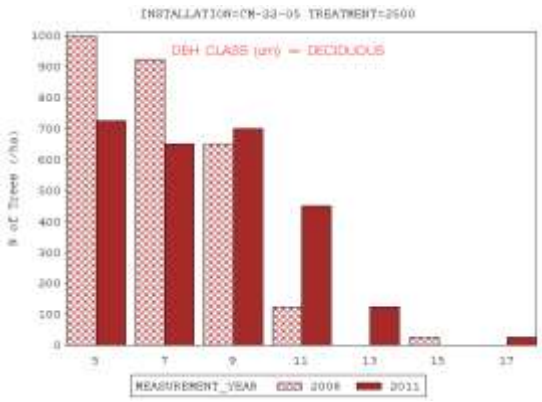
The first set of graphs shows the height and dbh frequency distributions in all the plots within the 3 installations. On the left hand side there are the deciduous graphs (in brown), while on the right hand side there are the coniferous graphs (in green). Each plot within the installation has four graphs, two deciduous (DBH and Height) and two coniferous (DBH and Height).

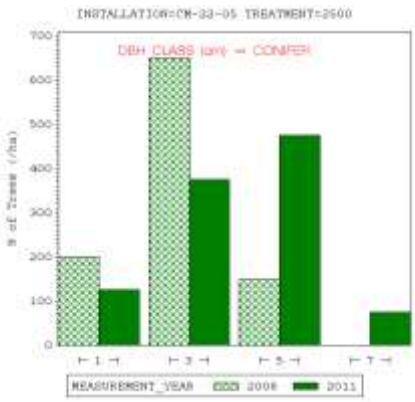
The second set of graphs shows the dbh and height trajectories in each plot of the 3 installations. The deciduous with dbh on top and height at the bottom are located on the left hand side (in brown), while the coniferous graphs are located on the right hand side (in green).

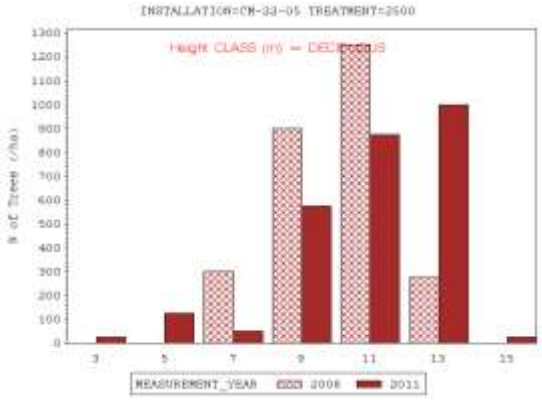
The third set of graphs shows the basal area trajectories for the plots within the installations, deciduous on the left hand side and coniferous on the right hand side, while the fourth set of graphs shows the top height trajectories for all plots, deciduous on the left hand side and coniferous on the right hand side.

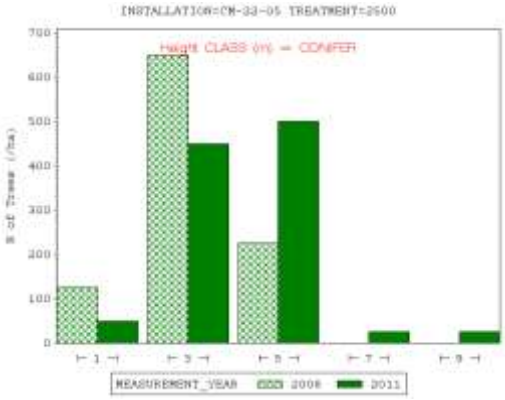
Frequency Distribution of DBH and Height for CM-22-05: 2008 vs. 2011

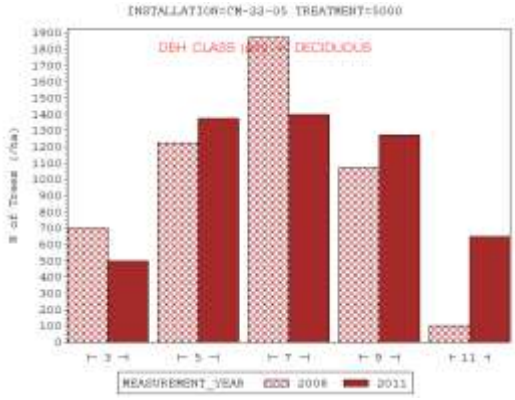


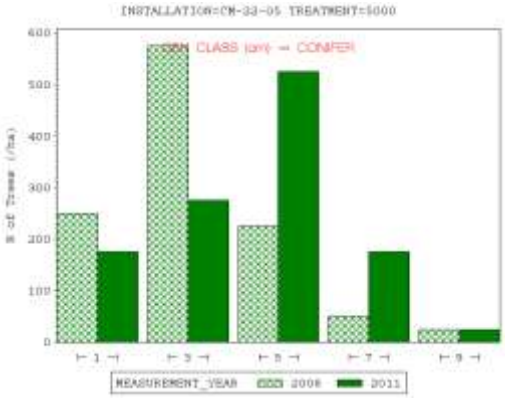

INSTALLATION=CM-33-05 TREATMENT=2500
DBH CLASS (cm) = DECIDUOUS
N of Trees (/ha)
MEASUREMENT_YEAR 2008 2011

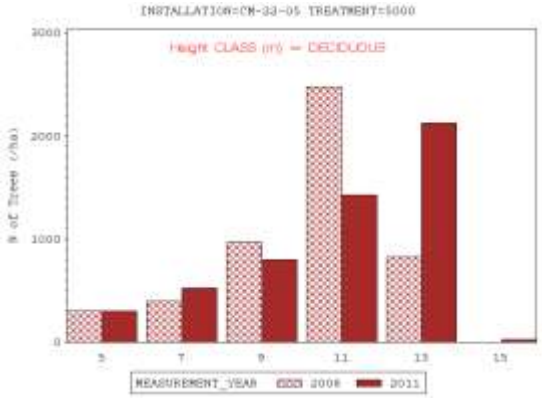

INSTALLATION=CM-33-05 TREATMENT=2500
DBH CLASS (cm) = CONIFER
N of Trees (/ha)
MEASUREMENT_YEAR 2008 2011

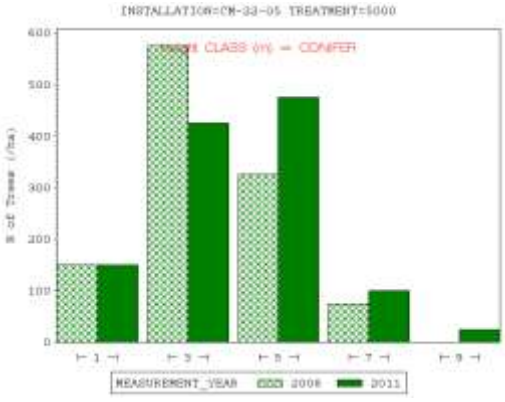

INSTALLATION=CM-33-05 TREATMENT=2500
Height CLASS (m) = DECIDUOUS
N of Trees (/ha)
MEASUREMENT_YEAR 2008 2011

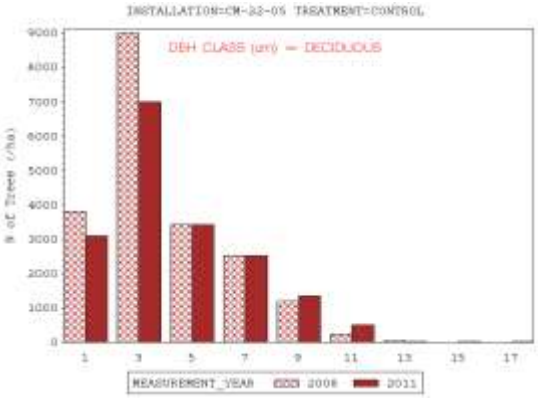

INSTALLATION=CM-33-05 TREATMENT=2500
Height CLASS (m) = CONIFER
N of Trees (/ha)
MEASUREMENT_YEAR 2008 2011

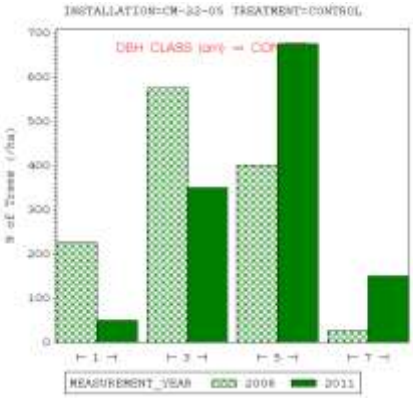

INSTALLATION=CM-33-05 TREATMENT=5000
DBH CLASS (cm) = DECIDUOUS
N of Trees (/ha)
MEASUREMENT_YEAR 2008 2011

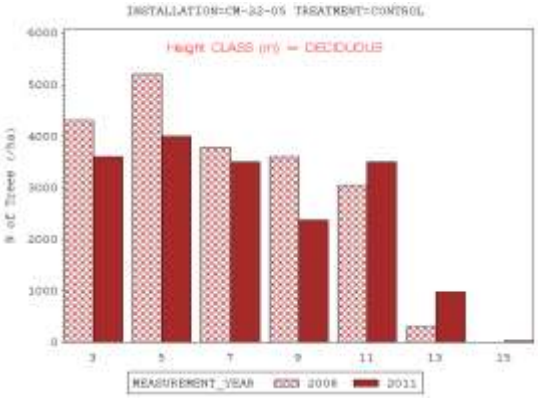

INSTALLATION=CM-33-05 TREATMENT=5000
DBH CLASS (cm) = CONIFER
N of Trees (/ha)
MEASUREMENT_YEAR 2008 2011

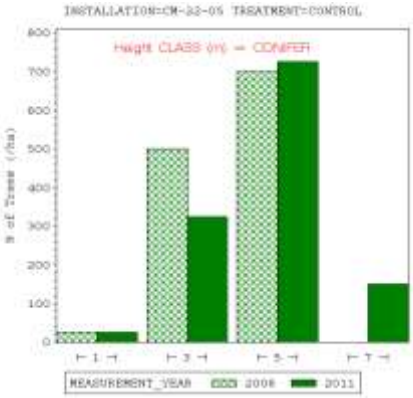

INSTALLATION=CM-33-05 TREATMENT=5000
Height CLASS (m) = DECIDUOUS
N of Trees (/ha)
MEASUREMENT_YEAR 2008 2011


INSTALLATION=CM-33-05 TREATMENT=5000
Height CLASS (m) = CONIFER
N of Trees (/ha)
MEASUREMENT_YEAR 2008 2011

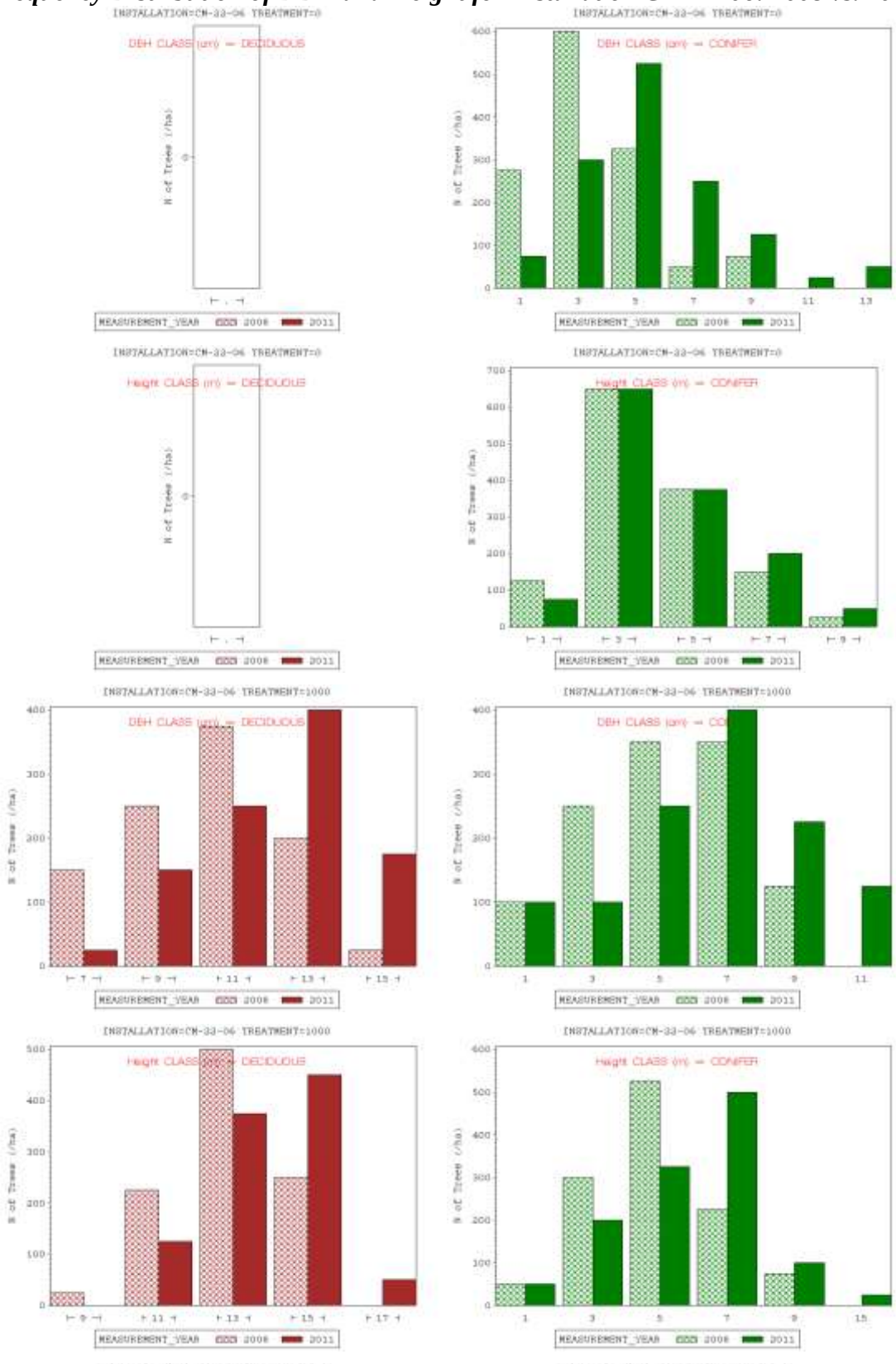

INSTALLATION=CM-32-05 TREATMENT=CONTROL
DBH CLASS (cm) = DECIDUOUS
MEASUREMENT_YEAR 2008 2011

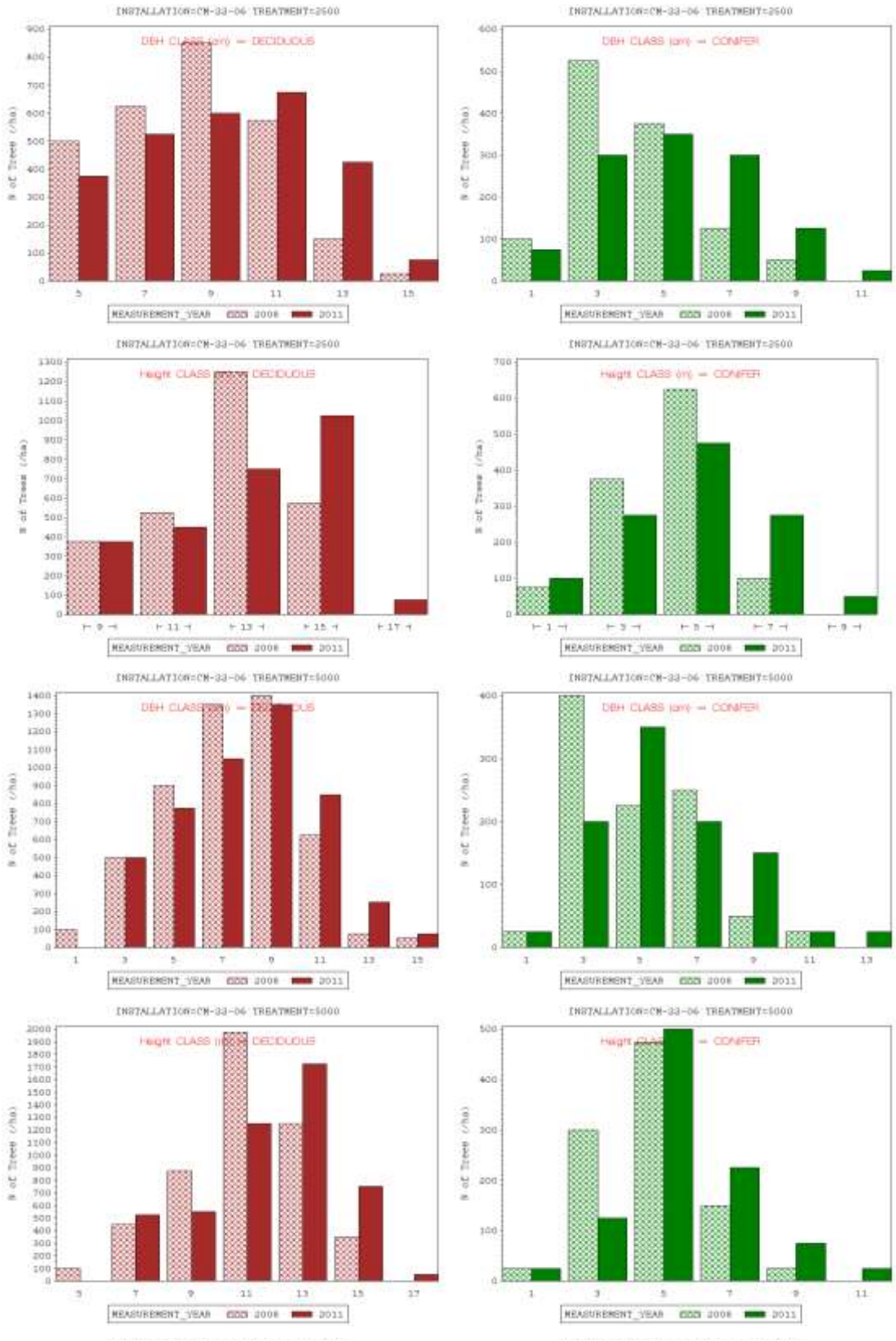

INSTALLATION=CM-32-05 TREATMENT=CONTROL
MEASUREMENT_YEAR 2008 2011

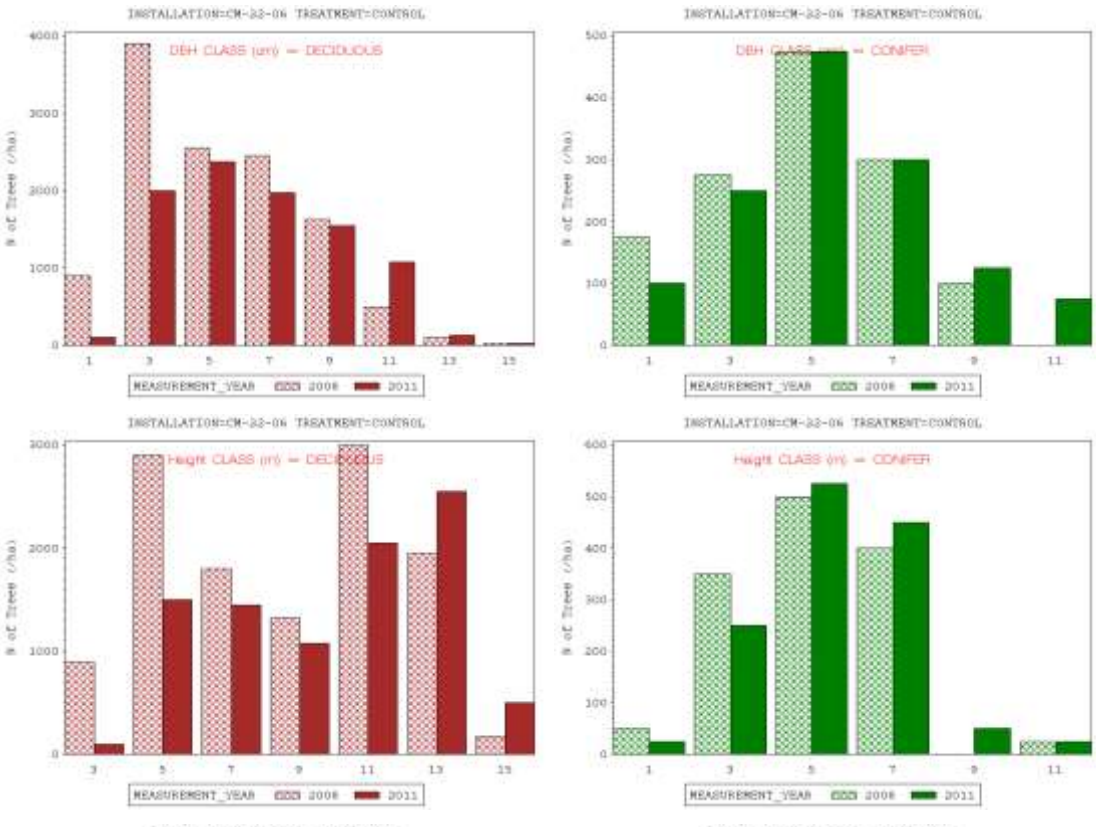

INSTALLATION=CM-32-05 TREATMENT=CONTROL
Height CLASS (m) = DECIDUOUS
MEASUREMENT_YEAR 2008 2011


INSTALLATION=CM-32-05 TREATMENT=CONTROL
Height CLASS (m) = CONIFER
MEASUREMENT_YEAR 2008 2011

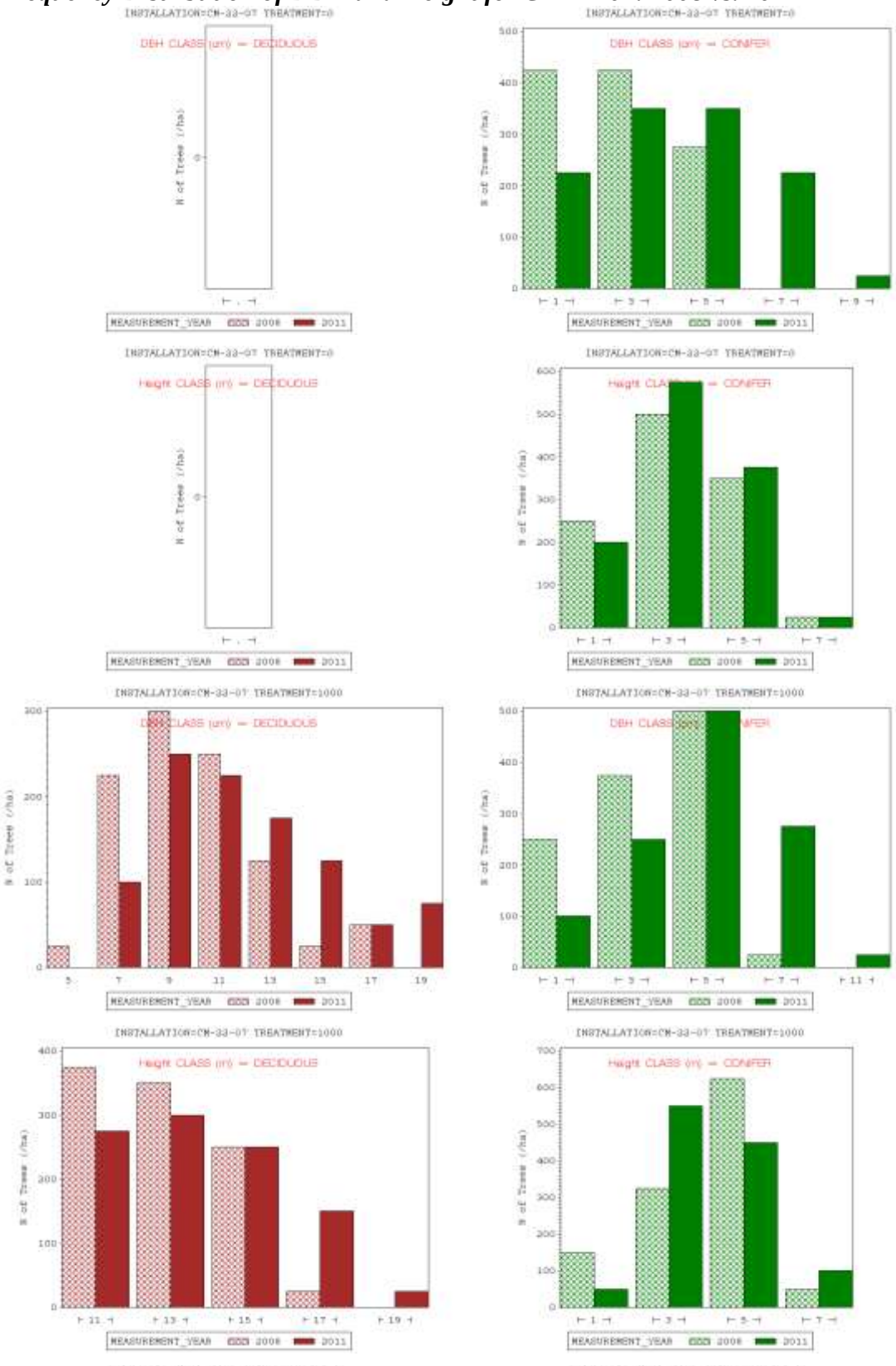
Frequency Distribution of DBH and Height for Installation CM-22-06: 2008 vs. 2011

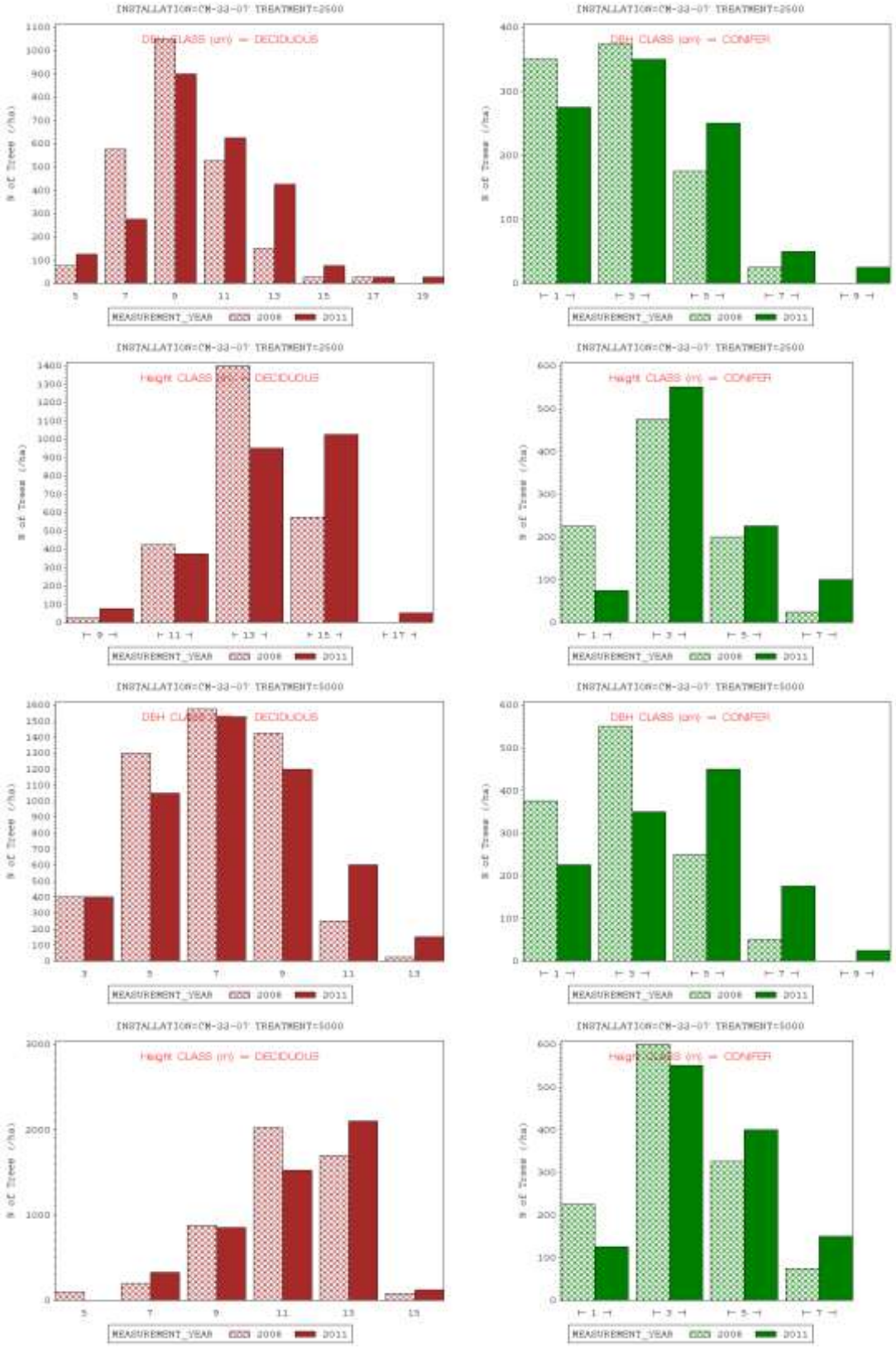



INSTALLATION=CM-33-06 TREATMENT=2500
DBH CLASS (cm) = DECIDUOUS
INSTALLATION=CM-33-06 TREATMENT=2500
DBH CLASS (cm) = CONIFER
INSTALLATION=CM-33-06 TREATMENT=2500
Height CLASS (m) = DECIDUOUS
INSTALLATION=CM-33-06 TREATMENT=2500
Height CLASS (m) = CONIFER
INSTALLATION=CM-33-06 TREATMENT=5000
DBH CLASS (cm) = DECIDUOUS
INSTALLATION=CM-33-06 TREATMENT=5000
DBH CLASS (cm) = CONIFER
INSTALLATION=CM-33-06 TREATMENT=5000
Height CLASS (m) = DECIDUOUS
INSTALLATION=CM-33-06 TREATMENT=5000
Height CLASS (m) = CONIFER
MEASUREMENT_YEAR 2006 2011

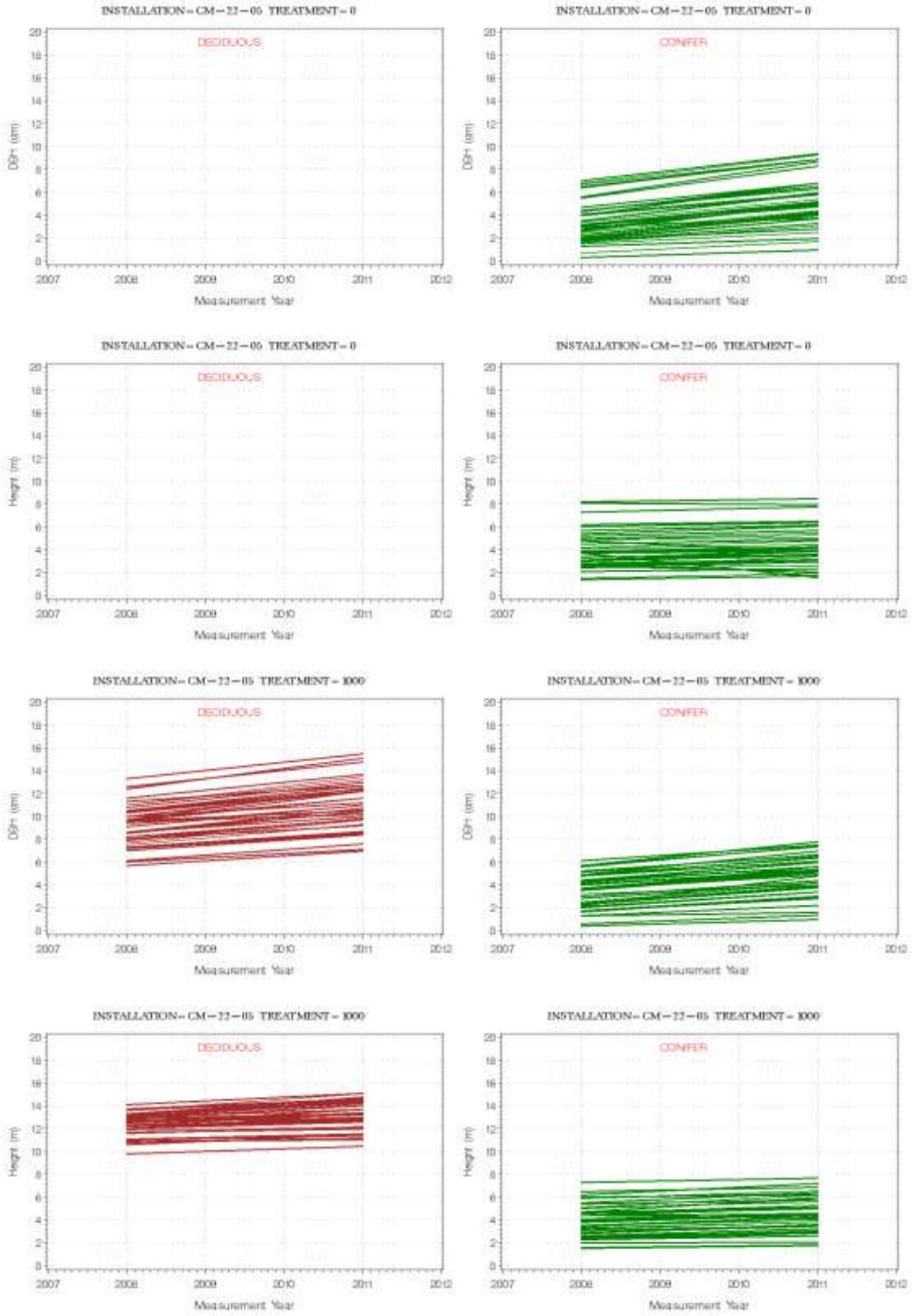

INSTALLATION=CM-32-06 TREATMENT=CONTROL
DBH CLASS (cm) = DECIDUOUS
INSTALLATION=CM-32-06 TREATMENT=CONTROL
DBH CLASS (cm) = CONIFER
INSTALLATION=CM-32-06 TREATMENT=CONTROL
Height CLASS (m) = DECIDUOUS
INSTALLATION=CM-32-06 TREATMENT=CONTROL
Height CLASS (m) = CONIFER
MEASUREMENT_YEAR 2006 2011

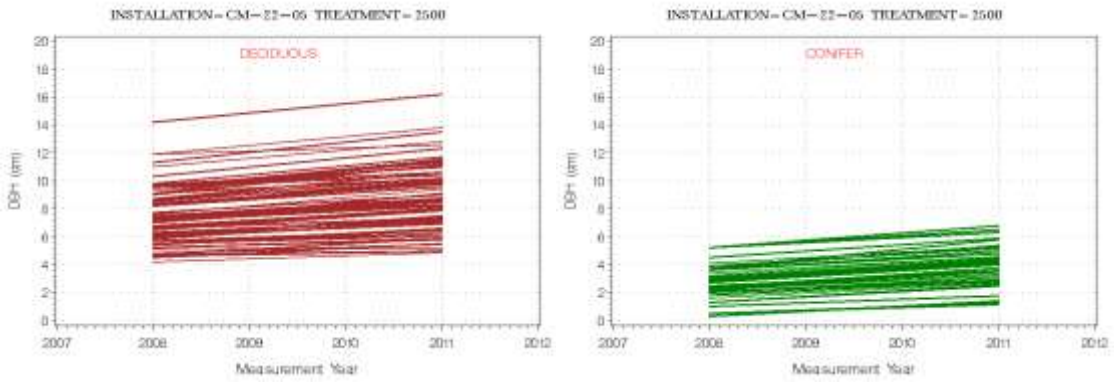
Frequency Distribution of DBH and Height for CM-22-07: 2008 vs. 2011



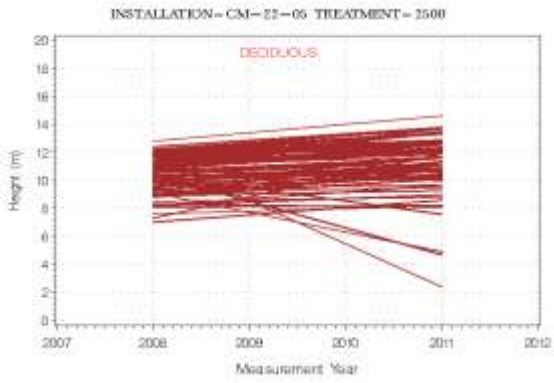

[INSTALLATION=CM-33-07 TREATMENT=2500
DBH CLASS (cm) = DECIDUOUS
MEASUREMENT_YEAR 2008 2011
[INSTALLATION=CM-33-07 TREATMENT=2500
DBH CLASS (cm) = CONIFER
MEASUREMENT_YEAR 2008 2011
[INSTALLATION=CM-33-07 TREATMENT=2500
Height CLASS (m) = DECIDUOUS
MEASUREMENT_YEAR 2008 2011
[INSTALLATION=CM-33-07 TREATMENT=2500
Height CLASS (m) = CONIFER
MEASUREMENT_YEAR 2008 2011
[INSTALLATION=CM-33-07 TREATMENT=5000
DBH CLASS (cm) = DECIDUOUS
MEASUREMENT_YEAR 2008 2011
[INSTALLATION=CM-33-07 TREATMENT=5000
DBH CLASS (cm) = CONIFER
MEASUREMENT_YEAR 2008 2011
[INSTALLATION=CM-33-07 TREATMENT=5000
Height CLASS (m) = DECIDUOUS
MEASUREMENT_YEAR 2008 2011
[INSTALLATION=CM-33-07 TREATMENT=5000
Height CLASS (m) = CONIFER
MEASUREMENT_YEAR 2008 2011

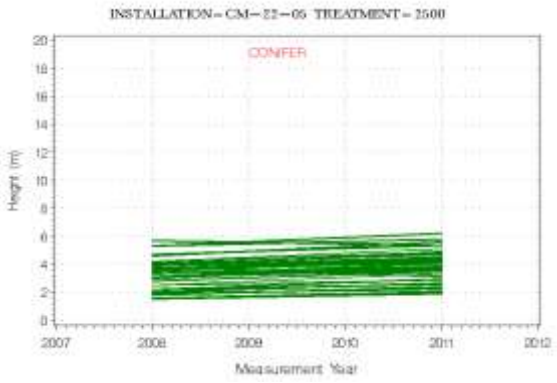
DBH and Height Trajectories for CM-22-05: 2008 vs. 2011

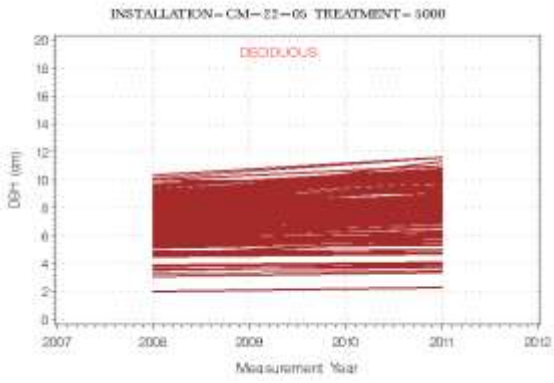


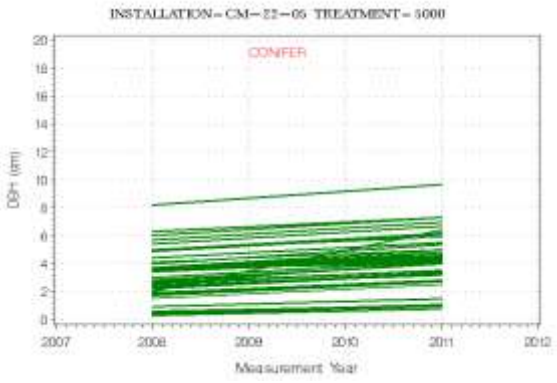

INSTALLATION=CM-22-05 TREATMENT=2500
DECIDUOUS
DBH (cm)
Measurement Year

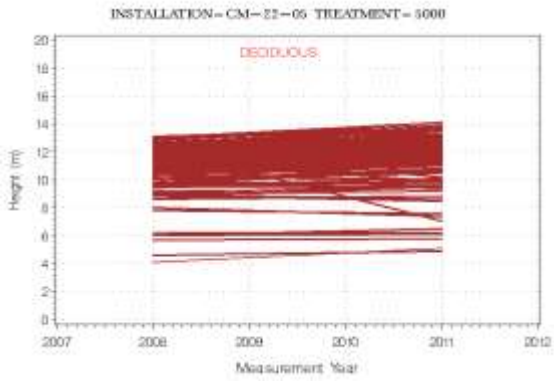
INSTALLATION=CM-22-05 TREATMENT=2500
CONIFER
DBH (cm)
Measurement Year


INSTALLATION=CM-22-05 TREATMENT=2500
DECIDUOUS
Height (m)
Measurement Year

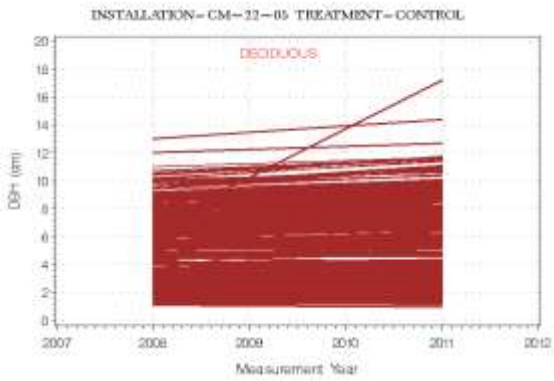

INSTALLATION=CM-22-05 TREATMENT=2500
CONIFER
Height (m)
Measurement Year

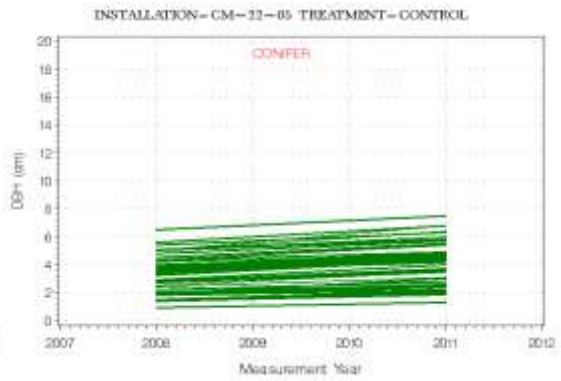

INSTALLATION=CM-22-05 TREATMENT=5000
DECIDUOUS
DBH (cm)
Measurement Year

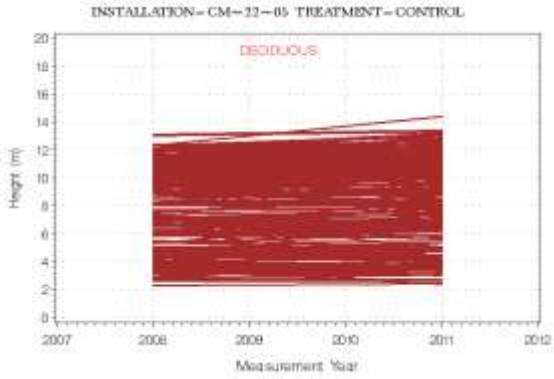

INSTALLATION=CM-22-05 TREATMENT=5000
CONIFER
DBH (cm)
Measurement Year

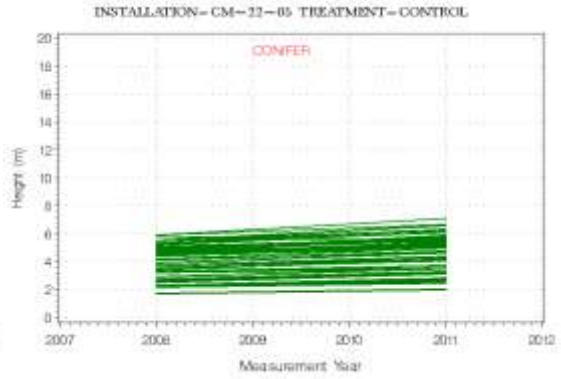

INSTALLATION=CM-22-05 TREATMENT=5000
DECIDUOUS
Height (m)
Measurement Year


INSTALLATION=CM-22-05 TREATMENT=5000
CONIFER
Height (m)
Measurement Year

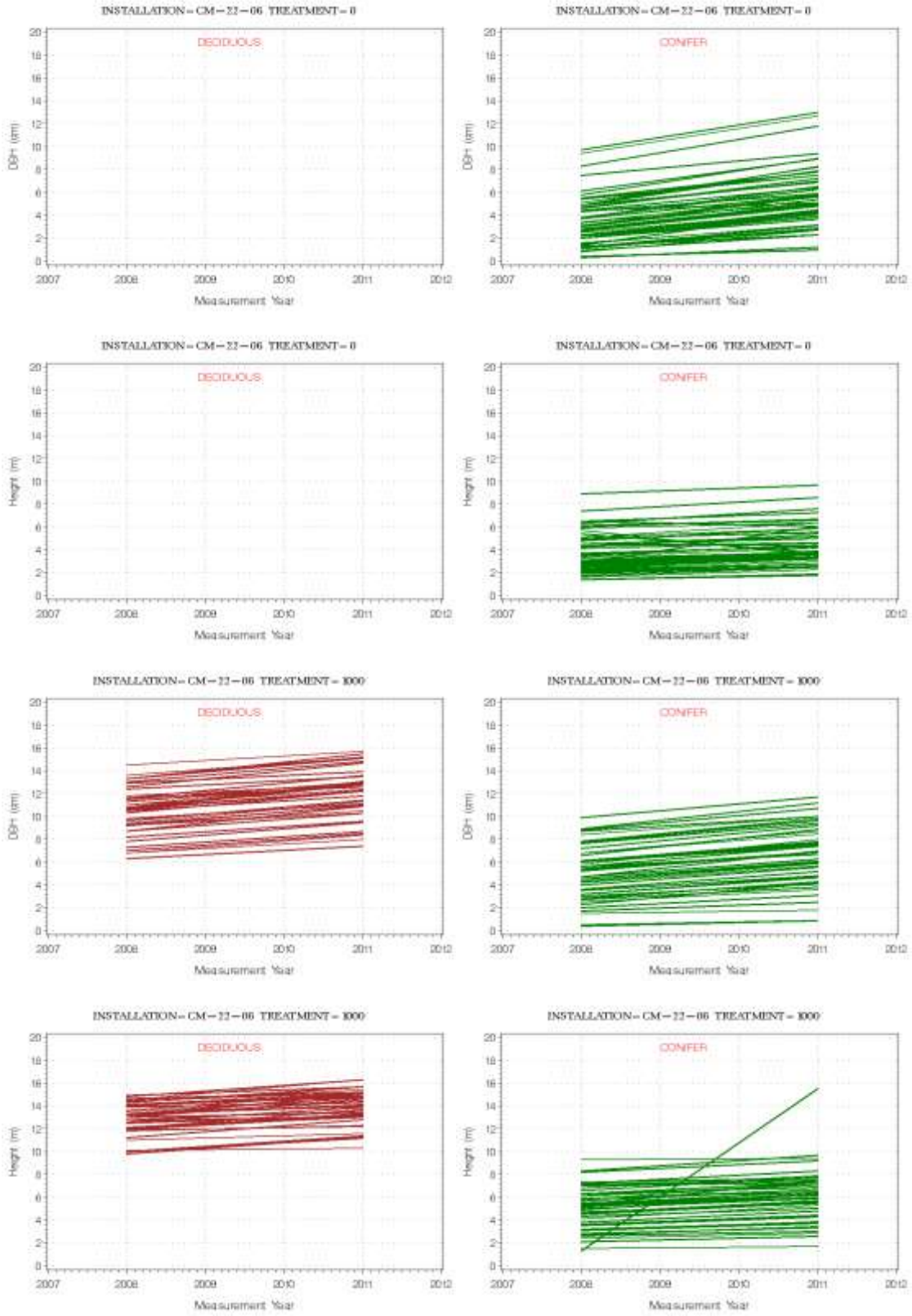

INSTALLATION= CM-22-05 TREATMENT= CONTROL
DECIDUOUS
DBH (cm)
Measurement Year

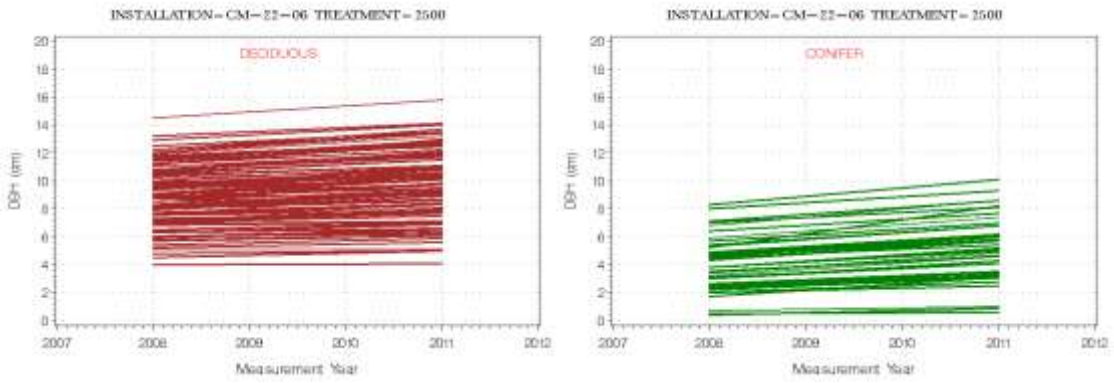

INSTALLATION= CM-22-05 TREATMENT= CONTROL
CONIFER
DBH (cm)
Measurement Year


INSTALLATION= CM-22-05 TREATMENT= CONTROL
DECIDUOUS
Height (m)
Measurement Year

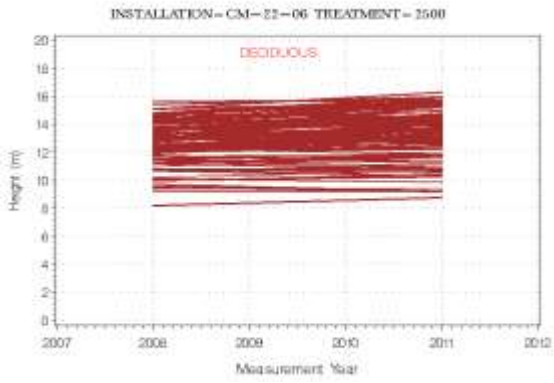

INSTALLATION= CM-22-05 TREATMENT= CONTROL
CONIFER
Height (m)
Measurement Year

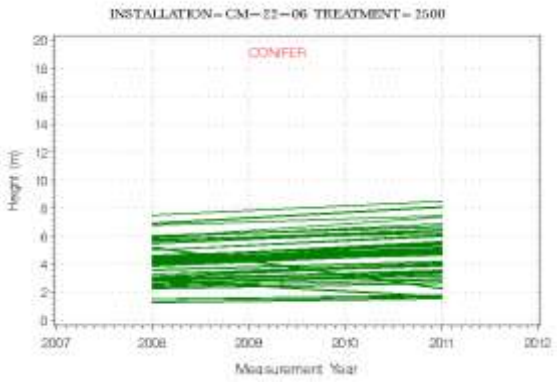
DBH and Height Trajectories for CM-22-06: 2008 vs. 2011

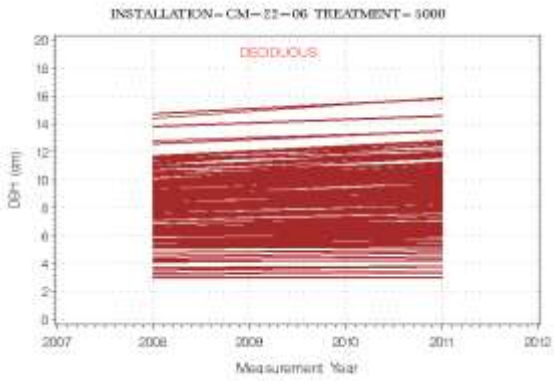


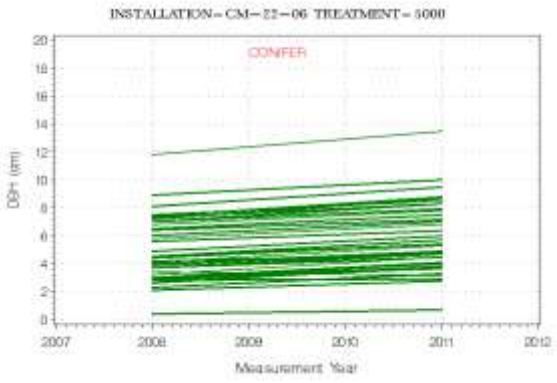

INSTALLATION= CM-22-06 TREATMENT= 2500
DECIDUOUS
DBH (cm)
Measurement Year

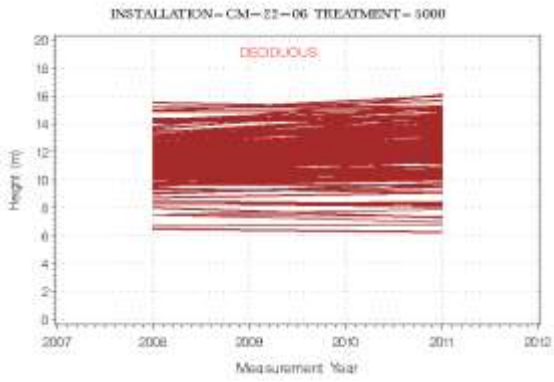
INSTALLATION= CM-22-06 TREATMENT= 2500
CONIFER
DBH (cm)
Measurement Year

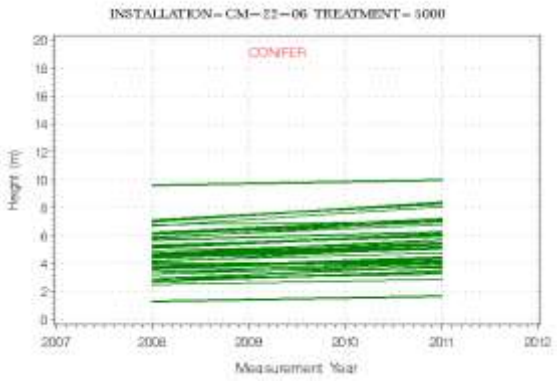

INSTALLATION= CM-22-06 TREATMENT= 2500
DECIDUOUS
Height (m)
Measurement Year

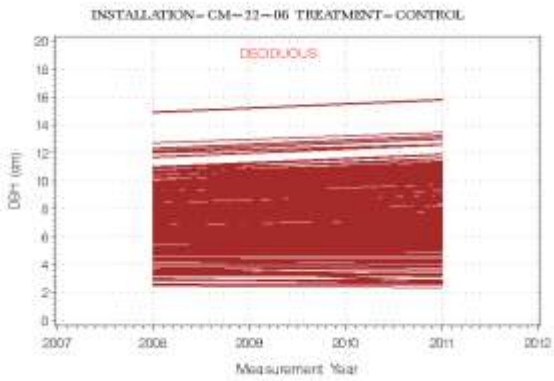

INSTALLATION= CM-22-06 TREATMENT= 2500
CONIFER
Height (m)
Measurement Year

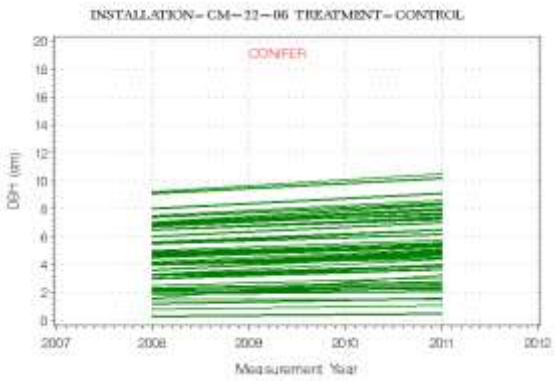

INSTALLATION= CM-22-06 TREATMENT= 5000
DECIDUOUS
DBH (cm)
Measurement Year

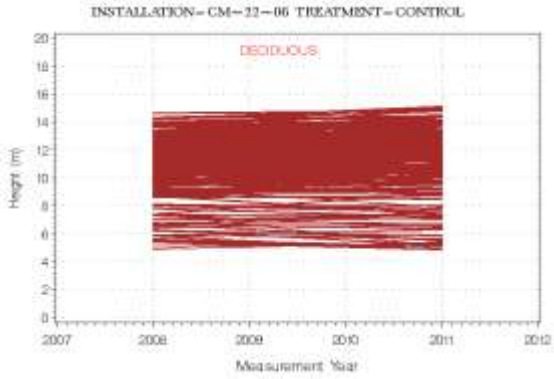

INSTALLATION= CM-22-06 TREATMENT= 5000
CONIFER
DBH (cm)
Measurement Year

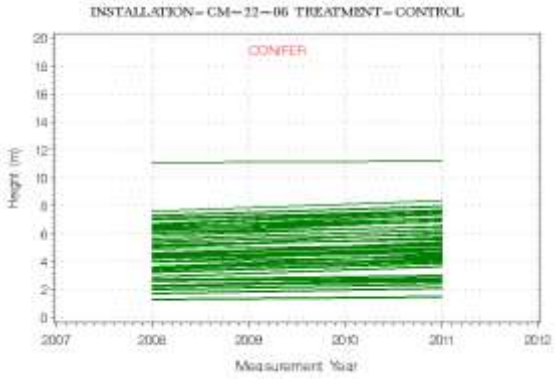

INSTALLATION= CM-22-06 TREATMENT= 5000
DECIDUOUS
Height (m)
Measurement Year


INSTALLATION= CM-22-06 TREATMENT= 5000
CONIFER
Height (m)
Measurement Year

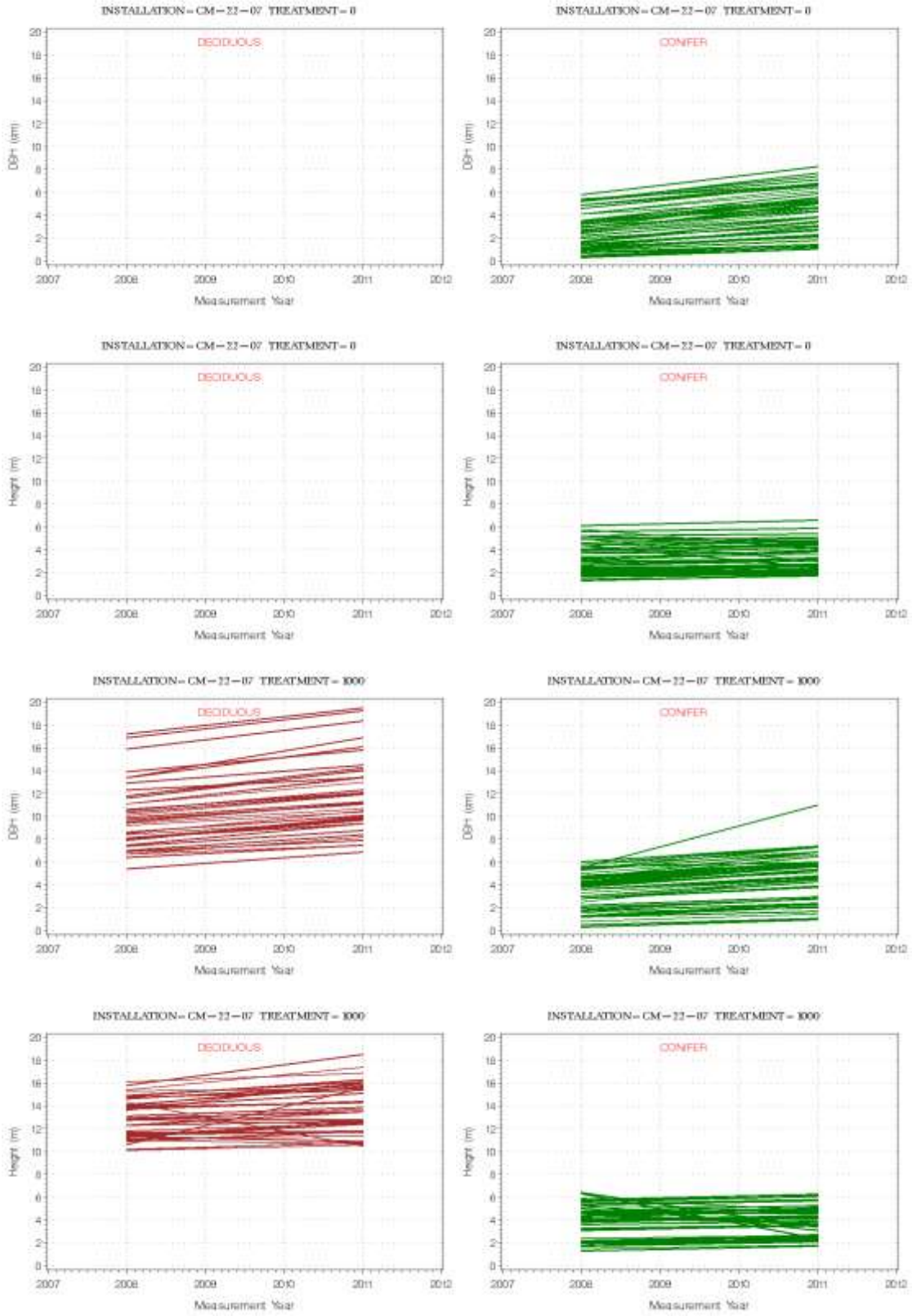

INSTALLATION= CM-22-06 TREATMENT= CONTROL
DECIDUOUS
DBH (cm)
Measurement Year

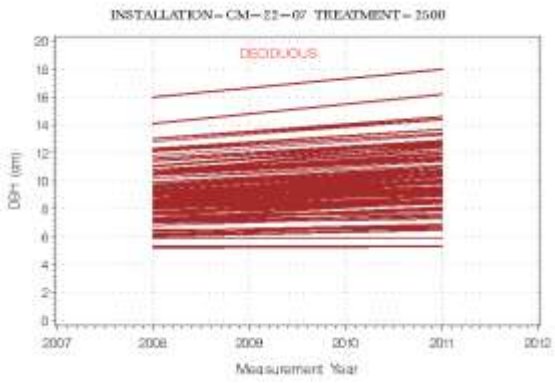

INSTALLATION= CM-22-06 TREATMENT= CONTROL
CONIFER
DBH (cm)
Measurement Year

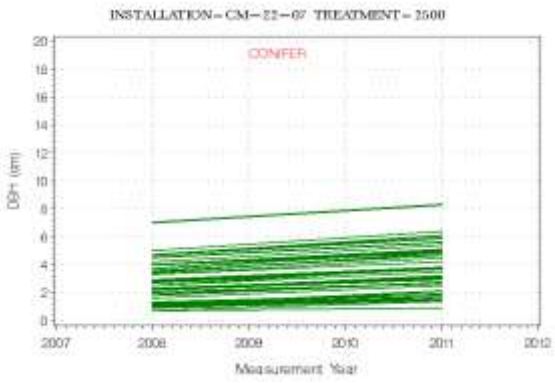

INSTALLATION= CM-22-06 TREATMENT= CONTROL
DECIDUOUS
Height (m)
Measurement Year

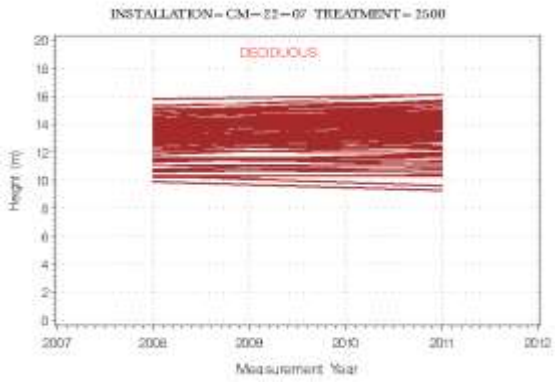

INSTALLATION= CM-22-06 TREATMENT= CONTROL
CONIFER
Height (m)
Measurement Year

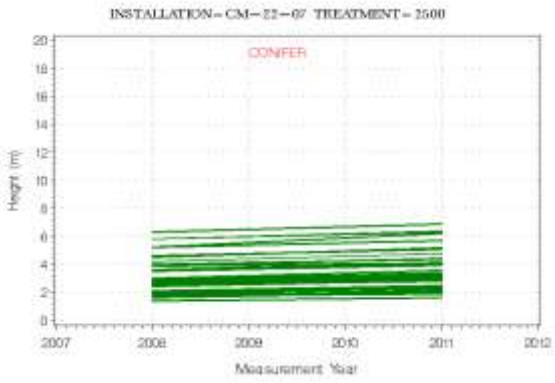
DBH and Height Trajectories for CM-22-07: 2008 vs. 2011

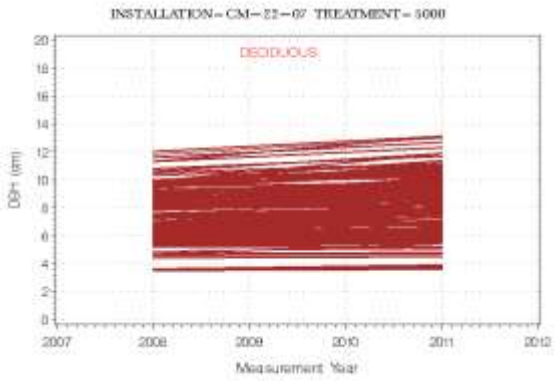


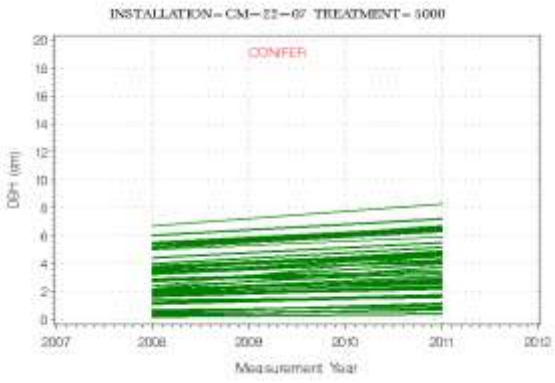

INSTALLATION= CM-22-07 TREATMENT= 2500
DECIDUOUS
DBH (cm)
Measurement Year

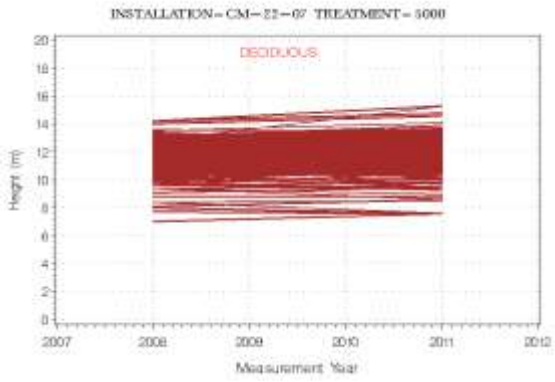

INSTALLATION= CM-22-07 TREATMENT= 2500
CONIFER
DBH (cm)
Measurement Year

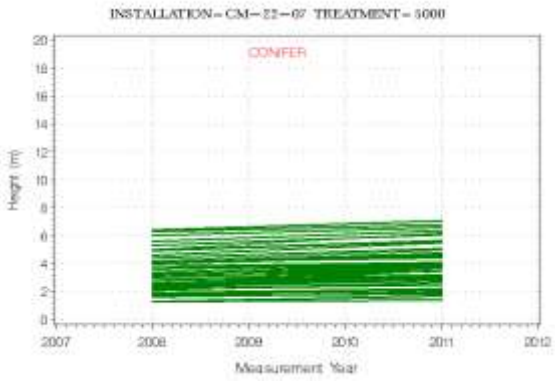

INSTALLATION= CM-22-07 TREATMENT= 2500
DECIDUOUS
Height (m)
Measurement Year

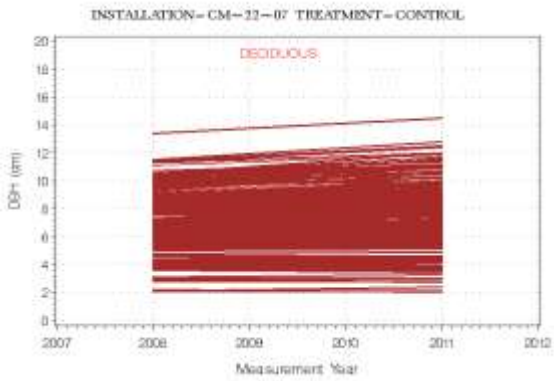

INSTALLATION= CM-22-07 TREATMENT= 2500
CONIFER
Height (m)
Measurement Year

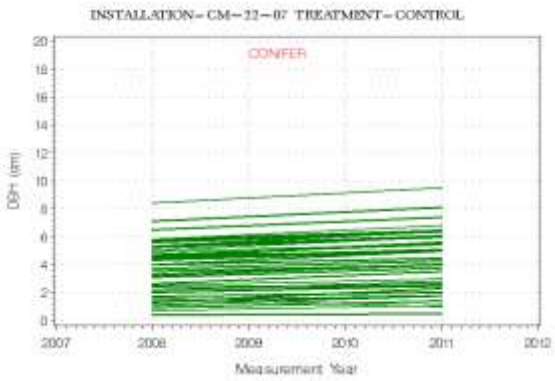

INSTALLATION= CM-22-07 TREATMENT= 5000
DECIDUOUS
DBH (cm)
Measurement Year

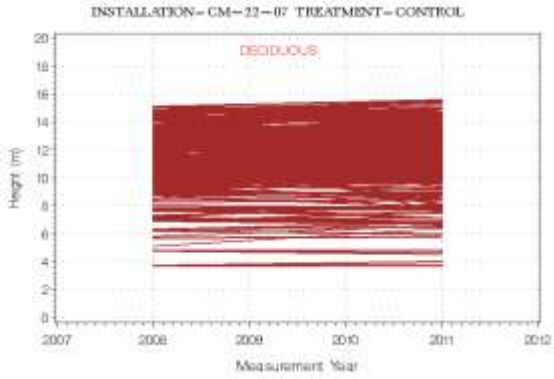

INSTALLATION= CM-22-07 TREATMENT= 5000
CONIFER
DBH (cm)
Measurement Year

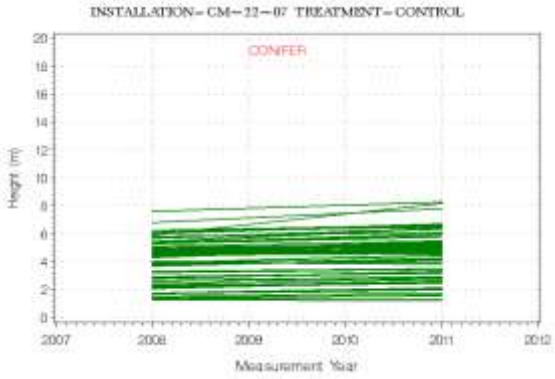

INSTALLATION= CM-22-07 TREATMENT= 5000
DECIDUOUS
Height (m)
Measurement Year


INSTALLATION= CM-22-07 TREATMENT= 5000
CONIFER
Height (m)
Measurement Year

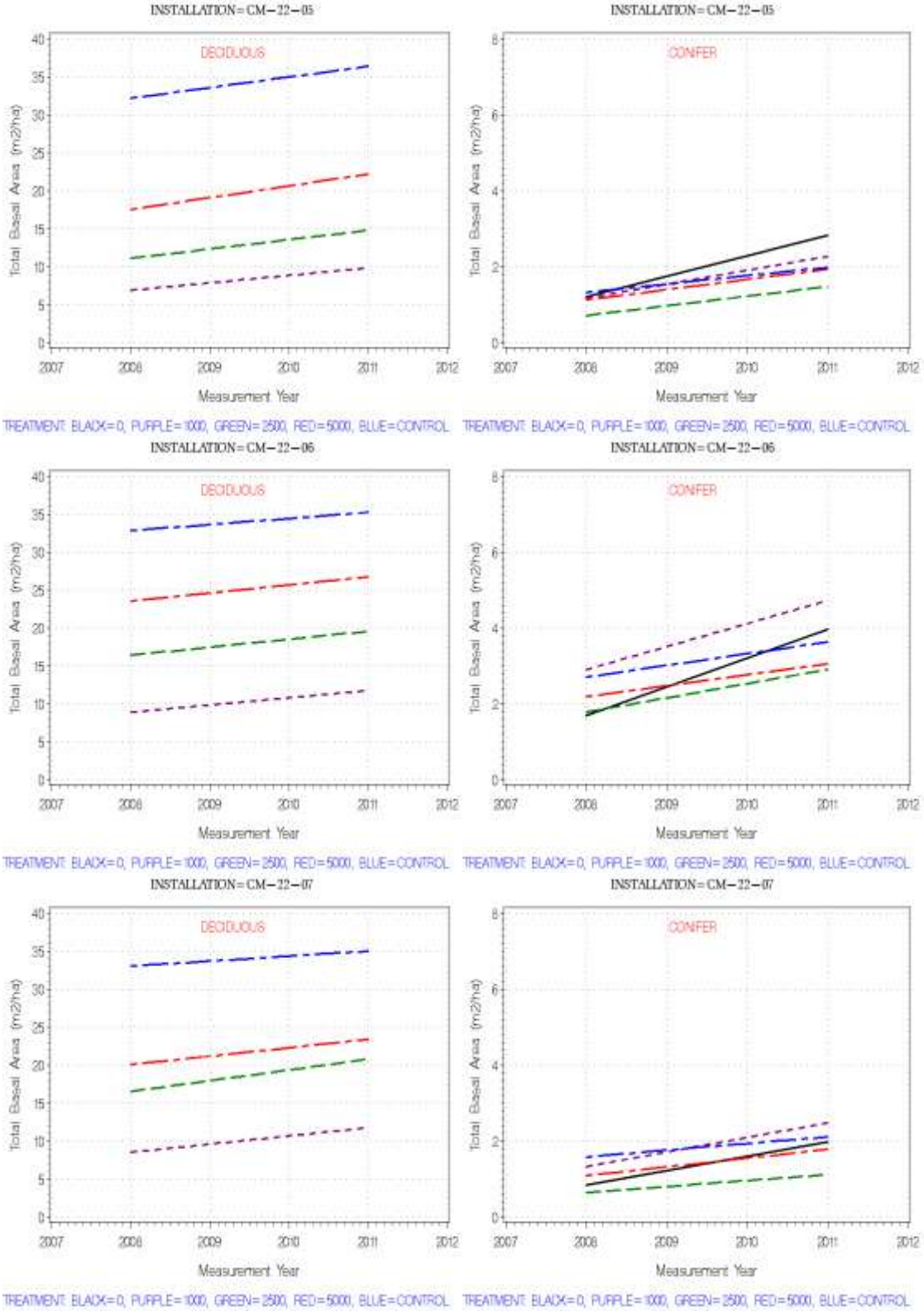

INSTALLATION= CM-22-07 TREATMENT= CONTROL
DECIDUOUS
DBH (cm)
Measurement Year


INSTALLATION= CM-22-07 TREATMENT= CONTROL
CONIFER
DBH (cm)
Measurement Year

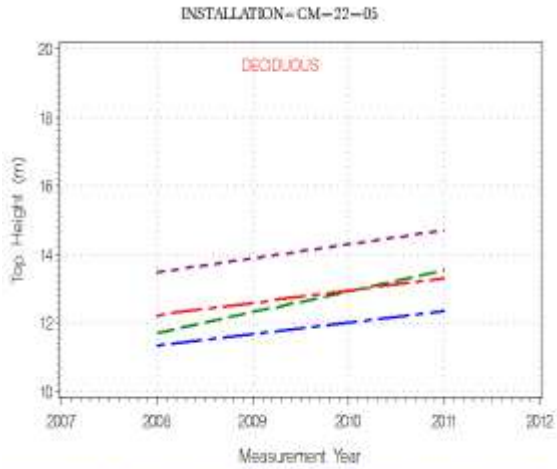

INSTALLATION= CM-22-07 TREATMENT= CONTROL
DECIDUOUS
Height (m)
Measurement Year

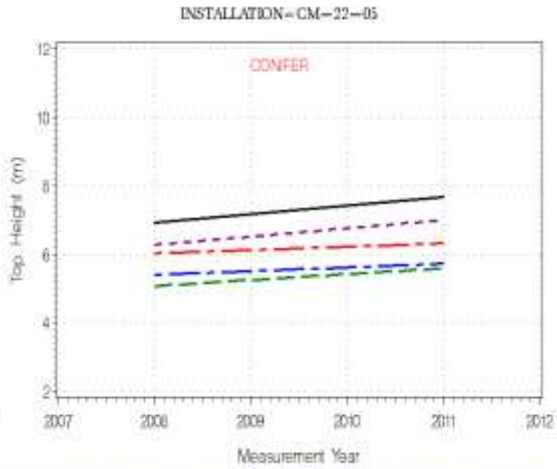

INSTALLATION= CM-22-07 TREATMENT= CONTROL
CONIFER
Height (m)
Measurement Year

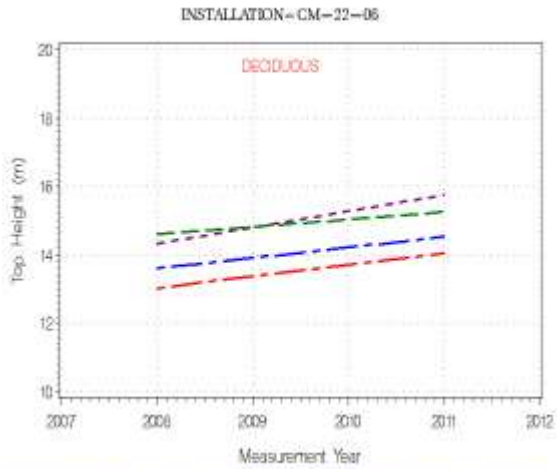
Basal Area Trajectories for All Three Installations 2008-2011

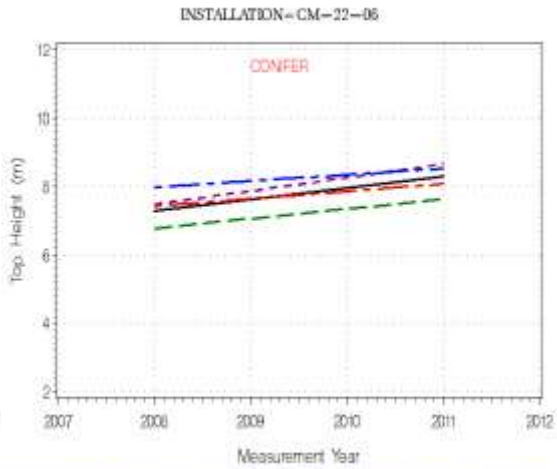


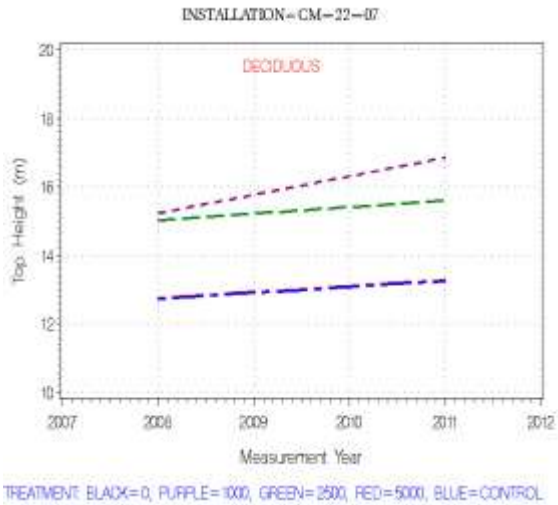
Top Height Trajectories for All Three Installations 2008-2011

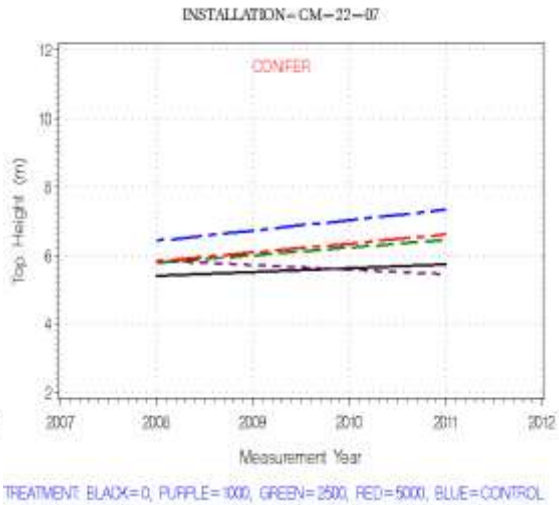




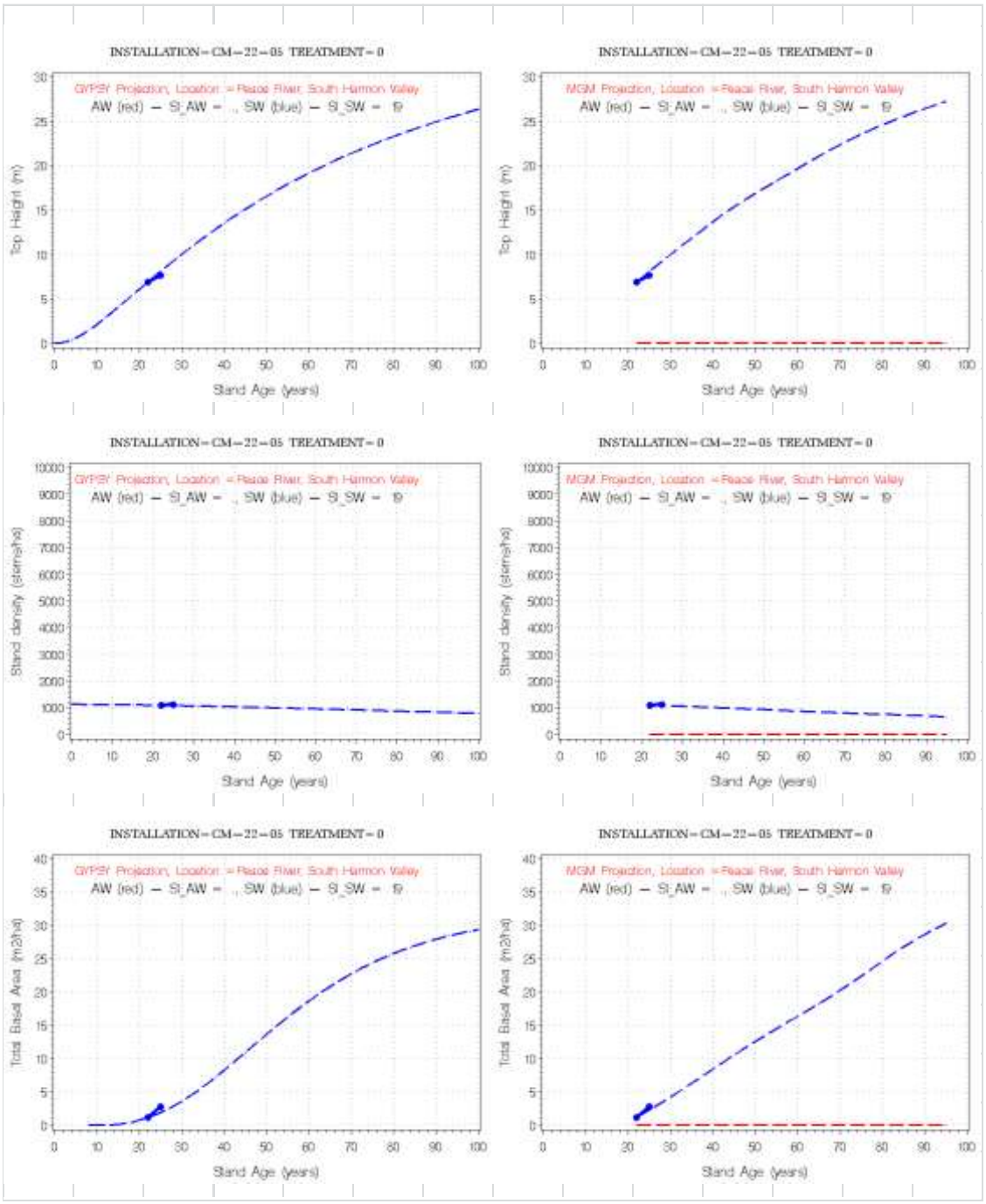


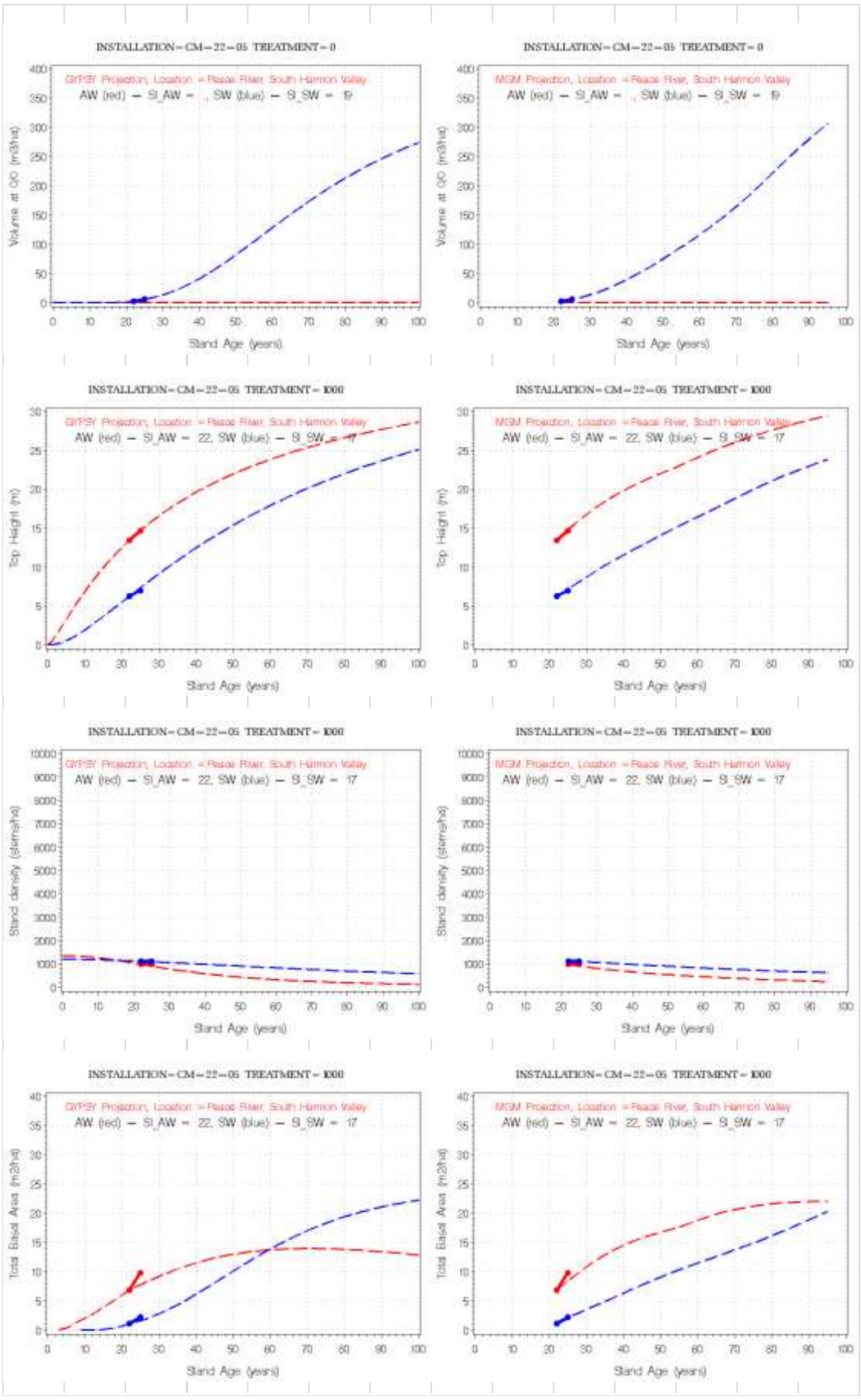


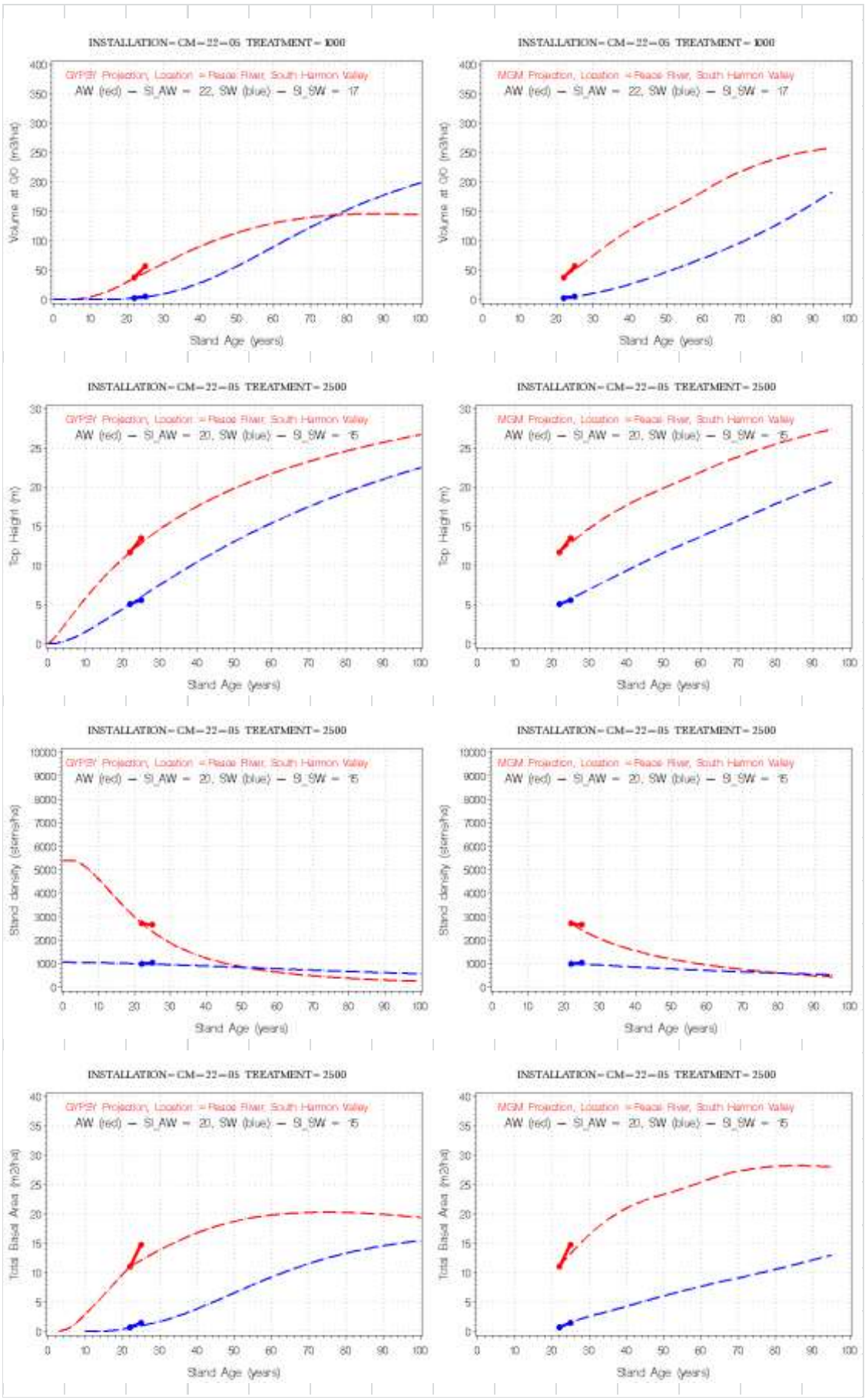


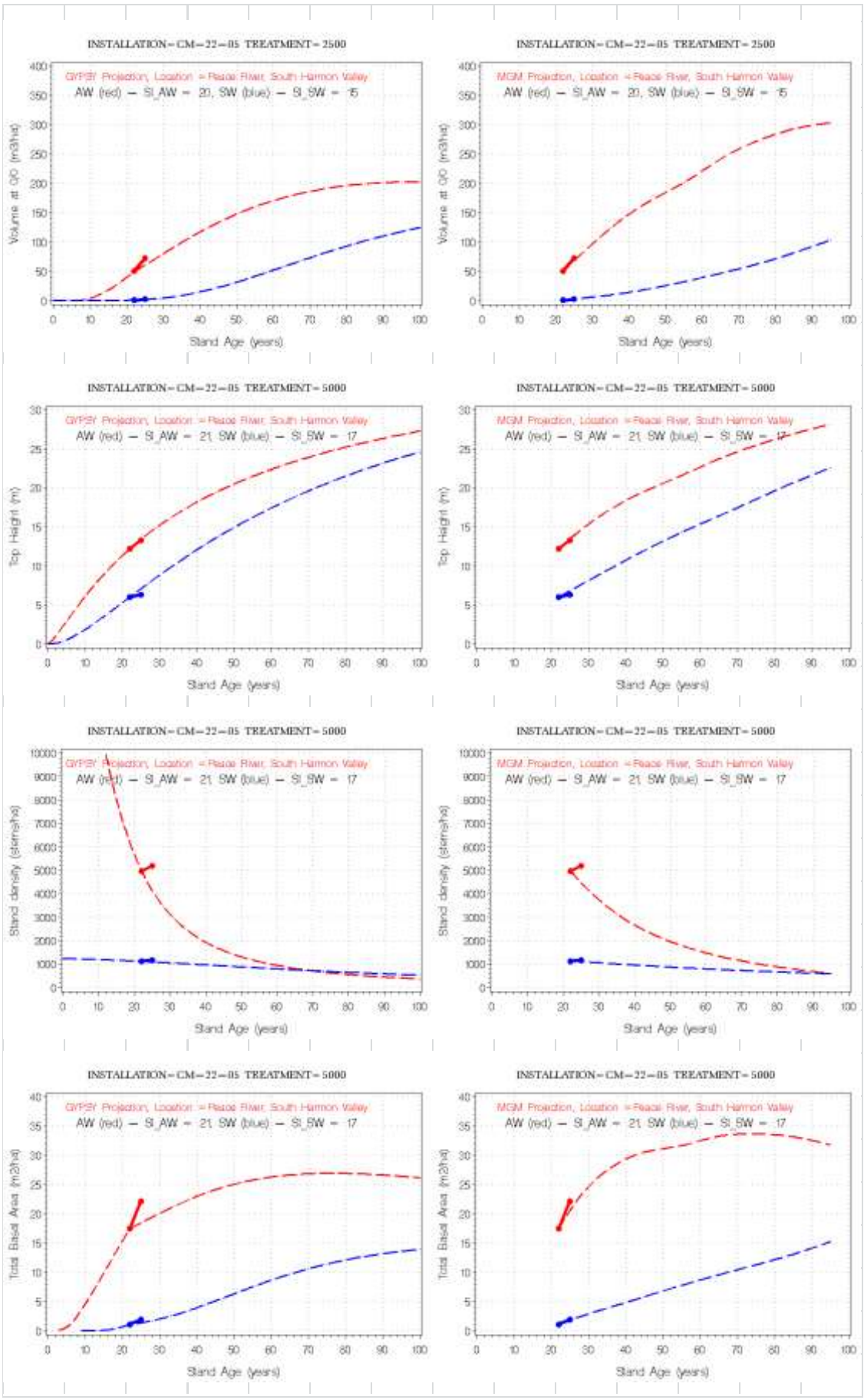


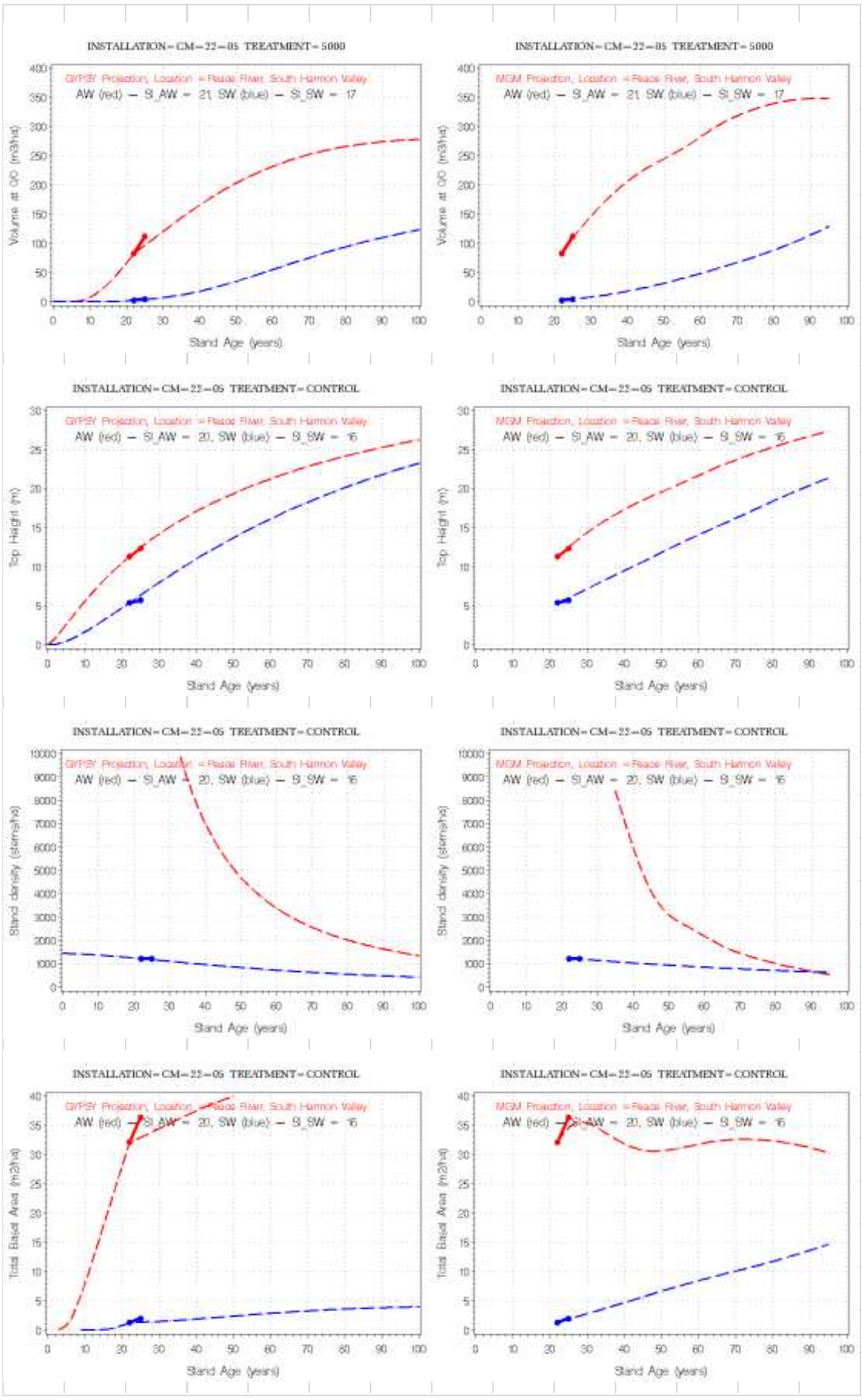
Appendix 2. Observed versus Projected Responses

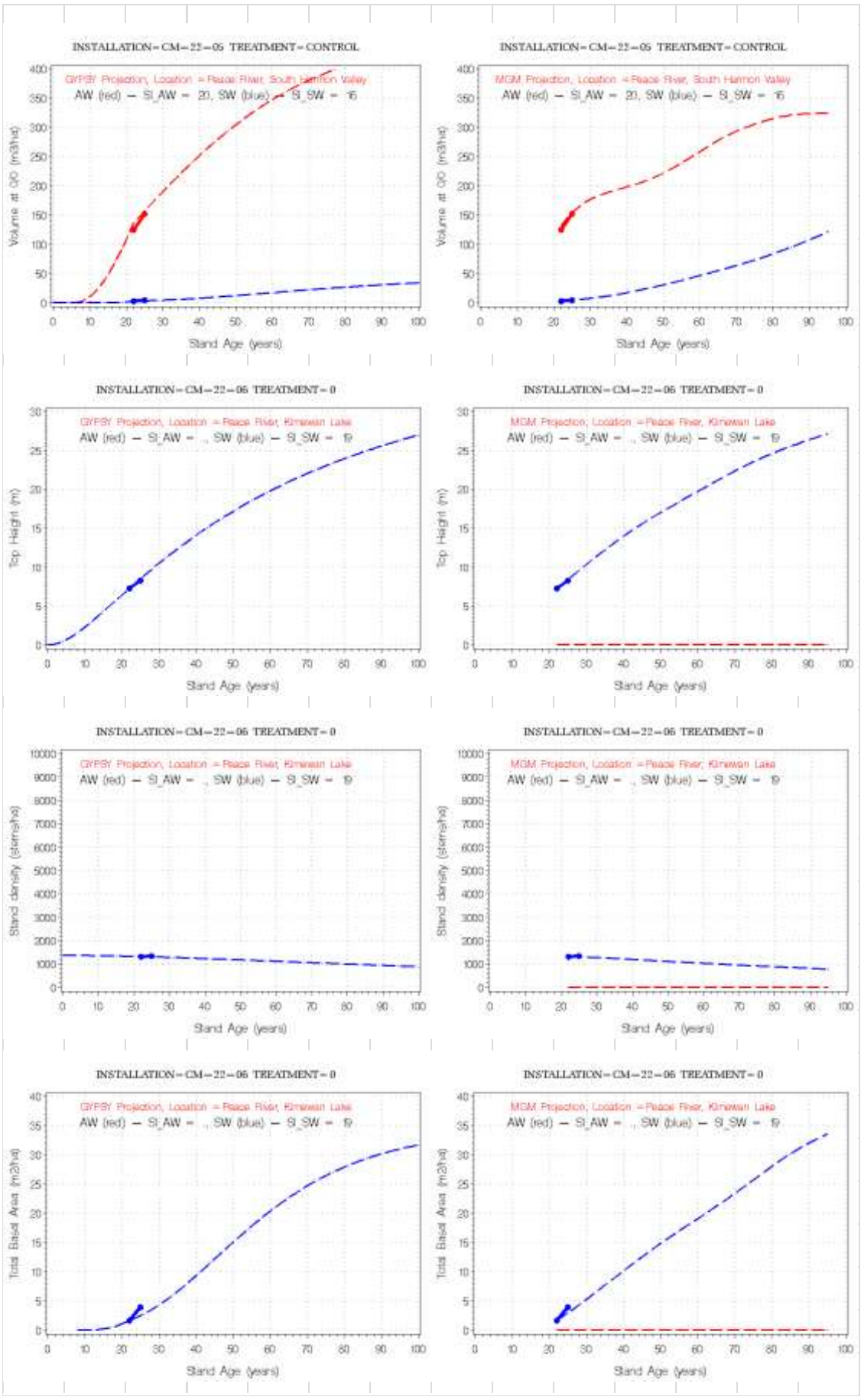


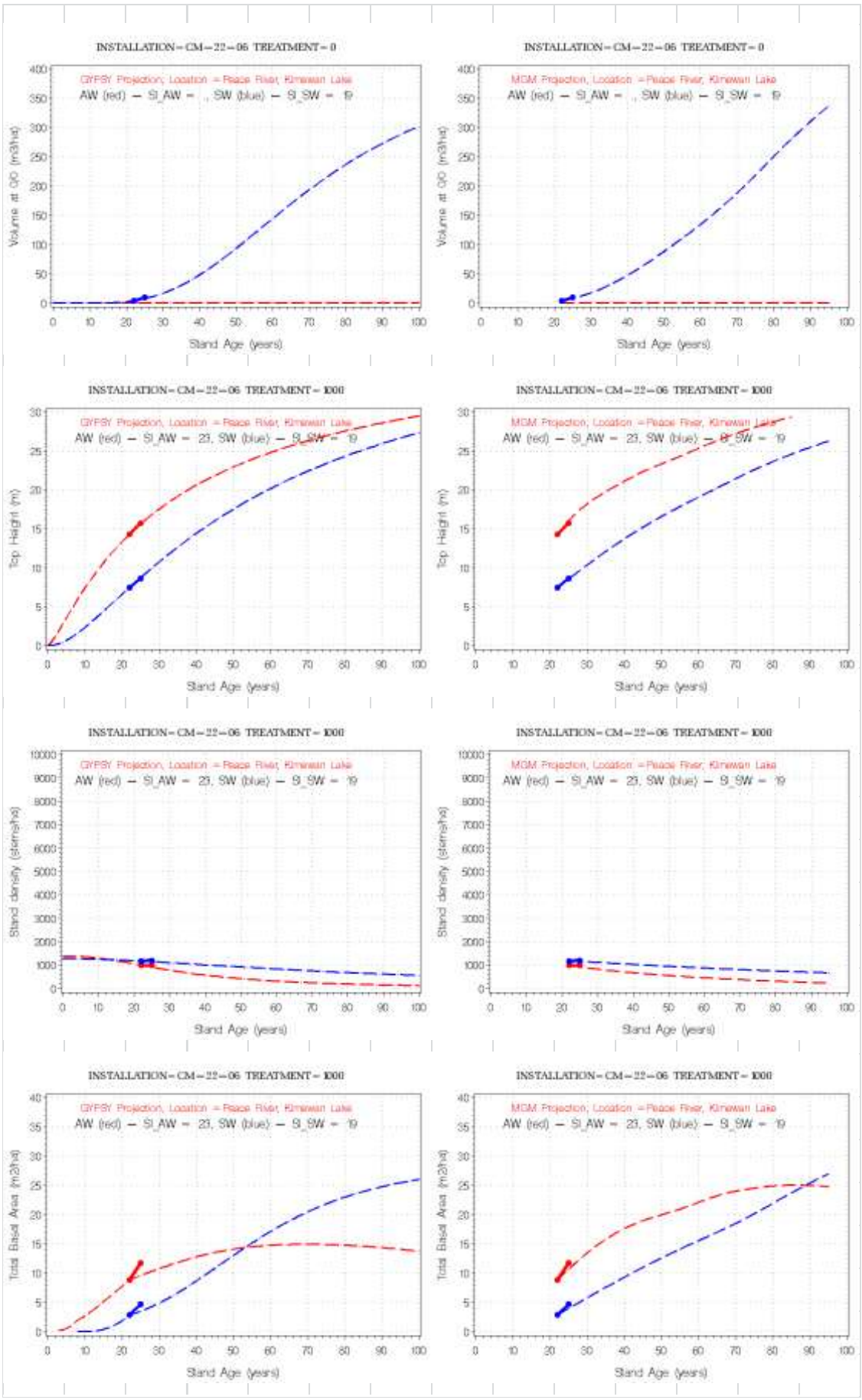

INSTALLATION = CM – 22 – 05 TREATMENT = 0
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = , SW (blue) – SI_SW = 19
Volume at 0/0 (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 0
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = , SW (blue) – SI_SW = 19
Volume at 0/0 (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 1000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 1000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 1000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 1000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 1000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 1000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Total Basal Area (m2/ha)
Stand Age (years)

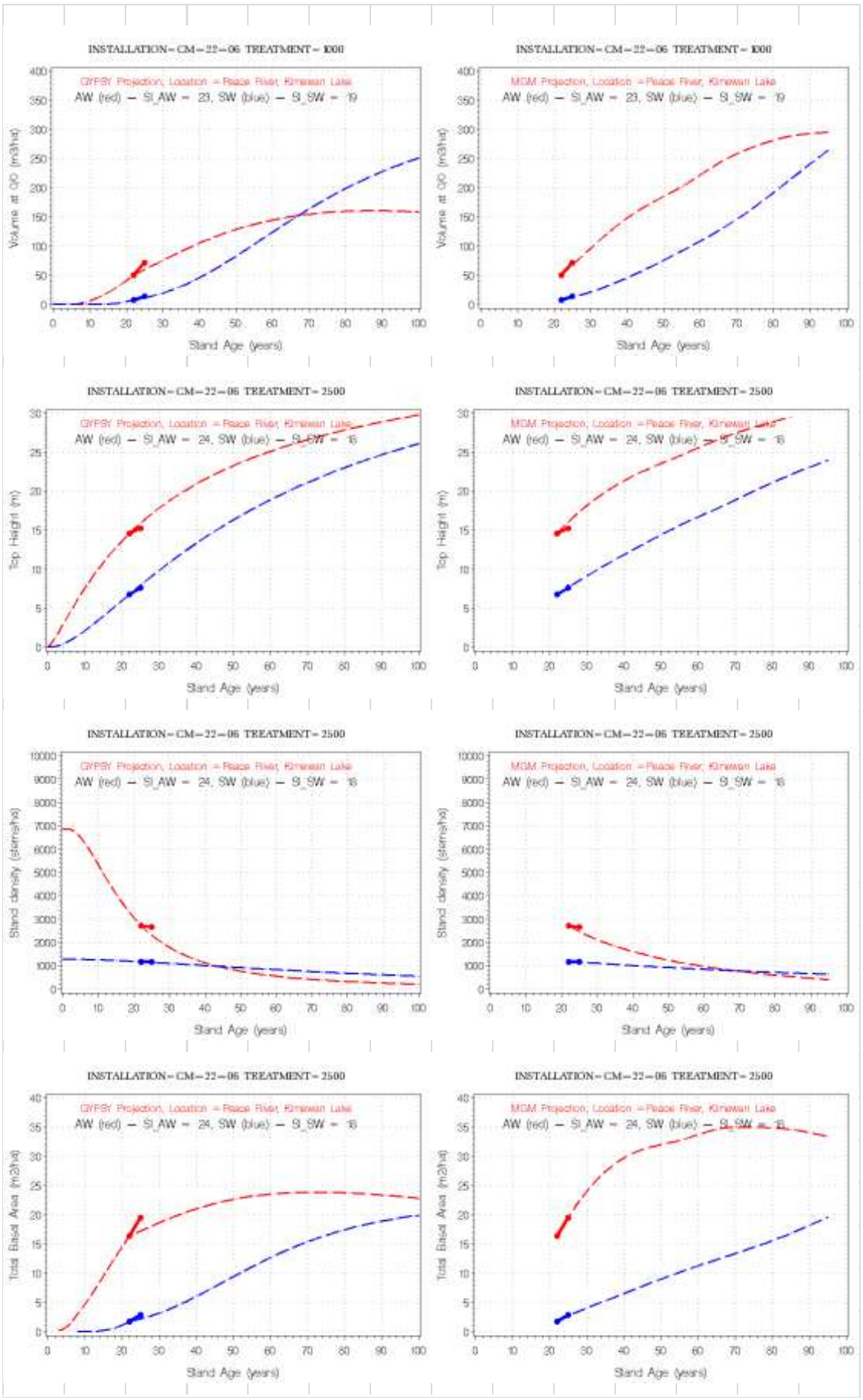

INSTALLATION = CM – 22 – 05 TREATMENT = 1000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Volume at OC (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 1000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Volume at OC (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 2500
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 15
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 2500
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 15
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 2500
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 15
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 2500
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 15
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 2500
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 15
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 05 TREATMENT = 2500
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 15
Total Basal Area (m2/ha)
Stand Age (years)

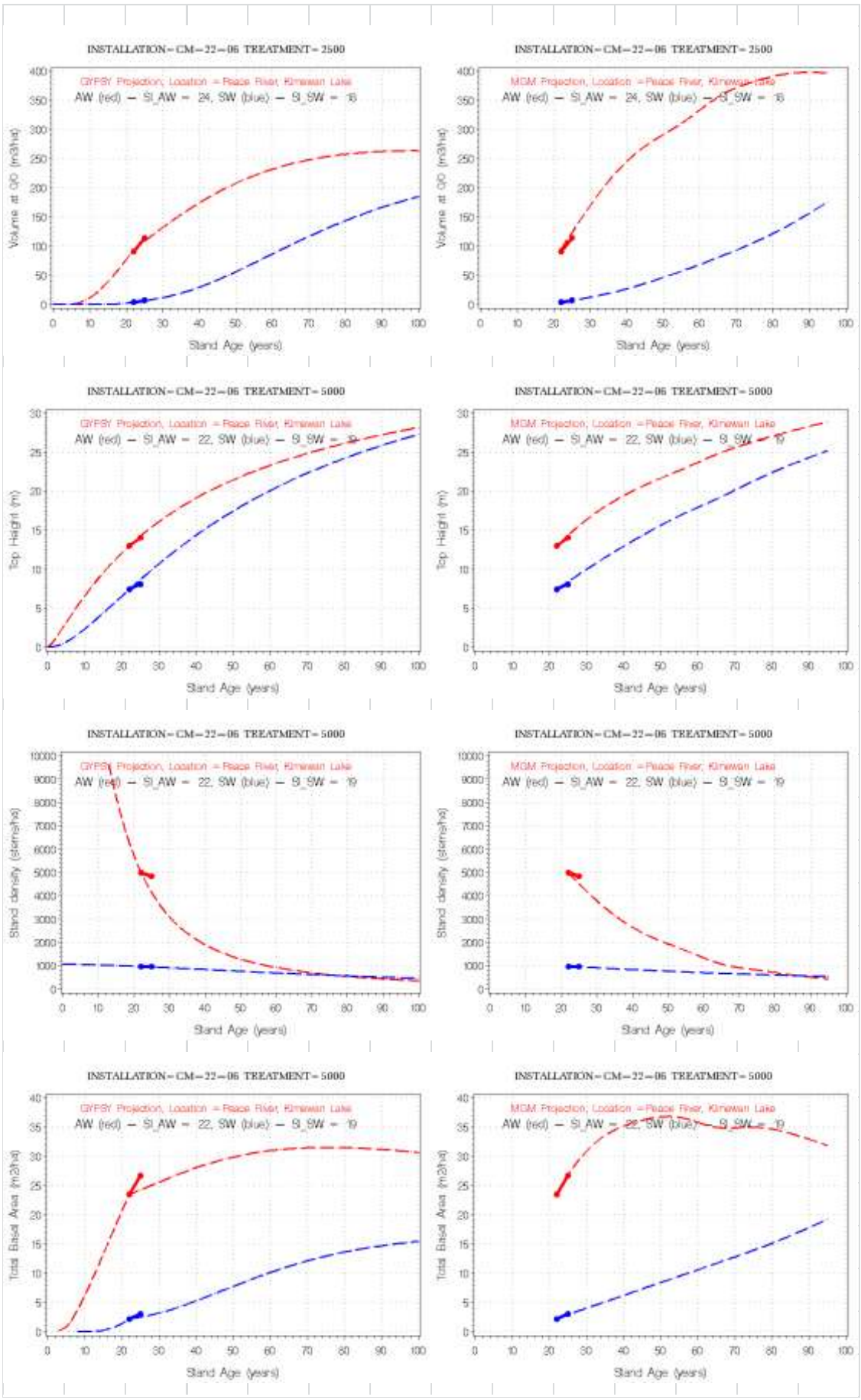

INSTALLATION=CM-22-05 TREATMENT=2500
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 15
Volume at OU (m3/ha)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=2500
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 15
Volume at OU (m3/ha)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=5000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 21, SW (blue) – SI_SW = 17
Top Height (m)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=5000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 21, SW (blue) – SI_SW = 17
Top Height (m)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=5000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 21, SW (blue) – SI_SW = 17
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=5000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 21, SW (blue) – SI_SW = 17
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=5000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 21, SW (blue) – SI_SW = 17
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=5000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 21, SW (blue) – SI_SW = 17
Total Basal Area (m2/ha)
Stand Age (years)

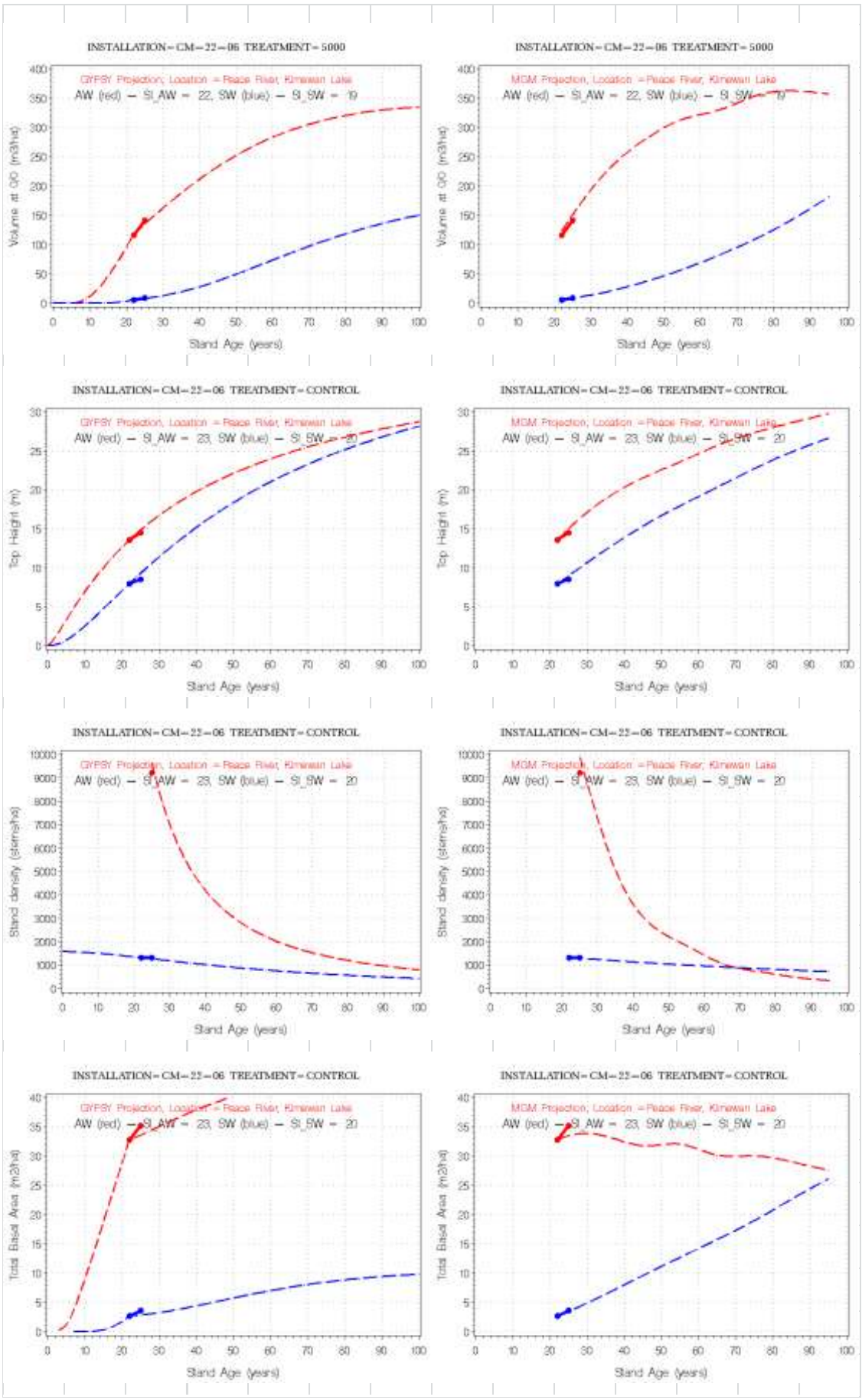

INSTALLATION=CM-22-05 TREATMENT=5000
GYPSY Projection, Location =Peace River, South Harmon Valley
AW (red) – SI_AW = 21, SW (blue) – SI_SW = 17
Volume at O/O (m3/ha)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=5000
MGM Projection, Location =Peace River, South Harmon Valley
AW (red) – SI_AW = 21, SW (blue) – SI_SW = 17
Volume at O/O (m3/ha)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=CONTROL
GYPSY Projection, Location =Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 16
Top Height (m)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=CONTROL
MGM Projection, Location =Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 16
Top Height (m)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=CONTROL
GYPSY Projection, Location =Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 16
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=CONTROL
MGM Projection, Location =Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 16
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=CONTROL
GYPSY Projection, Location =Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 16
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=CONTROL
MGM Projection, Location =Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 16
Total Basal Area (m2/ha)
Stand Age (years)

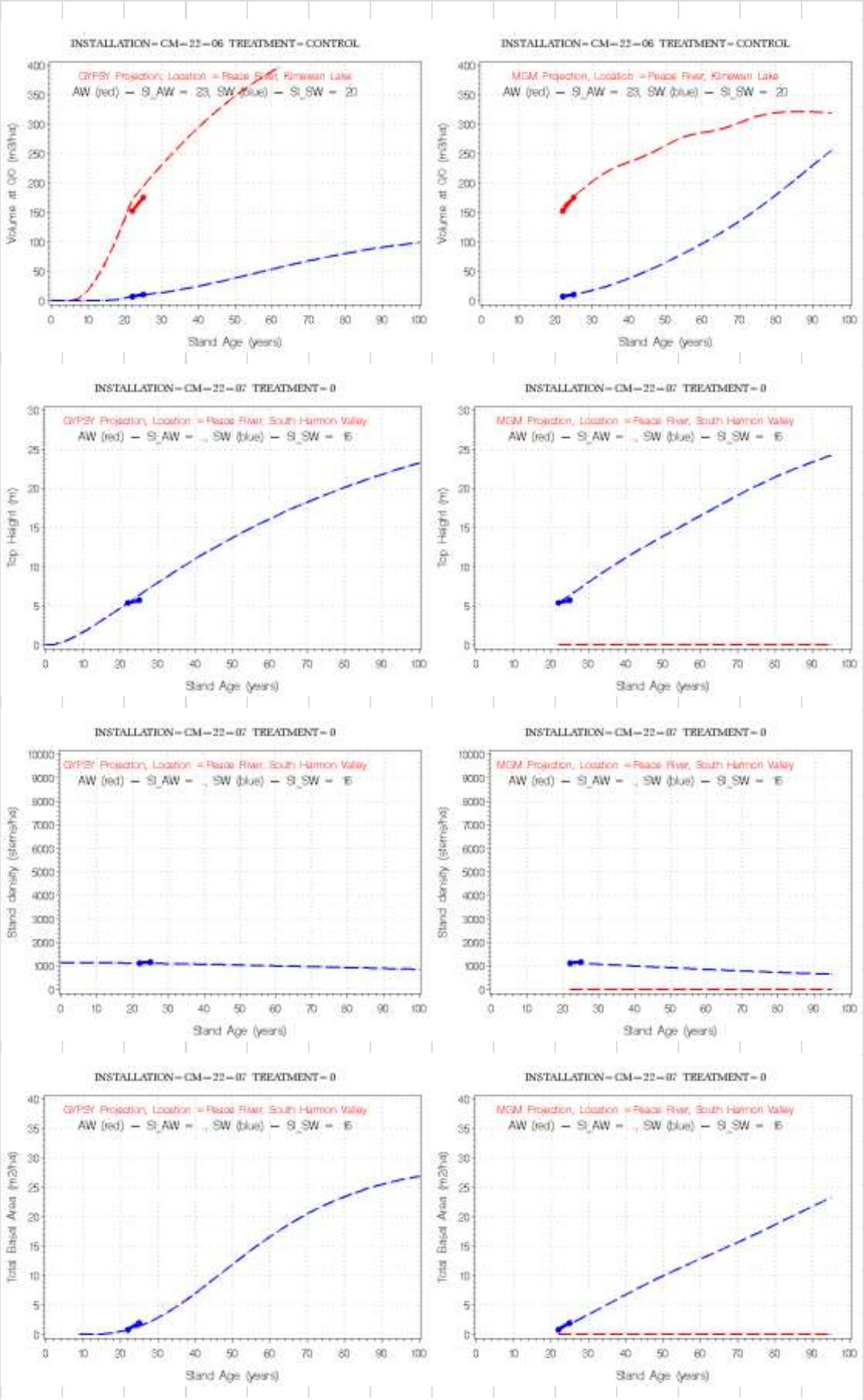

INSTALLATION=CM-22-05 TREATMENT=CONTROL
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 15
Volume at QO (m3/ha)
Stand Age (years)
INSTALLATION=CM-22-05 TREATMENT=CONTROL
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 20, SW (blue) – SI_SW = 15
Volume at QO (m3/ha)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=0
GYPSY Projection, Location = Peace River, Kinsman Lake
AW (red) – SI_AW = ., SW (blue) – SI_SW = 19
Top Height (m)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=0
MGM Projection, Location = Peace River, Kinsman Lake
AW (red) – SI_AW = ., SW (blue) – SI_SW = 19
Top Height (m)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=0
GYPSY Projection, Location = Peace River, Kinsman Lake
AW (red) – SI_AW = ., SW (blue) – SI_SW = 19
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=0
MGM Projection, Location = Peace River, Kinsman Lake
AW (red) – SI_AW = ., SW (blue) – SI_SW = 19
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=0
GYPSY Projection, Location = Peace River, Kinsman Lake
AW (red) – SI_AW = ., SW (blue) – SI_SW = 19
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=0
MGM Projection, Location = Peace River, Kinsman Lake
AW (red) – SI_AW = ., SW (blue) – SI_SW = 19
Total Basal Area (m2/ha)
Stand Age (years)

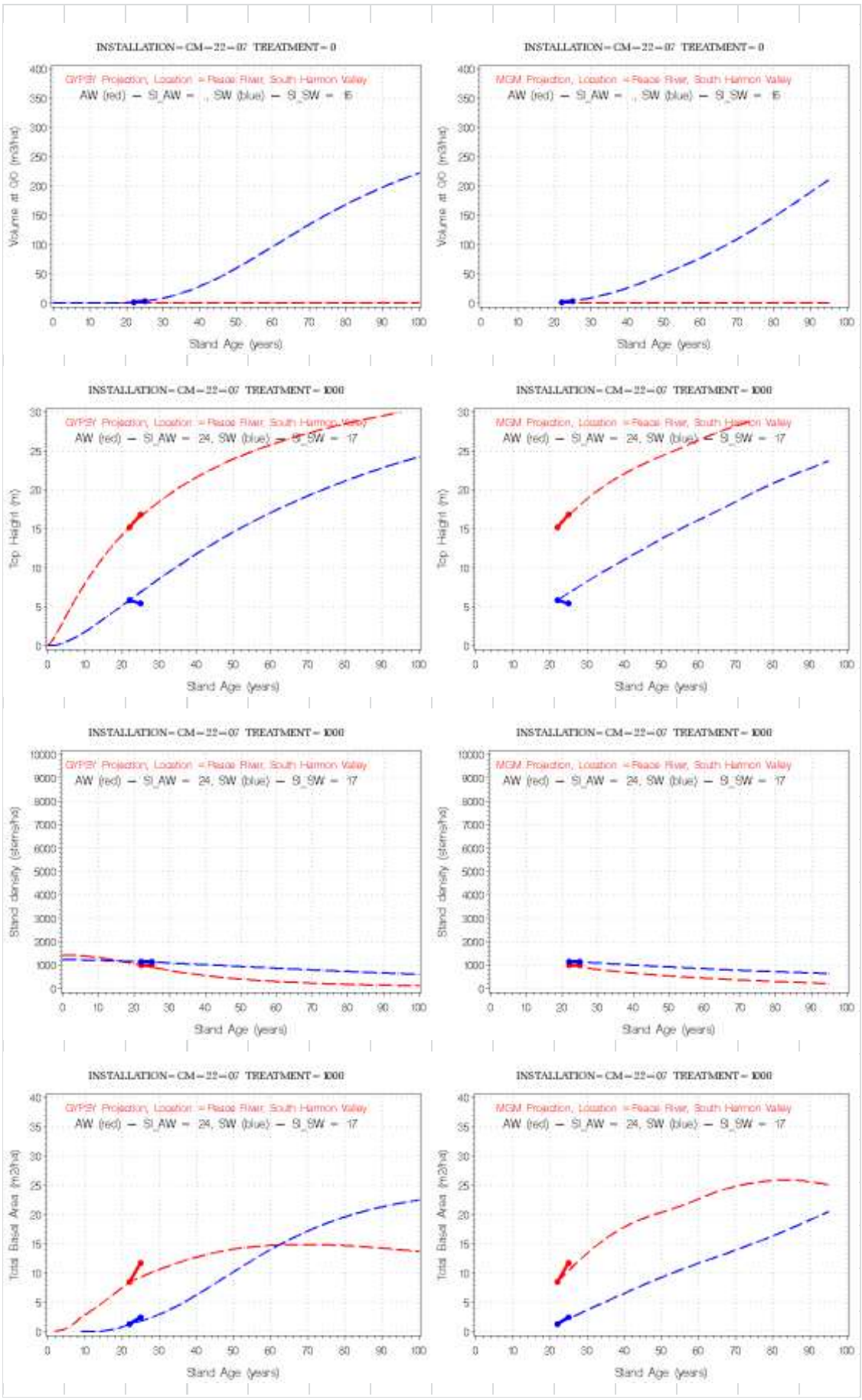

INSTALLATION = CM – 22 – 06 TREATMENT = 0
GYPSY Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = , SW (blue) – SI_SW = 19
Volume at 0/0 (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = 0
MGM Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = , SW (blue) – SI_SW = 19
Volume at 0/0 (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = 1000
GYPSY Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 19
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = 1000
MGM Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 19
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = 1000
GYPSY Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 19
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = 1000
MGM Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 19
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = 1000
GYPSY Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 19
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = 1000
MGM Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 19
Total Basal Area (m2/ha)
Stand Age (years)

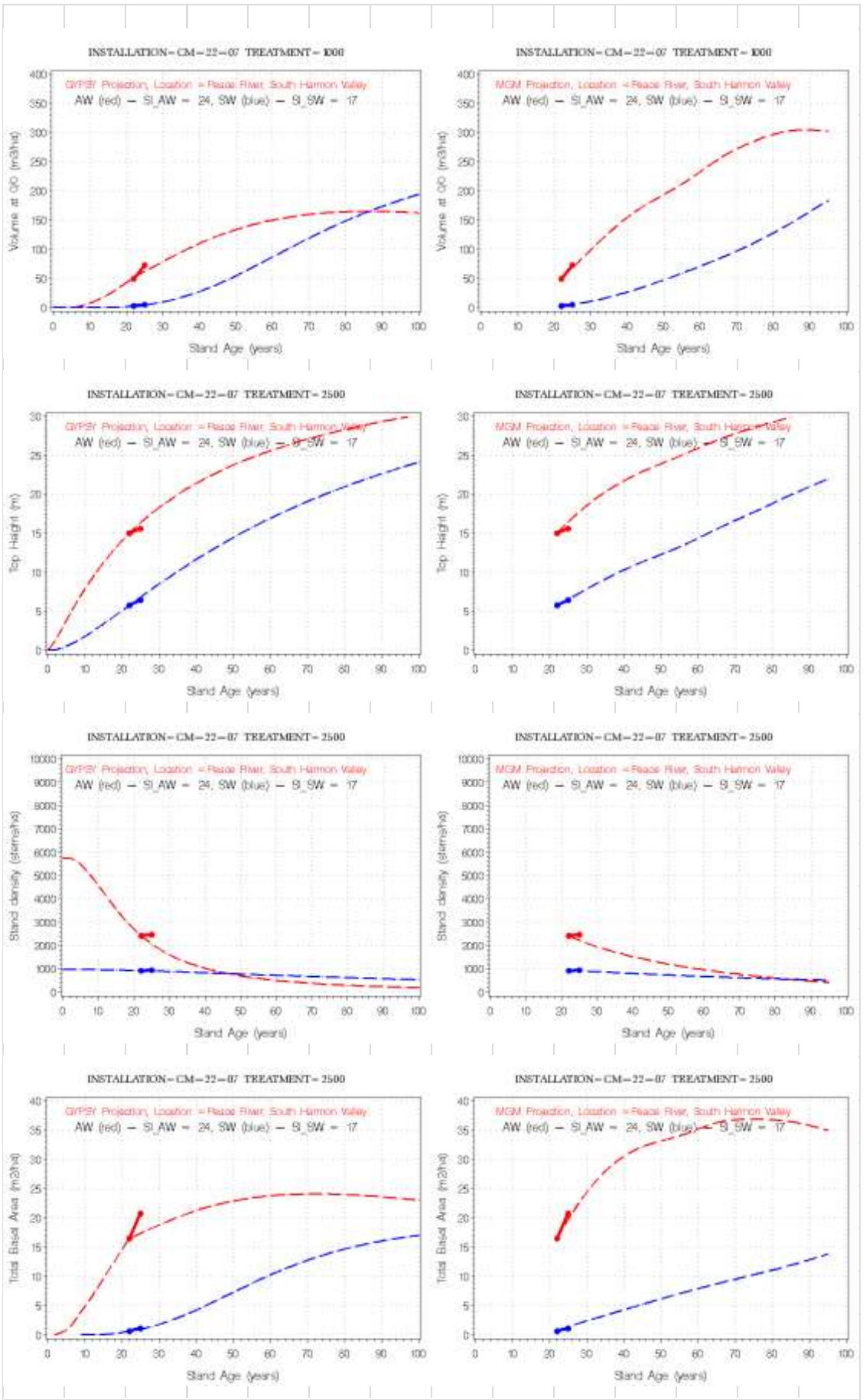

INSTALLATION=CM-22-06 TREATMENT=1000
GYPSY Projection, Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 19
Volume at 0/0 (m3/ha)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=1000
MDM Projection, Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 19
Volume at 0/0 (m3/ha)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=2500
GYPSY Projection, Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 16
Top Height (m)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=2500
MDM Projection, Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 16
Top Height (m)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=2500
GYPSY Projection, Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 16
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=2500
MDM Projection, Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 16
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=2500
GYPSY Projection, Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 16
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION=CM-22-06 TREATMENT=2500
MDM Projection, Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 16
Total Basal Area (m2/ha)
Stand Age (years)

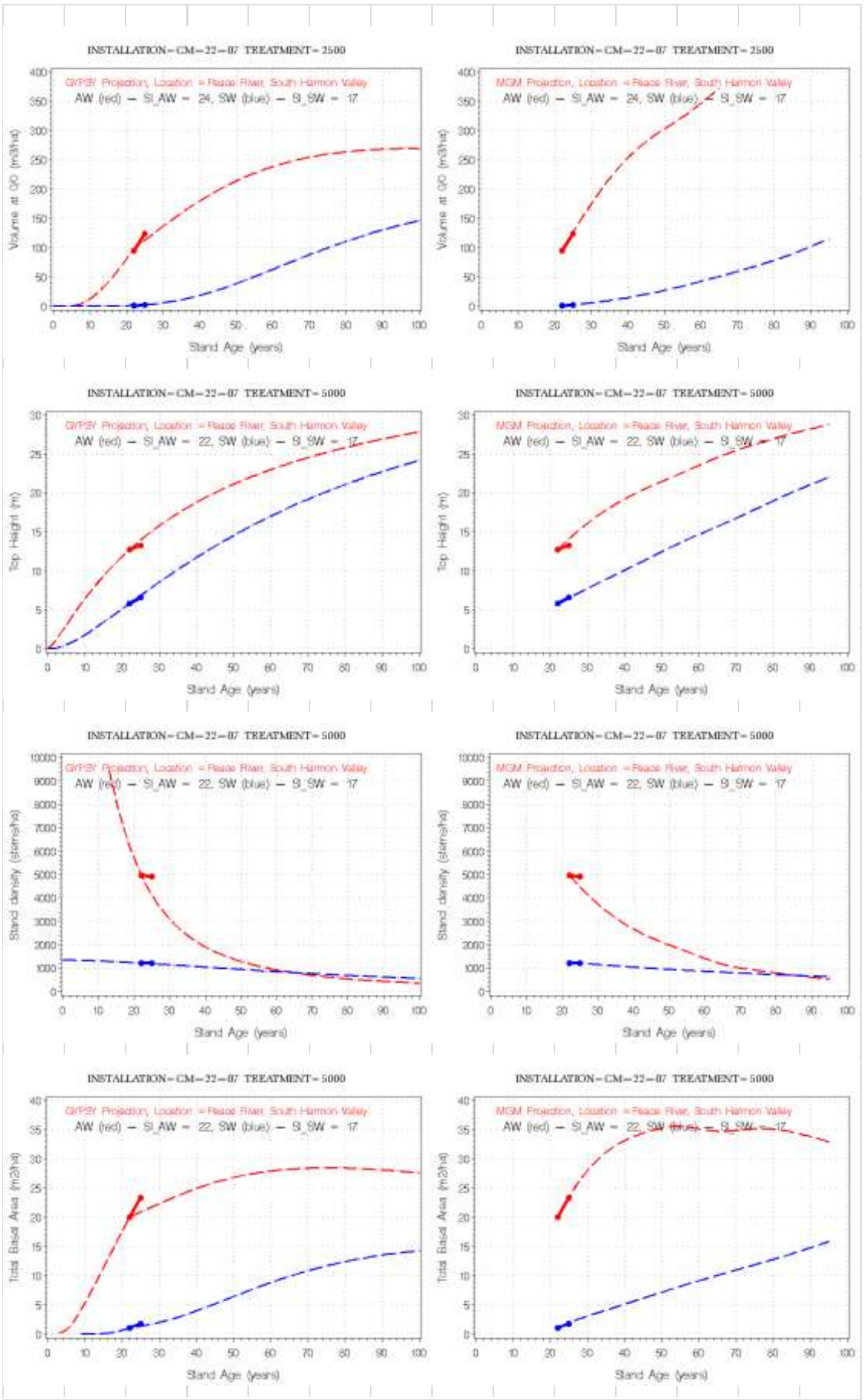

INSTALLATION=CM=22=06 TREATMENT=2500
GYPSY Projection, Location = Peace River, Kinewan Lake
AW (red) = SI_AW = 24, SW (blue) = SI_SW = 16
Volume at 0/0 (m3/ha)
Stand Age (years)
INSTALLATION=CM=22=06 TREATMENT=2500
MDM Projection, Location = Peace River, Kinewan Lake
AW (red) = SI_AW = 24, SW (blue) = SI_SW = 16
Volume at 0/0 (m3/ha)
Stand Age (years)
INSTALLATION=CM=22=06 TREATMENT=5000
GYPSY Projection, Location = Peace River, Kinewan Lake
AW (red) = SI_AW = 22, SW (blue) = SI_SW = 19
Top Height (m)
Stand Age (years)
INSTALLATION=CM=22=06 TREATMENT=5000
MDM Projection, Location = Peace River, Kinewan Lake
AW (red) = SI_AW = 22, SW (blue) = SI_SW = 19
Top Height (m)
Stand Age (years)
INSTALLATION=CM=22=06 TREATMENT=5000
GYPSY Projection, Location = Peace River, Kinewan Lake
AW (red) = SI_AW = 22, SW (blue) = SI_SW = 19
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM=22=06 TREATMENT=5000
MDM Projection, Location = Peace River, Kinewan Lake
AW (red) = SI_AW = 22, SW (blue) = SI_SW = 19
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM=22=06 TREATMENT=5000
GYPSY Projection, Location = Peace River, Kinewan Lake
AW (red) = SI_AW = 22, SW (blue) = SI_SW = 19
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION=CM=22=06 TREATMENT=5000
MDM Projection, Location = Peace River, Kinewan Lake
AW (red) = SI_AW = 22, SW (blue) = SI_SW = 19
Total Basal Area (m2/ha)
Stand Age (years)

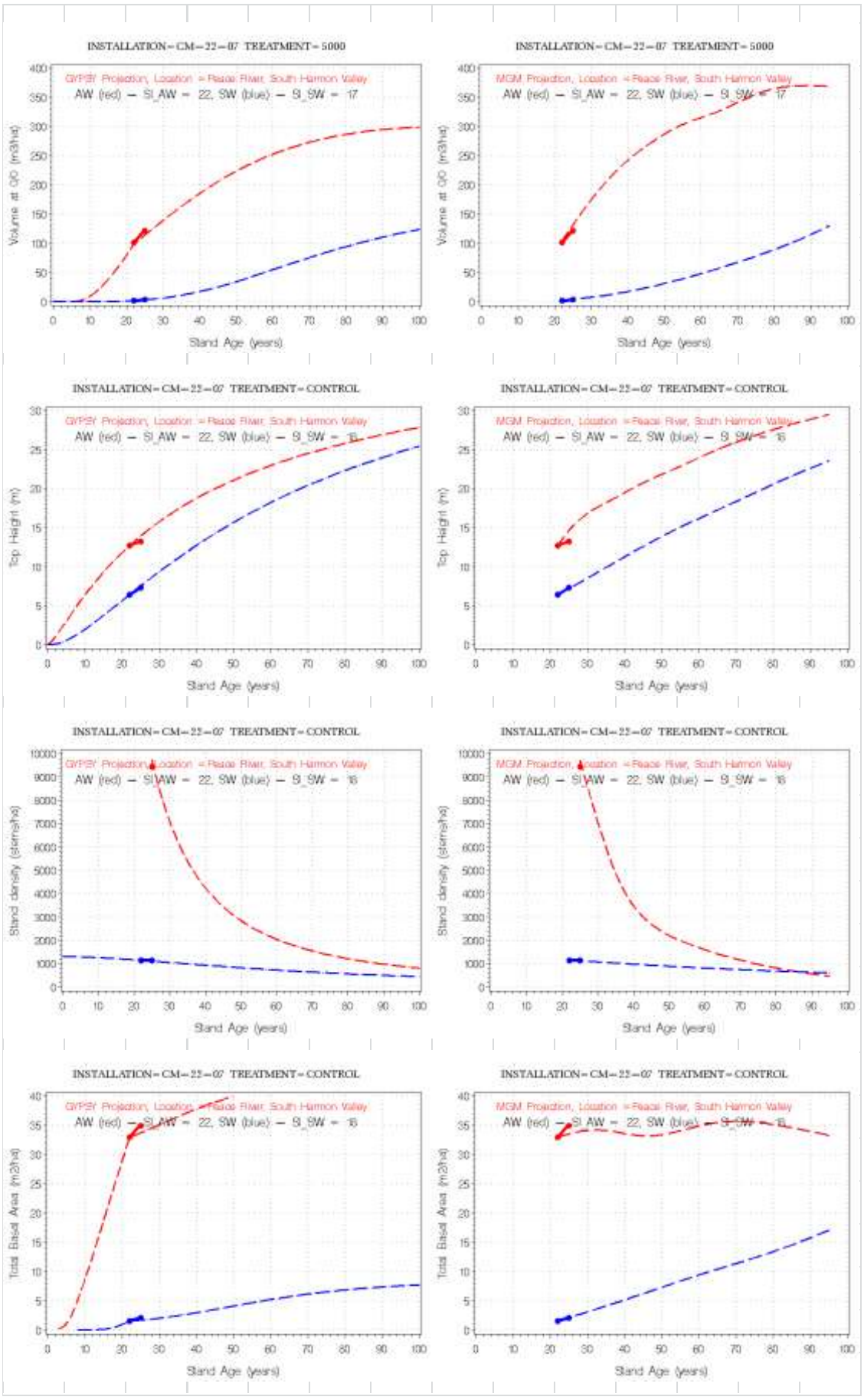

INSTALLATION = CM – 22 – 06 TREATMENT = 5000
GYPSY Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 19
Volume at QO (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = 5000
MGM Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 19
Volume at QO (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = CONTROL
GYPSY Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 20
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = CONTROL
MGM Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 20
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = CONTROL
GYPSY Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 20
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = CONTROL
MGM Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 20
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = CONTROL
GYPSY Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 20
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = CONTROL
MGM Projection; Location = Peace River, Kinuseo Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 20
Total Basal Area (m2/ha)
Stand Age (years)

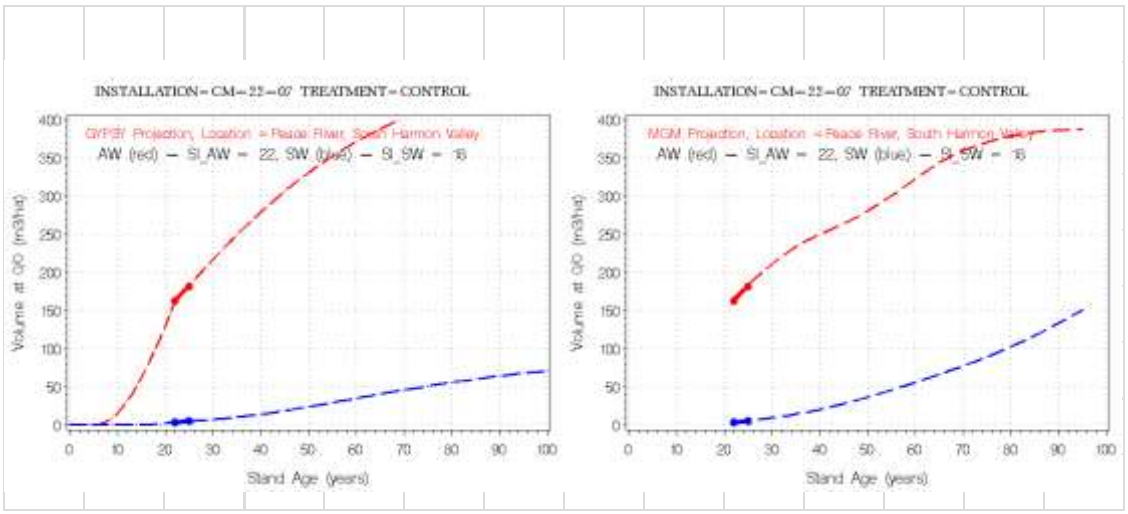

INSTALLATION = CM – 22 – 06 TREATMENT = CONTROL
GYPSY Projection, Location = Peace River, Kimiwan Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 20
Volume at QO (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 06 TREATMENT = CONTROL
MGM Projection, Location = Peace River, Kimiwan Lake
AW (red) – SI_AW = 23, SW (blue) – SI_SW = 20
Volume at QO (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 0
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = ., SW (blue) – SI_SW = 15
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 0
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = ., SW (blue) – SI_SW = 15
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 0
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = ., SW (blue) – SI_SW = 15
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 0
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = ., SW (blue) – SI_SW = 15
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 0
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = ., SW (blue) – SI_SW = 15
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 0
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = ., SW (blue) – SI_SW = 15
Total Basal Area (m2/ha)
Stand Age (years)


INSTALLATION = CM – 22 – 07 TREATMENT = 0
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = , SW (blue) – SI_SW = 15
Volume at 0/0 (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 0
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = , SW (blue) – SI_SW = 15
Volume at 0/0 (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 1000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 1000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 1000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 1000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 1000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 1000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Total Basal Area (m2/ha)
Stand Age (years)


INSTALLATION = CM – 22 – 07 TREATMENT = 1000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Volume at QD (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 1000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Volume at QD (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 2500
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 2500
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 2500
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 2500
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 2500
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 2500
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Total Basal Area (m2/ha)
Stand Age (years)

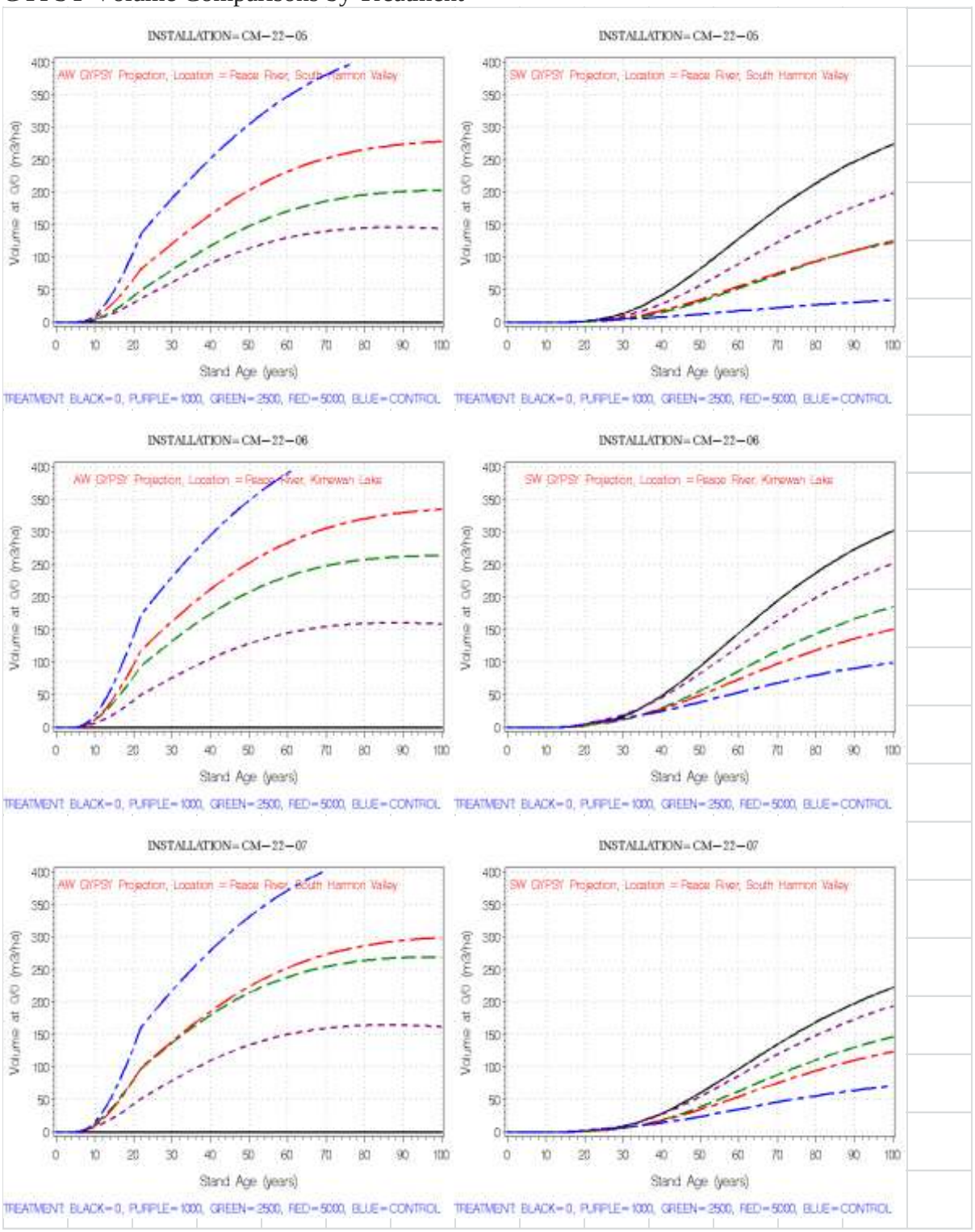

INSTALLATION=CM-22-07 TREATMENT=2500
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Volume at QD (m3/ha)
Stand Age (years)
INSTALLATION=CM-22-07 TREATMENT=2500
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 24, SW (blue) – SI_SW = 17
Volume at QD (m3/ha)
Stand Age (years)
INSTALLATION=CM-22-07 TREATMENT=5000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Top Height (m)
Stand Age (years)
INSTALLATION=CM-22-07 TREATMENT=5000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Top Height (m)
Stand Age (years)
INSTALLATION=CM-22-07 TREATMENT=5000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM-22-07 TREATMENT=5000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Stand density (stems/ha)
Stand Age (years)
INSTALLATION=CM-22-07 TREATMENT=5000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION=CM-22-07 TREATMENT=5000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Total Basal Area (m2/ha)
Stand Age (years)


INSTALLATION = CM – 22 – 07 TREATMENT = 5000
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Volume at O/O (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = 5000
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 17
Volume at O/O (m3/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = CONTROL
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 16
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = CONTROL
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 16
Top Height (m)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = CONTROL
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 16
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = CONTROL
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 16
Stand density (stems/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = CONTROL
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 16
Total Basal Area (m2/ha)
Stand Age (years)
INSTALLATION = CM – 22 – 07 TREATMENT = CONTROL
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 16
Total Basal Area (m2/ha)
Stand Age (years)

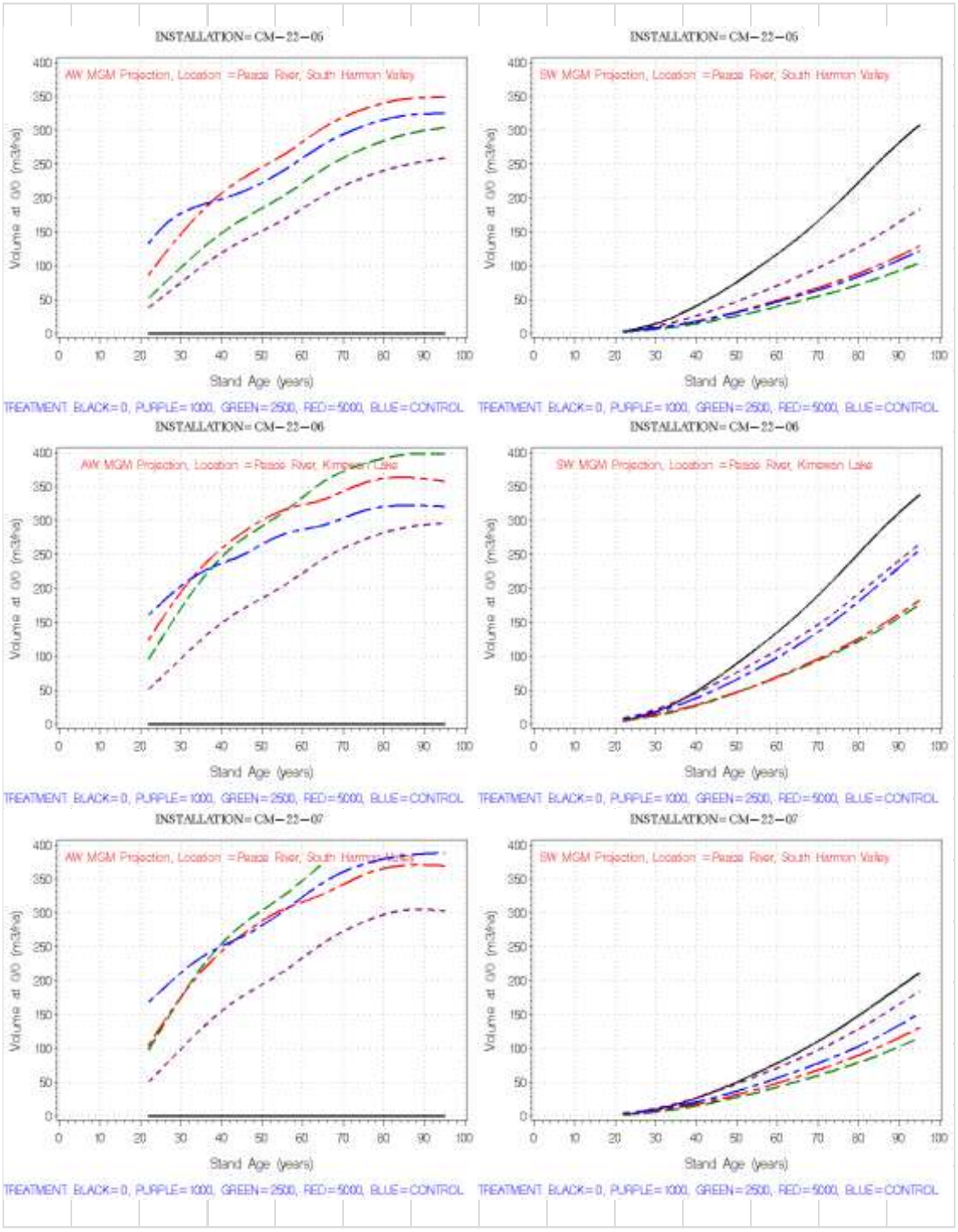

INSTALLATION=CM-22-07 TREATMENT=CONTROL
GYPSY Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 16
Volume at CIO (m3/ha)
Stand Age (years)
INSTALLATION=CM-22-07 TREATMENT=CONTROL
MGM Projection, Location = Peace River, South Harmon Valley
AW (red) – SI_AW = 22, SW (blue) – SI_SW = 16
Volume at CIO (m3/ha)
Stand Age (years)

Appendix 3. Gypsy and MGM Reponses by Treatment

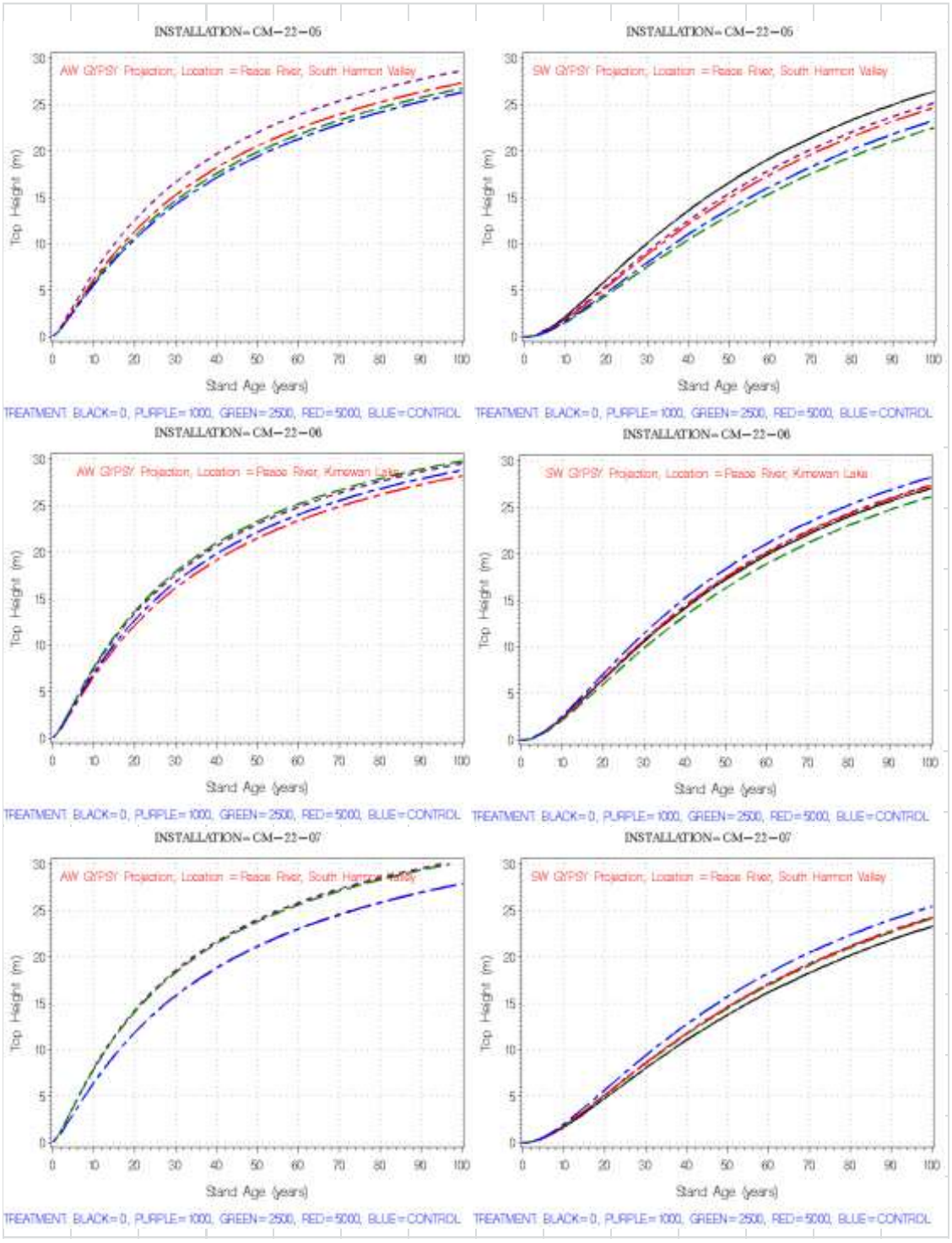
GYPSY Volume Comparisons by Treatment



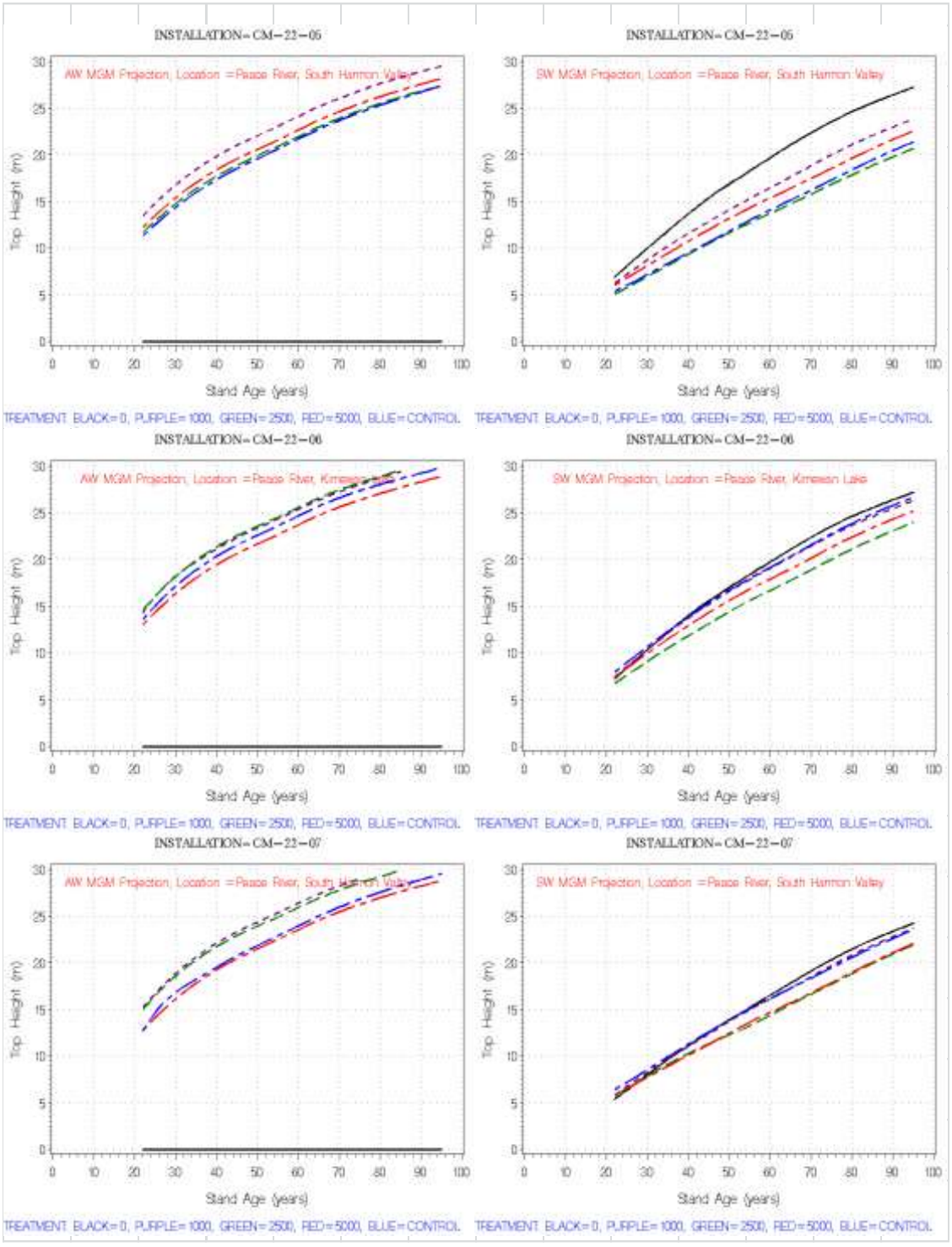
MGM Volume Comparisons by Treatment



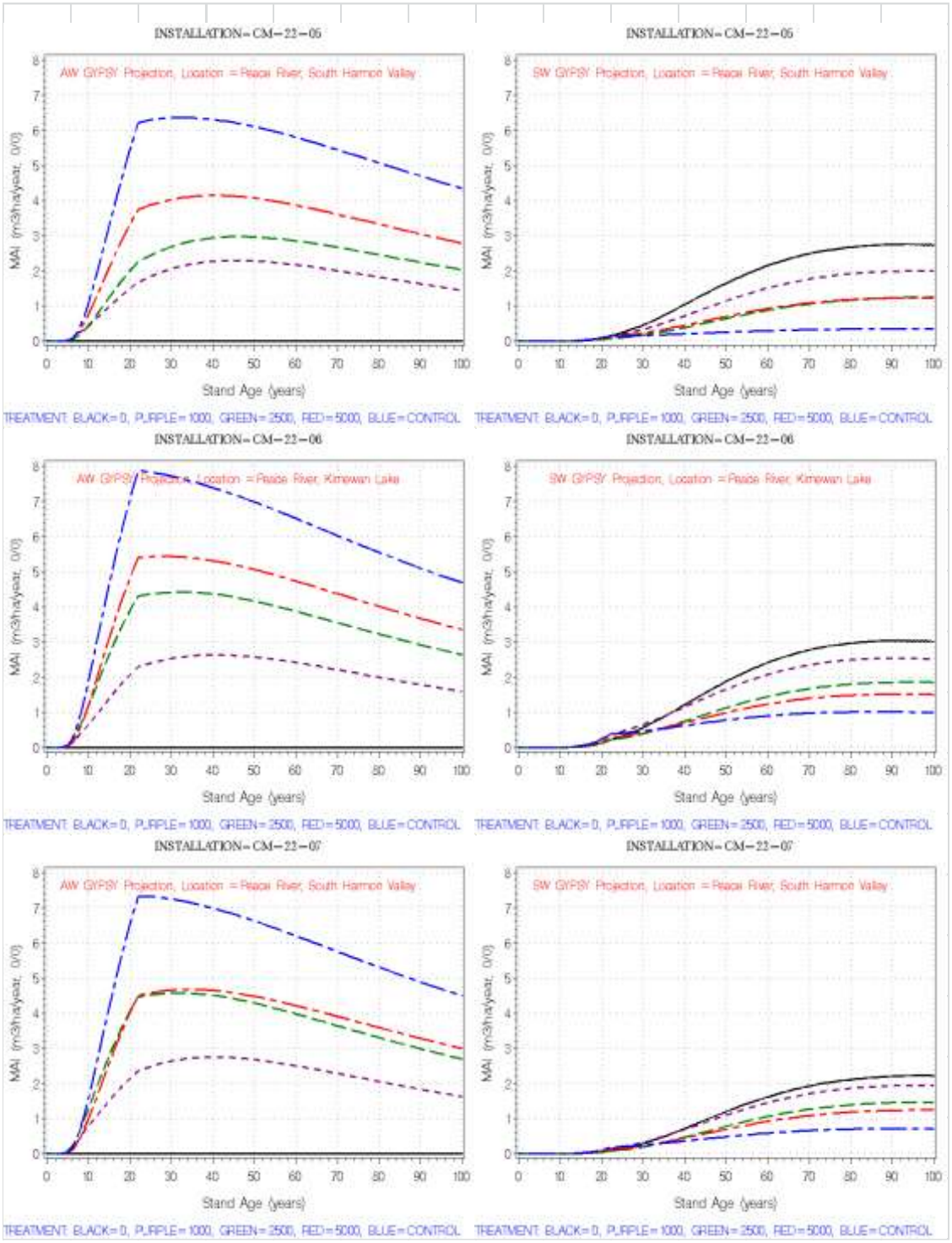
GYPSY Top Height Comparisons by Treatment



MGM Top Height Comparisons by Treatment



GYPSY Mean Annual Increment Comparisons by Treatment



MGM Mean Annual Increment Comparisons by Treatment