FPS Crosswalk Table for King's Site Index Curves

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Quick FBRI Update

- FPS Version 7.60 released March 23, 2023
  - Several bugs fixed
  - Implemented regional rules for scaling butt logs
  - Includes crosswalk tables for King's site index curves and Monserud's site index system
  - Additional documentation is in the C:\Fp7\Doc folder
- Going forward
  - Two in-person workshops have been scheduled
    - FPS Basics—April 11 & 12
    - Harvest Scheduling—October 17 & 18
  - Fix more bugs
  - Research new methods for producing forest inventories
  - Establish an eastern FBRI office
  - Begin planning a major upgrade to the FPS software (the 5th generation of the program)
    - Process census-level inventories
    - Move away from Microsoft Access
    - GIS integration

FPS Crosswalk Table for King's Site Index Curves

- The crosswalk table below is used to determine the PctHt, SITE_PHY, and SITE_SHP for any given King's site index

CrosswalkKingTo10mSite

RowID	KingsSI	YrsToBH	PctHt	SITE_PHY	SITE_SHP
50	104	4	0.8120	7.1498	0.7147
51	105	4	0.8116	7.2426	0.7198
52	106	4	0.8069	7.3392	0.7228
53	107	4	0.8023	7.4358	0.7258
54	108	4	0.7976	7.5324	0.7288
55	109	4	0.7929	7.6290	0.7318
56	110	4	0.7882	7.7256	0.7348
57	111	4	0.7836	7.8221	0.7379
58	112	4	0.7789	7.9187	0.7409
59	113	4	0.7742	8.0153	0.7439
60	114	4	0.7696	8.1119	0.7469

Record: 51 of 101 No Filter Search

- This presentation describes how the crosswalk table was developed from King's site index curves

King's site index curves for Douglas-fir

Published in 1966

Widely used in Washington, Oregon, and California

Only requires total height and age at breast height on a sample of trees to estimate a site's productivity

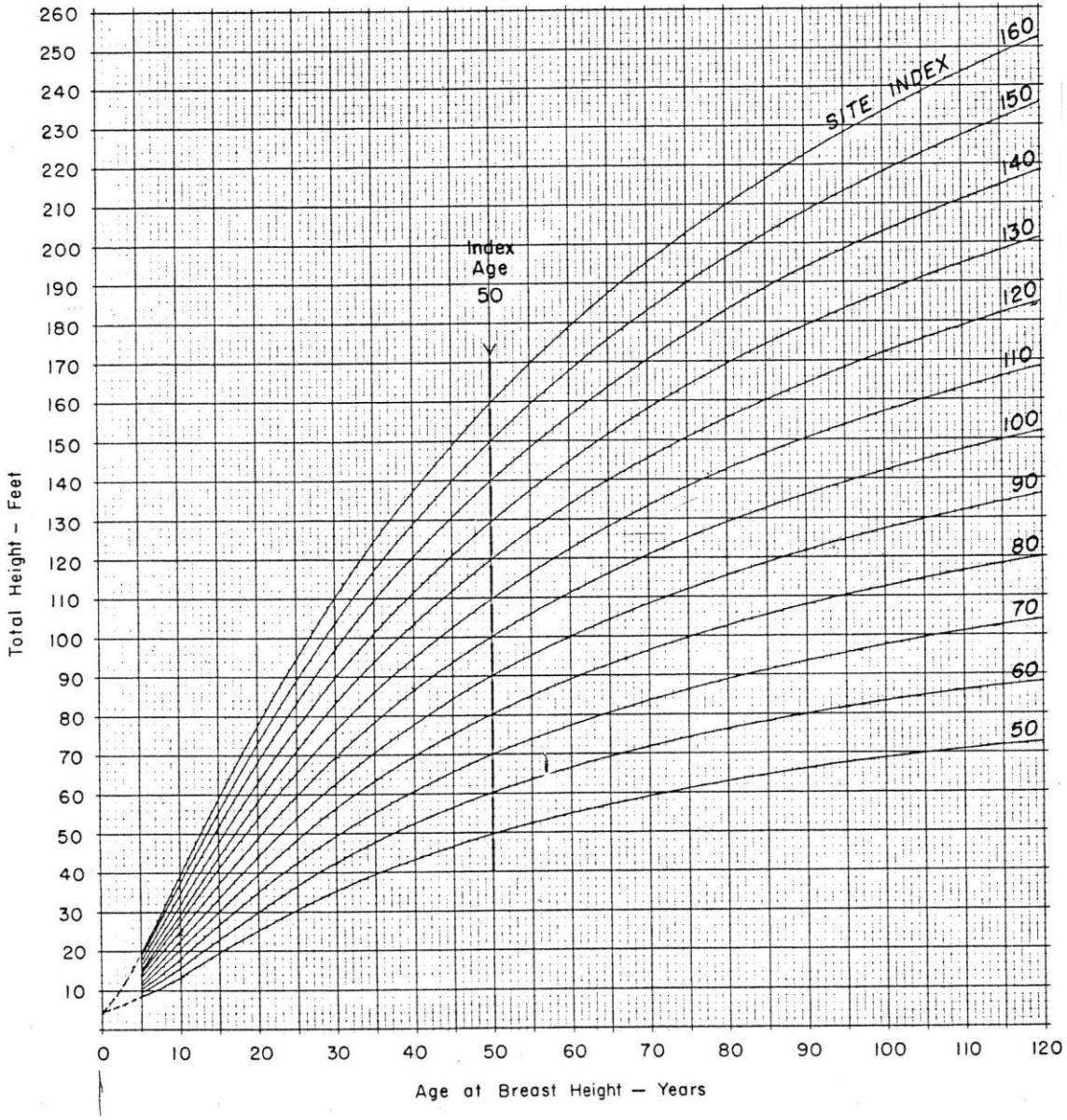
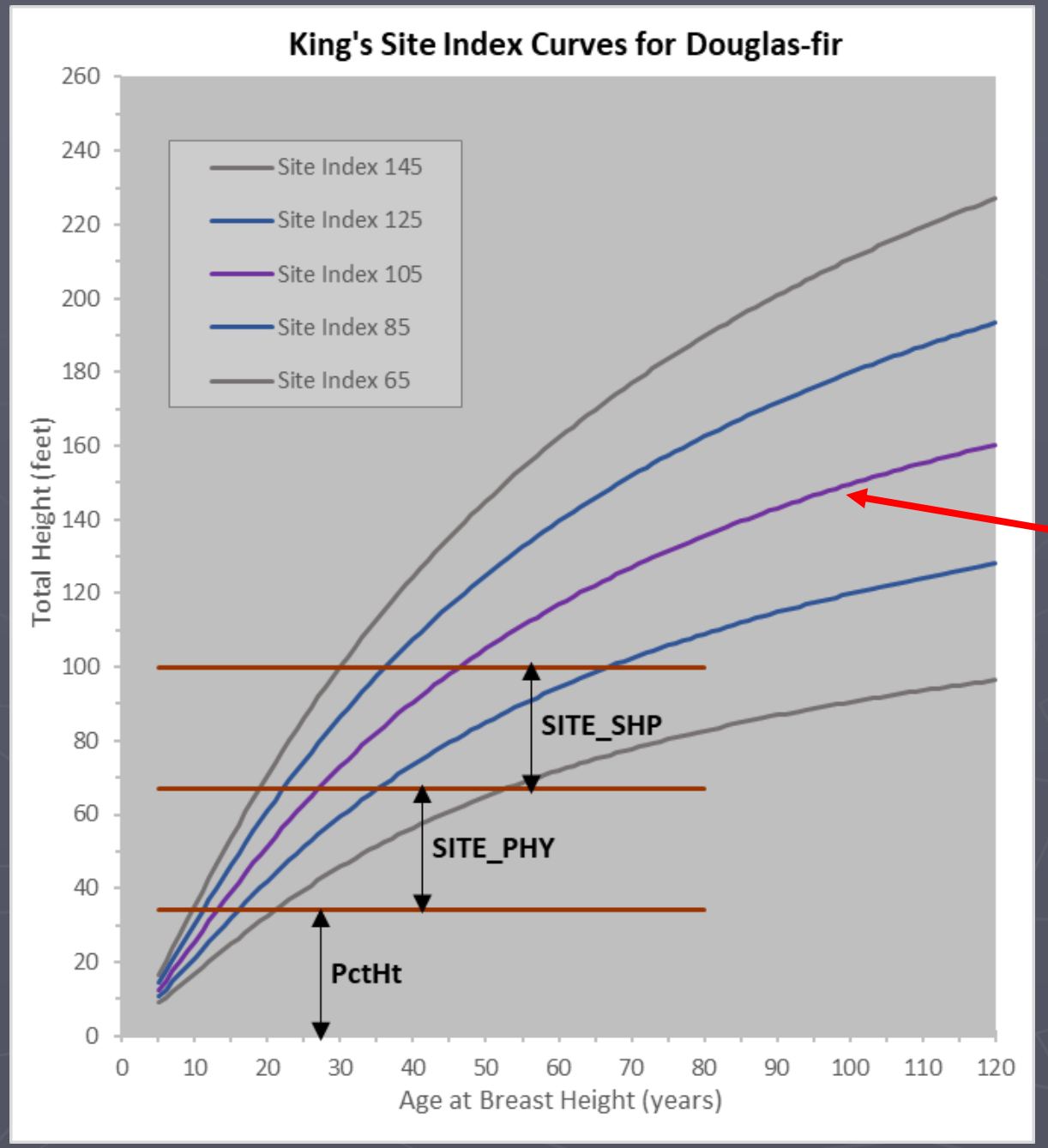


FIGURE 5. Site index curves for Douglas-fir.

To model King's curves within FPS, we need to find the SITE_PHY, SITE_SHP, and PctHt values for each site index



For example, what values of SITE_PHY, SITE_SHP, and PctHt produce a curve that is a <u>good approximation</u> to King's site index 105 curve?

Calculation of the three 10m Site Metrics

SITE_PHY, SITE_SHP, and PctHt

- Macro-site growth capacity

$$SITE\_PHY = \frac{10\ meters\ x\ 10\ years/decade}{ring\ count\ at\ 34\ ft - ring\ count\ at\ 67\ ft}$$

- Long-term growth adjusted for limiting environmental factors

$$SITE\_SHP = \frac{ring\ count\ at\ 34\ ft\ - ring\ count\ at\ 67\ ft}{ring\ count\ at\ 67\ ft - ring\ count\ at\ 100\ ft}$$

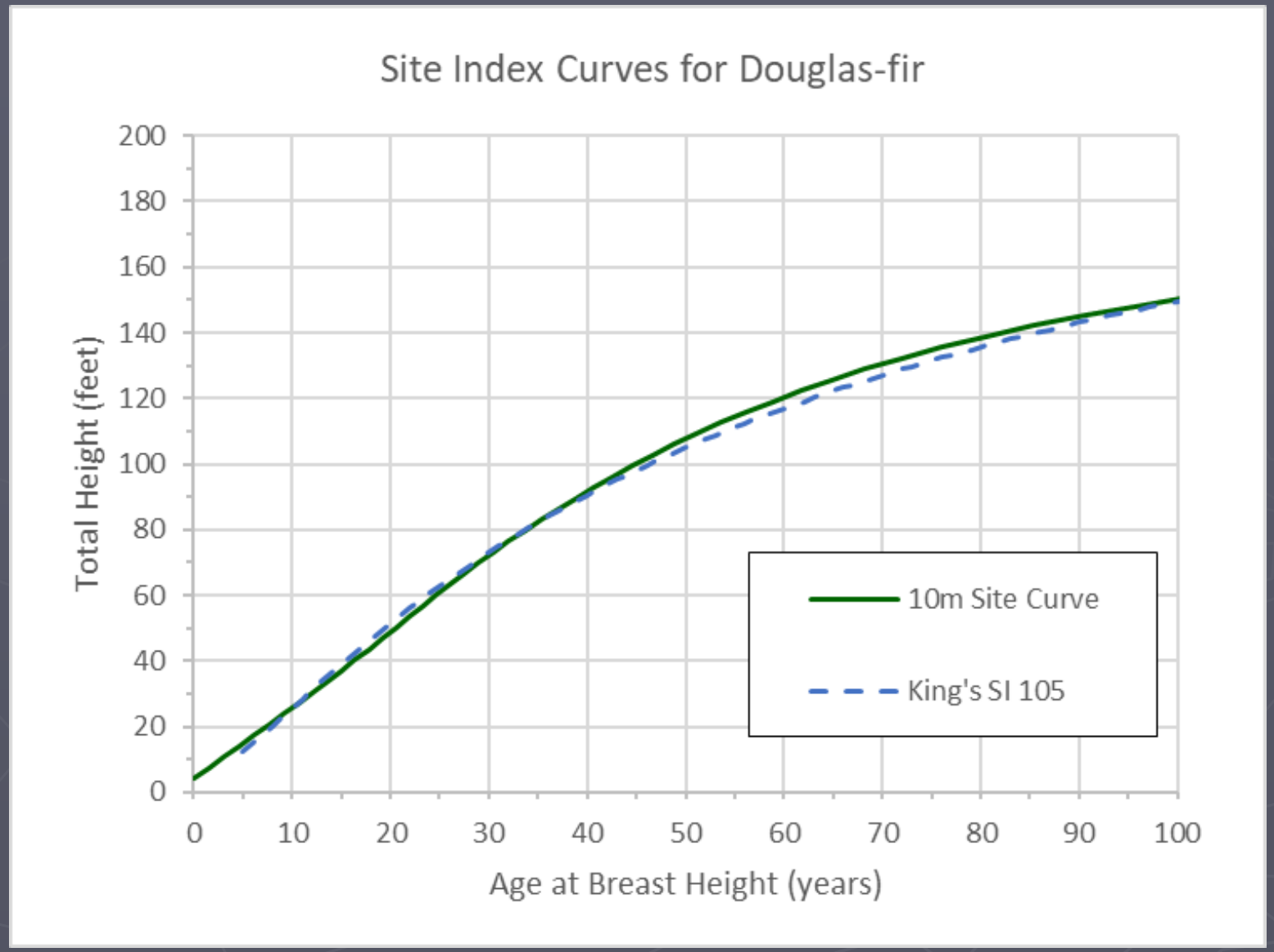
- Growth due to early silviculture

$$PctHt = \frac{ring\ count\ at\ 34\ ft\ - ring\ count\ at\ 67\ ft}{ring\ count\ at\ 1\ ft - ring\ count\ at\ 34\ ft}$$

10m Site Curves can exhibit a wide variety of patterns

Metrics for the 10m Site Curve shown in the chart (green curve)

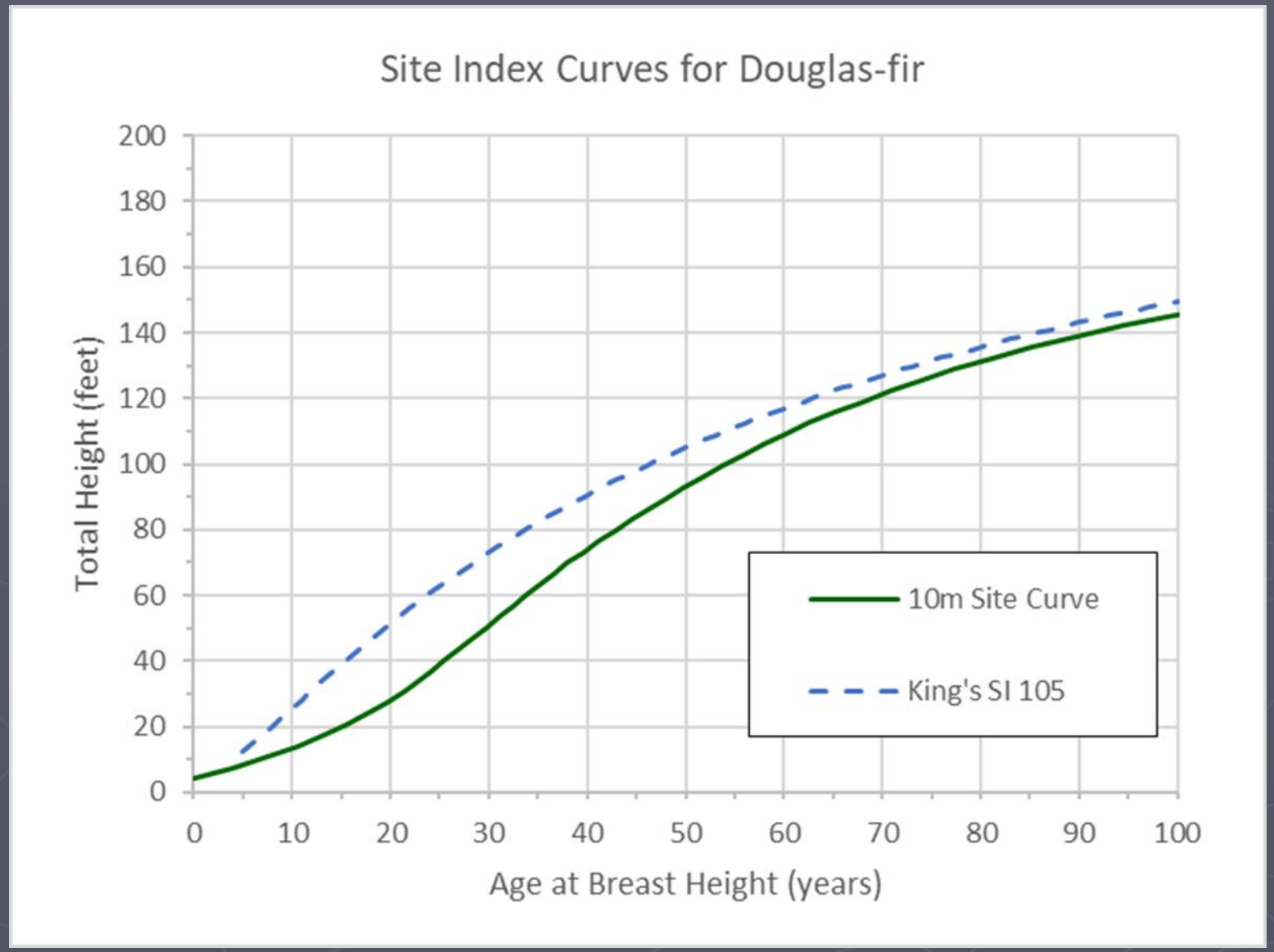
- SITE_PHY = 7.243
- SITE_SHP = 71.98%
- PctHt = 81.16%



10m Site Curves can exhibit a wide variety of patterns

Metrics for the 10m Site Curve shown in the chart (green curve)

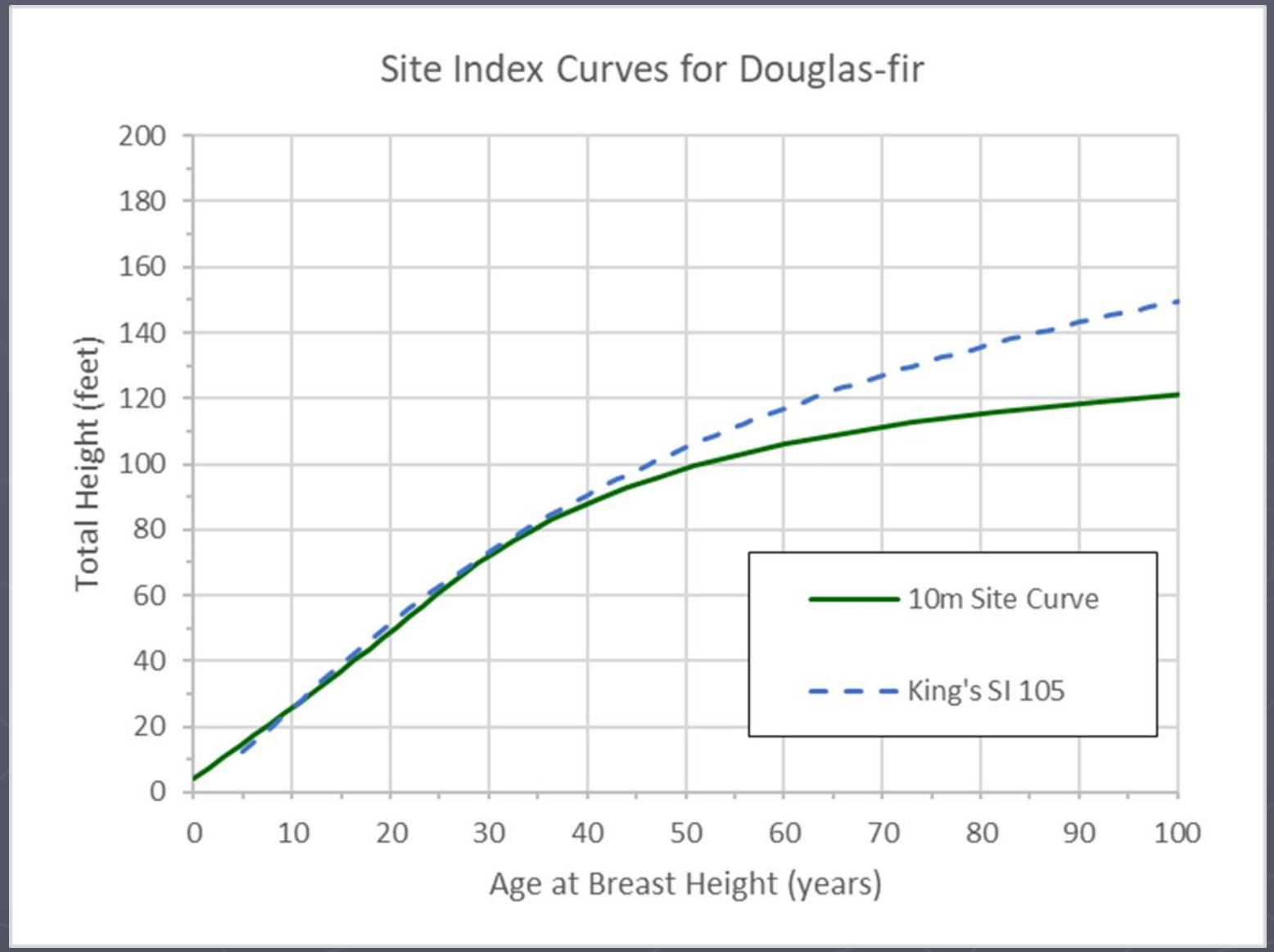
- SITE_PHY = 7.243
- SITE_SHP = 71.98%
- PctHt = 40.00%



10m Site Curves can exhibit a wide variety of patterns

Metrics for the 10m Site Curve shown in the chart (green curve)

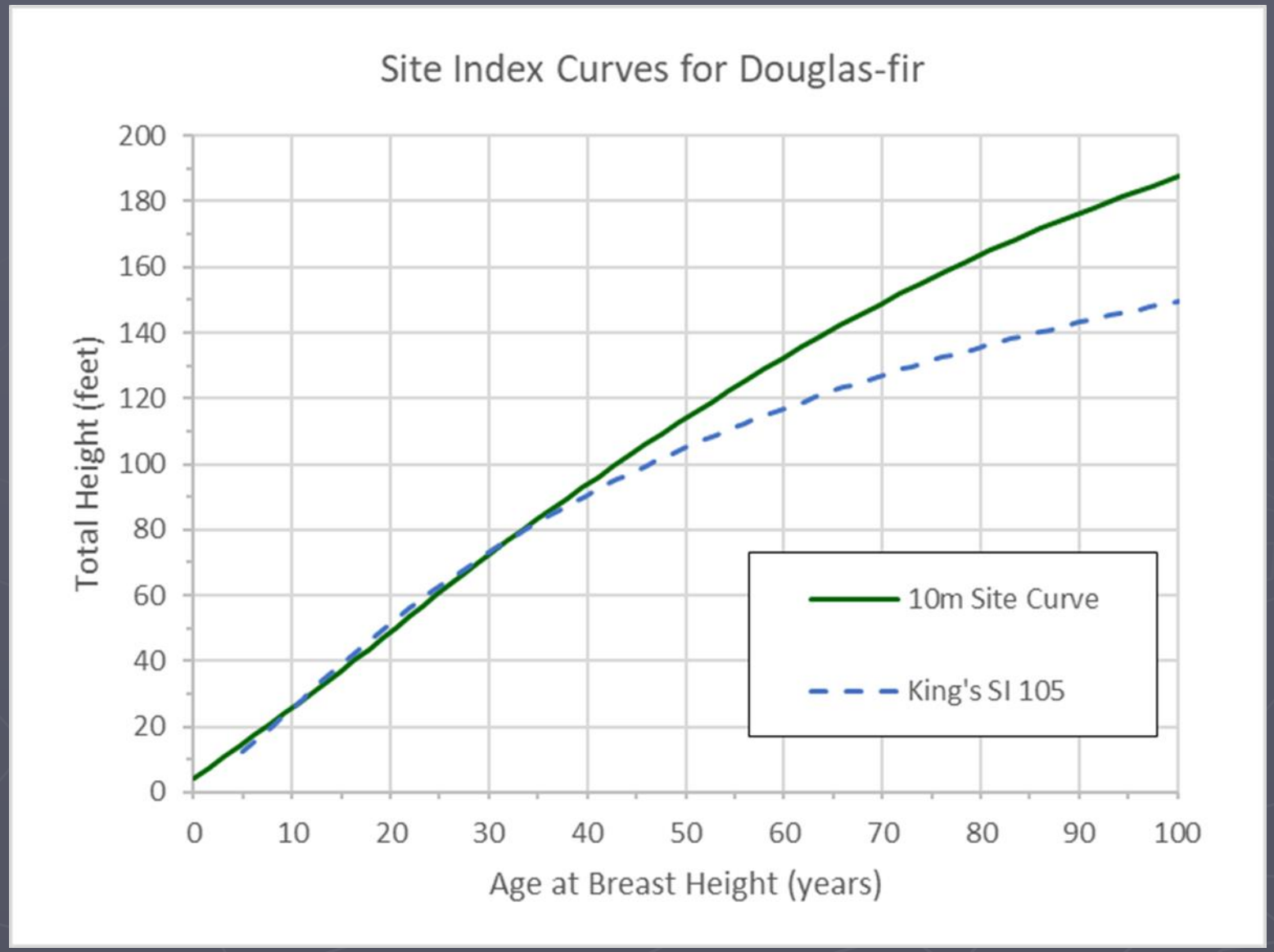
- SITE_PHY = 7.243
- SITE_SHP = 50.00%
- PctHt = 81.16%



10m Site Curves can exhibit a wide variety of patterns

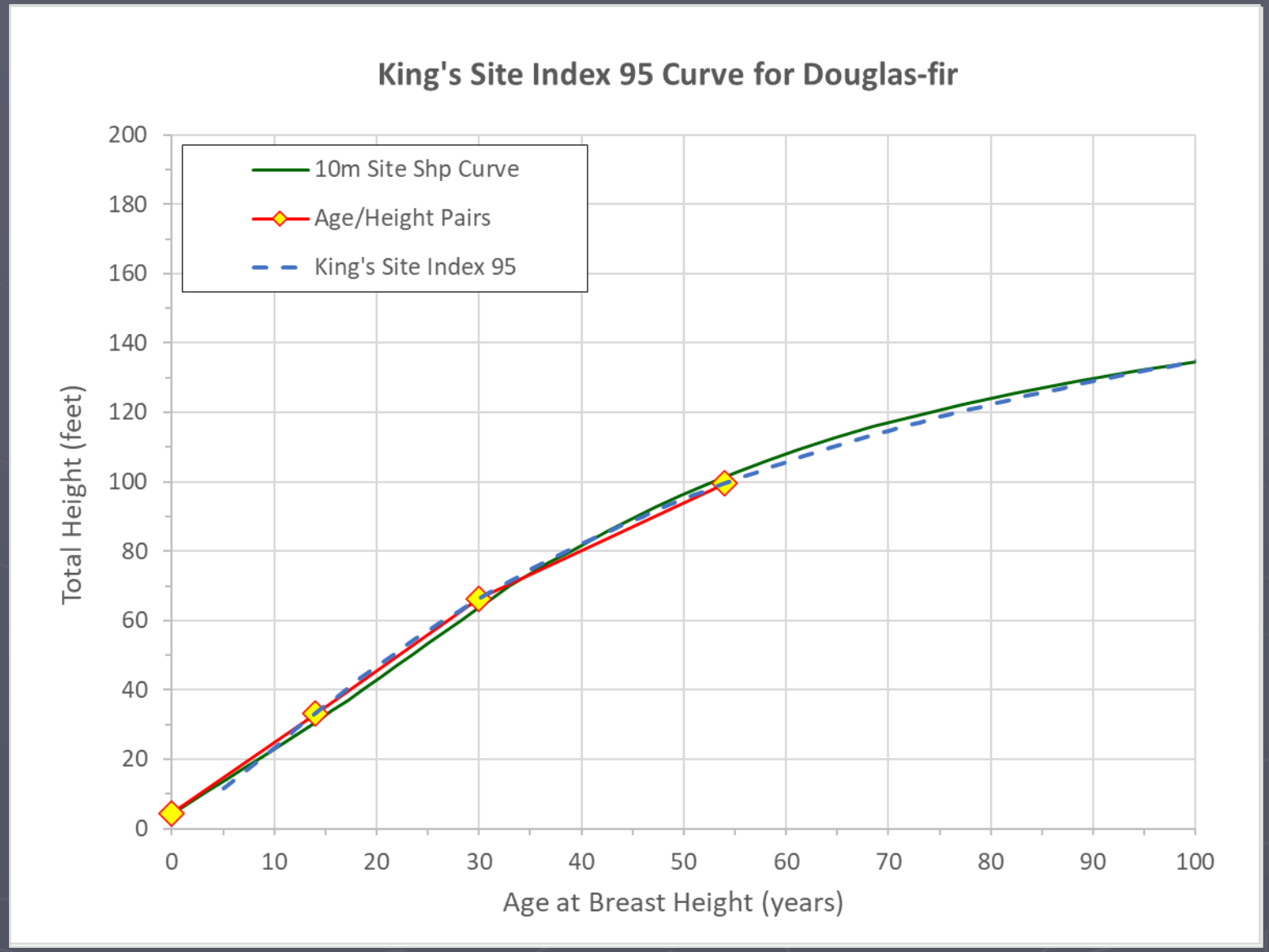
Metrics for the 10m Site Curve shown in the chart (green curve)

- SITE_PHY = 7.243
- SITE_SHP = 80.00%
- PctHt = 81.16%



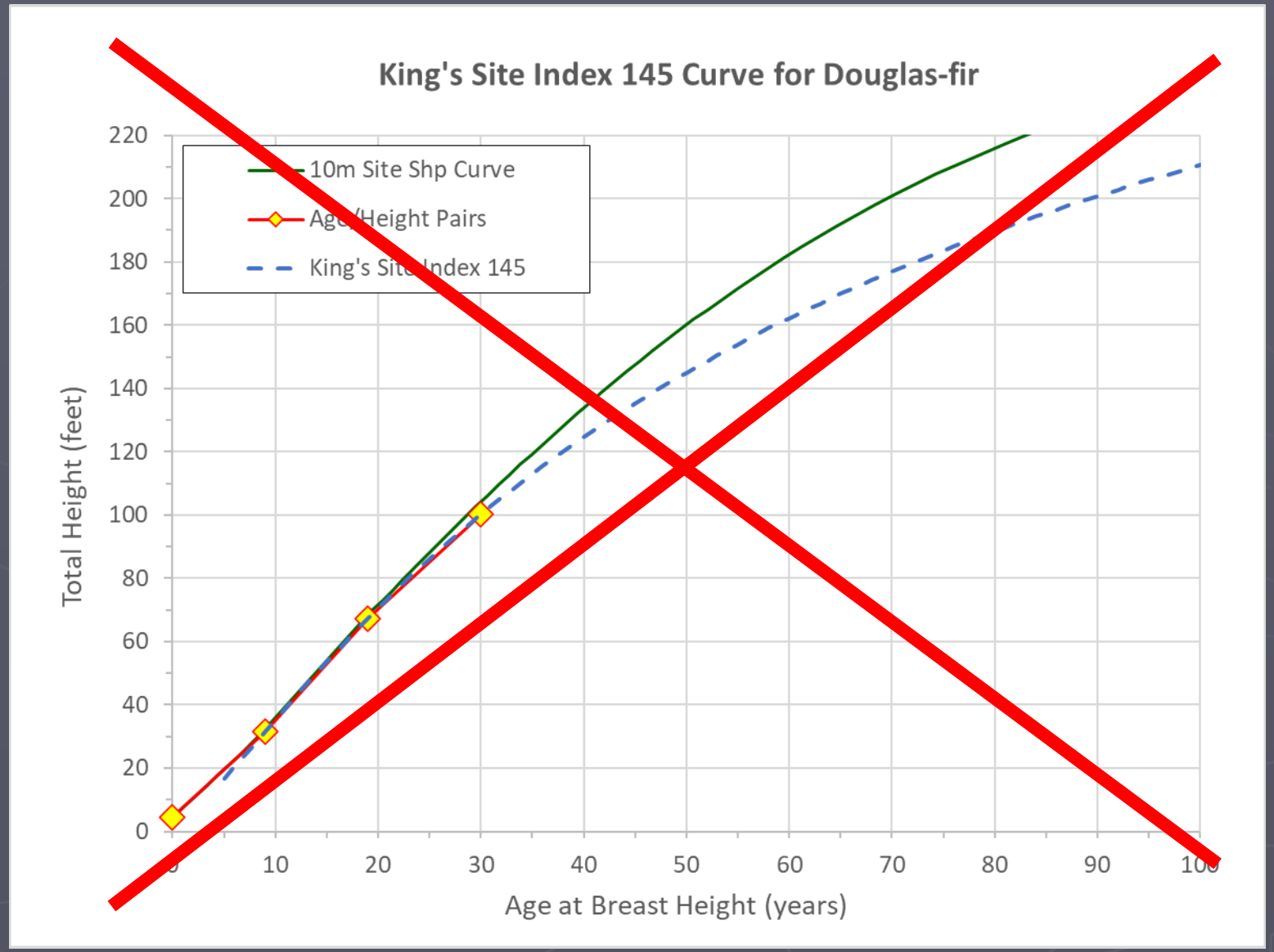
Calculation of the three 10m site metrics for King's site index 95

- Start with King's curve
- Calculate SITE_PHY
  = 6.314 meters/decade
- Calculate SITE_SHP
  = 66.85%
- Calculate PctHt
  = 81.59%
- PRETTY GOOD FIT!



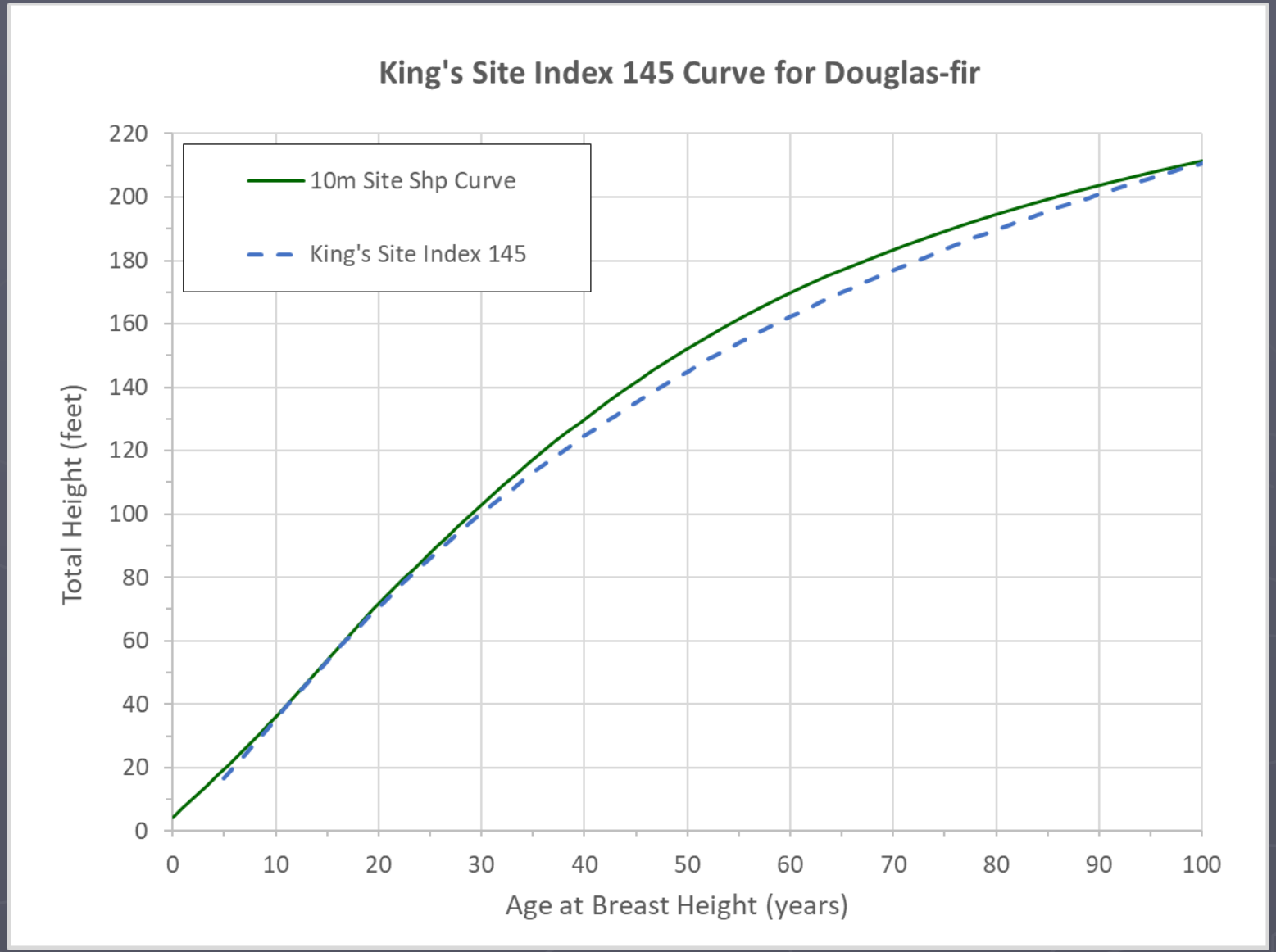
Calculation of the three 10m site metrics for King's site index 145

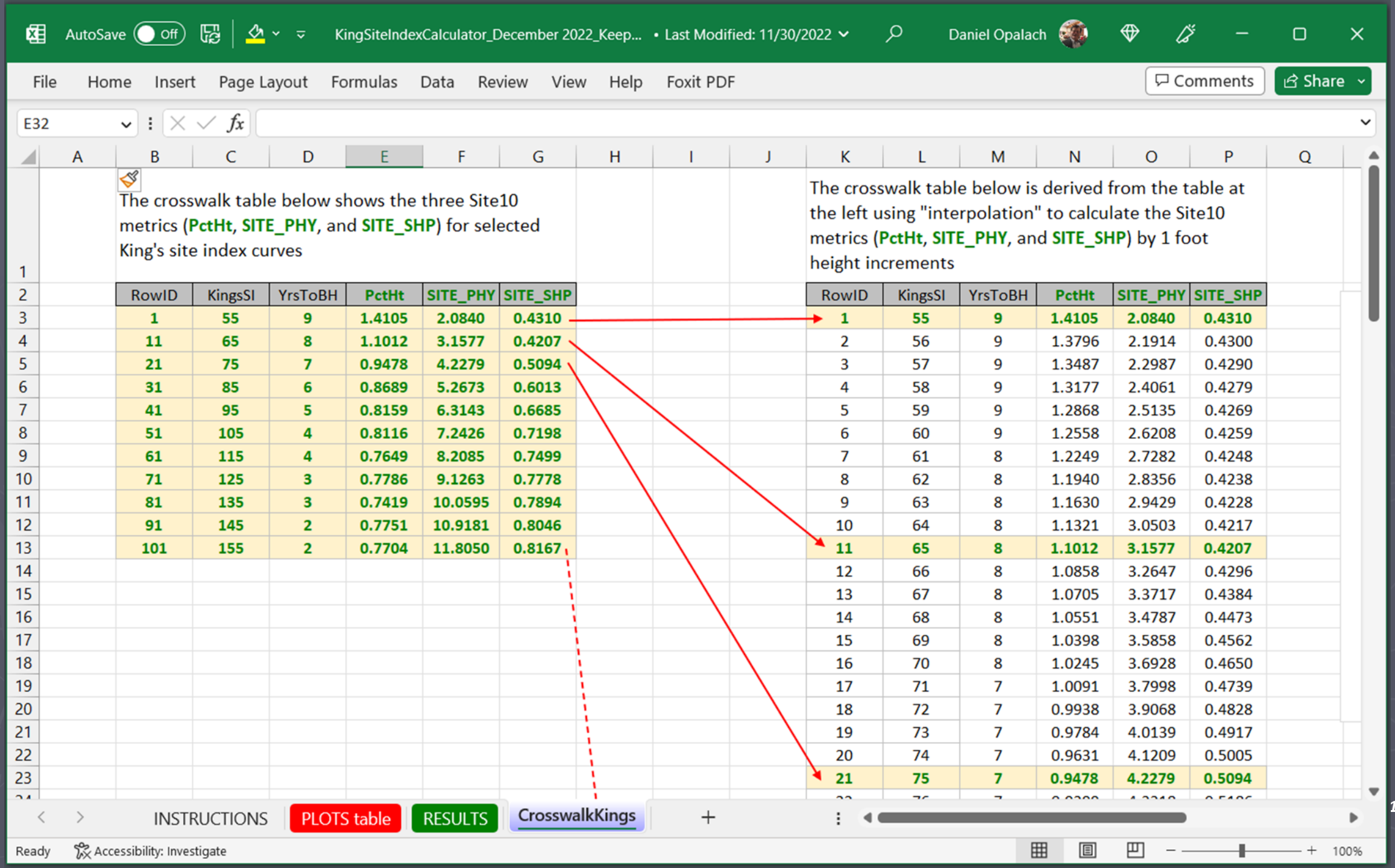
- Start with King's curve
- Calculate SITE_PHY
  = 10.918 meters/decade
- Calculate PctHt
  = 77.51%
- Calculate SITE_SHP
  = 83.25%
- CRAPPY FIT!!!
- To fix the problem reduce SITE_SHP



Calculation of the three 10m site metrics for King's site index 145

- Start with King's curve
- Calculate SITE_PHY
  = 10.918 meters/decade
- Calculate PctHt
  = 77.51%
- Re-define SITE_SHP based on height at 100 years old:
  SITE_SHP = 80.46%
- MUCH BETTER FIT!

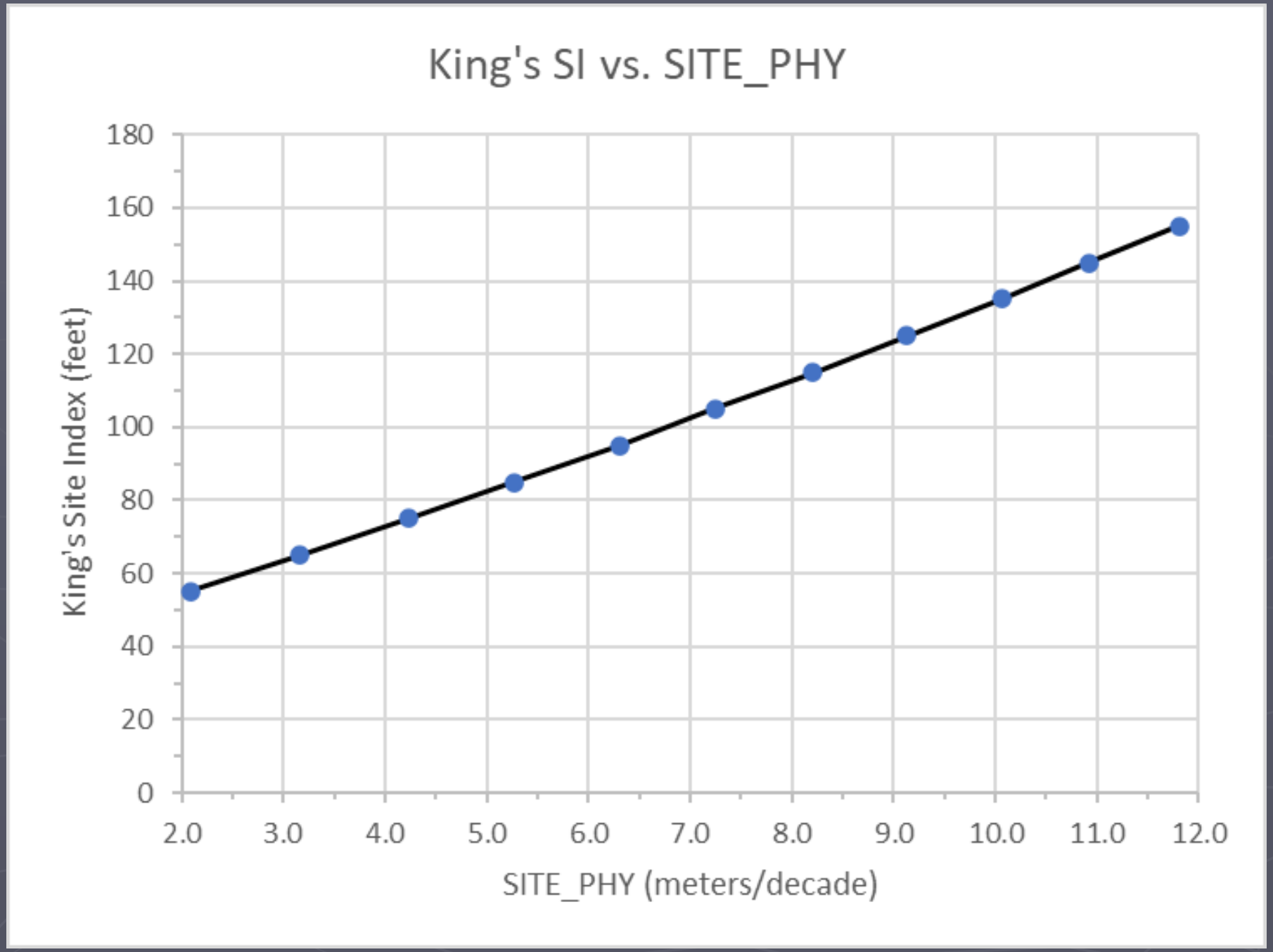




RowID	KingsSI	YrsToBH	PctHt	SITE_PHY	SITE_SHP
1	55	9	1.4105	2.0840	0.4310
11	65	8	1.1012	3.1577	0.4207
21	75	7	0.9478	4.2279	0.5094
31	85	6	0.8689	5.2673	0.6013
41	95	5	0.8159	6.3143	0.6685
51	105	4	0.8116	7.2426	0.7198
61	115	4	0.7649	8.2085	0.7499
71	125	3	0.7786	9.1263	0.7778
81	135	3	0.7419	10.0595	0.7894
91	145	2	0.7751	10.9181	0.8046
101	155	2	0.7704	11.8050	0.8167

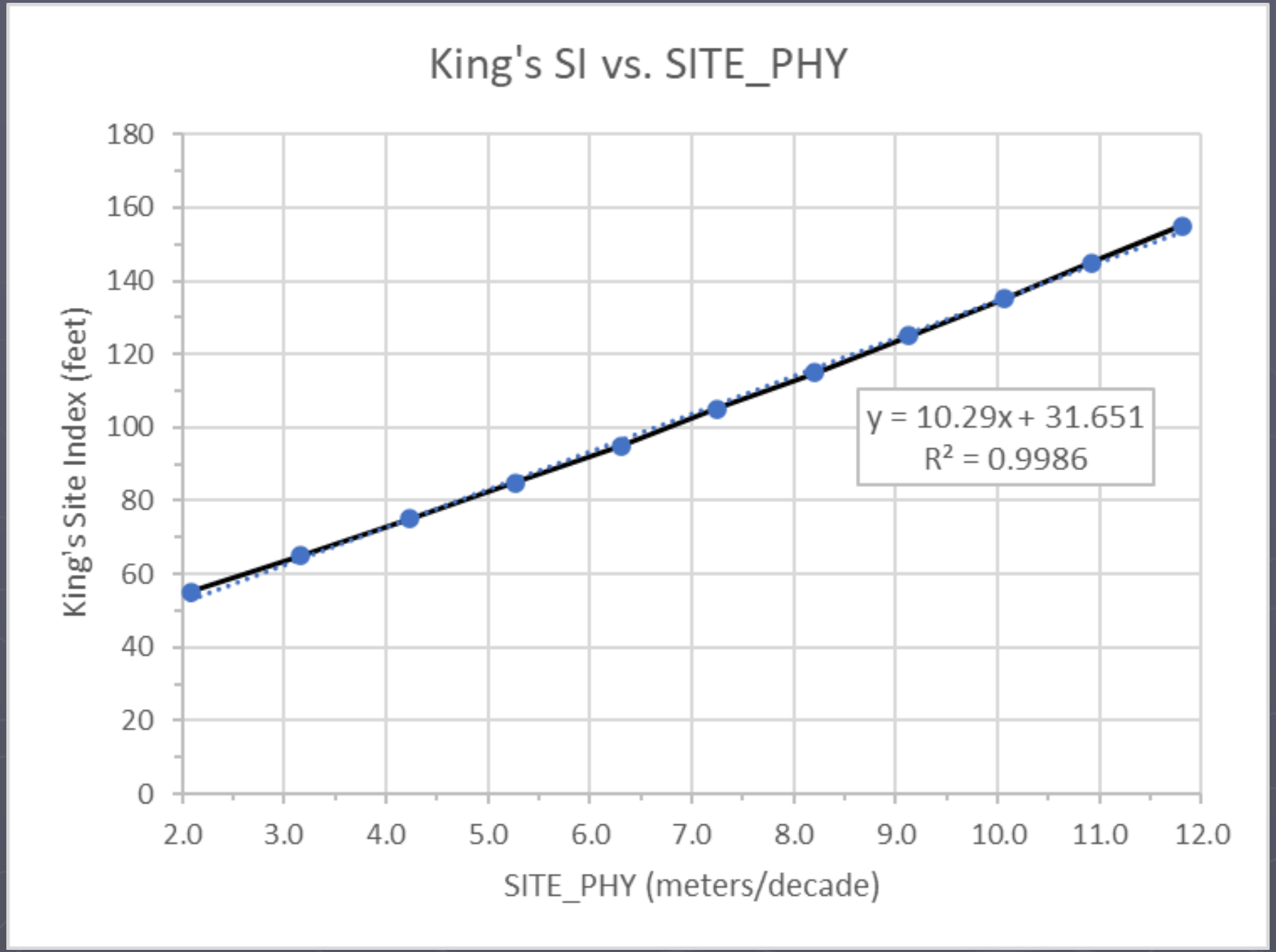
RowID	KingsSI	YrsToBH	PctHt	SITE_PHY	SITE_SHP
1	55	9	1.4105	2.0840	0.4310
2	56	9	1.3796	2.1914	0.4300
3	57	9	1.3487	2.2987	0.4290
4	58	9	1.3177	2.4061	0.4279
5	59	9	1.2868	2.5135	0.4269
6	60	9	1.2558	2.6208	0.4259
7	61	8	1.2249	2.7282	0.4248
8	62	8	1.1940	2.8356	0.4238
9	63	8	1.1630	2.9429	0.4228
10	64	8	1.1321	3.0503	0.4217
11	65	8	1.1012	3.1577	0.4207
12	66	8	1.0858	3.2647	0.4296
13	67	8	1.0705	3.3717	0.4384
14	68	8	1.0551	3.4787	0.4473
15	69	8	1.0398	3.5858	0.4562
16	70	8	1.0245	3.6928	0.4650
17	71	7	1.0091	3.7998	0.4739
18	72	7	0.9938	3.9068	0.4828
19	73	7	0.9784	4.0139	0.4917
20	74	7	0.9631	4.1209	0.5005
21	75	7	0.9478	4.2279	0.5094

- There is a linear relationship between King’s site index and SITE_PHY



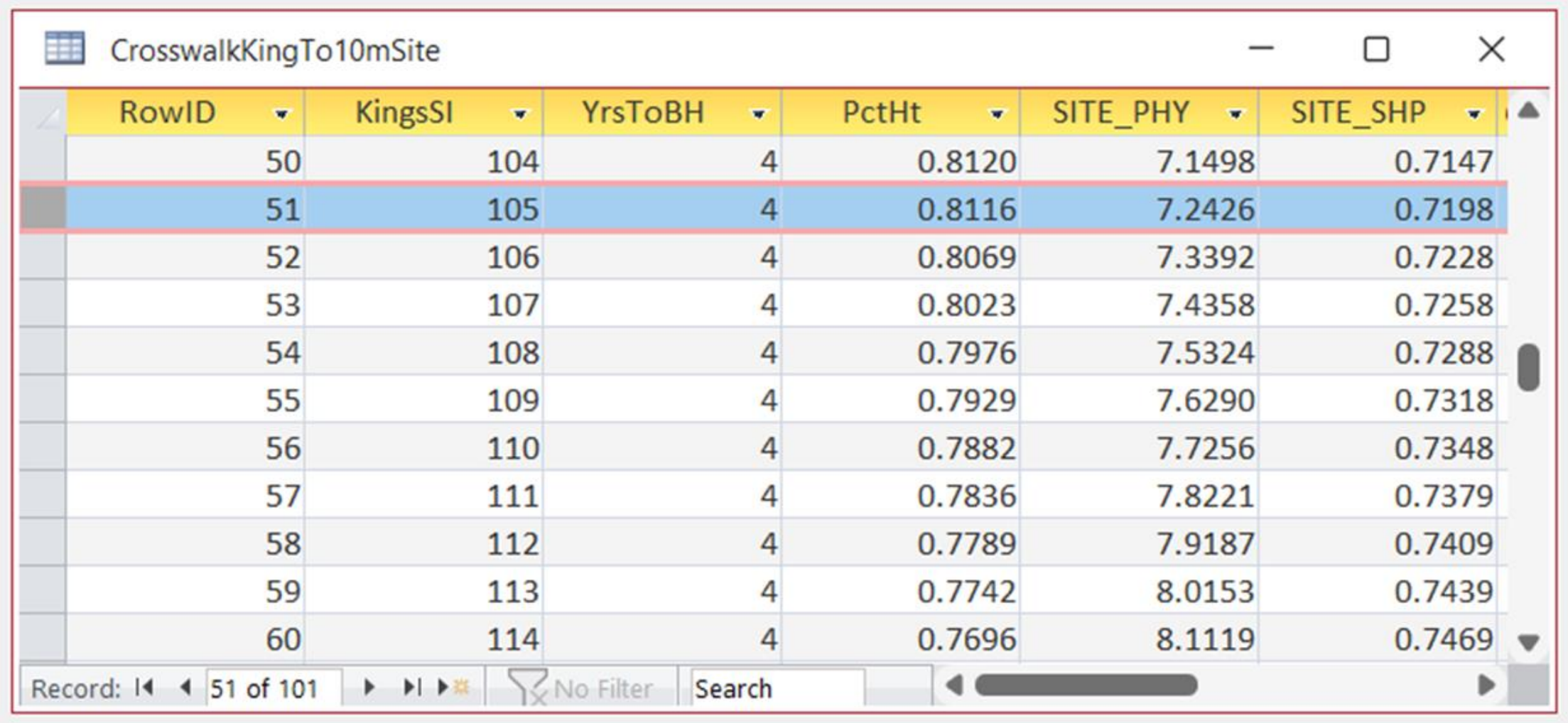
- There is a linear relationship between King's site index and SITE_PHY
- Run a trendline through the data
- Dr. Jim Arney reported a simplified version of this relationship in his SiteGrid papers and other places:

  y = 10x + 30



Example Database for FPS Simulations

FPS_760_KingsSiteCurves.mdb



Example Database for FPS Simulations

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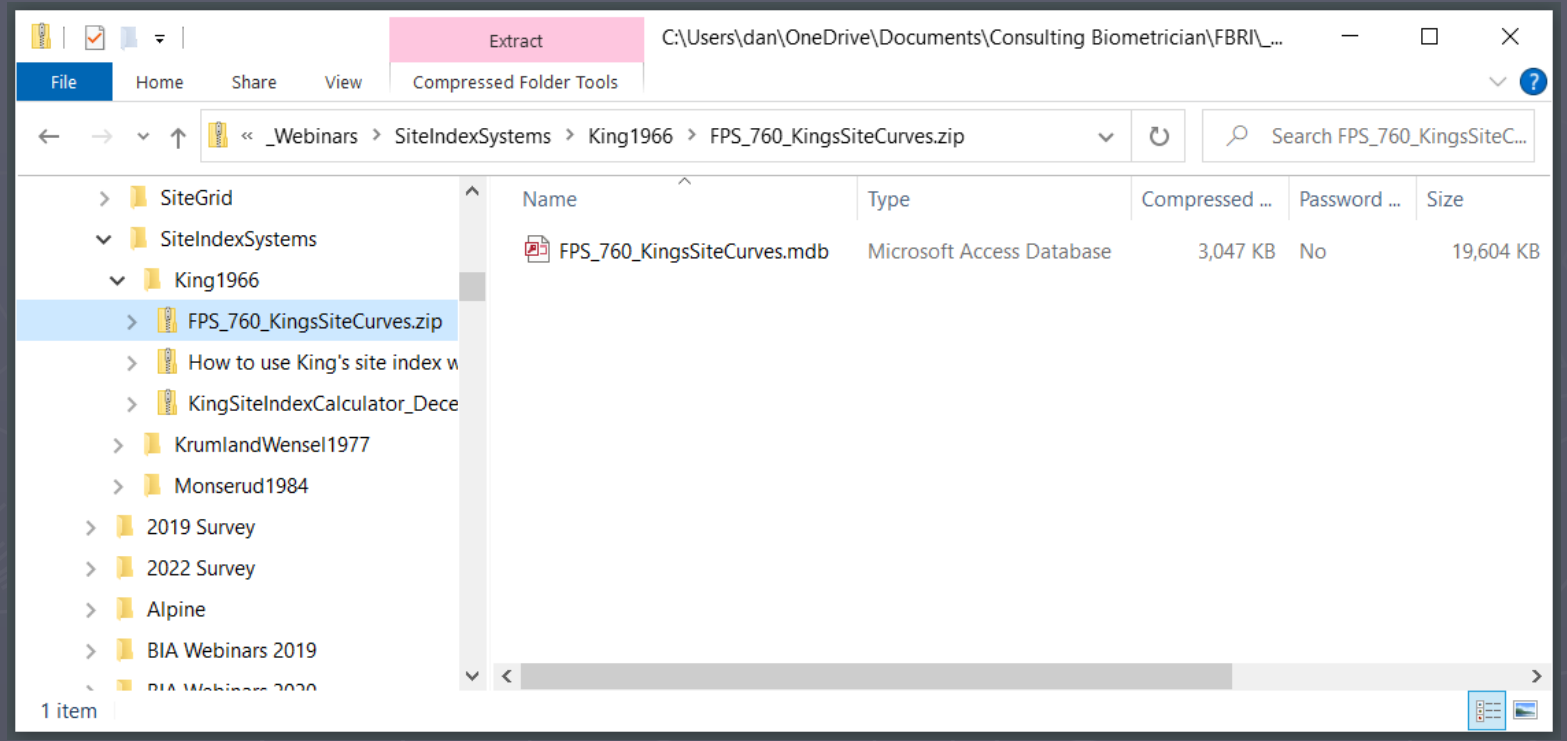


Example Database for FPS Simulations

FPS_760_KingsSiteCurves.mdb

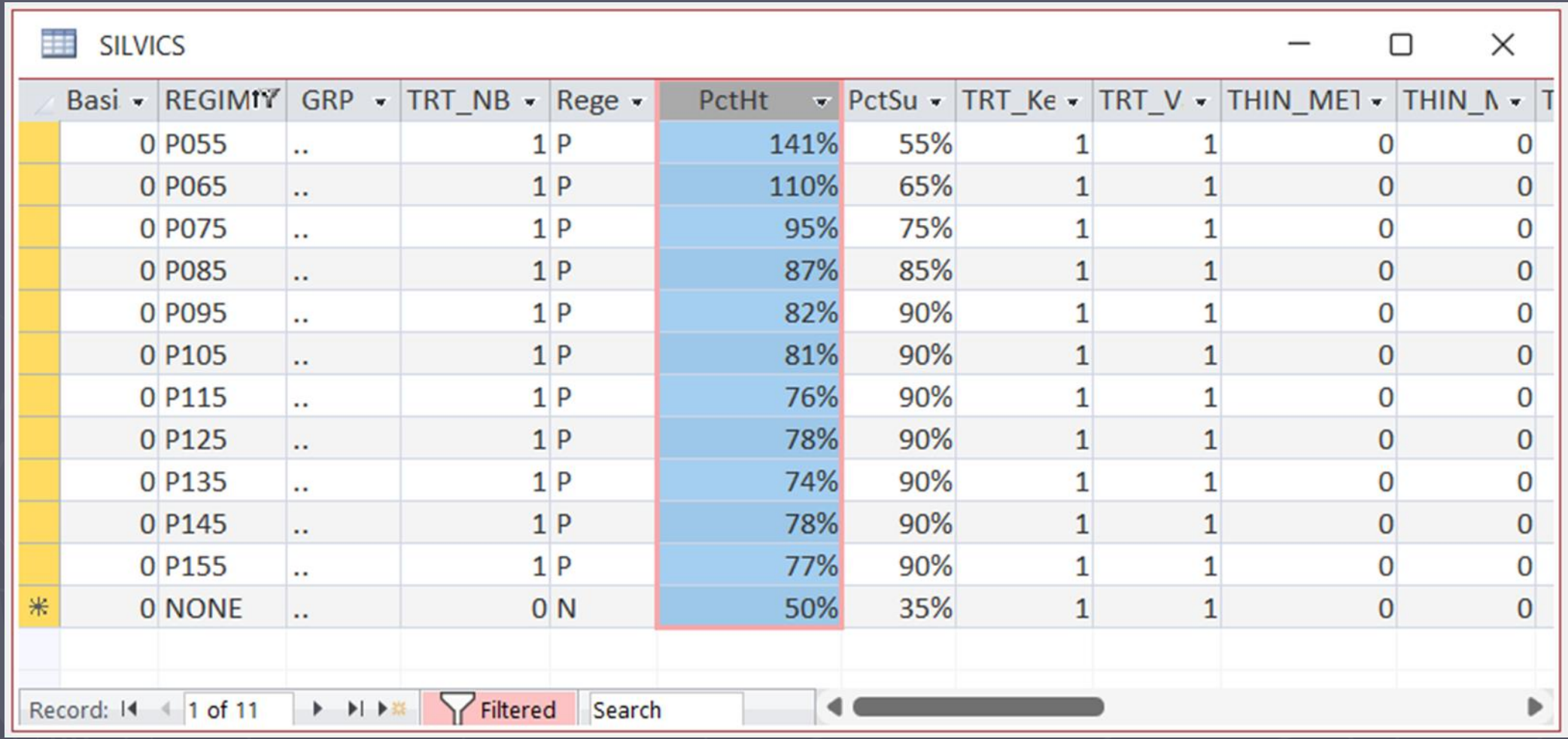
ADMIN

STD_ID	HAB_CLS	HAB_GRP	REGIME	PLAN_YR	SITE_PHY	SITE_SHP
55	0	0	GROW	0	2.1	0.43
65	0	0	GROW	0	3.2	0.42
75	0	0	GROW	0	4.2	0.51
85	0	0	GROW	0	5.3	0.60
95	0	0	GROW	0	6.3	0.67
105	0	0	GROW	0	7.2	0.72
115	0	0	GROW	0	8.2	0.75
125	0	0	GROW	0	9.1	0.78
135	0	0	GROW	0	10.1	0.79
145	0	0	GROW	0	10.9	0.80
155	0	0	GROW	0	11.8	0.82
0	0	0	NONE	0	0.0	0.67

Record: 1 of 11 No Filter Search

Example Database for FPS Simulations

FPS_760_KingsSiteCurves.mdb



Basi	REGIM	GRP	TRT_NB	Rege	PctHt	PctSu	TRT_Ke	TRT_V	THIN_ME1	THIN_N	T
0	P055	..	1	P	141%	55%	1	1	0	0	
0	P065	..	1	P	110%	65%	1	1	0	0	
0	P075	..	1	P	95%	75%	1	1	0	0	
0	P085	..	1	P	87%	85%	1	1	0	0	
0	P095	..	1	P	82%	90%	1	1	0	0	
0	P105	..	1	P	81%	90%	1	1	0	0	
0	P115	..	1	P	76%	90%	1	1	0	0	
0	P125	..	1	P	78%	90%	1	1	0	0	
0	P135	..	1	P	74%	90%	1	1	0	0	
0	P145	..	1	P	78%	90%	1	1	0	0	
0	P155	..	1	P	77%	90%	1	1	0	0	
0	NONE	..	0	N	50%	35%	1	1	0	0	

Record: 1 of 11 Filtered Search

Example Database for FPS Simulations

FPS_760_KingsSiteCurves.mdb

CRUISE

STD_ID	M_DATE	MSMT_YR	CRUISER	BAF	BAF_DBH	PLOT_AREA	VEG_AREA	TRANSECT	PLOTS	T
55	5 /12/2022	2021	DANO	10.00	999.0	1.00	20.00	66.00	1	
65	5 /12/2022	2021	DANO	10.00	999.0	1.00	20.00	66.00	1	
75	5 /12/2022	2021	DANO	10.00	999.0	1.00	20.00	66.00	1	
85	5 /12/2022	2021	DANO	10.00	999.0	1.00	20.00	66.00	1	
95	5 /12/2022	2021	DANO	10.00	999.0	1.00	20.00	66.00	1	
105	5 /12/2022	2021	DANO	10.00	999.0	1.00	20.00	66.00	1	
115	5 /12/2022	2021	DANO	10.00	999.0	1.00	20.00	66.00	1	
125	5 /12/2022	2021	DANO	10.00	999.0	1.00	20.00	66.00	1	
135	5 /12/2022	2021	DANO	10.00	999.0	1.00	20.00	66.00	1	
145	5 /12/2022	2021	DANO	10.00	999.0	1.00	20.00	66.00	1	
155	5 /12/2022	2021	DANO	10.00	999.0	1.00	20.00	66.00	1	
		0	Crew	10.00	5.0	100.00	20.00	66.00	0	

Record: 1 of 11 Unfiltered Search

Example Database for FPS Simulations

FPS_760_KingsSiteCurves.mdb

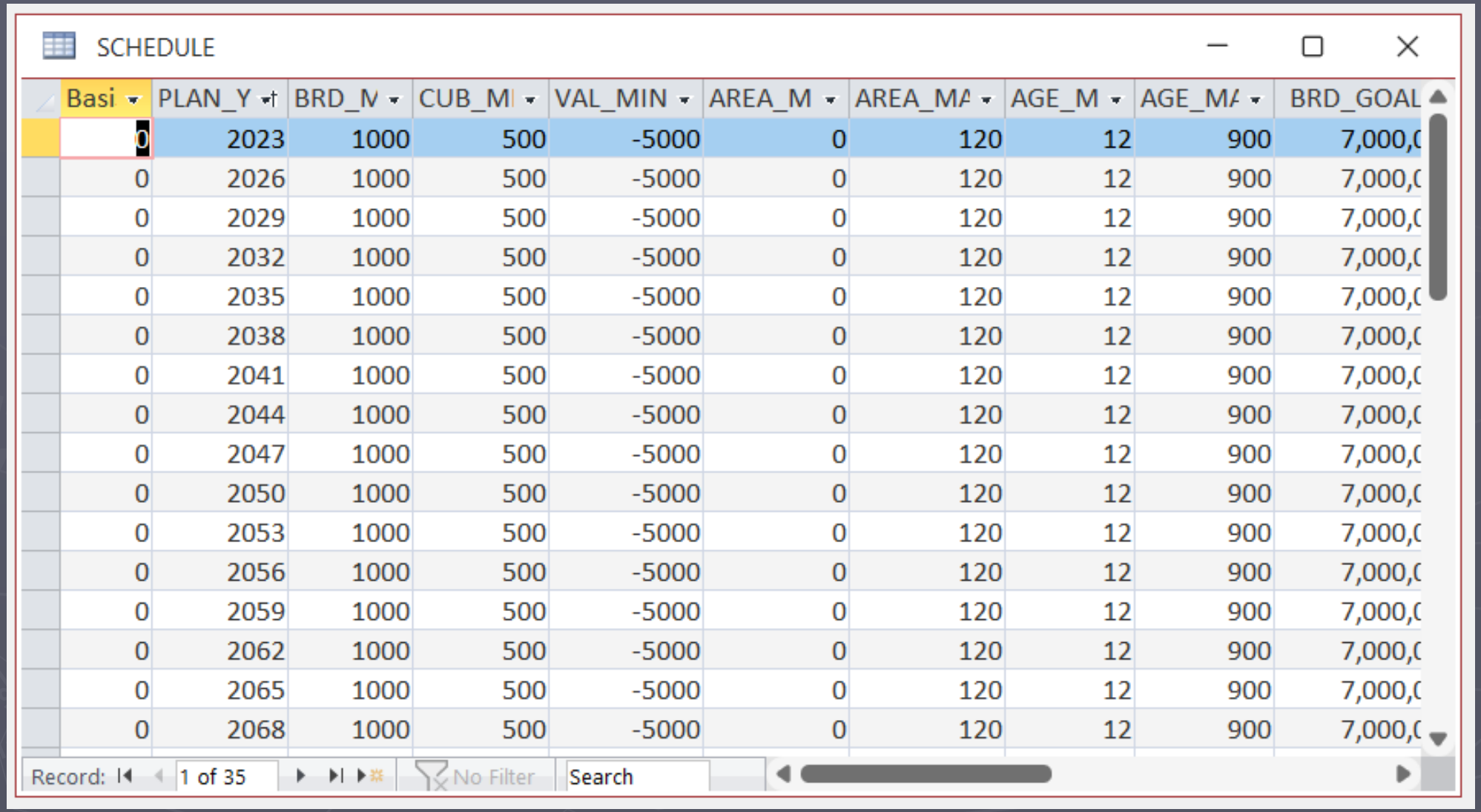
PLOTS

STD_ID	PLOT	TREE	SPEC	GRP	X_	Y_[	MSMT	DBH	TREES	HEIGHT	HT_CODE	TAP_DIA	TAP_
55	1	1	DF	..	0	0	2021	0.0	100.0	0.9	1	0.0	
55	1	2	DF	..	0	0	2021	0.0	100.0	1.1	1	0.0	
55	1	3	DF	..	0	0	2021	0.0	100.0	1.3	1	0.0	
65	1	1	DF	..	0	0	2021	0.0	100.0	0.9	1	0.0	
65	1	2	DF	..	0	0	2021	0.0	100.0	1.1	1	0.0	
65	1	3	DF	..	0	0	2021	0.0	100.0	1.3	1	0.0	
75	1	1	DF	..	0	0	2021	0.0	100.0	0.9	1	0.0	
75	1	2	DF	..	0	0	2021	0.0	100.0	1.1	1	0.0	
75	1	3	DF	..	0	0	2021	0.0	100.0	1.3	1	0.0	
85	1	1	DF	..	0	0	2021	0.0	100.0	0.9	1	0.0	
85	1	2	DF	..	0	0	2021	0.0	100.0	1.1	1	0.0	
85	1	3	DF	..	0	0	2021	0.0	100.0	1.3	1	0.0	
95	1	1	DF	..	0	0	2021	0.0	100.0	0.9	1	0.0	
95	1	2	DF	..	0	0	2021	0.0	100.0	1.1	1	0.0	
95	1	3	DF	..	0	0	2021	0.0	100.0	1.3	1	0.0	
105	1	1	DF	..	0	0	2021	0.0	100.0	0.9	1	0.0	
105	1	2	DF	..	0	0	2021	0.0	100.0	1.1	1	0.0	
105	1	3	DF	..	0	0	2021	0.0	100.0	1.3	1	0.0	
115	1	1	DF	..	0	0	2021	0.0	100.0	0.9	1	0.0	

Record: 10 of 33 | No Filter | Search

Example Database for FPS Simulations

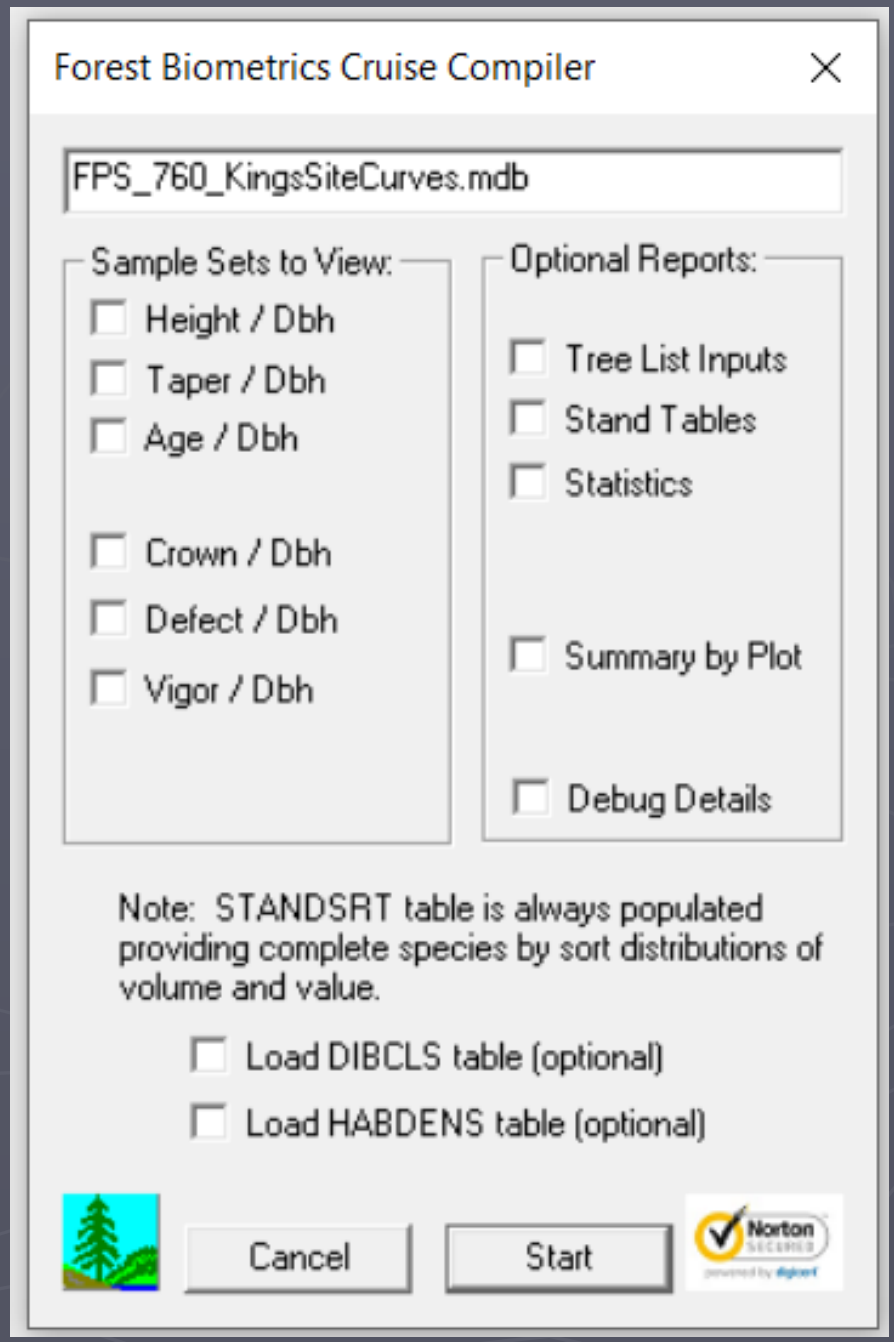
FPS_760_KingsSiteCurves.mdb



Example Database for FPS Simulations

FPS_760_KingsSiteCurves.mdb

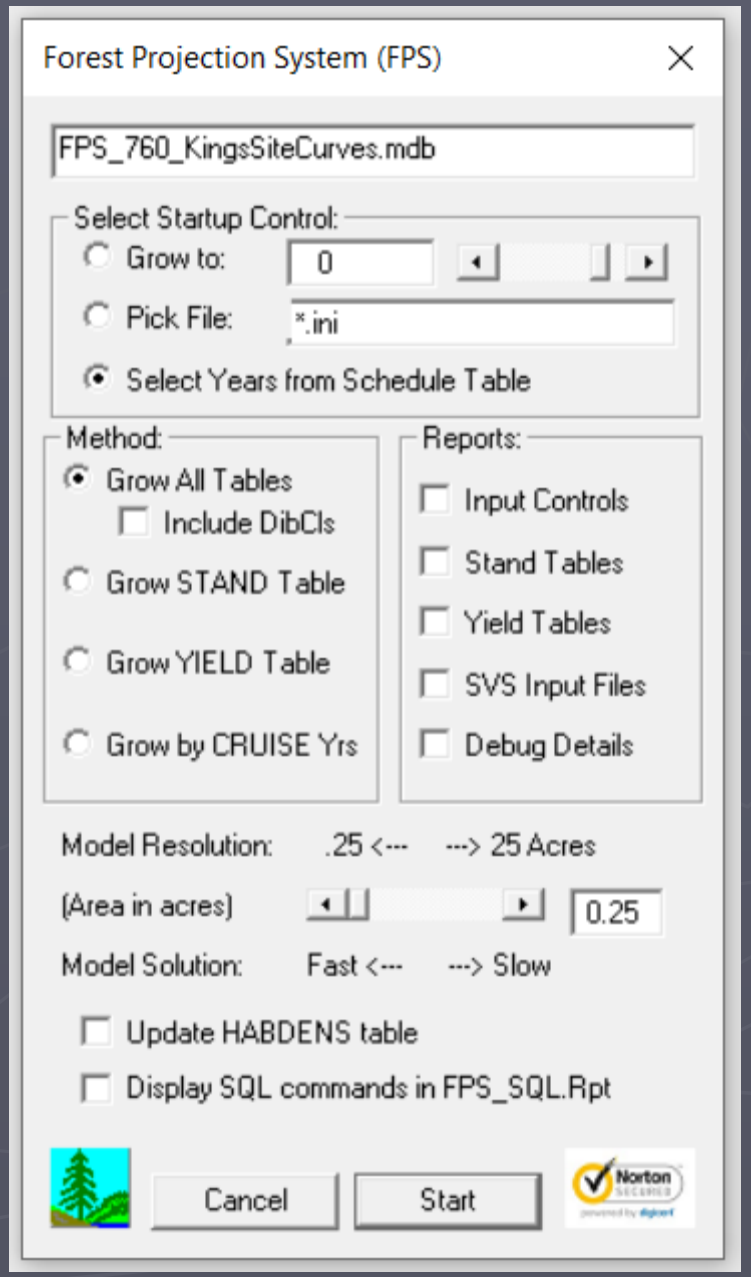
- Compile



Example Database for FPS Simulations

FPS_760_KingsSiteCurves.mdb

- Grow the stands
  - Select Years from Schedule Table
  - Grow All Tables



Example Database for FPS Simulations

FPS_760_KingsSiteCurves.mdb

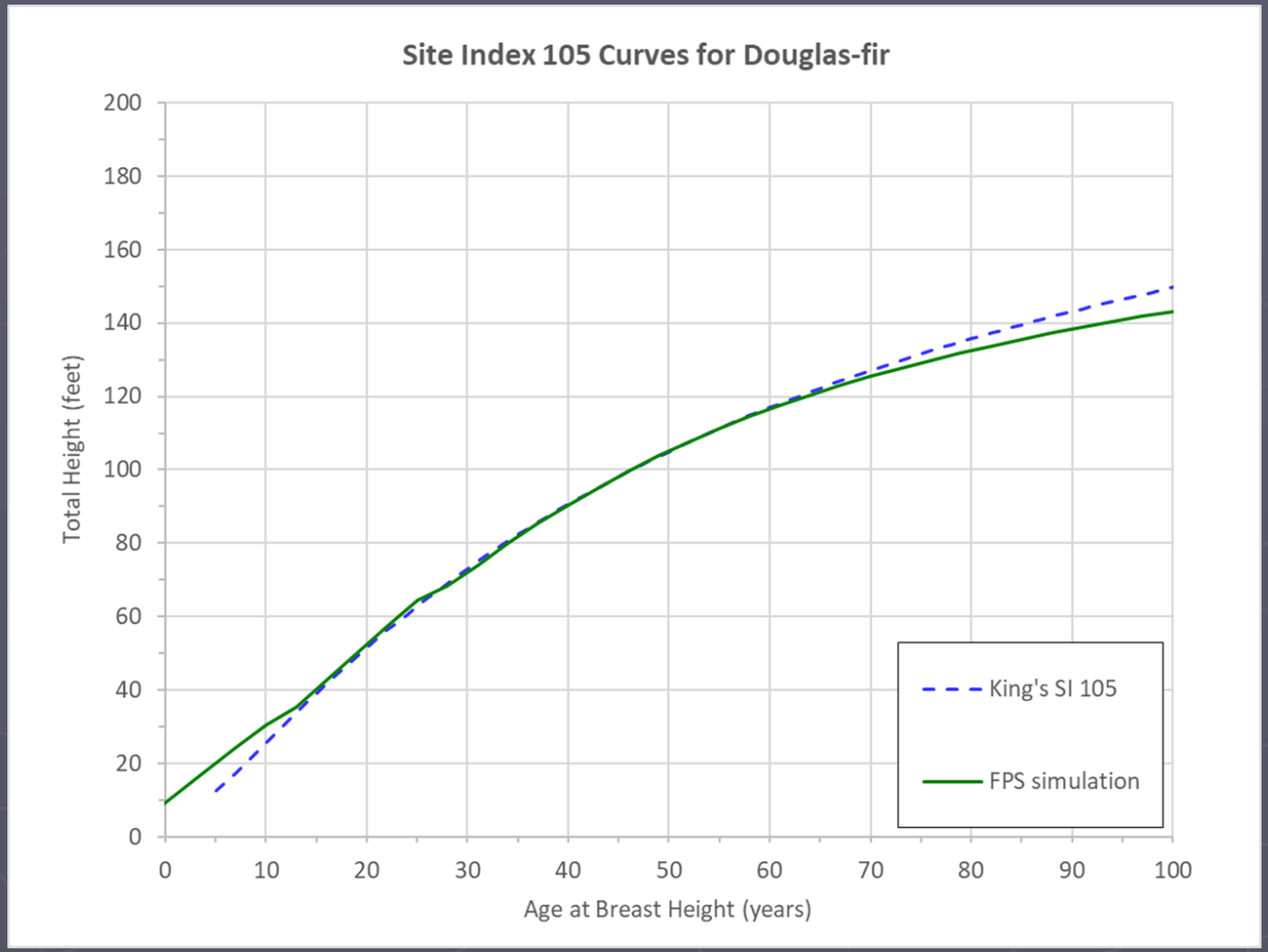
STAND

STD_ID	RPT_YR	REGIME	Status	TBR_I	Flag_\	Tot_Age	Trees	QDBH	BASAL	TOP_HT	CCF	RI
105	2021	GROW	0	DF..	1	0	300.00	0.0	0.0	1.1	8	
105	2023	GROW	0	DF..	3	2	294.34	1.2	2.4	5.4	19	
105	2026	GROW	0	DF..	3	5	285.69	3.1	14.8	11.9	45	
105	2029	GROW	0	DF..	3	8	276.86	5.0	37.4	18.6	80	
105	2032	GROW	0	DF..	3	11	272.33	6.7	66.7	25.0	120	
105	2035	GROW	0	DF..	3	14	272.32	8.2	99.4	31.0	162	
105	2038	GROW	0	DF..	3	17	272.32	9.5	133.0	36.2	204	
105	2041	GROW	0	DF..	3	20	272.32	11.2	187.8	43.7	270	
105	2044	GROW	0	DF..	3	23	272.31	12.4	228.8	51.1	315	
105	2047	GROW	0	DF..	3	26	272.30	13.6	273.7	58.6	359	
105	2050	GROW	0	DF..	3	29	272.25	14.6	316.0	65.8	399	
105	2053	GROW	0	DF..	3	32	272.19	15.0	332.7	69.3	415	
105	2056	GROW	0	DF..	3	35	272.09	15.6	362.5	75.4	442	
105	2059	GROW	0	DF..	3	38	271.99	16.3	392.3	81.3	469	
105	2062	GROW	0	DF..	3	41	271.57	16.8	415.6	86.7	490	
105	2065	GROW	0	DF..	3	44	271.01	17.2	435.1	91.8	506	
105	2068	GROW	0	DF..	3	47	270.49	17.5	453.7	96.6	521	
105	2071	GROW	0	DF..	3	50	269.99	17.9	471.6	101.1	535	
105	2074	GROW	0	DF..	3	53	268.99	18.2	484.7	105.2	545	
105	2077	GROW	0	DF..	3	56	267.83	18.4	495.5	108.9	552	
105	2080	GROW	0	DF..	3	59	266.75	18.6	505.5	112.5	559	

Record: 1 of 36 | Filtered | Search

King's Site Index Curves vs. FPS Simulations

- In the following 11 slides I will be comparing King's site index curves with FPS simulations
- King's curves are shown with a dashed blue line
- FPS simulations are shown with a solid green line

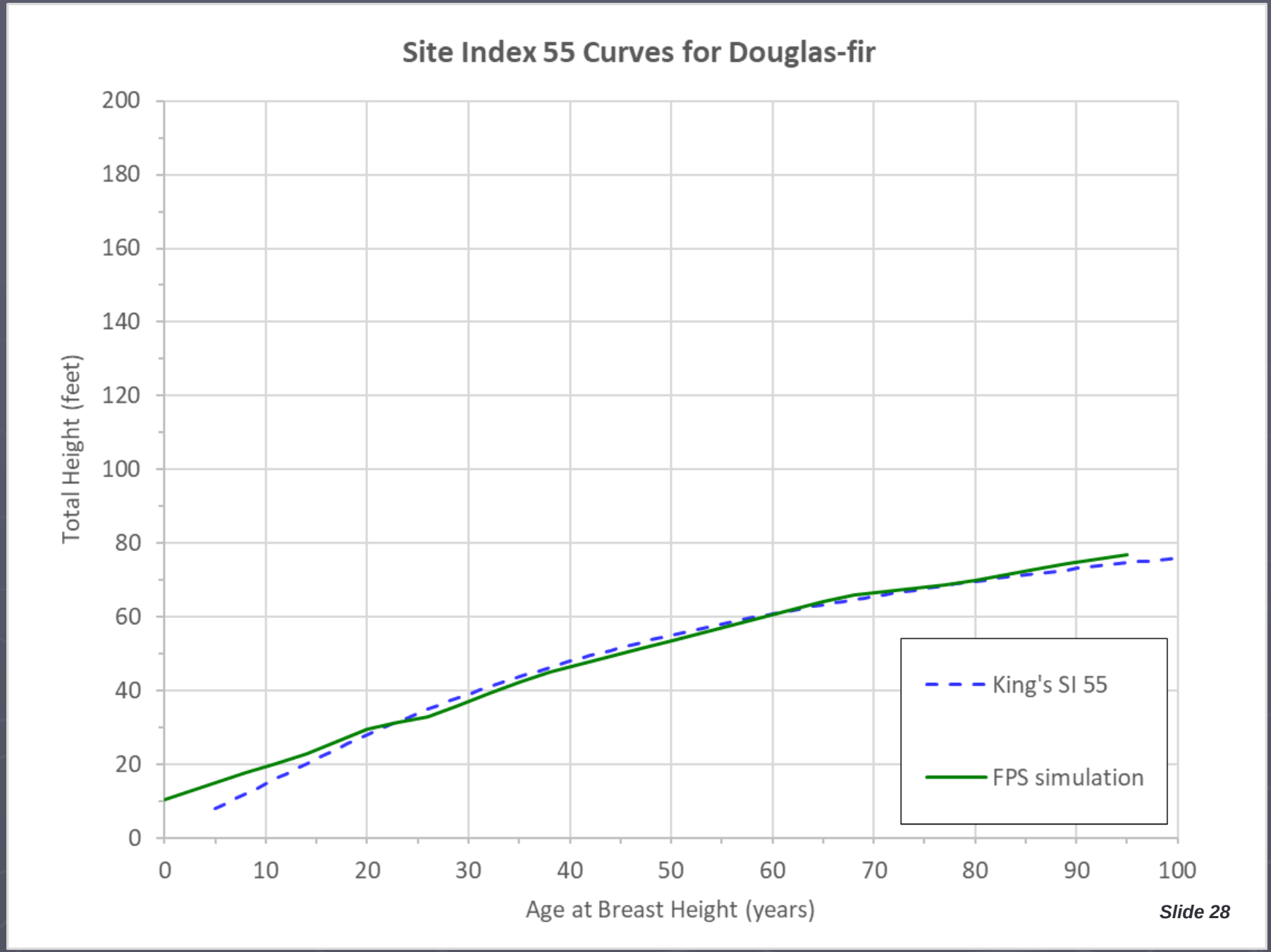


FPS Simulation for Site Index 55

PctHt = 141.05%

SITE_PHY = 2.084

SITE_SHP = 43.10%

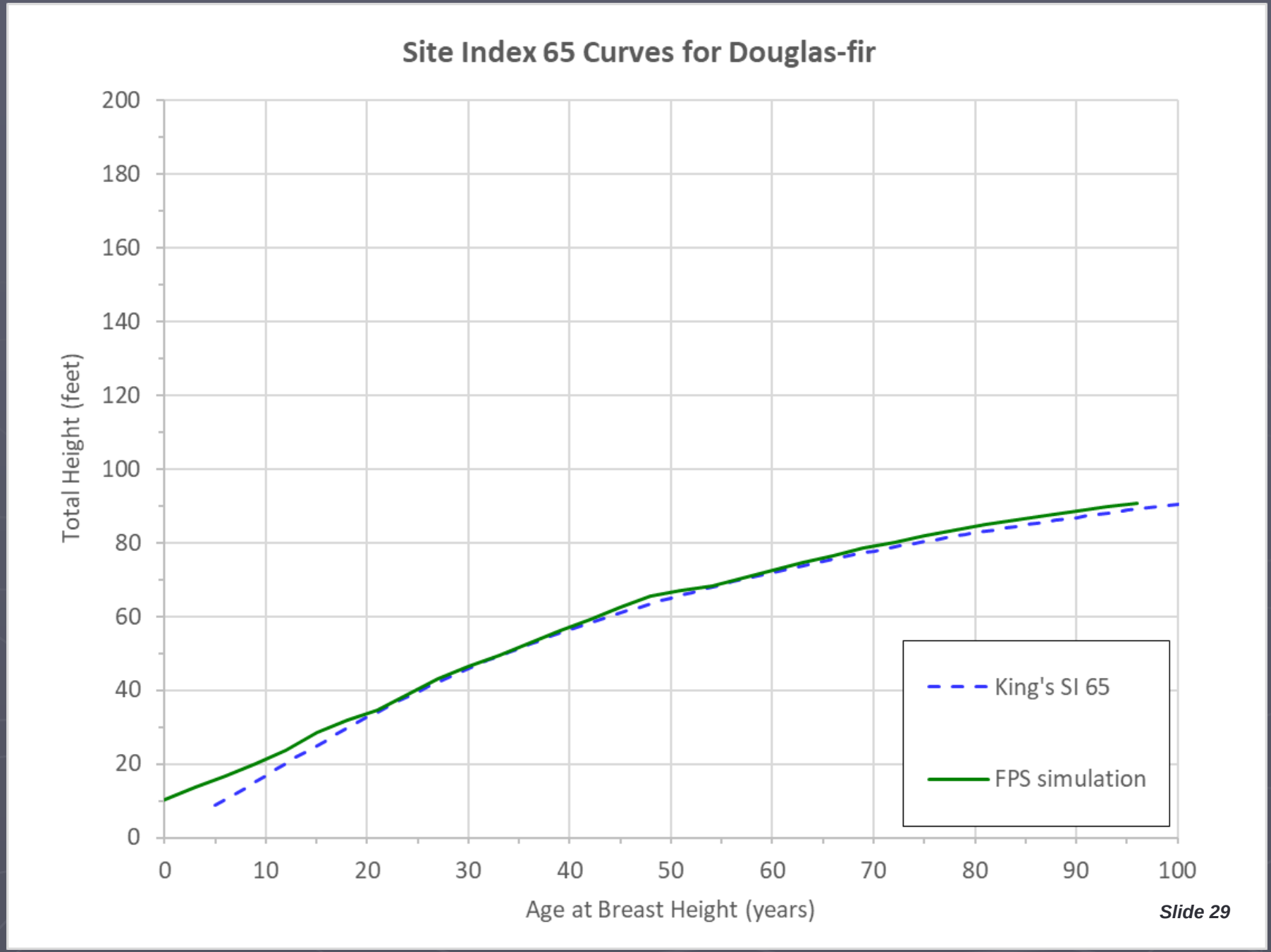


FPS Simulation for Site Index 65

PctHt = 110.12%

SITE_PHY = 3.158

SITE_SHP = 42.07%

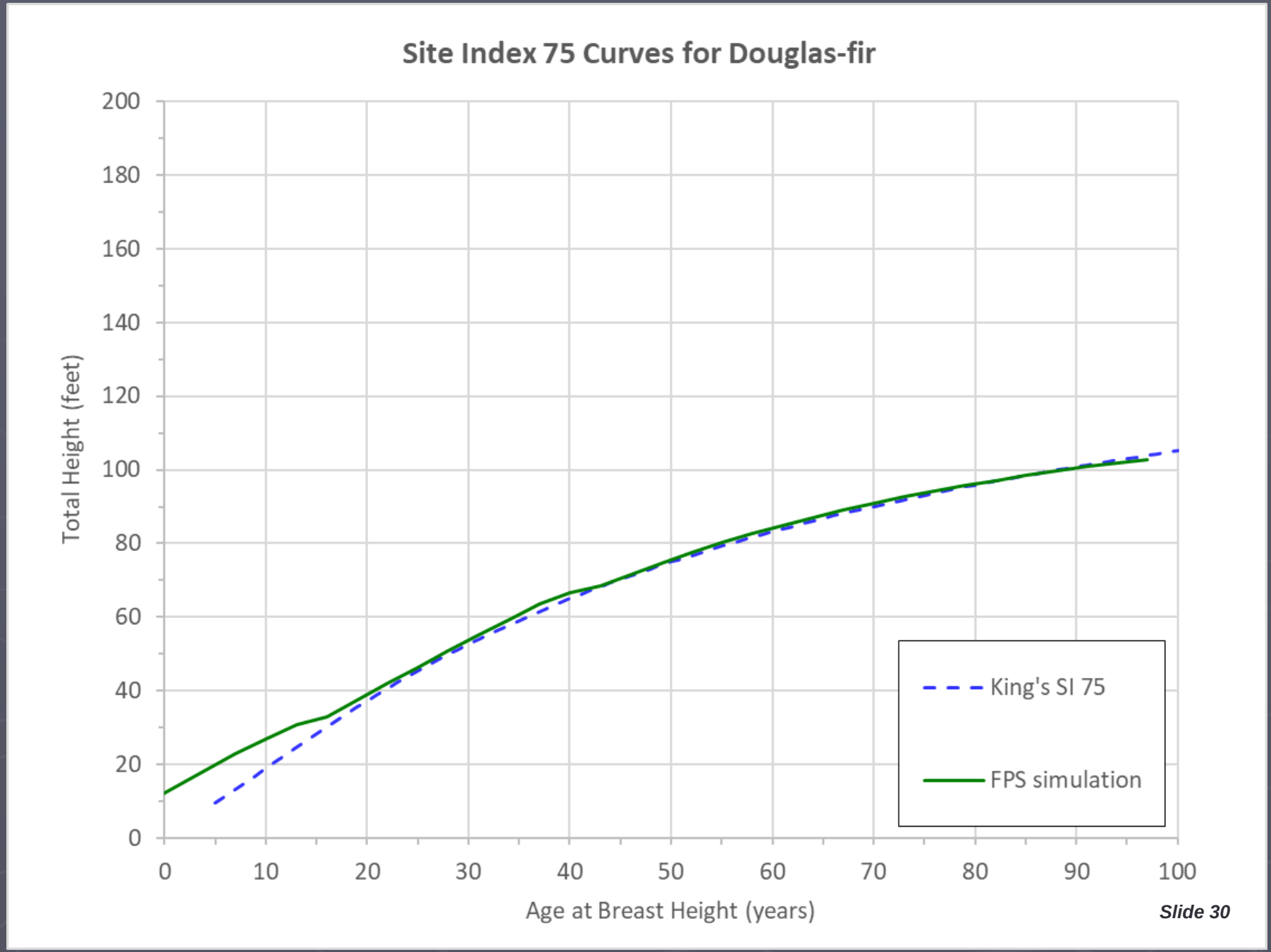


FPS Simulation for Site Index 75

PctHt = 94.78%

SITE_PHY = 4.228

SITE_SHP = 50.94%

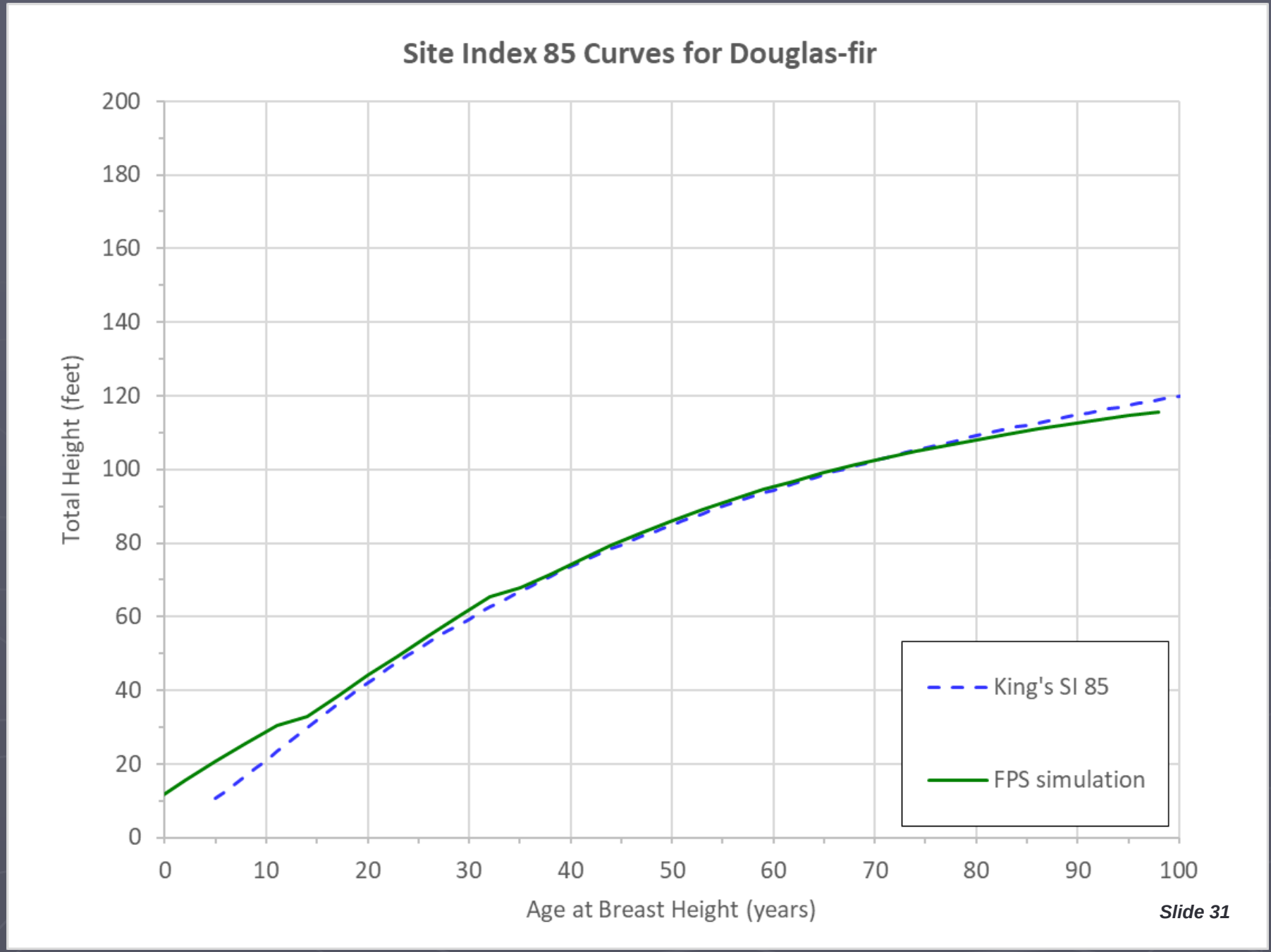


FPS Simulation for Site Index 85

PctHt = 86.89%

SITE_PHY = 5.267

SITE_SHP = 60.13%

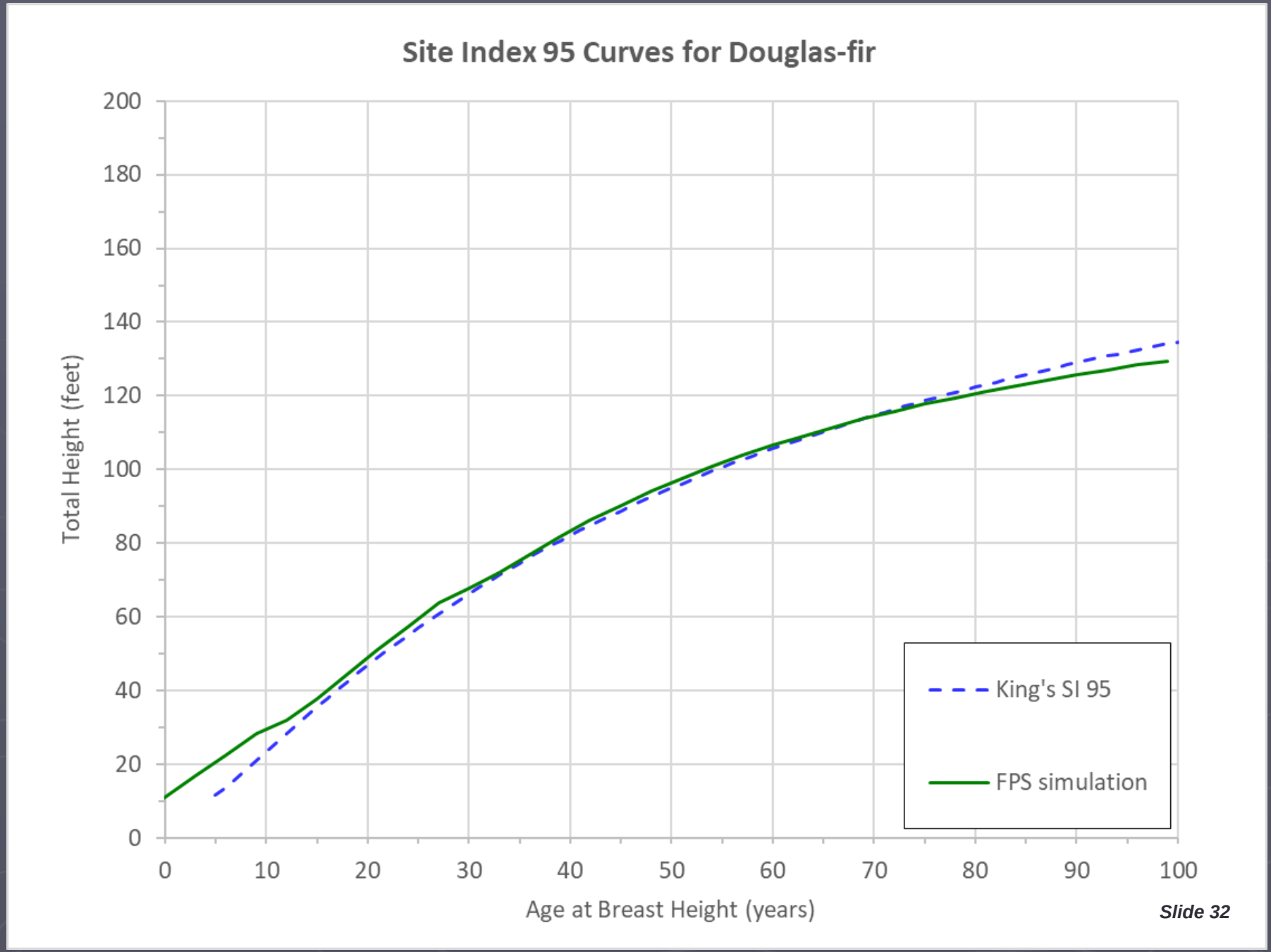


FPS Simulation for Site Index 95

PctHt = 81.59%

SITE_PHY = 6.314

SITE_SHP = 66.85%

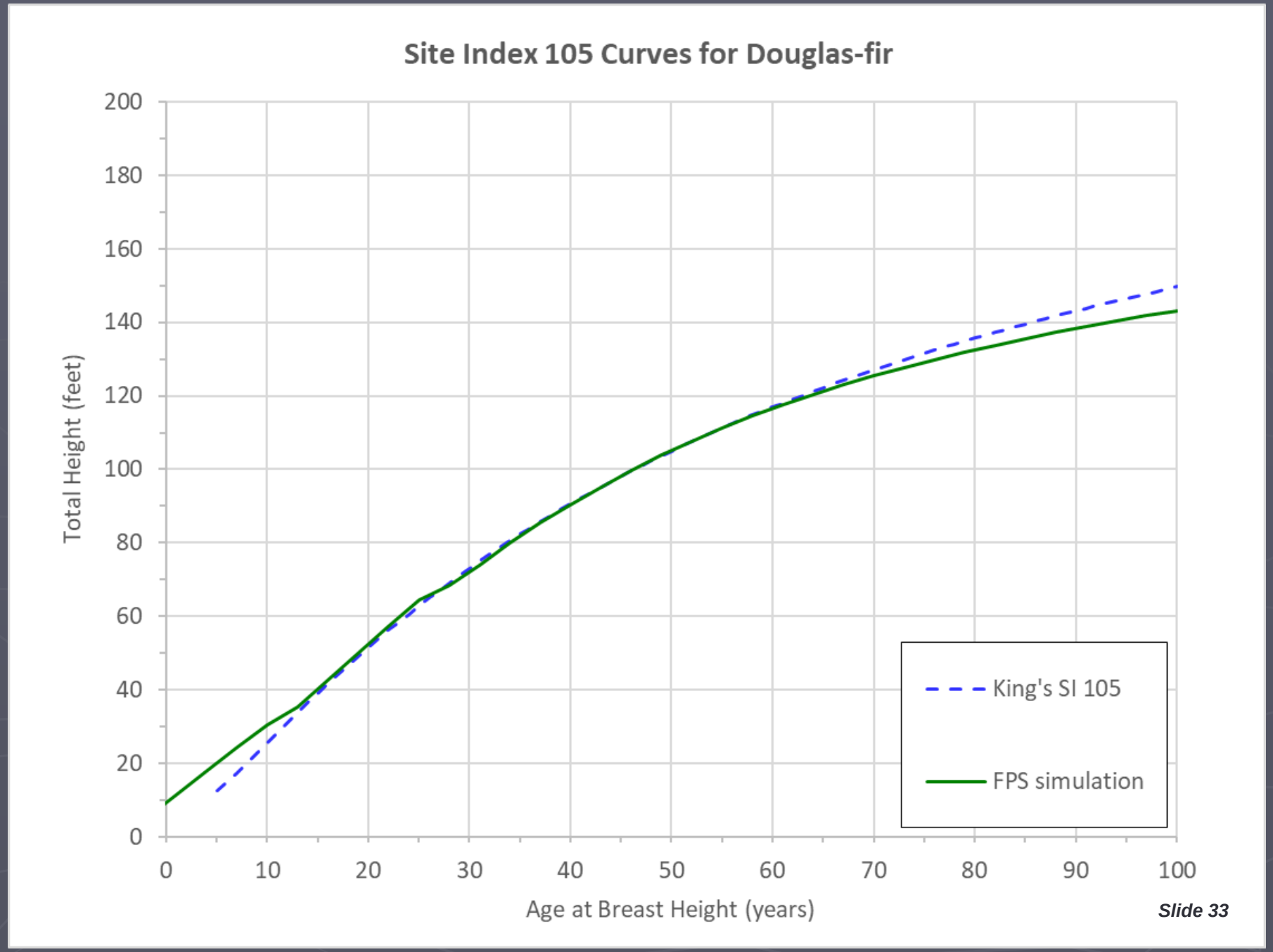


FPS Simulation for Site Index 105

PctHt = 81.16%

SITE_PHY = 7.243

SITE_SHP = 71.98%

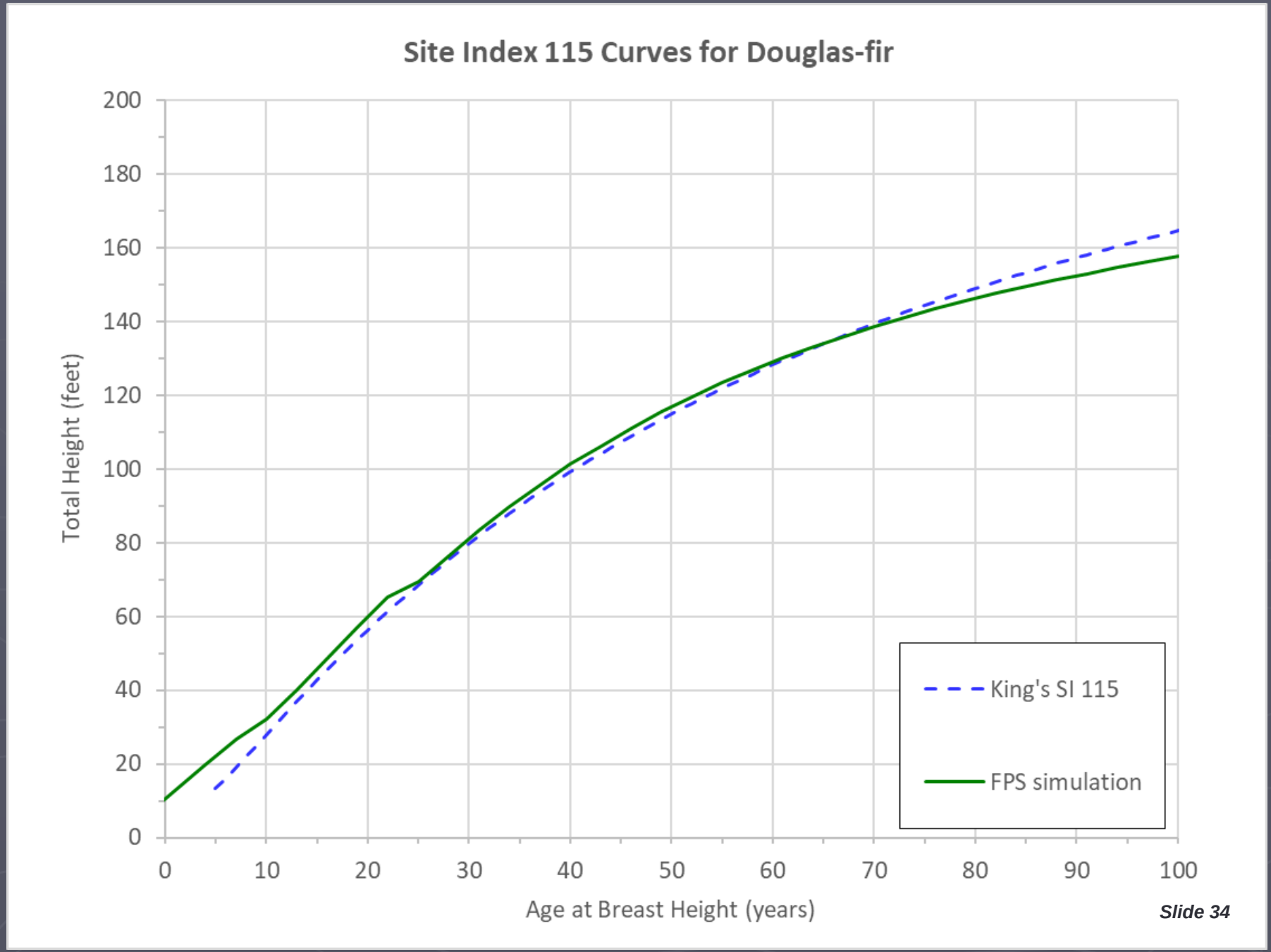


FPS Simulation for Site Index 115

PctHt = 76.49%

SITE_PHY = 8.208

SITE_SHP = 74.99%

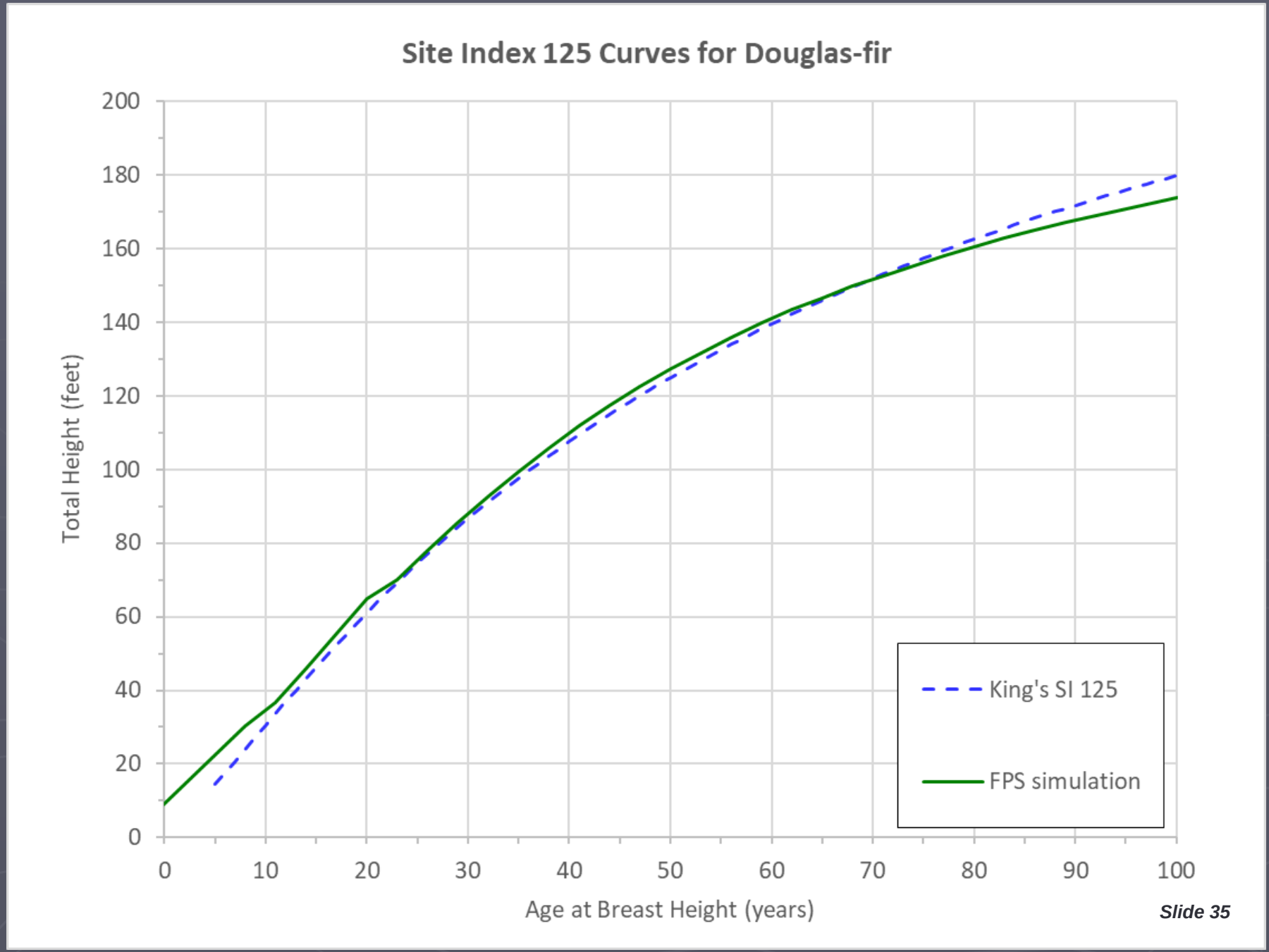


FPS Simulation for Site Index 125

PctHt = 77.86%

SITE_PHY = 9.126

SITE_SHP = 77.78%

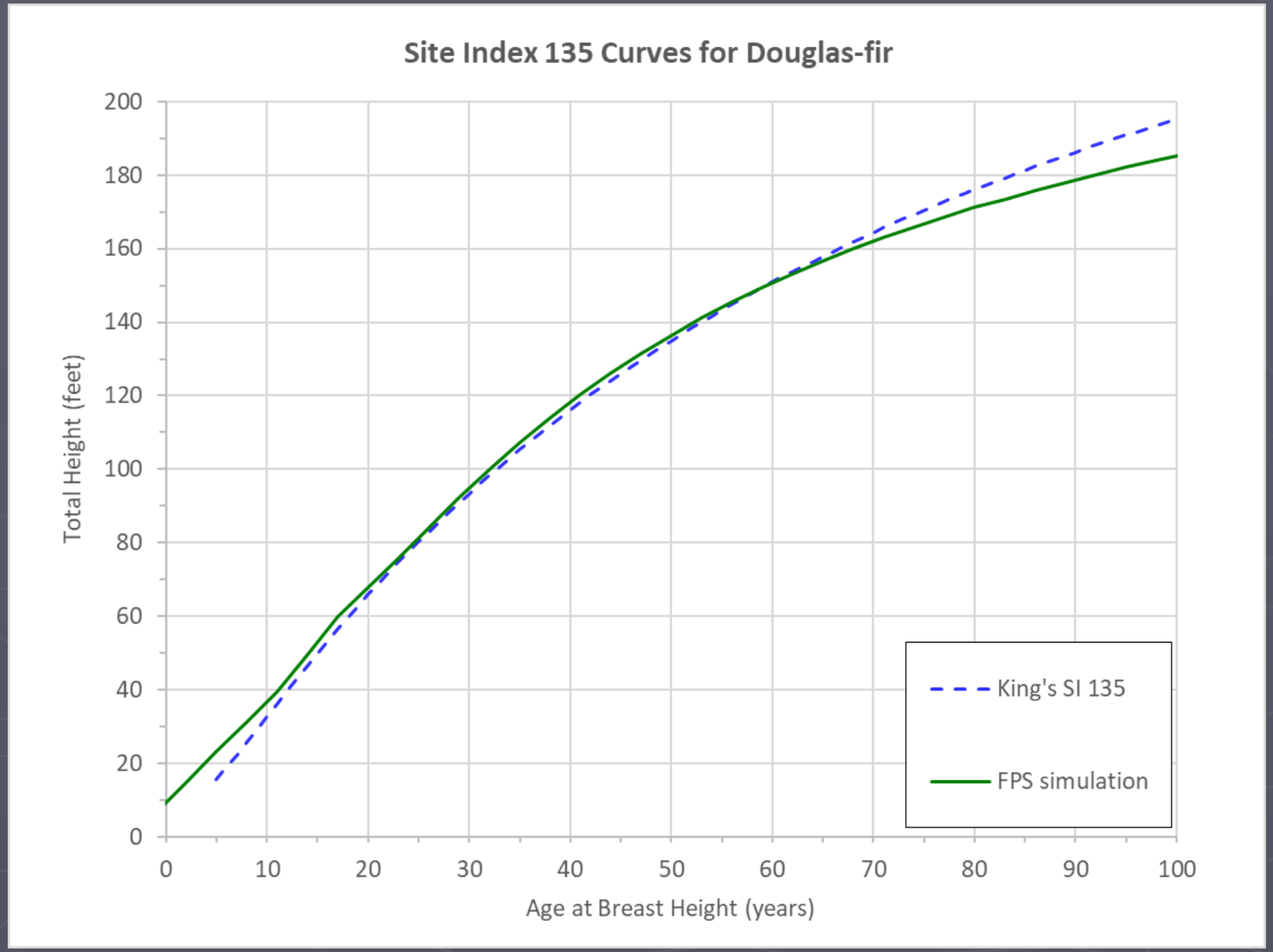


FPS Simulation for Site Index 135

PctHt = 74.19%

SITE_PHY = 10.059

SITE_SHP = 78.94%

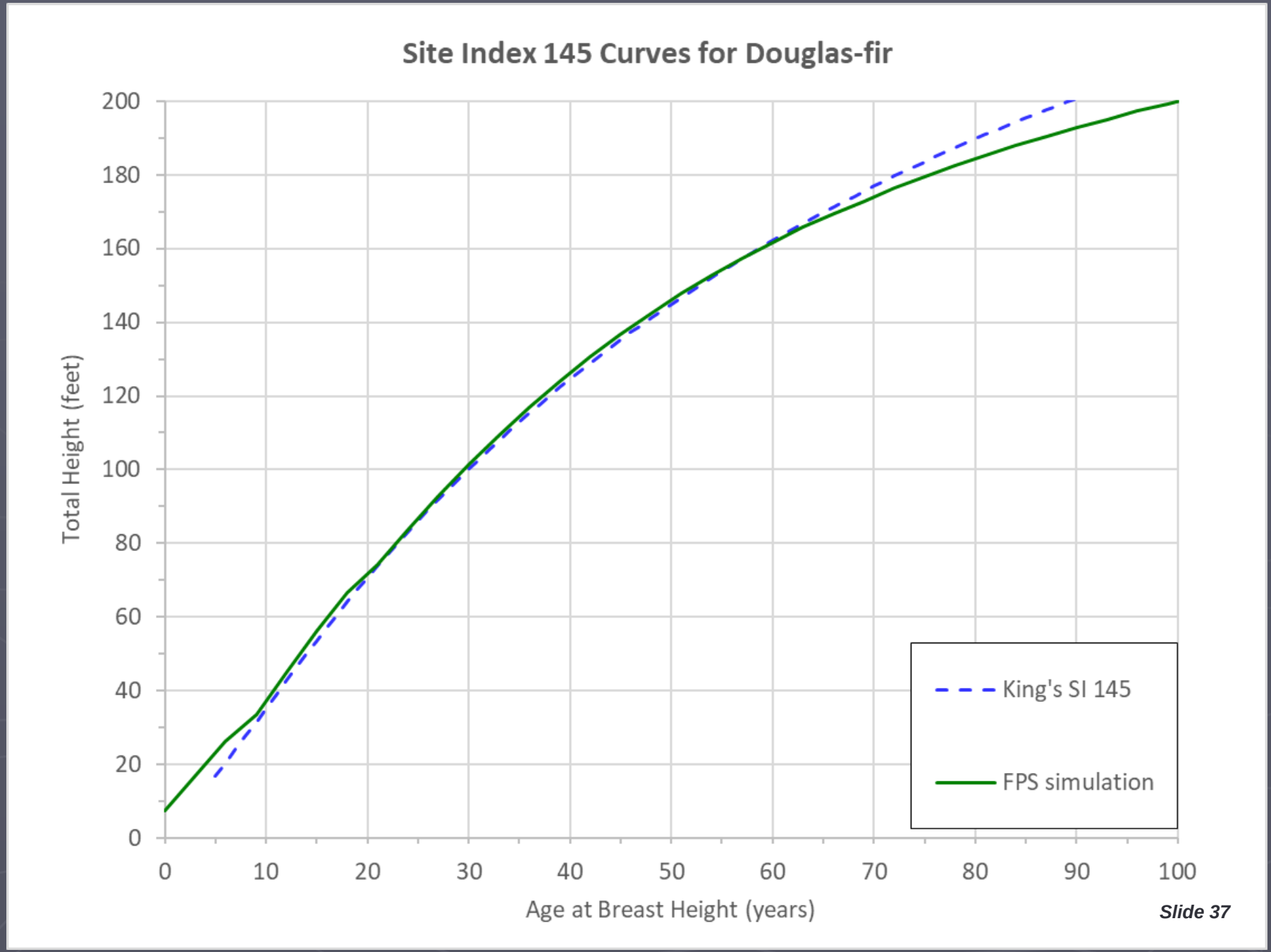


FPS Simulation for Site Index 145

PctHt = 77.51%

SITE_PHY = 10.918

SITE_SHP = 80.46%

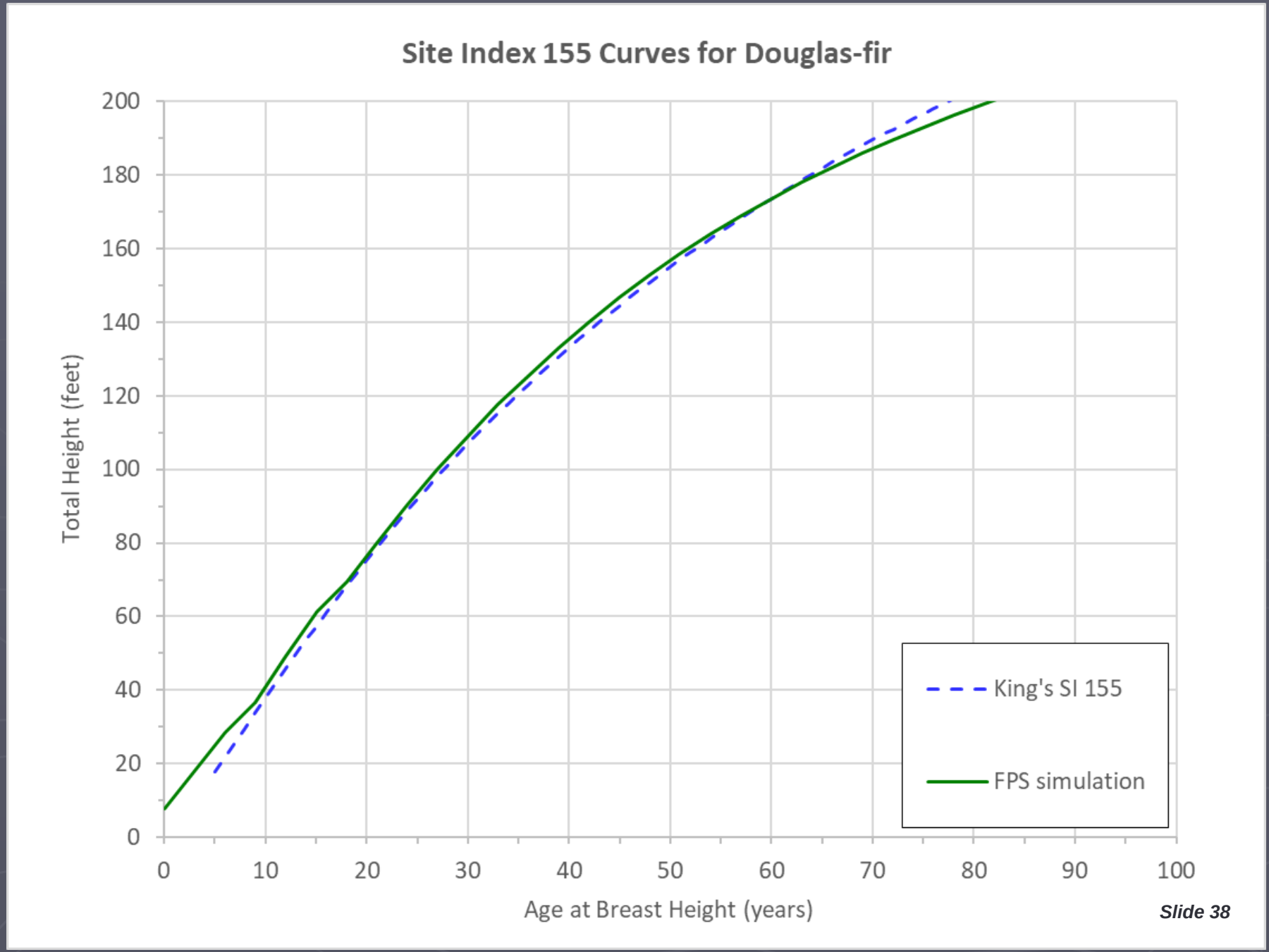


FPS Simulation for Site Index 155

PctHt = 77.04%

SITE_PHY = 11.805

SITE_SHP = 81.67%



Breast Height Age	King's Site Index Curve (height at BH age 50)	FPS Simulation (TOP_HT at BH age 50)
50	55	53
50	65	66
50	75	75
50	85	86
50	95	96
50	105	106
50	115	117
50	125	127
50	135	136
50	145	146
50	155	156

FPS 7.60 Crosswalk Tables

- Two crosswalk tables for Douglas-fir have been developed to date
  - FPS Crosswalk Table for King's Site Index Curves
  - FPS Crosswalk Table for Monserud's Site Index Curves

CrosswalkKingTo10mSite

RowID	KingsSI	YrsToBH	PctHt	SITE_PHY	SITE_SHP
50	104	4	0.8120	7.1498	0.7147
51	105	4	0.8116	7.2426	0.7198
52	106	4	0.8069	7.3392	0.7228
53	107	4	0.8023	7.4358	0.7258
54	108	4	0.7976	7.5324	0.7288
55	109	4	0.7929	7.6290	
56	110	4	0.7882	7.7256	
57	111	4	0.7836	7.8221	
58	112	4	0.7789	7.9187	
59	113	4	0.7742	8.0153	
60	114	4	0.7696	8.1119	

Record: 51 of 101 No Filter Search

King's crosswalk table

Monserud's crosswalk table

CrosswalkMonserudTo10mSite

RowID	MonserudsSI	YrsToBH	PctHt	SITE_PHY	SITE_SHP
47	63.0	8	0.8263	3.4466	0.6625
48	63.5	8	0.8263	3.4822	0.6644
49	64.0	8	0.8263	3.5177	0.6664
50	64.5	8	0.8263	3.5532	0.6683
51	65.0	8	0.8263	3.5887	0.6703
52	65.5	8	0.8263	3.6270	0.6721
53	66.0	8	0.8263	3.6653	0.6739
54	66.5	8	0.8263	3.7036	0.6757
55	67.0	8	0.8263	3.7418	0.6775
56	67.5	8	0.8263	3.7801	0.6794
57	68.0	8	0.8263	3.8184	0.6812

Record: 51 of 101 No Filter Search

Questions?

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