

TREE RING RESPONSE TO CLIMATE IN THE SAN JUAN ISLANDS

*by Gary J. MORRIS (garymorris93@gmail.com), C1990, 2011
Ongoing revision 2011/2012 - Last update 9-28-2011*

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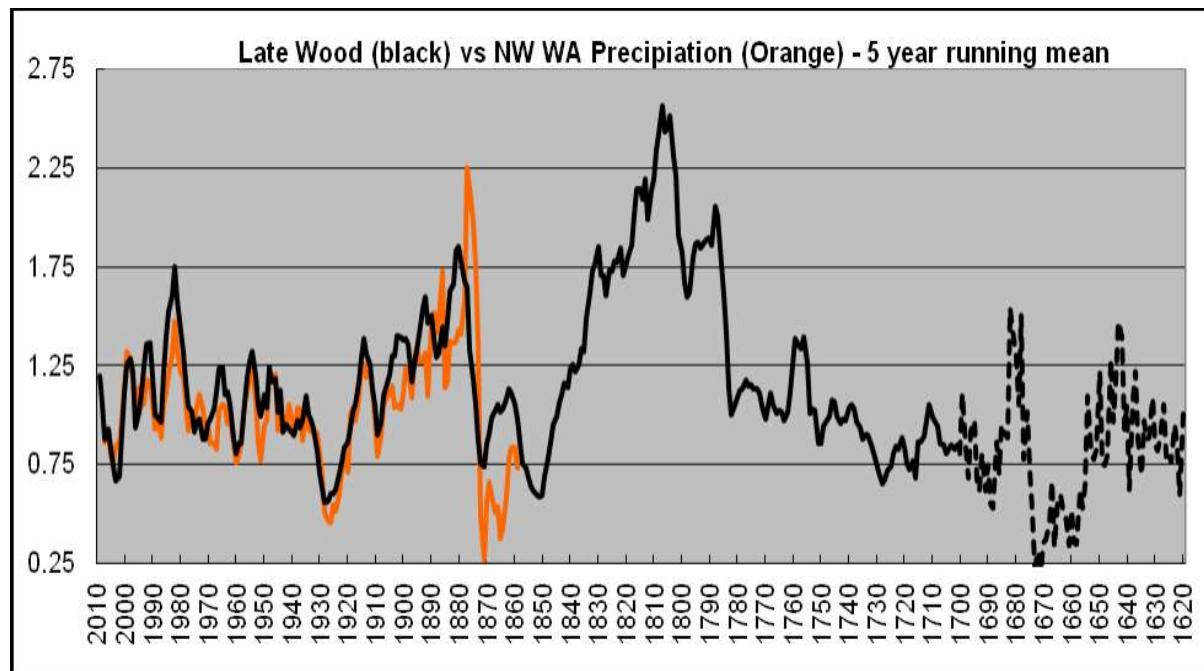
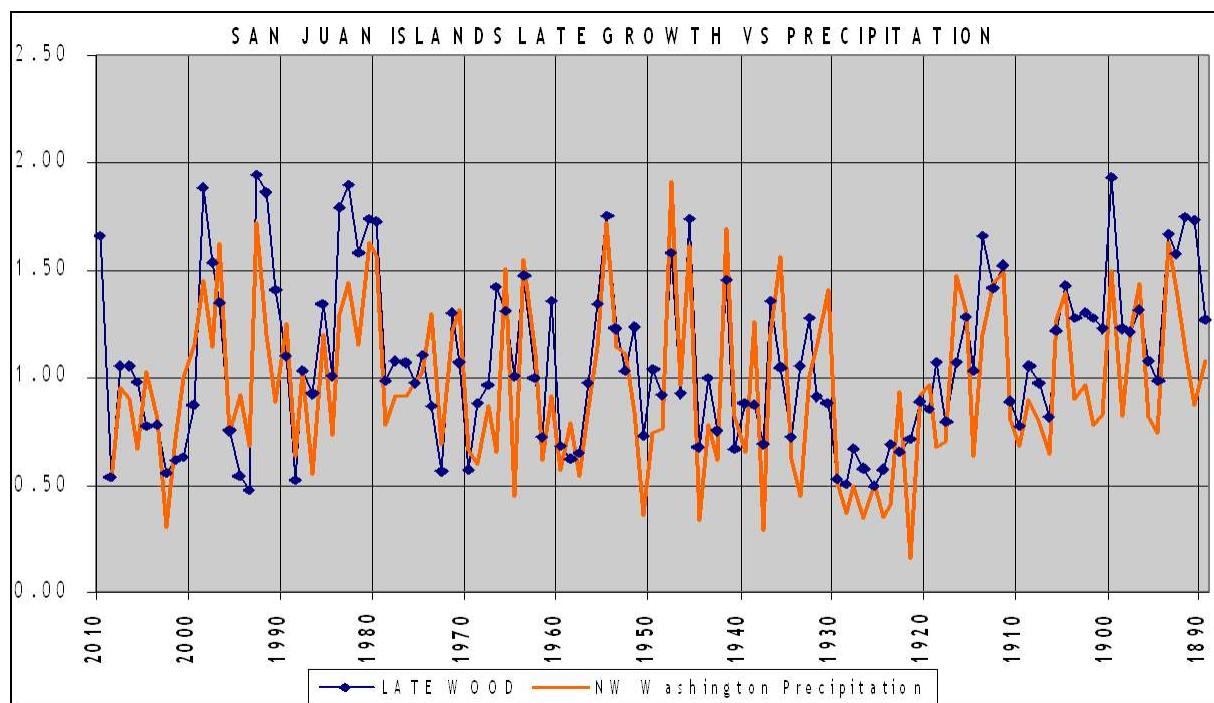
Tree rings record the annual growth of a tree. A tree growing in an open condition (not inside the forest), and on a well drained site, responds well to wet and dry years. In order to develop an extended prehistory of Pacific NW climate, the greater San Juan Islands tree rings were investigated on two counts: 1) this region is one of the driest on the west coast, north of California, and 2) this area is one of two areas west of the Cascades (in western Washington) which reflect the overall Pacific NW response, rather than localized effects of mountains. The results of this study reveal that the tree rings do record an excellent record of rainfall amounts, but the response is basically one of May, June, and July precipitation (tree ring growth season).

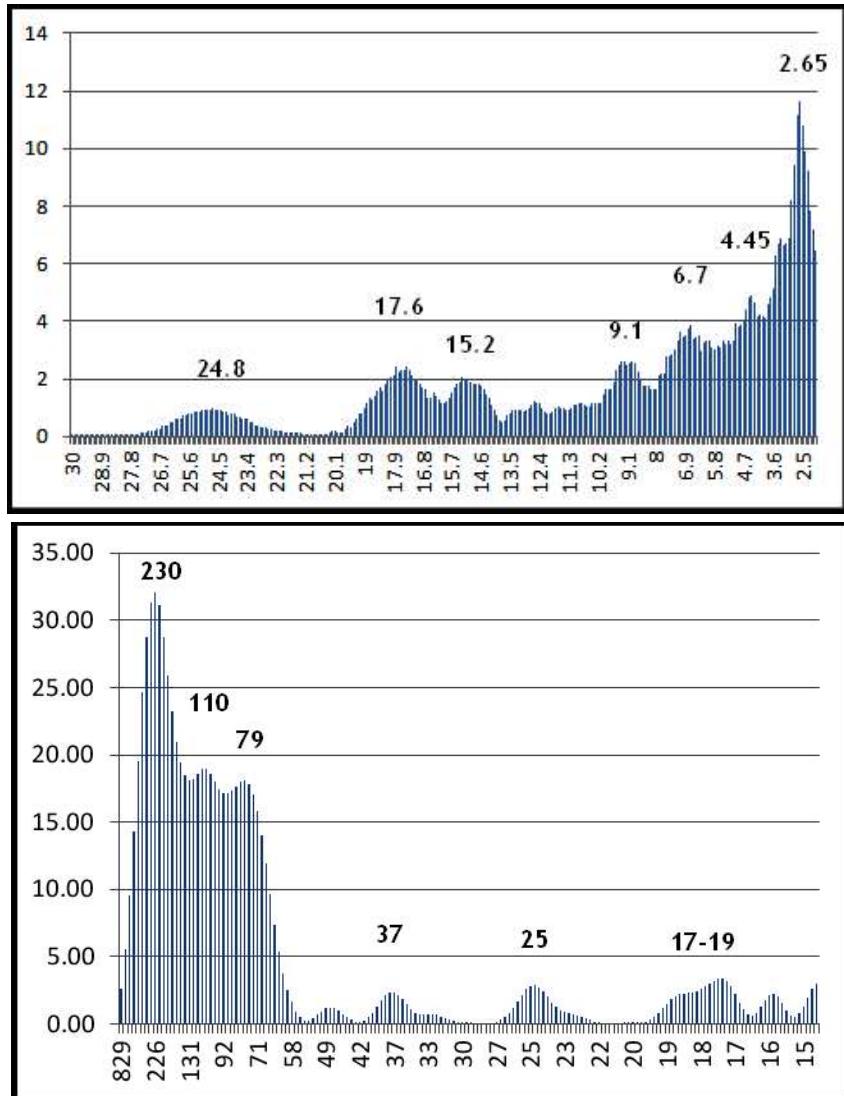
All tree rings analyzed were based on Douglas Fir trees, located on open, exposed hill slopes facing the south, in a well drained site, to obtain the greatest climate (drought) response, and least forest competition response. About 100 trees were cored (from over 10 sites). All the cores are in storage with the author.

This is one of the few studies of the Pacific NW tree rings which analyzes not only the annual tree ring, but also, separately, the Early Wood (light in color), and Late Wood (dark in color, and denser). Correlations with NW Washington precipitation indicate that Early Wood growth is mainly in May to mid June, and Late Wood growth significantly during June (May-July). Latewood growth is in response to the early part of the summer moisture stress season. One of the highest tree ring correlations in the Pacific NW is that of the San Juan Islands Latewood growth to June precipitation ($R=0.60$). This is not to indicate a direct response to June precipitation, but a combined effect from the health of the tree during early wood growth, which determines, at least in part, the growth of the tree during Latewood growth, plus June precipitation. There is only a slight correlation to fall season cambial growth.

Multivariate statistics were used to best reconstruct summer precipitation from the tree ring data, and a very high correlation with observed precipitation was the result. A simple formula was constructed with a high correlation to NW Precipitation: Monthly Precipitation (.25 May) + (.5 June) + (.25 July) = Correlation to Late Wood 0.74. A slightly revised formula increases the

correlation by about 0.015: Monthly Precipitation % Normal: (.25 May) + (.5 June) + (.25 July) = Correlation to Late Wood 0.75.





**Spectrum of climate cycles
from the San Juan Tree Ring Record
(Showing the 200 year, Gleissberg 88 year,
Lunar Nodal 18.6 year, and QBO 2.6 year cycles)**

TREE RING INDICES - GREATER SAN JUAN ISLANDS

(updated 09 2011)

	EARLY									LATE									# SITES			
	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9		
2010	0.92	1.60									2010	1.67	1.66								9	
2000	1.19	1.11	1.24	1.00	0.63	1.15	1.29	1.21	1.26	1.27	2000	0.87	0.63	0.61	0.56	0.78	0.77	0.98	1.06	1.05	0.54	
1990	0.78	1.10	1.36	0.96	0.99	0.66	1.05	1.02	0.86	1.04	1990	1.10	1.41	1.87	1.94	0.48	0.54	0.75	1.36	1.54	1.89	
1980	1.25	1.52	1.01	1.51	1.53	1.63	1.23	1.21	0.69	0.72	1980	1.72	1.74	1.58	1.90	1.79	1.01	1.35	0.93	1.04	0.52	
1970	0.82	1.02	0.99	0.84	0.94	1.05	1.34	1.24	1.10		1970	0.58	1.07	1.30	0.56	0.87	1.11	0.97	1.07	1.08	0.99	
1960	0.80	1.05	0.70	0.93	1.14	1.15	1.16	1.41	0.87	1.10	1960	0.68	1.36	0.73	1.00	1.48	1.01	1.31	1.42	0.97	0.88	
1950	1.11	1.22	1.15	1.12	0.87	1.44	1.18	1.12	0.72	0.71	1950	1.04	0.73	1.23	1.04	1.23	1.75	1.35	0.97	0.65	0.62	
1940	0.88	0.71	1.05	0.77	0.93	0.99	1.10	1.07	1.23	1.18	1940	0.88	0.67	1.45	0.75	1.00	0.68	1.74	0.93	1.58	0.92	
1930	0.52	0.53	0.67	0.96	1.12	0.76	0.88	0.77	0.92	0.80	1930	0.53	0.88	0.91	1.28	1.06	0.72	1.05	1.36	0.69	0.88	
1920	1.04	0.95	0.90	0.86	0.68	0.67	0.65	0.62	0.69	0.62	1920	0.86	0.89	0.72	0.66	0.69	0.58	0.50	0.58	0.67	0.51	
1910	0.89	0.89	1.14	1.35	1.25	1.27	0.98	1.12	0.76	1.02	1910	0.78	0.89	1.53	1.42	1.66	1.03	1.28	1.07	0.79	1.07	
1900	1.39	1.36	1.24	1.14	1.18	0.96	1.02	0.91	1.16	0.84	1900	1.93	1.23	1.28	1.31	1.28	1.43	1.22	0.81	0.97	1.05	
1890	1.09	1.28	1.38	1.25	1.32	1.16	1.14	1.10	1.18	1.12	1890	1.27	1.73	1.75	1.57	1.67	0.99	1.08	1.32	1.22	1.23	
1880	1.60	1.63	1.48	1.35	1.31	1.41	1.25	1.21	1.20	1.08	1880	1.60	2.01	1.84	1.24	1.66	1.39	1.26	1.19	1.74	1.01	
1870	0.94	0.95	0.98	0.86	0.86	0.98	1.26	1.30	1.21	1.62	1870	0.86	0.62	0.78	0.66	0.87	1.44	1.51	1.45	1.36	2.47	
1860	1.03	1.29	1.21	1.34	1.14	1.10	1.18	0.98	0.98	0.94	1860	1.29	1.26	1.11	1.07	0.93	1.04	1.01	1.01	1.26	0.78	
1850	0.75	0.73	0.68	0.65	0.72	0.83	0.70	0.82	0.84	0.88	1850	0.58	0.58	0.53	0.53	0.74	0.72	0.68	0.75	0.79	0.82	
1840	1.02	1.10	1.13	0.92	0.83	0.98	1.02	0.89	0.88	0.65	1840	1.28	1.30	1.30	0.82	1.12	0.99	1.08	0.98	0.59	0.71	
1830	1.58	1.64	1.57	1.49	1.39	1.30	1.16	1.03	1.21	1.13	1830	2.01	1.76	2.22	1.25	1.41	1.45	1.12	1.39	1.30	0.99	
1820	1.67	1.65	1.62	1.62	1.47	1.53	1.44	1.49	1.36	1.38	1820	1.85	1.73	1.74	1.64	2.26	1.50	1.77	1.49	1.68	1.60	
1810	1.41	1.65	1.57	1.40	1.46	1.66	1.64	1.52	1.55	1.67	1810	1.57	2.53	1.75	1.75	1.86	2.24	2.60	2.01	2.02	1.85	
1800	1.02	1.39	1.64	1.57	1.53	1.94	1.94	1.77	1.71	1.49	1.65	1800	1.72	1.98	2.79	2.22	2.32	2.24	3.00	2.46	2.15	2.97
1790	1.35	1.27	1.65	1.45	1.82	1.61	1.90	1.46	1.84	1.34	1790	1.96	1.48	2.07	2.11	1.75	1.82	1.61	2.05	1.76	0.85	
1780	1.20	1.09	1.24	1.00	1.28	1.22	1.31	1.19	1.69	1.52	1780	1.06	1.05	0.95	0.92	1.04	1.69	2.49	1.89	2.13	1.83	
1770	0.93	0.87	0.89	1.14	1.23	1.14	0.85	1.05	1.06	1.09	1770	1.14	1.10	1.02	1.12	1.17	1.26	1.11	1.11	1.10	1.30	
1760	0.66	0.87	0.98	0.93	0.98	0.90	1.30	1.15	0.91	0.98	1760	1.06	1.20	1.30	0.86	0.63	0.85	1.41	1.37	0.78	0.86	
1750	0.54	0.78	0.69	0.84	0.80	0.93	0.85	0.80	0.90	0.74	1750	0.94	1.10	0.75	0.89	1.42	0.99	1.00	2.00	1.55	1.14	
1740	0.92	0.91	0.70	0.94	1.14	0.82	0.94	0.74	0.80	0.72	1740	1.20	1.02	0.80	0.87	1.01	1.09	1.20	1.18	0.90	0.60	
1730	0.75	0.71	0.74	0.77	0.87	1.00	0.84	0.87	0.99	1.08	1730	0.61	0.92	1.01	0.86	0.85	0.88	0.90	0.90	1.17	0.99	
1720	0.84	0.78	0.97	0.85	1.27	1.12	0.92	0.82	0.92	0.69	1720	0.68	0.81	1.07	0.76	0.84	0.73	0.63	0.73	0.66	0.63	
1710	1.19	0.99	0.89	0.74	0.71	0.93	1.02	0.83	0.66	1.04	1710	1.34	0.77	0.68	1.42	0.67	0.92	0.65	0.66	0.50	1.13	
1700	0.92	0.83	0.76	0.88	0.90	0.85	0.83	0.69	0.67	0.54	1700	0.81	0.73	0.71	0.87	1.00	0.91	0.65	0.58	1.10	1.05	
1690	0.97	0.74	0.69	0.56	0.74	0.62	0.54	0.72	0.72	1.06	1690	0.75	0.62	0.81	0.62	0.67	0.98	0.92	0.68	0.83	1.11	
1680	0.76	0.94	0.99	1.15	0.89	0.92	1.18	1.08	0.59	0.71	1680	1.29	1.43	1.54	0.89	0.91	0.95	0.70	0.87	0.53	0.56	
1670	0.40	0.48	0.44	0.62	0.56	0.58	1.01	0.88	0.92	1.00	1670	0.36	0.21	0.31	0.23	0.51	0.72	1.02	0.78	1.50	1.06	
1660	0.45	0.53	0.48	0.52	0.48	0.48	0.61	0.48	0.42	0.43	1660	0.52	0.34	0.50	0.52	0.59	0.58	0.34	0.67	0.45	0.37	
1650	0.79	0.84	1.24	0.95	1.00	0.78	0.83	0.56	0.86	0.52	1650	1.22	0.82	0.78	0.82	1.10	0.64	0.53	0.62	0.35	0.35	
1640	0.91	1.48	1.22	1.84	1.04	0.72	1.06	1.16	0.96	1.07	1640	1.04	0.93	1.40	1.47	1.17	0.96	1.28	0.79	0.75	0.76	
1630	1.64	0.93	1.34	1.45	1.68	1.27	1.13	1.24	1.25	0.97	1630	0.85	1.09	0.88	0.88	0.97	0.70	0.88	1.22	1.08	0.62	
1620	1.08	1.44	1.60	1.63	0.98	0.74	1.19	1.10	1.44	0.97	1620	1.02	0.60	0.84	0.95	0.76	0.82	0.79	1.05	0.88	0.82	
1610							1.52	1.01	0.68		1610							0.89	0.90	0.99		

TREE RING CORRELATION COEFFICIENTS

NW WASHINGTON TREE RING/CLIMATE CORRELATION COEFFICIENTS (1900-1999) :

	J	F	M	A	M	J	J	A	S	O	N	D	ANN
Early Wood to PRECIPITATION (Current year (top)/Previous Year (bottom))	0.05	0.12	0.05	0.16	0.16	0.27	0.12	-0.16	0.08				0.16
Late Wood to PRECIPITATION (Current year (top)/Previous Year (bottom))	0.09	0.22	0.14	0.09	0.26	0.60	0.39	-0.03	0.09				0.44
Early Wood to TEMPERATURE (Current year (top)/Previous Year (bottom))	0.10	0.01	-0.06	-0.13	-0.03	-0.04	-0.08	0.20	-0.08	-0.10			-0.06
Late Wood to TEMPERATURE (Current year (top)/Previous Year (bottom))	0.09	0.06	0.08	-0.12	0.01	-0.15	-0.23	0.07	-0.19	-0.13			-0.07

STANDARD DEVIATIONS

Summer Precipitation	100 ± 39%
Reconstructed Summer Precipitation(Trees)	100 ± 47%
Latewood Indices	100 ± 47%
Earlywood Indices	100 ± 27%
Summer Temperature	59.64 degrees F ± 0.907 degrees F

INDIVIDUAL SITE RECORDS

SAN JUAN ISLANDS

SJ 1 SAN JUAN ISLANDS WIDTH_EARLY PSME - WIDTH_LATE
SJ 2 WASHINGTON PSEUDOTSUGA MENZIESSI 300 location 1700-1987
SJ 3 GARY J. MORRIS 02-1987 TO 08-1987
 MEASUREMENTS TO .01mm(*100)

EARLY WOOD

LATE WOOD

KEY: First 2 letters: San Juan Islands; 2nd 2 letters: Individual Site Record
(See end statement)

	0	1	2	3	4	5	6	7	8	9		0	1	2	3	4	5	6	7	8	9
SJCH01	1950	216	220	184	95	167	86	91	28	60	1950	69	127	95	163	163	67	34	28	82	
SJCH01	1960	87	114	56	82	136	159	188	196	106	97	1960	58	113	39	67	171	65	163	131	94
SJCH01	1970	69	67	60	69	69	30	41	97	69	82	1970	21	58	39	16	50	20	30	50	54
SJCH01	1980	71	138	52	88	110	149	119	82	33	37	1980	136	82	204	177	136	54	97	26	51
SJCH01	1990	46	67	104	78	63	39	41	50	41	69	1990	52	76	100	122	24	17	28	54	76
SJCH01	2000	91	86	80	84	41	88	121	122	163	130	2000	58	34	26	28	65	67	67	117	78
SJCH01	2010	78	131									2010	97	82							24
SJCH03	1960	93	168	156	181	196	164	153	201	89	149	1960	39	194	231	192	196	71	181	134	95
SJCH03	1970	134	149	117	82	110	103	134	192	170	142	1970	64	153	134	25	93	67	134	110	145
SJCH03	1980	149	181	71	166	106	198	185	103	125	71	1980	216	86	134	86	103	28	156	25	82
SJCH03	1990	110	153	142	89	86	99	117	106	93	93	1990	164	224	241	170	28	121	60	99	99
SJCH03	2000	114	93	127	125	71	125	153	141	125	121	2000	54	43	50	56	138	149	125	134	164
SJCH03	2010	93	114									2010	201	91							25
SJCH04	1940											1940									124
SJCH04	1950	275	307	276	200	170	275	145	283	121	137	1950	133	55	104	126	216	366	220	93	91
SJCH04	1960	229	239	113	159	165	155	183	158	74	82	1960	69	158	42	115	132	60	122	105	30
SJCH04	1970	65	93	72	90	79	71	115	129	131	87	1970	33	72	59	18	48	35	52	38	63
SJCH04	1980	80	118	67	165	92	90	65	55	36	59	1980	69	47	49	59	45	38	47	14	32
SJCH04	1990	85	93	105	86	77	88	102	65	55	47	1990	59	42	45	55	13	26	27	25	39
SJCH04	2000	58	64	64	52	42	63	86	55	65	59	2000	23	14	13	10	20	20	16	20	10
SJCH04	2010	35	100									2010	31	25							124
SJCH05	1970	49	35	51	47	43	64	31	43	77	72	1970	27	15	45	23	11	38	16	19	13
SJCH05	1980	47	64	74	64	66	57	91	78	45	40	1980	21	69	45	23	32	48	33	39	37
SJCH05	1990	15	27	28	6	18	9	44	32	29	33	1990	7	9	13	31	3	9	11	13	9
SJCH05	2000	49	43	74	37	19	48	37	45	37	40	2000	13	9	11	9	8	11	16	12	10
SJCH05	2010	43	74									2010	23	40							13
SJCH06	1970	81	85	87	75	78	72	59	102	105	85	1970	26	54	45	13	44	26	19	27	41
SJCH06	1980	95	130	57	122	135	107	102	81	21	33	1980	76	49	41	88	72	81	78	16	21
SJCH06	1990	39	65	108	84	74	79	62	44	43	36	1990	27	45	54	101	27	25	14	14	23
SJCH06	2000	44	41	53	48	18	50	52	48	63	59	2000	14	11	9	8	5	10	9	16	17
SJCH06	2010	44	85									2010	33	19							10
SJCH07	1970	49	75	67	50	64	48	72	70	115	76	1970	17	21	26	12	16	15	17	24	33
SJCH07	1980	100	99	75	60	82	95	95	74	61	48	1980	26	24	38	45	41	21	49	16	16
SJCH07	1990	69	79	114	79	51	54	81	90	60	103	1990	30	52	58	48	30	13	11	35	25
SJCH07	2000	89	85	87	55	60	103	90	84	84	62	2000	24	23	23	7	29	13	17	35	23
SJCH07	2010	60	121									2010	32	40							13
SJDPO6B	1680											1680	106	24	81						50
SJDPO6B	1690	69	63	75	58	67	67	32	69	88	122	1690	41	56	50	52	54	81	89	69	88
SJDPO6B	1700	77	54	28	28	39	52	47	56	58	49	1700	63	50	30	69	45	54	37	64	37
SJDPO6B	1710	71	76	64	34	51	67	52	73	50	81	1710	77	71	54	50	41	54	54	52	41
SJDPO6B	1720	54	47	39	57	101	81	93	81	86	93	1720	30	41	60	54	54	69	47	73	81
SJDPO6B	1730	56	56	67	54	56	64	69	81	81	54	1730	60	97	54	51	45	63	50	60	110
SJDPO6B	1740	77	77	64	81	54	81	77	58	64	67	1740	99	53	47	67	41	94	50	73	45
SJDPO6B	1750	64	73	70	88	71	73	67	84	69	43	1750	99	70	52	66	109	59	51	54	40
SJDPO6B	1760	36	41	56	51	54	60	57	62	47	53	1760	26	46	43	29	16	30	55	24	19
SJDPO6B	1770	49	42	54	76	71	65	64	54	65	71	1770	19	19	21	34	39	64	26	21	39
SJDPO6B	1780	68	84	93	58	81	89	85	102	198	138	1780	44	54	28	22	53	128	207	183	142
SJDPO6B	1790	117	85	93	68	126	94	120	80	120	154	1790	70	30	54	81	88	58	45	61	73
SJDPO6B	1800	76	126	139	89	54	81	83	96	116	92	1800	118	178	116	46	53	67	72	83	106
SJDPO6B	1810	103	103	106	101	96	158	103	111	111	136	1810	78	100	89	53	136	62	53	36	58
SJDPO6B	1820	147	156	145	145	100	102	92	121	82	99	1820	107	20	49	69	64	50	72	56	39
SJDPO6B	1830	128	138	117	132	102	102	83	61	74	62	1830	109	54	153	29	50	83	49	56	37
SJDPO6B	1840	67	84	98	84	63	71	73	59	64	47	1840	32	66	81	33	32	103	69	30	21
SJDPO6B	1850	49	51	48	49	48	39	34	55	40	53	1850	19	20	24	17	26	19	17	23	11
SJDPO6B	1860	63	76	68	62	50	46	61	55	44	41	1860	43	43	22	21	29	23	31	23	14
SJDPO6B	1870	98	102	120	77	64	48	73	53	46	50	1870	14	16	26	27	29	53	18	25	91
SJDPO6B	1880	84	58	70	55	62	78	56	68	48	37	1880	47	31	28	22	32	33	16	22	30
SJDPO6B	1890	36	50	49	60	72	53	37	45	47	68	1890	13	11	21	25	32	17	15	22	18
SJDPO6B	1900	73	50	38	34	39	22	25	29	32	22	1900	27	15	14	9	21	11	10	10	13
SJDPO6B	1910	29	29	25	31	26	30	27	36	33	35	1910	10	12	10	17	11	10	10	16	12
SJDPO6B	1920	27	24	25	25	22	23	20	16	23	22	1920	9	11	15	16	11	8	6	8	26
SJDPO6B	1930	11	16	20	31	35	14	35	21	19	16	1930	5	6	7	17	14	6	21	12	5
SJDPO6B	1940	18	6	27	22	12	26	30	27	30	29	1940	6	4	10	9	6	7	17	11	12
SJDPO6B	1950	30	33	27	19	18	39	32	36	9	30	1950	14	7	13	9	9	25	18	11	8
SJDPO6B	1960	34	35	15	23	29	33	27	32	19	22	1960	17	21	7	10	16	16	10	16	13
SJDPO6B	1970	12	23	24	17	27															

SJDP08	1780	152	123	159	99	169	130	123	101	166	143	1780	95	80	80	68	86	68	80	105	84	92
SJDP08	1790	101	107	152	76	155	130	143	159	219	120	1790	55	65	109	111	61	65	59	159	55	53
SJDP08	1800	119	199	197	199	107	185	139	203	185	135	1800	86	72	72	56	103	88	64	107	59	72
SJDP08	1810	173	212	163	139	118	163	141	130	206	227	1810	119	123	48	76	92	99	91	64	88	95
SJDP08	1820	231	143	151	147	187	173	187	159	111	119	1820	111	80	55	42	88	54	54	40	56	53
SJDP08	1830	183	147	130	86	97	127	91	55	49	46	1830	99	40	114	36	18	29	29	51	21	21
SJDP08	1840	48	51	71	44	51	73	62	31	48	56	1840	23	32	62	40	22	31	39	22	20	31
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SJDP08	1860	170	237	180	176	133	117	170	151	107	143	1860	98	105	72	57	61	71	102	104	76	36
SJDP08	1870	80	86	87	76	74	82	178	110	102	219	1870	41	22	27	25	22	52	102	54	37	187
SJDP08	1880	191	121	123	84	72	90	101	86	59	60	1880	58	47	41	20	31	28	35	26	56	18
SJDP08	1890	53	74	112	28	59	41	100	118	109	100	1890	27	30	63	13	27	20	67	59	41	60
SJDP08	1900	161	149	159	135	104	97	89	71	101	67	1900	141	67	123	86	65	38	25	28	31	24
SJDP08	1910	83	82	82	90	82	97	64	101	38	43	1910	20	33	41	43	38	27	27	24	8	8
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SJDP08	1940	26	15	36	23	18	25	34	28	38	25	1940	10	11	13	10	5	9	27	11	28	10
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SJDP09	1610											1610								70	70	77
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SJDP09	1640	57	93	77	115	65	45	66	72	59	66	1640	72	64	96	100	79	65	86	53	50	50
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SJDP09	1670	23	28	26	36	32	34	58	51	53	57	1670	21	12	18	13	30	41	58	44	85	59
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SJDP09	1700	50	25	58	69	64	46	56	44	32	28	1700	41	65	67	44	80	49	43	40	64	42
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SJDP09	1810	85	123	99	81	103	81	102	77	71	98	1810	58	189	85	117	102	164	117	103	64	63
SJDP09	1820	70	100	81	98	102	93	93	65	58	58	1820	51	85	94	70	133	68	40	98	88	
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SJDP09	1840	41	37	48	41	29	41	76	39	37	40	1840	37	36	34	20	15	28	68	36	17	28
SJDP09	1850	46	35	39	31	39	47	44	47	35	25	1850	23	17	26	24	25	25	16	25	19	13
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SJDP09	1880	52	33	27	51	66	42	48	34	39	49	1880	29	23	19	43	35	30	24	17	23	25
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SJDP09	1980	30	31	19	19	26	33	16	12			1980	14	18	18	11	12	12	7			
SJDP10	1820											1820								257	284	301
SJDP10	1830	110	73	78	59	33	37	34	41	50	29	1830	202	99	132	53	38	39	45	50	26	17
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SJMD01	1870	155	192	80	101	148	124	173	133	121	216	1870	124	133	32	56	74	59	109	121	68	192
SJMD01	1880	117	148	142	195	204	193	206	192	204	103	1880	64	243	84	176	198	58	222	124	232	47
SJMD01	1890	131	133	160	216	170	110	122	74	62	69	1890	134	78	153	275	142	100	178	34	33	42
SJMD01	1900	76	50	88	61	49	61	113	88	125	108	1900	78	25	70	28	41	28	83	55	115	86
SJMD01	1910	198	107	151	140	197	185	216	140	119	79	1910	125	31	125	89	185	113	146	37	91	23
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SJMD01	1930	152	85	132	104	160	129	175	98	117	170	1930	68	24	68	106	139	45	132	52	76	112
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SJMD01	1950	110	103	72	92	65	96	113	130	65	93	1950	117	36	40	19	42	61	103	50	34	76
SJMD01	1960	125	139	106	52	61	79	71	74	83	110	1960	66	40	59	20	34	18	19	11	25	13
SJMD01	1970	40	46	58	42	42	37	58	73	47	47	1970	5	10	24	6	13	10	12	16	11	6
SJMD01	1980	60	90	48	58	62	57	47	47			1980	36	38	22	16	26	12	14	11		
SJMD02	1790																	180	135	174	150	90
SJMD02	1800	69	180	120	180	391	186	221	183	162	213	1800	78	117	96	270	120	113	148	258	219	175
SJMD02	1810	252	216	273	234	210	253	237	312	269	150	1810	228	90	192	100	83	201	102	228	204	84
SJMD02	1820	187	156	232	216	131	188		125	231	180	1820	146	102	137	125	137	118		163	169	69
SJMD02	1830	166	141	212	265	255	118	180	116	190	89	1830	114	175	149	169	145	127	106	76	73	42
SJMD02	1840	125	127	114	93	103	125	91	137	95	83	1840	89	71	64	93	112	69	56	89	59	58
SJMD02	1850	39	51	30	76	65	91	72	59	96	52	1850	51	18	34	52	42	49	35	59	48	62
SJMD02	1860	81	80	108	96	170	125	149	67	49	67	1860	50	73	59	116	69	65	59	27	49	39
SJMD02	1870	78	86	98	69	106	105	82	89	118	102	1870	55	47	55	34	43	39	34	51	76	39
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SJMD03	1830	188	240	150	171	179	178	108	98	130	128	1830	164	107	121	87	52	112	22	101	80	22
SJMD03	1840	134	145	149	107	67	73	76	66	49	42	1840	87	105	96	17	55	56	31	44	3	24
SJMD03	1850	54	61	81	57	57	80	62	88	90	152	1850	24	17	30	3	39	44	36	44	73	85
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SJMD04	1870		147	161	198	193	265	267	235	478		1870	0	156	129	138	145	124	133	143	133	276
SJMD04	1880	302	408	368	244	290	271	273	193			1880	161	150	193	104	345	189	216	103	248	156
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SJMD04	1940	186	102	181	72	144	93	153	181	139	135	1940	100	33	116	29	82	18	104	77	56	70
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SJME01	1970	56	62	23	41	34	46	84	58	41		1970	14	24	26	9	23	44	22	23	41	27
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SJME02	1820				1552	1073	737															

SJME08B	1910	88	62	87	187	173	219	114	117	95	90	1910	44	40	64	100	157	68	78	43	48	88
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SJME10	1830						635	375	363	218		1830							121	133	193	181
SJME10	1840	302	187	272	402	278	483	411	544	725	278	1840	121	91	94	43	254	30	66	212	79	121
SJME10	1850	514	532	236	242	266	381	145	172	239	242	1850	73	145	42	60	73	106	80	118	187	60
SJME10	1860	224	272	278	574	363	320	311	195	287	184	1860	190	99	130	63	54	108	94	76	39	88
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SJME10	1900	101	153	111	116	137	66	101	86	121	70	1900	80	76	49	71	58	91	109	20	43	35
SJME10	1910	77	79	124	180	130	130	65	82	63	93	1910	26	63	122	55	89	39	79	42	39	53
SJME10	1920	91	63	62	73	49	45	53	47	68	38	1920	37	34	32	42	13	24	45	26	44	18
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SJME10	1980	72	74	83	97	122	129	98	102			1980	57	46	68	112	71	17	67			
SJOL02	1970	48	64	37	31	42	37	72	139	91	78	1970	13	22	31	11	17	12	26	60	35	109
SJOL02	1980	418	448	272	99	132	106	70	71			1980	211	65	32	7	9	11	19	21		
SJOL03	1700	120	174	108	122	127	131	106	71	85	63	1700	52	16	26	52	49	63	35	26	66	106
SJOL03	1710	219	127	132	127	94	99	179	113	92	160	1710	115	38	33	143	58	61	33	38	21	99
SJOL03	1720	127	110	169	99	167	136	118	91	103	63	1720	46	30	75	56	40	37	28	40	24	21
SJOL03	1730	94	76	66	66	101	114	103	99	110	160	1730	20	29	66	38	56	49	59	31	52	61
SJOL03	1740	94	103	70	73	126	66	88	54	96	47	1740	54	44	33	35	31	40	44	52	52	5
SJOL03	1750	47	66	57	70	82	80	68	51	52	66	1750	16	54	21	32	55	35	46	26	68	41
SJOL03	1760	54	64	74	73	88	71	87	96	81	72	1760	63	44	71	47	35	25	59	99	40	41
SJOL03	1770	54	62	49	55	75	101	70	61	41	61	1770	14	26	24	40	43	46	42	19	16	31
SJOL03	1780	87	83	82	61	63	65	88	63	63	82	1780	27	45	27	25	16	35	65	21	45	80
SJOL03	1790	71	65	66	92	71	120	103	50	79	52	1790	56	34	49	63	61	118	71	68	84	10
SJOL03	1800	59	56	74	85	99	94	69	91	79	127	1800	63	43	94	118	82	63	107	82	63	109
SJOL03	1810	69	74	71	62	60	64	104	99	87	96	1810	22	38	40	32	36	57	87	91	78	35
SJOL03	1820	113	91	102	100	115	87	103	116	82	87	1820	52	69	66	75	50	38	87	60	40	38
SJOL03	1830	96	102	85	94	75	84	69	71	56	68	1830	21	62	49	40	59	28	11	18	20	38
SJOL03	1840	81	96	65	76	73	56	66	54	45	31	1840	54	38	19	35	50	13	20	23	17	5
SJOL03	1850	37	34	29	27	32	28	29	30	29	32	1850	7	10	6	7	7	6	9	9	7	
SJOL03	1860	29	47	41	50	53	59	40	36	36	31	1860	8	12	15	20	19	19	5	11	12	9
SJOL03	1870	37	40	38	28	37	36	41	51	42	49	1870	14	9	7	5	7	7	15	18	27	
SJOL03	1880	53	72	73	58	64	52	59	73	66	65	1880	40	109	34	30	49	39	61	46	31	31
SJOL03	1890	68	58	62	72	73	76	65	53	49	55	1890	37	12	40	71	58	31	28	18	18	31
SJOL03	1900	77	72	79	63	58	47	62	40	49	36	1900	36	34	27	18	13	14	13	16	13	
SJOL03	1910	38	23	34	27	40	40	32	28	27	35	1910	10	5	10	11	20	16	21	8	13	13
SJOL03	1920	25	36	43	24	25	21	20	20	20	20	1920	10	12	15	7	7	5	6	5	5	4
SJOL03	1930	21	20	27	22	30	28	29	14	26	26	1930	9	5	7	8	14	10	6	2	7	12
SJOL03	1940	20	14	15	30	28	18	23	20	22	30	1940	8	2	6	4	11	6	6	3	12	8
SJOL03	1950	28	22	15	23	22	20	37	31	28	28	1950	11	9	26	7	13	10	23	10	9	14
SJOL03	1960	21	25	25	22	21	24	27	14	23	14	1960	5	7	10	7	7	8	7	6	10	8
SJOL03	1970	19	13	28	24	20	21	28	31	26	29	1970	5	3	7	10	5	4	8	28	10	11
SJOL03	1980	37	49	24	43	47	63	29	47			1980	13	25	10	19	33	21	18	11	0	
SJOL07	1800											1800								67	43	
SJOL07	1810	139	178	207	207	231	228	207	218	183	212	1810	46	111	75	152	163	160	122	90	93	110
SJOL07	1820	216	196	163	143	122	228	226	202	122	184	1820	132	164	68	65	186	107	79	53	61	108
SJOL07	1830	131	189	119	119	111	124	87	125	202	218	1830	193	62	113	35	37	38	54	102	107	59
SJOL07	1840	164	165	140	107	127	145	96	68	58	58	1840	88	88	78	20	38	55	29	12	12	16
SJOL07	1850	42	40	55	36	51	52	38	61	48	97	1850	14	8	7	6	15	14	11	14	15	29
SJOL07	1860	96	144	189	208	120	119	111	117	122	126	1860	49	64	99	79	37	62	58	47	79	56
SJOL07	1870	65	93	115	96	120	187	288	356	288	475	1870	30	27	46	56	76	237	180	219	193	207
SJOL07	1880	277	209	268	217	200	211	197	134	154	130	1880	143	134	209	96	36	100	80	103	108	80
SJOL0																						

WP1	JUNIPER	2516"	180	10	1		
WP11	DF	6022"	180	15	2	VERY SMALL FIRE	
WP11B	DF	3014"	180	10	70	1	NOTE: APPARENTLY NUMBERED 2 TREES AS WP11
WP12	DF	10020"	180	5	1		
WP13	DF	16"	180	10	Y1916	1	
WP14	DF		180	15	Y1890	1	
WP2	JUNIPER	3522"	180	8	1		
WP3	DF	7022"	180	15	130	1	
WP4	JUNIPER	1016"	180	45	90	1	
WP5A	DF	13036"	180	55	180	2	FIRE
WP5B	(SAME)						
WP6	DF	7515"	180	30	1	DELETED?	
WP7	DF	10025"	180	20	2	NO FIRE: IN RAVINE	
WP8	DF	10022"	180	30	130	2	NO FIRE
WP9	DF	7524"	180	40	1		