Addenda 1

1) Vendor Sing In sheet
2) Questions and Answers
3) Dendrochronology Report
4) Poster presentation to the Society for Historical Archaeology
5) Federal Hourly Rates
6) Federal Salary table
7) VTSU Style Guide

Granger House Q & A		
Number	Question	Answer
1	Has any testing been done for the presence of asbestos in the building? If not, will this be a service provided by the Owner?	No testing has been done. The owner will hire the firm to test for lead and asbestos.
2	Has any testing been done for lead paint on the building or exterior ground area? If not, will this be a service provided by the Owner?	No testing has been done. The owner will hire the firm to test for lead and asbestos.
3	Do you have an archeology report?	No we do not. The report is still being drafted. We can provide a map of previously disturbed areas and can work with the selected firm to provide the necessary documentation for all required reviews.
4	Under General Services, what are the hourly rate requirements that apply to this project?	Please see hourly rates included in the addenda
5	Under General Services, what are the design services required for this project for the Build America, Buy America Act? And what Fiscal Year Funding requirements apply to this project (FY23- all iron and steel, FY24- all iron and steel and all listed construction materials or FY25- all iron and steel, all listed construction materials and all manufactured products)? Can you provide a more defined description of design services required for BABAA.for this project?	FY 24 applies to this project
6	The deliverable Schedules on page 5 and 7 do not include a Design Development Phase but is listed on page 11 in the fee proposal. For submission requirements. Will Design Development be incorporated into the Construction Document Phase or does a Design Development Phase need to be added to the schedule and fee proposal?	Thank you for this clarifying question. It is the expectation that the vendor provides the standard services of SD (schematic design), DD (design development) CD (construction documents) but given the fact that there is a deadline provided for an 80% CD progress set that includes a full cost estimate it was felt that the lines blurred from the defined end of SD to the full completion of CD. Please include DD in the CD phase and consider that the 80% CD's covers the defined project specific requirements and the normal elements that define the end of the DD phase.

7	Do you have an estimated construction budget for this project?	The total project funding at the time is $450,000. That will include all soft cost and whatever construction scope can be accomplished within that budget
8	Please confirm if the owner will provide hazardous materials testing, or should the consultant plan to provide this?	Owner will provide. This will be part of the $450,000 total budget
9	Please confirm that the consultant should plan to perform any needed exploratory probes.	Confirmed
10	Please confirm that the owner will provide to the selected consultant any existing documentation, including but not limited to archeology reports, historic research notes, previously developed architectural drawings, historic photos, etc.	The awarded firm will be provided access to all documents related the Granger property.
11	Please provide a copy of the attendee list from the walkthrough on December 3	This is included in the addenda
12	Will the selected consultant be required to follow any University guidelines for design, graphics, document formats, etc?	Yes please. Our Style Guide is included in the addenda
13	It was mentioned that estimating will be a continuous part of the process. Is the design team to include an independent estimator as part of the team in its proposal? If so, how many separate estimates should we assume (e.g. after schematic design, 50% construction documents, 95% construction documents)?	Project includes SD and 80% CD estimates. The 80% CD estimate will ultimately define the scope of services that can be accomplished within the project funds and the 100% CD's should reflect that. Estimates are to be accurate to ensure adherence to project budget.
14	Will an MEP engineer be required as part of the project team, or will all MEP engineering be provided design/build by the contractor?	VTSU expects that the project complies with granting requirements and it delivers the largest amount of construction possible within the available budget. Design build will not be acceptable but we will not identify what professional expertise you will need on your project team.
15	It is understood that all historic application materials will be going through PTVT, however will an independent historic preservation consultant be required as part of the project team?	PTV will serve this roll for this project.
16	Is there a construction budget for the scope of work set out in the RFP?	See response to question 7 above

17	The majority of the work is architectural and structural, but there will likely be a small amount of MEP. Does VSC have preferred MEP engineers, or shall we include someone on our team we think would be a good fit? Alternatively, would you prefer to deliver this scope in a design-build capacity?	We do not have a preferred MEP engineer. All work associated with this project will need to be part of the estimating and design documents. VTSU will not deliver any portion of that scope outside of this project format. Design Build will not be acceptable.
18	Please confirm that an historic preservation consultant is not necessary. Jenna will support that effort.	PTV will serve this roll for this project.
19	You noted at the walk-through that we should propose on the base scope as listed in the RFP, even though we heard there is likely to be additional work on the building in the future. Will the selected architect also be the architect for future wok (provided all goes well), or will there be another RFP to solicit services?	VTSU has no current plans for future work at this time.
20	The RFP suggests a design-bid-build construction delivery methodology. Is this confirmed, or will VSC entertain a Construction Management delivery?	VTSU expects that the project complies with granting requirements and it delivers the largest amount of construction possible within the available budget. We will not dictate the path to get there.
21	The RFP notes that reimbursable line items are not allowed in the contract. Is it okay to provide a fixed fee for expenses typically billed as reimbursable (i.e., printing, travel, etc.)?	Yes
22	Are there any existing drawings (floor plans, elevations, sections) of the building? If so, will the chosen firm have access to those, or should we plan to measure and develop our own existing plans?	There is a folder of Granger House related materials at the facility barn that does include floor plans and elevations. The awarded vendor will be granted access to those materials.
23	Is there a site survey (topographic and site features (trees, utilities, etc.)), or should we plan for that as part of our scope of work?	There is no site survey/utility mapping for this parcel. The scope of work is defined in the RFP and does not include these services. All firms should provide a break out cost in proposal to include this. We may select these service based on the funding available
24	Please verify if the $450k budget includes all soft costs, including design fees. There is some slightly confusing language in the RFP about this.	See response to question 7 above

25	Will the chosen architect be expected to include a Civil Engineer on the team?	The awarded vendor is to carry any and all professionals needed to perform the defined scope in the RFP in compliance with the granting requirements and applicable laws and codes.
26	Will the chosen architect be expected to include a historic preservation consultant on the team?	PTV will serve this roll for this project.
27	Is Design-Build an acceptable method for the MEP needs of the wing?	Design Build will not be acceptable.
28	What is the desired program for the second floor of the main house?	The intended use for the 2nd floor is exhibit space
29	Please confirm that ADA access to the second floor can not be achieved through an addition to the building unless no other design option can meet the extent	Access should not be accomplished through the means of an addition unless all other design options prove not feasible through the defined process outlined for preservation projects through the National Park Service.
30	If ADA access to the second floor restricts/eliminates use of the back stair, would the spiral staircase be open to users?	Possibly for emergency purposes only.
31	Should the project include evaluation of the existing main house floor framing? The change of use from residence to public building will likely require an evaluation of the floor capacity.	Yes

A Dendrochronology Study of Select Framing Timbers from the Granger House, Castleton, Vermont

William A. Flynt
July, 2022

Castleton Hidden History
Archaeology • Geography • History

NATIONAL ENDOWMENT FOR THE HUMANITIES

A Dendrochronology Study of Select Framing Timbers from the Granger House, Castleton, Vermont

Introduction

On June 6th, 2022, a selection of timbers were cored in the Granger house located at the corner of Seminary Lane and South street in Castleton, Vermont by William Flynt for the purposes of conducting a dendrochronology study. All samples were mounted, sanded, measured, and analyzed back in Dummerston by William Flynt.

Background

Dendrochronology, or the study of tree ring growth patterns to date the age of archeological timbers, was initially developed in the 1920's by Andrew E. Douglass using long-lived Ponderosa pines in the Southwest United States. An astronomer by training, Douglass was interested in historical sun spot activity and its relationship to earth's climate. He surmised that by looking at yearly growth ring sequences in long-lived trees growing in an arid environment where moisture is key, he might be able to ascertain yearly variations in climate attributable to sunspot activity. (Baillie, 1982). To push the tree ring database back past the age of living trees, samples were taken from roof poles in Pueblo ruins that turned out to eventually overlap the living tree data. Besides fulfilling his research needs, this work revealed the feasibility of dating archeological structures.

In the 1980's the advent of computer programs to collate data, run comparative analyses, and compile master chronologies enabled unknown samples to be compared to known masters with a high degree of accuracy in more temperate climates. Pioneering work in Eastern Massachusetts focusing on Oak (Krusic and Cook 2001, Miles, Worthington and Grady 2002, 2003, 2005) and in the Connecticut River valley initially concentrating on Pitch pine (Krusic 2001,Flynt 2004) and expanding into oak, chestnut, hemlock, spruce, and white pine, has revealed the suitability of using dendrochronology as a mainstream research tool for analyzing and establishing construction timber felling dates in the Northeast, a region heretofore considered too variable climatically to provide reliable results.

Over the past 20 years conducting such studies of historic structures throughout New England and eastern New York state, the author has been able to develop numerous site and regional dated masters for all of the species noted above. These are constantly being updated as additional material is dated and added to the appropriate masters to further enhance the chances of successfully dating future projects. As well, additional New England dated chronologies for some of these species, available online at the International Tree-Ring Databank, are also used as needed.

It should be remembered that trees were usually felled in the winter months with frame preparation occurring shortly thereafter, so the earliest a frame could be raised would be in the year following the felling date delineated in a dendrochronology study such as this.

Procedures

In procuring samples suitable for dendrochronology research, the analyst must be on the lookout for timbers, framing, and boards that exhibit several parameters. First, a bark, or waney, edge must be present if one wishes to establish with certainty the last year of growth. Second, there needs to be a sufficient number of rings in a sample to span several distinctive climactic variations that register as patterns of wide and narrow rings. Ideally, having 100 or more years of growth is best, but more often than not, samples will range from 50 to 100+ years. While it is feasible to get dates on young samples (50-60 rings), spurious results are possible and thus must be reviewed carefully both with longer-lived samples from the same structure as well as with what documentary and stylistic research uncovers. Third, enough samples need to be obtained (10-15 per building episode is usually reasonable) to allow for comparison and the fact that often some will not align for one reason or another. It is also critical that an assessment be made of the building frame to ascertain that the members from which samples are extracted were not reused or inserted at a later date, or, if so, are duly noted. Fourth, all samples must be labeled and entered into a log book that notes the position of each sampled timber within the structure, its species, whether or not it has wane, and any other information pertinent to the sample. In labeling the samples the following codes were employed; CG (Castleton, Granger). The numbers that follow simply refer to the sequence in which the samples were taken.

Samples were extracted using a custom coring bit, chucked into a 20 volt, ½" battery-powered drill, that creates a 9/16" hole out of which is obtained a 3/8" core. Core samples were glued into custom wood mounts and sanded using successively finer grit paper (150-600 grit) both on a bench top belt sander and by hand sanding to create a mirror-smooth finish. All samples were then viewed under an Amscope 7.5-45X binocular microscope fitted with cross hairs in one eyepiece to count and mark the number of rings per sample. This was followed with a careful visual review, again under magnification, in an attempt to determine if site-specific growth patterns could be ascertained in order to help cross date the samples. Each sample was then placed under the microscope on a Velmex Acu-Rite Encoder sliding stage calibrated to read to the nearest micron (.001mm). Measuring begins at the outer, or last year of growth ring (LYOG), established as 1000, and proceeds to the center of the sample or first year of growth, as measured (FYOG). It should be noted that not all cores reach the center of the tree, thus the first year of growth does not necessarily reflect when the tree began to grow. At the junction of each growth ring, the analyst registers the interface electronically, which sends the measurement to the computer via a VMO Digital Readout.

In all of the work in this study, the measuring program MEASURE J2X was used to compile each sample's raw data files. The program transforms the ring widths into a series of indices that relate each ring's growth to its neighbors, thus standardizing the climate-related influences on a year-to-year basis (Krusic 2001). Thus trees from a similar location but growing at different rates should exhibit similar indices. With the raw data in hand, using the program COFECHA (Holmes, 1983) the samples from this site can be compared with each other to determine if all were cut at the same time or within the span of several years or more. The hope is that a floating chronology can be

developed revealing the felling relationship between some, if not all of the samples within each species found in the structure. The samples are also compared against one or more dated regional master chronologies or site masters of the same species to determine the exact year or years when the samples in question were felled. As strong samples are uncovered, these are added to a fledgling site master and the raw data is again run against this site master to see if additional samples align.

With COFECHA samples are broken down into ring groups of 50 years that are then compared to either the other undated samples (to create a floating site master) or with various dated masters (to determine a calendar year match). The 50-year ring groups in an individual sample are lagged a certain number of years (in this study lags of 20 and 25 years were used) to provide an overlap of data within the groupings. The results are displayed in a series of ways, with Part 8 "Date Adjustment for Best Fit Matches for Counted or Unknown Series" composed of columns with the "best fit" being in column #1, the next "best fit" in column #2 and so on out 11 columns. The "add" number is the number to be added to the last year of growth (1000) to provide the year date of felling, while the "corr" number relates to how well the "add" meshes with the master. A correlation coefficient of .3281 is considered the threshold of significance for 50-year ring groups. Higher correlation values (preferably over .40) accompanying consistent "add" numbers in the first column usually reveal reliable results for longer-lived samples. It should be noted that samples exhibiting short ring counts (less than 60) are more prone to display spurious results. In the example below, consistent "add" numbers with strong correlations appearing in the first column for samples DLBH-07 and 08 reveal each samples true date of felling (1000+784 and 782 = 1784 and 1782 respectively). Sample DLBH-09 does not show consistently strong correlation with any particular date. Note that the lag used in this example is 10 years.

SERIES	COUNTED SEGMENT	ADD	CORR # 1	ADD	CORR # 2	ADD	CORR # 3	ADD	CORR # 4	ADD	CORR # 5	ADD	CORR # 6	ADD	CORR # 7	ADD	CORR # 8	ADD	CORR # 9	ADD	CORR #10
DLBH-07	937- 986	784	.51	712	.47	729	.37	713	.37	847	.33	846	.31	728	.30	813	.29	800	.29	763	.28
DLBH-07	947- 996	784	.54	712	.45	760	.33	816	.31	729	.31	800	.29	713	.29	671	.29	847	.26	808	.25
DLBH-07	951-1000	784	.41	760	.35	712	.35	661	.31	787	.30	800	.29	774	.29	729	.27	808	.26	832	.25
DLBH-08	929- 978	782	.44	746	.42	793	.33	760	.32	705	.32	846	.31	858	.30	689	.30	824	.28	685	.26
DLBH-08	939- 988	782	.61	746	.37	689	.34	840	.30	725	.29	708	.27	723	.27	806	.27	684	.25	724	.25
DLBH-08	949- 998	782	.69	669	.47	840	.41	722	.32	806	.28	708	.27	700	.26	683	.25	723	.25	720	.24
DLBH-08	951-1000	782	.69	669	.38	840	.38	722	.34	757	.29	700	.28	730	.25	659	.24	838	.23	723	.23
DLBH-09	932- 981	713	.52	785	.35	848	.35	744	.35	729	.32	863	.31	846	.28	849	.26	693	.26	714	.25
DLBH-09	942- 991	846	.38	713	.36	785	.33	848	.33	729	.29	727	.29	790	.29	693	.28	761	.28	705	.27
DLBH-09	951-1000	799	.43	783	.39	731	.30	689	.30	808	.29	767	.27	756	.26	790	.25	814	.24	846	.24

Once samples from a site are firmly dated and grouped into a site master, Part 2 "Correlations with Master Series of all Segments as Dated and Measured" and Part 3 "Segments Correlating Low, or Higher, at other than Dated Position" of COFECHA can be viewed to see how well each sample correlates with the others in the group and where weak areas within the ring counts are located for further scrutiny.

Results- See Figure 1

A total of 30 samples, comprised of a mix of white pine, hemlock, black ash, elm, and oak, were extracted from the main house, the leanto, and the extended ell. Of these, 15 came from the main house attic and basement, 2 came from the leanto, 7 were extracted

from the attic and first floor area of the first ell, and 6 came from the second section of the ell.

Black Ash

A majority of the black ash, a species that is often mistaken for chestnut in the field, was found in the main house frame, with one sample coming from the leanto and one from the first ell. Black ash is a difficult species to work with as it does not date well and the few small dated masters are a fair distance from Castleton.

The first series of tests aimed at establishing a floating chronology that would indicate when each timber was felled in relation to the others. This was met with success, as depicted on Chart 1A, where a majority of the samples were clearly felled the same year, as noted by the consistent appearance of and "add" number of 0 in the first column accompanied by strong correlation coefficients in all cases. In addition, it should be noted that CG-14 has a last year of growth one year later while samples CG-15 and 22 have a last year of growth 4 years later. CG-17 indicates a last year of growth 22 years earlier which may dispel the thought that the area where sampling occurred did include wane. Notes taken during coring reveal that the presence of wane was questioned, but sampling occurred nonetheless.

Chart 1B displays how well each samples 50-year ring groups correlate with those of the other samples where they overlap. In general the correlation coefficients are decent with only a few "flags" noted where better fits are in other positions. As these discrepancies tend to be in the early years of growth, there is little cause for concern.

The next series of tests compared this raw data to other dated masters from the region that, while not all black ash, might well indicate some strength for particular dates. Numerous tests were run against oak, hemlock, and pine regional masters, along with two against black ash masters, but unfortunately no meaningful results were forthcoming, which was a big disappointment.

White Pine

As with the black ash, the white pine was subjected to internal testing in an attempt to build a floating chronology. Chart 2 reveals some alignment amongst the samples with CG-23 and 24 indicating having been felled the same year while CG-02 and 05 came down 9 years earlier. Unfortunately both CG-23 and 24 showed evidence of reuse, thus it will be difficult to use this information to determine the exact age of the present structure, other than to say it clearly is later than the date being suggested by these samples.

When the white pine data was compared to several regional white pine masters, two revealed some plausible results. One of the masters focuses on eastern New York state while the second is centered in southeastern Vermont, as illustrated on Chart 3. In both instances CG-02 and 05 indicate a preference for wanting to date to 1806 while, in the case of the comparison with the eastern New York state master, CG-16 shows decent strength for a date of 1809. While clearly spurious, CG-07 aligns with 1666. In neither test do samples CG-23 and 24 align well with 1815 (the 9-year difference noted on the Chart 2 test results), though the date does lurk weakly within both outputs, but not with any degree of certainty. In spite of the weakness of the latter two samples with a date of 1815, their decent alignment with CG-02 and 05 in the floating master coupled with the

decent alignment of CG-02 and 05 with the date 1806, all four samples were assigned dates to create a small white pine site master, as shown on Chart 4.

Hemlock

With the exception of sample CG-19 (first ell attic), all of the hemlock samples were extracted from the second section of the ell. Once again the first tests looked to establish the felling relationships between the samples. As detailed on Chart 5, all but sample CG-29 aligned strongly with each other at varying felling dates. With CG-19 assigned at 0, the second ell samples indicate their having been felled anywhere between 13 to 18 years previous. In all cases, the 50-year ring group correlation coefficients where they overlap each other remain strong, as noted in Part 2 on this chart, ranging generally from roughly .50 to .68. There is some indication that CG-29 might have been felled 94 years previous to CG-19.

Testing the hemlock data against a large eastern New York-central Massachusetts-southern Vermont hemlock master, as depicted on Chart 6, reveals definitive results for almost all of the Granger house samples. CG-19 aligns with 1836, CG-25 is associated with1818, CG-26 and 27 align with 1823, CG-28 dates to 1821, and CG-30 associates with 1822. In each case the date offsets agree with the offsets noted on Chart 4. As such these samples were assigned the dates indicated to create a hemlock site master (Chart 7).

Oak

Only one oak sample was acquired during sampling from a short east end gable wall stud from the first ell. When this was tested against several dated Vermont oak masters from the region, as illustrated on Chart 8, a recurring date of 1788 appears in the first column. It could well be that this is the correct date, but without additional samples to create a floating master against which to corroborate this lone association, one should be wary of assigning too much significance to this date, especially since there is a fair amount of clearly reused material within the frame of the first ell.

Elm

Several samples turned out to be elm, a species rarely encountered and as such, has no dated masters against which to compare. As well, it is difficult to discern ring boundaries under the microscope making accurate measuring difficult, thus these samples were not analyzed.

Discussion

The Granger house proved to be an elusive test subject in terms of dendrochronology analysis due to the preponderance of black ash being used for the main house framing. While a floating chronology for the species was successfully compiled, the failure to accurately date these samples against any dated master was frustrating at best. Thankfully the few white pine samples that were obtained did provide a ray of hope for the main building in that both suggest a date of 1806. Granted, two samples are not really adequate to establish when a majority of the trees were felled for the frame, but it does help to focus further documentary research in the period from 1805 to 1810.

As for the other appendages, the two samples from the leanto appear to indicate that this may have been added four year after the main house if one were to assume that the black

ash sample CG-15 was felled specifically for this purpose (note the 4-year age difference on Chart 1A). Additionally CG-16, the other leanto sample is white pine and, when compared to the eastern New York state white pine master (Chart 3), reveals an alignment with 1809, within range of the offset noted with the black ash (it could well be that the main house framing was felled in 1805 and 06). Unfortunately not enough suitable samples could be obtained from the leanto to definitively determine when it was added.

The first ell is composed of much reused material and thus it is almost impossible to determine when it was constructed. The few samples that could be dated were white pine with two reused posts weakly indicating a possible 1815 felling and a short log joist in the attic dating to 1836. While it was not possible to determine if the log joist was reused, its 1836 date would imply that this portion was erected on or after this date. It could also be that this log joist, near the current chimney, may relate to the possible insertion of the chimney around the mid-1830's. Clearly much more architectural sleuthing within this portion of the building is required to better understand when this was added to the main house.

The second ell frame is composed mainly of hemlock, some of which appears to have been felled specifically for this structure. As noted in the discussion for this species, the hemlock dated well and indicates that this portion of the building was likely framed no earlier than the spring of 1824. As to whether it was initially a free standing building that was attached to the main house with an infill section or was dragged up to the first ell needs further study.

Acknowledgements

The author would like to thank Matthew Moriarty of Castleton University for his interest in incorporating a dendrochronology component to the historical research pertaining to the Castleton Hidden History project. The Castleton Hidden History Project has been made possible in part by a major grant from the National Endowment for the Humanities: Sustaining the Humanities through the American Rescue Plan (SHARP) program.

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FIGURE 1

GRANGER HOUSE, CASTLETON, VT

SAMPLE	AGE	FYOG	LYOG	WANE	SPECIES	LOCATION
MAIN HOUSE ATTIC						
CG-01	133	868	1000	Y	FRNI	EAST BAY,E-W CENTRAL GIRT
CG-02	115	**1692**	**1806**	Y	PIST	NORTH PURLIN
CG-03	116	885	1000	Y	FRNI	CHIMNEY BAY,E-W CENTRAL GIRT
CG-04	148	853	1000*	Y	FRNI	WEST BAY,E-W CENTRAL GIRT
CG-05	63	**1744**	**1806**	Y	PIST	WEST END GIRT
CG-06	119	882	1000*	Y	PIST	W.CHIMNEY PURLIN TIE GIRT
CG-07	87	914	1000*	Y	PIST	N-S WEST CHIMNEY GIRT
MAIN HOUSE BASEMENT						
CG-08	NOT MEASURED			Y	ULSP	1ST LOG JOIST W. OF STAIRS
CG-09	124	877	1000	Y	FRNI	LOG JOIST AT W.SIDE OF STAIRS
CG-10	158	843	1000*	Y	FRNI	2ND LOG JOIST W.OF STAIRS
CG-11	NOT MEASURED			Y	ULSP	3RD LOG JOIST W.OF STAIRS
CG-12	119	882	1000	Y	FRNI	EAST CHIMNEY GIRT
CG-13	134	867	1000*	Y	FRNI	2ND LOG JOIST FROM W.SILL
CG-14	118	883	1000	Y	FRNI	WEST SILL
CG-21	82	919	1000	Y	FRNI	LOG JOIST,EAST OF STAIRS
LEANTO						
CG-15	137	864	1000	Y	FRNI	WEST END ATTIC GIRT
CG-16	101	900	1000	Y	PIST	5TH SAWN JOIST FROM W. END WALL
1ST ELL, ATTIC						
CG-17	128	873	1000*	Y?	FRNI	WEST END GIRT
CG-18	NOT MEASURED			Y	ULSP	1ST N-S TIE GIRT FROM E.END
CG-19	190	**1647**	**1836**	Y	TCSA	E-W SHORT LOG JOIST,S.OF CHIMNEY
CG-20	76	**1713**	**1788***	Y	QUAL	E. GABLE WALL STUD,N.OF ATTIC ACCESS DOOR
1ST ELL, MAIN FLOOR						
CG-22	129	872	1000	Y	FRNI	EAST SILL,REUSED?
CG-23	100	**1716**	**1815**	Y	PIST	NE CORNER POST, REUSED?
CG-24	92	**1724**	**1815**	Y	PIST	SE CORNER POST, REUSED?
2ND ELL						
CG-25	145	**1674**	**1818***	Y	TCSA	SW CORNER POST, REUSED?
CG-26	173	**1651**	**1823**	Y	TCSA	CENTER PLATE LEVEL TIE GIRT
CG-27	126	**1698**	**1823**	Y	TCSA	NORTH SIDE PLATE
CG-28	161	**1661**	**1821***	Y	TCSA	POST EAST OF CG-25
CG-29	97	904	1000	Y	TCSA	SOUTH PLATE
CG-30	188	**1635**	**1822**	Y	TCSA	S.SIDE SILL SECTION UNDER CG-25, REUSED?

FYOG = FIRST YEAR OF GROWTH, AS MEASURED, LYOG = LAST YEAR OF GROWTH, AS MEASURED
FRNI = BLACK ASH, PIST = WHITE PINE, ULSP = ELM, TCSA = HEMLOCK
* = PARTIAL LAST RING AT WANE, NOT MEASURED. TREE FELLED FOLLOWING SPRING/SUMMER

CHART 1A

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES — Tucson-Mendoza-Hamburg-Lamont ProgLib

CG BA VS CG BA ALIGNED
50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	ADD	CORR # 1	ADD	CORR # 2	ADD	CORR # 3	ADD	CORR # 4	ADD	CORR # 5	ADD	CORR # 6	ADD	CORR # 7	ADD	CORR # 8	ADD	CORR # 9	ADD	CORR #10	ADD	CORR #11
CG-01	868- 917	0	.42	30	.34	-19	.32	-18	.28	22	.28	60	.27	14	.25	8	.25	66	.24	20	.21	44	.21
CG-01	893- 942	0	.54	-25	.33	22	.30	-23	.28	30	.28	51	.28	-46	.26	-8	.22	21	.21	52	.20	45	.19
CG-01	918- 967	0	.78	-25	.41	30	.28	-40	.25	-45	.23	-46	.22	-62	.22	-30	.20	-63	.20	19	.20	25	.17
CG-01	943- 992	0	.68	-85	.38	-52	.33	-56	.32	-62	.32	-25	.28	-30	.27	-46	.26	-99	.24	-17	.23	4	.23
CG-01	951-1000	0	.65	-46	.38	-56	.34	-25	.32	-44	.30	-85	.29	-108	.28	-30	.27	-17	.24	-78	.24	-100	.20
CG-03	885- 934	0	.52	-10	.34	-30	.34	63	.27	18	.26	56	.25	62	.24	30	.23	45	.23	-7	.23	22	.20
CG-03	910- 959	0	.57	-56	.34	-52	.32	-34	.31	-26	.27	-66	.25	34	.24	-30	.22	44	.21	45	.20	-49	.20
CG-03	935- 984	0	.53	-19	.35	-52	.27	-66	.25	-74	.25	-45	.23	-70	.22	-72	.22	-85	.22	-44	.22	-56	.21
CG-03	951-1000	0	.51	-44	.46	-89	.32	-19	.32	-70	.31	-45	.29	4	.27	-52	.27	-66	.27	-108	.24	-85	.22
CG-04	853- 902	54	.53	82	.31	-1	.31	100	.28	99	.27	28	.25	9	.21	14	.21	83	.18	73	.18	79	.18
CG-04	878- 927	54	.37	-1	.36	-9	.30	16	.30	72	.29	55	.28	31	.27	29	.23	-13	.22	-11	.22	30	.22
CG-04	903- 952	16	.36	12	.34	-14	.32	-1	.26	-13	.26	-52	.26	-5	.25	43	.25	-9	.24	17	.22	-56	.22
CG-04	928- 977	-1	.33	-73	.32	12	.31	16	.25	17	.24	-69	.23	-52	.22	-18	.21	-6	.21	14	.20	-36	.19
CG-04	951-1000	-101	.48	-37	.37	-18	.31	-1	.28	-63	.24	-36	.23	-31	.23	-12	.22	-11	.22	-57	.21	-41	.20
CG-09	877- 926	0	.56	-23	.30	8	.29	77	.28	27	.27	26	.24	-18	.23	51	.22	73	.20	33	.20	-4	.20
CG-09	902- 951	0	.48	25	.35	-39	.29	-1	.28	28	.24	46	.24	1	.24	52	.23	51	.23	-57	.22	26	.21
CG-09	927- 976	0	.63	-66	.37	-44	.31	-25	.27	-84	.27	17	.23	-1	.23	-27	.21	26	.21	-19	.20	-83	.20
CG-09	951-1000	0	.74	-44	.37	-100	.34	-66	.34	-81	.31	-34	.24	-83	.22	-14	.20	-51	.19	-17	.19	-19	.18
CG-10	843- 892	0	.75	108	.35	83	.31	47	.30	23	.30	78	.29	104	.20	43	.19	38	.19	35	.17	4	.17
CG-10	868- 917	0	.60	30	.30	66	.30	4	.26	-17	.25	-19	.25	27	.24	55	.23	8	.22	23	.22	16	.22
CG-10	893- 942	0	.57	30	.31	25	.30	-19	.28	5	.27	52	.26	-38	.22	-39	.21	55	.20	-17	.19	51	.17
CG-10	918- 967	0	.58	25	.42	-31	.33	-61	.31	-70	.27	-45	.27	13	.27	-25	.26	-1	.25	-56	.25	-60	.22
CG-10	943- 992	0	.71	-30	.39	-70	.36	-49	.29	-45	.25	-44	.25	-31	.25	-96	.23	-18	.22	-23	.21	-25	.20
CG-10	951-1000	0	.69	-70	.37	-30	.33	-45	.33	-86	.28	-108	.27	-44	.22	-90	.22	-26	.21	-31	.18	-100	.17
CG-12	882- 931	0	.70	-30	.35	-12	.28	56	.27	55	.25	32	.25	-8	.24	-22	.22	10	.22	52	.20	-14	.19
CG-12	907- 956	0	.43	-22	.38	-30	.37	-37	.31	44	.27	-52	.26	-54	.25	-38	.24	25	.23	10	.23	-7	.21
CG-12	932- 981	0	.49	-30	.37	-74	.35	-86	.27	-4	.25	-29	.23	-77	.22	23	.21	13	.21	-54	.20	-52	.19
CG-12	951-1000	0	.66	-100	.45	-4	.32	-29	.30	-95	.29	-30	.25	-44	.24	-73	.22	-34	.22	-74	.21	-60	.19
CG-13	867- 916	0	.38	-23	.33	-18	.29	55	.27	47	.23	10	.21	81	.21	22	.21	85	.20	-4	.19	62	.19
CG-13	892- 941	0	.41	-16	.29	-1	.26	9	.25	8	.24	-47	.23	53	.22	-21	.22	60	.20	37	.20	44	.19
CG-13	917- 966	0	.59	-55	.35	8	.27	25	.24	-2	.22	26	.21	-47	.21	-40	.20	23	.18	-70	.17	-37	.16
CG-13	942- 991	0	.69	-31	.34	-43	.30	-27	.24	-89	.22	-48	.22	-83	.21	-70	.20	-3	.19	-99	.19	-18	.19
CG-13	951-1000	0	.69	-52	.30	-31	.28	-27	.26	-30	.25	-86	.24	-45	.22	-43	.21	-99	.21	-70	.21	-60	.21
CG-14	883- 932	1	.51	64	.40	39	.29	20	.28	71	.27	8	.27	41	.25	-38	.23	47	.23	-22	.22	-39	.22
CG-14	908- 957	1	.59	-25	.40	45	.34	-44	.32	47	.31	20	.26	-65	.26	5	.26	-6	.26	-61	.22	-29	.21
CG-14	933- 982	1	.69	-24	.53	-67	.36	-84	.33	-49	.26	-51	.26	7	.26	-50	.25	-25	.25	-44	.24	-89	.22
CG-14	951-1000	1	.50	-89	.41	-24	.36	-44	.29	-51	.28	-90	.27	-108	.27	-103	.26	-29	.21	-16	.21	-84	.20
CG-15	864- 913	4	.55	-19	.29	66	.26	76	.19	59	.19	16	.18	27	.18	-1	.17	67	.16	36	.16	42	.16
CG-15	889- 938	4	.60	9	.29	-39	.28	-43	.27	54	.25	34	.25	29	.24	-42	.22	39	.21	10	.19	-17	.19
CG-15	914- 963	4	.65	-61	.30	34	.27	38	.23	-5	.23	35	.22	-22	.22	-62	.22	9	.22	-21	.21	-39	.21
CG-15	939- 988	4	.57	-81	.34	-48	.31	-41	.30	-62	.28	-92	.26	-40	.24	-95	.24	-58	.20	5	.19	14	.18
CG-15	951-1000	4	.52	-41	.35	-49	.33	-104	.31	-108	.30	-92	.30	-73	.29	-96	.29	-91	.25	-48	.23	-40	.22
CG-17	873- 922	-22	.83	-4	.31	17	.31	-3	.29	44	.28	42	.25	48	.24	63	.24	30	.24	47	.22	-18	.21
CG-17	898- 947	-22	.70	48	.47	18	.31	44	.29	-38	.28	-26	.25	30	.22	-52	.20	-8	.19	-42	.18	24	.18
CG-17	923- 972	-22	.67	-67	.31	24	.29	-52	.28	-1	.27	-44	.26	3	.24	-38	.23	31	.19	-27	.18	-60	.18
CG-17	948- 997	-22	.64	-47	.33	-77	.24	-2	.21	-100	.20	-105	.18	-4	.18	-20	.18	-73	.17	-96	.17	-58	.17
CG-17	951-1000	-22	.64	-47	.28	-2	.26	-96	.22	-100	.20	-84	.20	-77	.20	-65	.20	-29	.20	-105	.20	-73	.19
CG-21	919- 968	0	.47	-6	.39	-46	.36	20	.30	-50	.29	-5	.23	-30	.21	-66	.21	-31	.21	-8	.20	-26	.19
CG-21	944- 993	0	.73	-70	.35	-25	.28	-26	.27	-91	.24	-46	.22	-92	.22	-30	.20	-44	.19	-45	.19	-36	.19
CG-21	951-1000	0	.77	-70	.38	-26	.29	-45	.29	-91	.27	-108	.24	-17	.24	-44	.23	-25	.23	-46	.21	-90	.17
CG-22	872- 921	4	.62	-15	.33	72	.30	70	.26	8	.25	-18	.24	42	.23	47	.22	27	.22	48	.22	-13	.21
CG-22	897- 946	4	.72	29	.37	-3	.32	-48	.27	49	.26	48	.26	47	.25	-28	.25	-26	.24	57	.22	27	.20
CG-22	922- 971	4	.84	-21	.37	-26	.36	29	.29	-62	.26	-66	.25	-34	.24	-51	.23	19	.19	22	.18	2	.17
CG-22	947- 996	4	.79	-21	.31	-104	.31	-52	.29	0	.28	-26	.28	-34	.27	-40	.26	-85	.26	-89	.25	-81	.25
CG-22	951-1000	4	.80	-21	.32	-89	.30	-26	.30	-104	.29	-41	.28	0	.26	-34	.25	-96	.24	-85	.23	-91	.21

CHART 1B

PART 2: CORRELATIONS WITH CG BLACK ASH FLOATING MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED

32-YEAR CUBIC SPLINE FILTER; CORRELATIONS OF 50-YEAR SEGMENTS LAGGED 25 YEARS

FLAGS: __A = CORRELATION UNDER 0.3281; __B = CORRELATION HIGHER AT OTHER POSITION

ØSEQ	SERIES	INTERVAL		825 850 875 900 925 950 975 1000 1025 1050 1075 1100 1125 1150 1175 1200 1225 1250 1275 1300	FLAGS/ TOTAL
				874 899 924 949 974 999 1024 1049 1074 1099 1124 1149 1174 1199 1224 1249 1274 1299 1324 1349	
1	CG-01	868-1000	=	.26 .26 .42 .77 .60 .58	2/ 6
+				__A __A	
2	CG-03	885-1000	=	= .41 .43 .47 .41 .41	0/ 5
+					
3	CG-09	877-1000	=	= .40 .34 .48 .64 .64	0/ 5
+					
4	CG-10	851-1000	=	.52 .43 .39 .56 .62 .59	0/ 6
+					
5	CG-12	882-1000	=	= .59 .44 .43 .52 .57	0/ 5
+					
6	CG-13	867-1000	=	.17 .24 .25 .60 .61 .59	3/ 6
+				__B __A __B	
7	CG-14	884-1001	=	= .39 .46 .52 .47 .39	0/ 5
+					
8	CG-15	868-1004	=	.37 .37 .53 .53 .39 .38	0/ 6
+					
9	CG-17	851- 978	=	.53 .50 .55 .50 .51 =	0/ 5
+					
10	CG-21	919-1000	=	= = .36 .52 .68 .70	1/ 4
+				__B	
11	CG-22	876-1004	=	= .50 .56 .80 .75 .74	0/ 5
+					

PART 3: SEGMENTS CORRELATING LOW, OR HIGHER AT OTHER THAN DATED POSITION Tucson-Mendoza-Hamburg-Lamont ProgLib

CORRELATIONS OF 50-YEAR SEGMENTS
FROM TEN YEARS EARLIER (-10) TO TEN YEARS LATER (+10) THAN DATED

SERIES	SEGMENT	HIGH	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
CG-01	868- 917		.08	.04	-.24	.03	.06	.21	.08	.01	-.11	.02	.26	.07	-.13	-.28	.14	.02	-.17	-.10	.26	-.19	-.19
+		0											<—>										
CG-01	875- 924		-.13	-.04	.05	-.02	-.04	-.25	.25	.18	.17	.08	.26	.06	-.10	-.22	.14	-.06	-.18	-.07	.23	-.18	-.16
+		0											<—>										
CG-13	867- 916		-.27	.04	.10	.00	.10	.06	.21	-.21	-.20	.02	.17	-.16	-.11	.00	.07	.07	.15	-.10	-.01	-.17	.20
+		-4							<—>				—										
CG-13	875- 924		-.30	-.08	.05	-.17	.05	-.04	.06	-.31	-.09	.16	.24	-.06	.03	.08	.16	.07	.05	-.14	.06	-.04	.21
+		0											<—>										
CG-13	900- 949		-.18	-.01	.10	-.12	.18	-.03	-.07	-.12	.00	.18	.25	.15	-.12	-.16	-.05	-.04	-.05	.16	.27	.24	-.03
+		8											—								<—>		
CG-21	919- 968		.01	-.16	.20	.16	.43	.25	.12	-.12	-.03	.02	.36	-.12	-.02	-.14	-.14	.04	-.04	-.11	-.08	.01	-.20
+		-6					<—>						—										

CHART 2

PART 2: CORRELATIONS WITH CG WHITE PINE FLOATING MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED

32-YEAR CUBIC SPLINE FILTER; CORRELATIONS OF 50-YEAR SEGMENTS LAGGED 25 YEARS

FLAGS: _A = CORRELATION UNDER 0.3281; _B = CORRELATION HIGHER AT OTHER POSITION

0SEQ	SERIES	INTERVAL	875 900 925 950 975 1000 1025 1050 1075 1100 1125 1150 1175 1200 1225 1250 1275 1300 1325 1350	FLAGS/ TOTAL
			924 949 974 999 1024 1049 1074 1099 1124 1149 1174 1199 1224 1249 1274 1299 1324 1349 1374 1399	
1	CG-02	901- 991	= .30 .58 .41 =	1/ 3
+			___A	
2	CG-05	929- 991	= = .51 .57 =	0/ 2
+				
3	CG-23	901-1000	= .50 .63 .60 .63	0/ 4
+				
4	CG-24	909-1000	= .57 .41 .48 .51	0/ 4
+				

PART 3: SEGMENTS CORRELATING LOW, OR HIGHER AT OTHER THAN DATED POSITION Tucson-Mendoza-Hamburg-Lamont ProgLib

CORRELATIONS OF 50-YEAR SEGMENTS
FROM TEN YEARS EARLIER (-10) TO TEN YEARS LATER (+10) THAN DATED

SERIES	SEGMENT	HIGH	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
CG-02	901- 950		-.03	.01	.07	-.01	.06	-.04	.07	-.26	-.05	.08	.30	-.02	.10	-.03	-.22	.21	.01	-.15	-.01	-.12	.26
+		0											<-->										

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES Tucson-Mendoza-Hamburg-Lamont ProgLib

CG WHITE PINE VS CG WHITE PINE ALIGNED
50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	CORR ADD # 1	CORR ADD # 2	CORR ADD # 3	CORR ADD # 4	CORR ADD # 5	CORR ADD # 6	CORR ADD # 7	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
CG-02	886- 935	-9 .89	65 .36	25 .29	22 .25	13 .24	39 .23	8 .22	31 .17	9 .17	53 .15	42 .15
CG-02	911- 960	-9 .62	25 .38	20 .38	5 .23	39 .22	-4 .20	17 .20	36 .17	1 .15	-24 .14	-26 .14
CG-02	936- 985	-9 .73	-38 .33	-43 .31	-7 .28	-12 .25	9 .24	-11 .24	-4 .22	-29 .21	-55 .21	-40 .18
CG-02	951-1000	-9 .65	-43 .27	-28 .26	-7 .24	-29 .23	-11 .22	-12 .20	-52 .19	-27 .18	-10 .18	-74 .18
CG-05	938- 987	-9 .70	-38 .40	-4 .36	-28 .23	-43 .22	-60 .18	-33 .17	-51 .14	-14 .13	-34 .12	-45 .11
CG-05	951-1000	-9 .75	-38 .32	-4 .29	-60 .24	-33 .18	-54 .18	-7 .17	-71 .17	-43 .17	-65 .15	-67 .14
CG-06	882- 931	5 .35	50 .30	45 .25	69 .25	51 .24	26 .22	22 .22	33 .21	11 .20	-1 .17	4 .15
CG-06	907- 956	22 .32	13 .26	18 .26	2 .23	39 .23	21 .20	-1 .20	33 .19	5 .18	23 .17	-16 .16
CG-06	932- 981	-52 .42	-10 .33	15 .29	-30 .27	17 .26	11 .25	-41 .25	13 .24	-12 .23	-42 .20	-34 .19
CG-06	951-1000	-12 .35	-52 .34	-30 .32	-18 .27	-38 .26	-32 .21	-14 .19	-5 .18	-64 .18	-4 .18	-35 .17
CG-07	914- 963	-23 .31	28 .30	15 .24	-1 .23	-12 .22	-17 .22	17 .21	4 .19	22 .18	-8 .18	-36 .18
CG-07	939- 988	-5 .42	-25 .37	-23 .35	-59 .34	-4 .33	-37 .28	-3 .27	6 .24	-39 .19	-51 .18	10 .12
CG-07	951-1000	-25 .40	-5 .39	-4 .38	-59 .32	-23 .27	-69 .21	-68 .20	-3 .20	-37 .20	-26 .17	-53 .14
CG-16	900- 949	15 .29	3 .24	-18 .23	44 .21	-6 .18	43 .18	1 .17	25 .17	11 .17	13 .17	-9 .16
CG-16	925- 974	-9 .38	-4 .27	19 .25	-35 .24	-1 .23	-13 .22	-12 .21	16 .21	-24 .19	-21 .17	-6 .17
CG-16	950- 999	-66 .30	-12 .27	-57 .27	-55 .27	-35 .25	-37 .22	-6 .22	-11 .22	-15 .19	-49 .18	-73 .18
CG-16	951-1000	-57 .30	-66 .27	-12 .26	-37 .26	-35 .25	-55 .24	-6 .24	-11 .22	-40 .20	-15 .19	-26 .19
CG-23	901- 950	0 .82	45 .35	43 .34	-22 .32	47 .25	-9 .21	9 .20	49 .19	34 .16	-20 .16	33 .15
CG-23	926- 975	0 .84	1 .30	-31 .28	6 .26	-42 .19	-5 .18	20 .17	-28 .17	-48 .14	5 .12	-34 .11
CG-23	951-1000	0 .86	-28 .43	-73 .34	-45 .27	-74 .27	-23 .25	-27 .25	-47 .20	-25 .17	-29 .16	-65 .14
CG-24	909- 958	0 .83	31 .33	-22 .27	29 .20	24 .19	-31 .18	-9 .17	-12 .17	34 .16	-14 .15	22 .14
CG-24	934- 983	0 .70	-1 .42	-24 .30	-34 .27	-2 .25	-20 .23	-48 .21	-54 .20	-23 .18	-5 .17	1 .15
CG-24	951-1000	0 .74	-74 .29	-1 .23	-2 .21	-47 .21	-54 .21	-23 .20	-45 .18	-21 .17	-57 .16	-6 .15

CHART 3

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES — Tucson-Mendoza-Hamburg-Lamont ProgLib

CG WHITE PINE VS SO VT WHITE PINE
50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	CORR ADD # 1	CORR ADD # 2	CORR ADD # 3	CORR ADD # 4	CORR ADD # 5	CORR ADD # 6	CORR ADD # 7	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
CG-02	886- 935	652 .46	722 .39	806 .36	823 .34	857 .32	880 .31	709 .29	886 .28	767 .28	779 .28	859 .26
CG-02	911- 960	806 .54	840 .39	631 .38	768 .32	855 .32	808 .32	728 .32	857 .32	710 .31	624 .31	688 .30
CG-02	936- 985	806 .58	857 .48	862 .36	830 .35	743 .31	777 .30	676 .30	855 .30	576 .29	717 .28	835 .27
CG-02	951-1000	597 .39	680 .34	830 .32	581 .31	806 .31	758 .30	659 .29	694 .28	774 .26	842 .26	808 .25
CG-05	938- 987	806 .44	578 .41	777 .31	719 .30	857 .30	750 .29	784 .28	694 .26	833 .26	772 .24	831 .23
CG-05	951-1000	806 .50	750 .37	784 .34	725 .29	748 .29	808 .27	833 .27	578 .26	726 .26	759 .25	772 .25
CG-06	882- 931	780 .49	683 .41	703 .34	656 .32	664 .30	676 .29	916 .29	776 .27	799 .27	843 .27	886 .26
CG-06	907- 956	780 .38	689 .33	839 .29	846 .29	683 .28	833 .27	703 .26	707 .25	656 .25	884 .24	862 .24
CG-06	932- 981	780 .38	862 .37	675 .35	854 .34	758 .33	618 .30	646 .29	627 .28	805 .28	650 .28	620 .28
CG-06	951-1000	679 .40	780 .38	621 .32	717 .32	736 .28	620 .28	639 .28	576 .27	691 .26	675 .26	718 .25
CG-07	914- 963	814 .43	666 .39	832 .39	881 .38	830 .38	731 .37	809 .37	696 .34	625 .33	645 .33	843 .33
CG-07	939- 988	666 .43	603 .37	718 .32	836 .30	780 .29	731 .29	634 .28	837 .27	769 .27	701 .27	680 .26
CG-07	951-1000	701 .49	666 .38	560 .37	562 .35	790 .33	836 .32	789 .31	571 .30	600 .30	660 .29	680 .28
CG-16	900- 949	611 .40	758 .37	751 .31	693 .28	883 .27	828 .27	650 .27	770 .27	636 .26	666 .26	830 .26
CG-16	925- 974	780 .36	629 .33	809 .33	622 .29	611 .28	791 .25	726 .25	647 .25	775 .24	668 .23	860 .23
CG-16	950- 999	742 .45	809 .42	573 .36	613 .32	780 .32	699 .31	584 .31	629 .31	831 .30	690 .30	833 .29
CG-16	951-1000	742 .43	809 .41	629 .33	573 .33	690 .31	613 .31	780 .31	831 .31	584 .29	833 .28	699 .28
CG-23	901- 950	817 .38	754 .31	697 .30	884 .28	734 .28	799 .27	623 .27	815 .26	736 .25	826 .24	674 .23
CG-23	926- 975	815 .45	841 .44	866 .38	587 .36	638 .32	792 .27	867 .27	784 .27	735 .24	728 .24	671 .24
CG-23	951-1000	658 .39	841 .35	839 .30	815 .29	794 .29	722 .28	747 .28	683 .27	607 .27	810 .27	840 .27
CG-24	909- 958	754 .35	841 .34	871 .33	623 .32	844 .30	714 .28	727 .28	815 .27	626 .27	611 .26	607 .25
CG-24	934- 983	769 .36	835 .36	734 .34	691 .32	723 .31	770 .30	768 .29	746 .29	702 .29	680 .29	722 .28
CG-24	951-1000	810 .43	722 .38	770 .36	691 .33	840 .31	723 .31	768 .30	747 .29	841 .28	574 .27	603 .27

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES — Tucson-Mendoza-Hamburg-Lamont ProgLib

CG WHITE PINE VS EASTERN NEW YORK STATE WHITE PINE
50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	CORR ADD # 1	CORR ADD # 2	CORR ADD # 3	CORR ADD # 4	CORR ADD # 5	CORR ADD # 6	CORR ADD # 7	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
CG-02	886- 935	888 .41	806 .40	857 .39	905 .33	840 .33	722 .32	736 .31	886 .31	753 .29	709 .26	740 .24
CG-02	911- 960	806 .47	728 .42	658 .40	671 .34	647 .31	808 .30	857 .30	876 .28	854 .28	772 .28	880 .28
CG-02	936- 985	806 .63	777 .38	811 .37	642 .33	626 .30	660 .30	680 .29	759 .29	640 .29	743 .28	852 .27
CG-02	951-1000	806 .45	759 .41	680 .40	777 .39	833 .35	624 .34	719 .33	774 .32	626 .31	825 .30	830 .30
CG-05	938- 987	806 .46	852 .37	759 .35	777 .31	680 .30	719 .28	629 .27	784 .27	642 .27	738 .26	823 .26
CG-05	951-1000	759 .40	806 .38	629 .37	680 .32	719 .28	852 .28	761 .28	613 .27	649 .27	779 .25	807 .24
CG-06	882- 931	780 .59	833 .36	819 .30	702 .30	909 .29	890 .27	886 .26	814 .25	889 .25	676 .24	863 .24
CG-06	907- 956	780 .44	833 .40	879 .37	733 .37	689 .31	799 .30	763 .29	863 .28	807 .28	885 .26	823 .26
CG-06	932- 981	646 .44	675 .33	780 .28	805 .28	853 .27	863 .26	702 .26	823 .26	727 .22	740 .22	854 .22
CG-06	951-1000	671 .40	736 .34	803 .33	831 .31	783 .31	698 .29	729 .29	805 .28	697 .27	675 .27	717 .26
CG-07	914- 963	666 .61	814 .33	731 .32	859 .32	767 .31	650 .31	832 .29	769 .29	644 .29	709 .28	711 .28
CG-07	939- 988	666 .64	724 .40	718 .30	838 .28	836 .28	684 .27	807 .27	664 .27	630 .26	763 .25	765 .25
CG-07	951-1000	666 .60	724 .45	836 .36	684 .29	807 .29	664 .28	718 .27	646 .27	645 .26	790 .23	701 .23
CG-16	900- 949	758 .46	876 .46	883 .28	830 .28	765 .28	809 .28	796 .27	731 .27	864 .26	706 .26	777 .25
CG-16	925- 974	809 .42	765 .32	668 .30	645 .28	652 .27	791 .25	806 .24	839 .23	654 .23	777 .22	773 .21
CG-16	950- 999	809 .55	645 .51	632 .38	654 .36	676 .33	742 .32	643 .32	697 .32	703 .29	847 .28	817 .28
CG-16	951-1000	809 .55	645 .49	632 .38	654 .36	697 .35	676 .35	643 .31	742 .29	703 .29	710 .28	817 .26
CG-23	901- 950	833 .39	817 .34	687 .32	754 .32	700 .30	815 .30	674 .28	680 .26	846 .25	667 .25	863 .25
CG-23	926- 975	815 .42	689 .42	703 .35	861 .35	747 .33	821 .33	635 .32	671 .29	766 .29	670 .26	802 .26
CG-23	951-1000	816 .38	741 .34	840 .33	810 .33	729 .32	788 .31	623 .29	787 .28	644 .27	625 .26	622 .24
CG-24	909- 958	786 .38	868 .35	824 .32	657 .31	687 .31	781 .30	880 .30	887 .30	653 .28	812 .28	788 .28
CG-24	934- 983	633 .38	634 .35	815 .34	655 .32	669 .31	687 .31	656 .30	666 .29	770 .26	723 .26	866 .25
CG-24	951-1000	729 .39	633 .31	816 .31	623 .30	840 .30	781 .29	763 .29	810 .28	787 .25	666 .24	675 .23

CHART 4

PART 2: CORRELATIONS WITH CG WHITE PINE DATED MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED

32-YEAR CUBIC SPLINE FILTER; CORRELATIONS OF 50-YEAR SEGMENTS LAGGED 20 YEARS

FLAGS: __A = CORRELATION UNDER 0.3281; __B = CORRELATION HIGHER AT OTHER POSITION

0SEQ	SERIES	INTERVAL	1680 1729	1700 1749	1720 1769	1740 1789	1760 1809	1780 1829	1800 1849	1820 1869	1840 1889	1860 1909	1880 1929	1900 1949	1920 1969	1940 1989	1960 2009	1980 2029	2000 2049	2020 2069	2040 2089	2060 2109	FLAGS/ TOTAL
1	CG-02	1716-1806	=	.30	.45	.58	.41	=	=														1/ 4
+				__A																			
2	CG-05	1744-1806	=	=	=	.51	.57	=	=														0/ 2
+																							
3	CG-23	1716-1815	=	.50	.62	.63	.63	=	=														0/ 4
+																							
4	CG-24	1724-1815	=	=	.57	.41	.51	=	=														0/ 3
+																							

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES — Tucson-Mendoza-Hamburg-Lamont ProgLib

CG WHITE PINE VS CG WHITE PINE DATED MASTER
50-YEAR SEGMENTS LAGGED 20 YEARS

SERIES	COUNTED SEGMENT	CORR ADD # 1	CORR ADD # 2	CORR ADD # 3	CORR ADD # 4	CORR ADD # 5	CORR ADD # 6	CORR ADD # 7	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
CG-02	886- 935	806 .89	880 .36	840 .29	837 .25	828 .24	854 .23	823 .22	846 .17	824 .17	868 .15	857 .15
CG-02	906- 955	806 .76	840 .33	835 .29	789 .25	832 .25	860 .22	828 .22	820 .20	800 .20	851 .19	854 .16
CG-02	926- 975	806 .70	811 .33	835 .28	780 .27	803 .25	777 .23	772 .22	837 .21	825 .20	775 .19	801 .19
CG-02	946- 995	806 .71	772 .36	804 .29	803 .24	777 .23	808 .22	805 .22	760 .19	746 .18	786 .16	755 .16
CG-02	951-1000	806 .65	772 .28	787 .26	808 .24	786 .23	804 .22	803 .20	763 .19	788 .18	805 .18	741 .18
CG-05	938- 987	806 .70	777 .40	811 .36	787 .22	772 .22	755 .18	782 .17	764 .14	801 .13	781 .12	770 .11
CG-05	951-1000	806 .75	777 .32	811 .29	755 .24	782 .18	761 .18	808 .17	744 .17	772 .17	750 .15	748 .14
CG-06	882- 931	820 .35	865 .30	860 .25	884 .25	866 .24	841 .22	837 .22	848 .21	826 .20	814 .17	819 .15
CG-06	902- 951	836 .31	837 .29	820 .28	811 .24	792 .23	860 .22	854 .21	833 .21	828 .20	817 .19	814 .16
CG-06	922- 971	836 .26	805 .26	838 .26	781 .25	830 .24	773 .22	828 .22	832 .20	780 .19	785 .19	772 .18
CG-06	942- 991	803 .33	763 .31	797 .26	777 .23	785 .22	805 .20	774 .20	765 .19	757 .18	752 .17	811 .17
CG-06	951-1000	803 .35	763 .34	785 .32	797 .27	777 .26	783 .21	801 .19	810 .18	751 .18	811 .18	780 .17
CG-07	914- 963	792 .31	843 .30	830 .24	814 .23	803 .22	798 .22	832 .21	819 .19	837 .18	807 .18	779 .18
CG-07	934- 983	792 .38	810 .33	790 .32	811 .32	778 .24	776 .22	821 .21	812 .19	758 .18	807 .15	798 .14
CG-07	951-1000	790 .40	810 .39	811 .38	756 .32	792 .27	746 .21	747 .20	812 .20	778 .20	789 .17	762 .14
CG-16	900- 949	830 .29	818 .24	797 .23	859 .21	809 .18	858 .18	816 .17	840 .17	826 .17	828 .17	806 .16
CG-16	920- 969	814 .41	806 .36	834 .27	803 .27	794 .25	778 .21	780 .19	828 .17	788 .17	831 .13	775 .12
CG-16	940- 989	803 .40	780 .35	778 .31	809 .31	760 .24	802 .24	758 .22	800 .22	769 .21	804 .19	814 .17
CG-16	951-1000	758 .30	749 .27	803 .26	778 .26	780 .25	760 .24	809 .24	804 .22	775 .20	800 .19	789 .19
CG-23	901- 950	815 .82	860 .35	858 .34	793 .32	862 .25	806 .21	824 .20	864 .19	849 .16	795 .16	848 .15
CG-23	921- 970	815 .85	835 .29	840 .25	784 .24	813 .20	810 .20	781 .20	807 .18	787 .18	793 .17	795 .15
CG-23	941- 990	815 .85	787 .33	821 .29	816 .24	784 .23	770 .20	791 .19	782 .18	792 .15	817 .15	810 .14
CG-23	951-1000	815 .86	787 .43	742 .34	770 .27	741 .27	792 .25	788 .25	768 .20	790 .17	786 .16	750 .14
CG-24	909- 958	815 .83	846 .33	793 .27	844 .20	839 .19	784 .18	806 .17	803 .17	849 .16	801 .15	837 .14
CG-24	929- 978	815 .70	813 .33	810 .32	814 .30	767 .23	791 .21	784 .20	793 .18	781 .15	836 .14	779 .14
CG-24	949- 998	815 .75	761 .23	794 .21	814 .20	770 .18	813 .18	784 .17	809 .16	795 .16	792 .16	775 .15
CG-24	951-1000	815 .74	741 .29	814 .23	813 .21	768 .21	761 .21	792 .20	770 .18	794 .17	758 .16	809 .15

CHART 5

PART 2: CORRELATIONS WITH CG HEMLOCK FLOATING MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED

32-YEAR CUBIC SPLINE FILTER; CORRELATIONS OF 50-YEAR SEGMENTS LAGGED 25 YEARS

FLAGS: __A = CORRELATION UNDER 0.3281; __B = CORRELATION HIGHER AT OTHER POSITION

0SEQ	SERIES	INTERVAL	775 824	800 849	825 874	850 899	875 924	900 949	925 974	950 999	975 1024	1000 1049	1025 1074	1050 1099	1075 1124	1100 1149	1125 1174	1150 1199	1175 1224	1200 1249	1225 1274	1250 1299	FLAGS/ TOTAL
1	CG-19	811- 987	=	.57	.63	.59	.68	.62	.47	.51	=												0/ 7
+ 2	CG-25	838- 982	=	=	.58	.52	.66	.63	.61	.61	=												0/ 6
+ 3	CG-26	815- 987	=	.44	.51	.48	.63	.49	.44	.61	=												0/ 7
+ 4	CG-27	862- 987	=	=	=	.51	.60	.58	.63	.63	=												0/ 5
+ 5	CG-28	825- 985	=	=	.50	.52	.63	.66	.60	.59	=												0/ 6
+ 6	CG-30	811- 986	=	.36	.52	.59	.53	.49	.53	.64	=												0/ 7

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

Tucson-Mendoza-Hamburg-Lamont ProgLib

CG HEMLOCK VS CG HEMLOCK ALIGNED
50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	ADD # 1	CORR	ADD # 2	CORR	ADD # 3	CORR	ADD # 4	CORR	ADD # 5	CORR	ADD # 6	CORR	ADD # 7	CORR	ADD # 8	CORR	ADD # 9	CORR	ADD #10	CORR	ADD #11	CORR
CG-19	811- 860	0	.83	100	.38	127	.33	50	.32	19	.31	57	.25	25	.24	115	.24	105	.24	113	.22	58	.22
CG-19	836- 885	0	.78	-20	.30	113	.30	-23	.29	112	.28	57	.27	-6	.24	-25	.23	53	.23	-19	.22	55	.22
CG-19	861- 910	0	.79	85	.39	26	.29	57	.28	56	.25	39	.23	-3	.22	30	.21	-58	.21	27	.21	44	.20
CG-19	886- 935	0	.82	56	.39	26	.35	-5	.34	62	.25	42	.25	-30	.21	-42	.20	-31	.20	-12	.20	46	.20
CG-19	911- 960	0	.73	-100	.42	-12	.32	-5	.24	-26	.22	17	.22	27	.21	-9	.20	-88	.20	36	.20	-107	.19
CG-19	936- 985	0	.67	-100	.34	-75	.29	-96	.27	-20	.27	-12	.26	-121	.25	-120	.25	-51	.23	-102	.22	-70	.21
CG-19	951-1000	0	.84	-127	.35	-141	.33	-29	.28	-71	.27	-86	.25	-41	.24	-6	.24	-20	.22	-28	.21	-144	.21
CG-25	856- 905	-18	.73	1	.44	-56	.40	-37	.38	13	.35	-44	.33	32	.32	44	.28	-12	.28	56	.25	27	.22
CG-25	881- 930	-18	.72	13	.45	-75	.43	-68	.36	-37	.31	-43	.29	1	.29	-4	.27	52	.25	-31	.25	-44	.24
CG-25	906- 955	-18	.80	-94	.46	-44	.41	-75	.38	-30	.35	-63	.29	25	.28	13	.25	-101	.25	-1	.24	-92	.22
CG-25	931- 980	-18	.75	-94	.37	-6	.32	-30	.31	-44	.31	-75	.31	-89	.23	-127	.23	-92	.23	-63	.22	-73	.21
CG-25	951-1000	-18	.75	-89	.34	-74	.30	-130	.29	-50	.28	-8	.26	-30	.25	-28	.22	-147	.21	-60	.20	-131	.19
CG-26	828- 877	-13	.68	87	.41	114	.31	4	.28	24	.28	37	.28	115	.27	6	.27	95	.26	29	.24	82	.24
CG-26	853- 902	-13	.70	63	.46	6	.45	37	.36	12	.33	87	.32	-32	.27	51	.27	93	.27	-19	.25	-37	.23
CG-26	878- 927	-13	.69	-63	.41	-69	.36	-44	.31	-38	.30	44	.26	73	.26	37	.24	58	.24	13	.24	31	.23
CG-26	903- 952	-13	.64	-69	.38	-39	.33	45	.32	-96	.31	-44	.28	-38	.26	-27	.25	38	.23	-63	.23	19	.22
CG-26	928- 977	-13	.67	-113	.40	-69	.36	-119	.31	-8	.26	-39	.24	-89	.22	-94	.22	-96	.22	-58	.20	-108	.20
CG-26	951-1000	-13	.75	-140	.40	-119	.33	-145	.27	-64	.25	-113	.24	-19	.24	-96	.23	-138	.23	-69	.21	-121	.20
CG-27	875- 924	-13	.67	45	.38	-55	.32	-10	.31	13	.30	46	.28	29	.26	72	.24	-63	.23	75	.22	-67	.22
CG-27	900- 949	-13	.72	-42	.41	46	.32	-39	.29	17	.29	44	.28	-95	.28	29	.25	-83	.25	43	.24	-63	.24
CG-27	925- 974	-13	.75	-113	.38	-39	.31	-121	.31	-70	.27	4	.23	-54	.23	-12	.22	-96	.20	-98	.20	-124	.20
CG-27	950- 999	-13	.76	-140	.41	-64	.30	-71	.29	-113	.28	-121	.25	-54	.24	-117	.23	-96	.22	-128	.20	-40	.20
CG-27	951-1000	-13	.77	-140	.40	-71	.31	-113	.30	-64	.30	-121	.24	-54	.23	-117	.22	-96	.22	-40	.22	-128	.21
CG-28	840- 889	-15	.63	10	.41	85	.33	42	.29	87	.26	65	.26	35	.25	30	.25	77	.24	14	.22	-9	.21
CG-28	865- 914	-15	.63	42	.43	11	.37	10	.36	-1	.30	-45	.29	85	.27	-34	.27	52	.25	-44	.25	-19	.24
CG-28	890- 939	-15	.72	11	.42	42	.34	-73	.33	-45	.28	43	.22	-20	.22	-29	.21	-90	.20	27	.20	-3	.19
CG-28	915- 964	-15	.74	-41	.44	-110	.43	-54	.38	-10	.36	-53	.32	-28	.31	-71	.27	31	.26	-115	.25	2	.24
CG-28	940- 989	-15	.70	-128	.33	-54	.32	-28	.31	-27	.29	-71	.28	-127	.25	-70	.25	-103	.24	-72	.24	-130	.22
CG-28	951-1000	-15	.68	-71	.42	-85	.32	-128	.31	-54	.31	-152	.28	-130	.27	-127	.25	-121	.24	-28	.23	-103	.21
CG-29	904- 953	-75	.54	-94	.44	33	.34	-1	.31	-77	.29	41	.28	11	.28	-52	.25	-100	.25	25	.25	-56	.24
CG-29	929- 978	-94	.61	-75	.40	-63	.33	-113	.31	-118	.31	-117	.27	-96	.27	-119	.24	-30	.22	-18	.21	10	.21
CG-29	951-1000	-94	.61	-113	.43	-63	.36	-38	.29	-39	.28	-59	.27	-139	.26	-64	.26	-13	.25	-89	.25	-147	.24
CG-30	813- 862	-14	.78	10	.35	-12	.28	30	.27	11	.27	86	.27	69	.26	39	.22	81	.21	31	.20	55	.20
CG-30	838- 887	-14	.75	86	.38	-39	.31	74	.31	11	.30	42	.26	69	.26	-16	.25	113	.25	-33	.24	45	.24
CG-30	863- 912	-14	.74	28	.35	-39	.35	86	.34	-33	.32	67	.25	-8	.25	74	.22	57	.22	-58	.21	-22	.21
CG-30	888- 937	-14	.69	-64	.35	57	.32	63	.28	18	.26	8	.24	-49	.22	-40	.20	31	.18	-33	.18	-70	.18
CG-30	913- 962	-14	.68	-31	.39	-114	.35	-88	.32	-44	.29	27	.28	10	.27	-90	.24	-45	.23	-2	.23	-94	.23
CG-30	938- 987	-14	.72	-57	.41	-114	.41	-31	.35	-88	.34	-131	.30	-46	.28	-56	.27	-72	.25	-71	.23	-44	.21
CG-30	951-1000	-14	.78	-131	.32	-73	.31	-56	.28	-114	.28	-15	.25	-129	.24	-86	.23	-72	.23	-31	.23	-126	.22

CHART 6

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES Tucson-Mendoza-Hamburg-Lamont ProgLib

CG HEMLOCK VS NY-MA-VT HEMLOCK MASTER
50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	ADD # 1	CORR	ADD # 2	CORR	ADD # 3	CORR	ADD # 4	CORR	ADD # 5	CORR	ADD # 6	CORR	ADD # 7	CORR	ADD # 8	CORR	ADD # 9	CORR	ADD #10	CORR	ADD #11	CORR
CG-19	811- 860	836	.57	855	.41	685	.41	949	.39	765	.37	819	.35	990	.35	786	.34	670	.33	1130	.32	1069	.31
CG-19	836- 885	836	.65	949	.45	963	.38	668	.35	749	.33	771	.31	1088	.30	893	.28	948	.28	1079	.27	1065	.26
CG-19	861- 910	836	.65	813	.37	1031	.37	921	.36	892	.33	625	.32	758	.30	1073	.30	893	.29	1061	.28	645	.28
CG-19	886- 935	836	.67	632	.47	1022	.43	973	.41	1031	.37	831	.36	892	.34	727	.34	748	.33	862	.32	630	.31
CG-19	911- 960	836	.51	670	.38	623	.35	714	.35	701	.35	736	.34	731	.34	727	.34	1022	.33	606	.30	882	.30
CG-19	936- 985	836	.53	574	.39	824	.36	952	.31	913	.29	873	.29	816	.29	675	.27	942	.27	1012	.26	766	.26
CG-19	951-1000	836	.63	695	.38	808	.37	994	.36	887	.35	952	.33	513	.33	915	.33	636	.32	558	.31	709	.31
CG-25	856- 905	818	.58	970	.44	837	.41	951	.38	945	.37	646	.36	905	.36	1051	.35	799	.35	881	.30	1028	.29
CG-25	881- 930	818	.59	612	.36	678	.36	832	.34	627	.33	955	.33	1042	.30	659	.30	697	.30	837	.30	645	.29
CG-25	906- 955	818	.62	955	.42	806	.36	683	.36	761	.35	709	.35	614	.34	718	.33	861	.32	792	.30	744	.30
CG-25	931- 980	818	.60	556	.45	709	.43	742	.35	688	.35	946	.34	761	.33	879	.32	863	.31	571	.31	900	.30
CG-25	951-1000	818	.61	556	.48	709	.43	911	.35	806	.32	897	.32	938	.32	687	.28	585	.28	762	.28	705	.28
CG-26	828- 877	823	.58	923	.51	1056	.44	931	.40	752	.40	764	.36	842	.35	810	.33	637	.33	1010	.32	738	.32
CG-26	853- 902	823	.61	899	.47	1043	.41	923	.39	842	.37	650	.37	702	.35	1037	.34	773	.33	637	.33	721	.33
CG-26	878- 927	823	.52	773	.46	622	.40	1042	.40	650	.38	632	.38	1024	.36	880	.34	606	.32	946	.31	682	.31
CG-26	903- 952	823	.45	624	.43	605	.40	652	.40	773	.37	969	.35	930	.33	1002	.32	806	.32	723	.32	632	.31
CG-26	928- 977	823	.55	652	.46	551	.41	723	.34	626	.34	932	.32	658	.31	631	.31	901	.31	1002	.30	624	.30
CG-26	951-1000	823	.66	991	.34	869	.32	652	.31	804	.29	937	.29	630	.29	615	.28	658	.28	939	.27	900	.27
CG-27	875- 924	735	.43	632	.42	823	.37	881	.36	690	.34	1050	.33	650	.33	756	.30	908	.30	799	.29	852	.29
CG-27	900- 949	823	.65	773	.46	882	.43	682	.41	735	.40	603	.39	619	.37	719	.36	880	.35	632	.34	926	.34
CG-27	925- 974	823	.67	723	.47	719	.35	870	.35	652	.31	760	.30	593	.30	992	.29	852	.28	673	.27	869	.26
CG-27	950- 999	823	.57	967	.47	561	.40	715	.39	652	.36	902	.33	505	.31	875	.29	606	.29	760	.29	929	.28
CG-27	951-1000	823	.56	967	.43	561	.40	715	.38	652	.35	631	.32	902	.31	606	.31	875	.30	505	.29	929	.29
CG-28	840- 889	821	.61	921	.39	846	.35	860	.34	742	.33	623	.32	950	.32	659	.31	808	.31	879	.31	700	.31
CG-28	865- 914	821	.62	949	.42	846	.42	878	.38	835	.38	743	.34	980	.33	921	.32	630	.32	611	.32	643	.31
CG-28	890- 939	821	.78	993	.38	1042	.38	878	.37	743	.37	676	.37	924	.34	949	.33	733	.31	893	.31	712	.31
CG-28	915- 964	821	.72	591	.44	650	.41	686	.41	808	.40	795	.38	691	.36	592	.35	1007	.32	745	.32	655	.32
CG-28	940- 989	821	.62	708	.42	691	.39	728	.35	965	.35	841	.32	808	.31	867	.31	559	.30	591	.30	656	.30
CG-28	951-1000	821	.63	559	.39	574	.38	765	.37	942	.34	837	.33	564	.32	989	.31	712	.31	866	.29	592	.29
CG-29	904- 953	761	.44	892	.43	975	.42	588	.42	847	.36	742	.35	993	.33	896	.32	921	.31	721	.30	1033	.30
CG-29	929- 978	742	.48	975	.41	869	.36	761	.36	877	.36	574	.34	1021	.32	640	.32	948	.31	706	.31	875	.30
CG-29	951-1000	742	.48	966	.47	975	.42	723	.40	632	.39	798	.36	551	.32	602	.31	521	.31	879	.30	574	.30
CG-30	813- 862	652	.39	824	.36	767	.35	731	.34	1141	.32	905	.32	1103	.30	979	.30	753	.29	675	.27	1033	.27
CG-30	838- 887	822	.59	1001	.45	922	.42	660	.36	910	.32	1049	.31	763	.30	880	.30	1042	.30	1112	.29	675	.29
CG-30	863- 912	822	.61	922	.52	1001	.47	955	.38	679	.36	781	.36	631	.35	660	.34	695	.33	797	.33	1062	.30
CG-30	888- 937	822	.49	1023	.34	567	.33	722	.32	748	.32	631	.31	663	.31	580	.30	903	.30	919	.30	1046	.30
CG-30	913- 962	822	.52	999	.43	991	.42	722	.39	792	.34	614	.34	805	.31	847	.31	974	.30	550	.30	646	.29
CG-30	938- 987	822	.57	991	.40	779	.39	646	.38	614	.37	792	.37	705	.36	861	.32	722	.32	951	.32	974	.30
CG-30	951-1000	822	.60	560	.41	763	.39	601	.37	575	.36	667	.32	838	.31	651	.31	614	.30	543	.28	878	.28

CHART 7

PART 2: CORRELATIONS WITH CG HEMLOCK MASTER SERIES OF ALL SEGMENTS AS DATED AND MEASURED

32-YEAR CUBIC SPLINE FILTER; CORRELATIONS OF 50-YEAR SEGMENTS LAGGED 25 YEARS

FLAGS: __A = CORRELATION UNDER 0.3281; __B = CORRELATION HIGHER AT OTHER POSITION

0SEQ	SERIES	INTERVAL	1625 1650 1675 1700 1725 1750 1775 1800 1825 1850 1875 1900 1925 1950 1975 2000 2025 2050 2075 2100 1674 1699 1724 1749 1774 1799 1824 1849 1874 1899 1924 1949 1974 1999 2024 2049 2074 2099 2124 2149	FLAGS/ TOTAL
1	CG-19	1647-1823	.57 .61 .65 .62 .63 .53 .51 = =	0/ 7
+				
2	CG-25	1674-1818	= .58 .58 .60 .65 .59 .61 = =	0/ 6
+				
3	CG-26	1651-1823	= .44 .57 .54 .47 .49 .61 = =	0/ 6
+				
4	CG-27	1698-1823	= = .51 .62 .57 .60 .63 = =	0/ 5
+				
5	CG-28	1661-1821	= .50 .64 .60 .66 .65 .59 = =	0/ 6
+				
6	CG-30	1647-1822	.36 .42 .70 .52 .40 .57 .64 = =	0/ 7
+				

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES — Tucson-Mendoza-Hamburg-Lamont ProgLib

CG HEMLOCK VS CG HEMLOCK DATED
50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	CORR ADD # 1	CORR ADD # 2	CORR ADD # 3	CORR ADD # 4	CORR ADD # 5	CORR ADD # 6	CORR ADD # 7	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
CG-19	811- 860	836 .83	936 .38	963 .33	886 .32	855 .31	893 .25	861 .24	941 .24	951 .24	949 .22	894 .22
CG-19	836- 885	836 .78	816 .30	949 .30	813 .29	948 .28	893 .27	830 .24	811 .23	889 .23	817 .22	891 .22
CG-19	861- 910	836 .79	921 .39	862 .29	893 .28	892 .25	875 .23	833 .22	866 .21	778 .21	863 .21	880 .20
CG-19	886- 935	836 .82	892 .39	862 .35	831 .34	898 .25	878 .25	806 .21	794 .20	824 .20	805 .20	882 .20
CG-19	911- 960	836 .73	736 .42	824 .32	831 .24	853 .22	810 .22	863 .21	827 .20	748 .20	872 .20	729 .19
CG-19	936- 985	836 .67	736 .34	761 .29	740 .27	816 .27	824 .26	716 .25	715 .25	785 .23	734 .22	766 .21
CG-19	951-1000	836 .84	709 .35	695 .33	807 .28	765 .27	750 .25	795 .24	830 .24	816 .22	692 .21	808 .21
CG-25	856- 905	818 .73	837 .44	780 .40	799 .38	849 .35	792 .33	868 .32	880 .28	824 .28	892 .25	863 .22
CG-25	881- 930	818 .72	849 .45	761 .43	768 .36	799 .31	793 .29	837 .29	832 .27	888 .25	805 .25	792 .24
CG-25	906- 955	818 .80	742 .46	792 .41	761 .38	806 .35	773 .29	861 .28	849 .25	735 .25	835 .24	823 .22
CG-25	931- 980	818 .75	742 .37	830 .32	806 .31	792 .31	761 .31	747 .23	709 .23	744 .23	773 .22	763 .21
CG-25	951-1000	818 .75	747 .34	762 .30	706 .29	786 .28	828 .26	806 .25	808 .22	689 .21	776 .20	705 .19
CG-26	828- 877	823 .68	923 .41	950 .31	840 .28	860 .28	873 .28	951 .27	842 .27	931 .26	865 .24	918 .23
CG-26	853- 902	823 .70	899 .46	842 .45	873 .36	848 .33	923 .32	804 .27	887 .27	929 .27	817 .25	799 .23
CG-26	878- 927	823 .69	773 .41	767 .36	792 .31	798 .30	880 .26	909 .26	873 .24	894 .24	849 .24	867 .23
CG-26	903- 952	823 .64	767 .38	797 .33	881 .32	740 .31	792 .28	798 .26	809 .25	874 .23	773 .23	855 .22
CG-26	928- 977	823 .67	723 .40	767 .36	717 .31	828 .26	797 .24	747 .22	742 .22	740 .22	778 .20	728 .20
CG-26	951-1000	823 .75	696 .40	717 .33	691 .27	772 .25	723 .24	817 .24	740 .23	698 .23	767 .21	715 .20
CG-27	875- 924	823 .67	881 .38	781 .32	826 .31	849 .30	882 .28	865 .26	908 .24	773 .23	911 .22	769 .22
CG-27	900- 949	823 .72	794 .41	882 .32	797 .29	853 .29	880 .28	741 .28	865 .25	753 .25	879 .24	811 .24
CG-27	925- 974	823 .75	723 .38	797 .31	715 .31	766 .27	840 .23	782 .23	824 .22	740 .20	738 .20	712 .20
CG-27	950- 999	823 .76	696 .41	772 .30	765 .29	723 .28	715 .25	782 .24	719 .23	740 .22	708 .20	777 .20
CG-27	951-1000	823 .77	696 .40	765 .31	723 .30	772 .30	715 .24	782 .23	719 .22	740 .22	796 .22	708 .21
CG-28	840- 889	821 .63	846 .41	921 .33	878 .29	923 .26	901 .26	871 .25	866 .25	913 .24	850 .22	827 .21
CG-28	865- 914	821 .63	878 .43	847 .37	846 .36	835 .30	791 .29	921 .27	802 .27	888 .25	792 .25	817 .24
CG-28	890- 939	821 .72	847 .42	878 .34	763 .33	791 .28	879 .22	816 .22	807 .21	863 .20	746 .20	833 .19
CG-28	915- 964	821 .74	795 .44	726 .43	782 .38	826 .36	783 .32	808 .31	765 .27	867 .26	721 .25	838 .24
CG-28	940- 989	821 .70	708 .33	782 .32	808 .31	809 .29	765 .28	709 .25	766 .25	733 .24	764 .24	706 .22
CG-28	951-1000	**821 .68**	765 .42	751 .32	708 .31	782 .31	684 .28	706 .27	709 .25	715 .24	808 .23	733 .21
CG-29	904- 953	761 .54	742 .44	869 .34	835 .31	759 .29	877 .28	847 .28	784 .25	736 .25	861 .25	780 .24
CG-29	929- 978	742 .61	761 .40	773 .33	723 .31	718 .31	719 .27	740 .27	717 .24	806 .22	818 .21	846 .21
CG-29	951-1000	742 .61	723 .43	773 .36	798 .29	797 .28	777 .27	697 .26	772 .26	823 .25	747 .25	689 .24
CG-30	813- 862	822 .78	846 .35	824 .28	866 .27	922 .27	847 .27	905 .26	875 .22	917 .21	867 .20	891 .20
CG-30	838- 887	822 .75	922 .38	797 .31	910 .31	847 .30	878 .26	905 .26	820 .25	949 .25	803 .24	881 .24
CG-30	863- 912	822 .74	864 .35	797 .35	922 .34	803 .32	903 .25	828 .25	910 .22	893 .22	778 .21	814 .21
CG-30	888- 937	822 .69	772 .35	893 .32	899 .28	854 .26	844 .24	787 .22	796 .20	867 .18	803 .18	766 .18
CG-30	913- 962	822 .68	805 .39	722 .35	748 .32	792 .30	863 .28	846 .27	746 .24	791 .23	834 .23	742 .23
CG-30	938- 987	822 .72	779 .41	722 .41	805 .35	748 .34	705 .30	790 .28	780 .27	764 .25	765 .23	792 .21
CG-30	951-1000	822 .78	705 .32	763 .31	780 .28	722 .28	821 .25	707 .24	750 .23	764 .23	805 .23	710 .22

CHART 8

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

CG OAK VS MIDDLEBURY OAK PROVISIONAL MASTER SUMMARY
50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	CORR ADD # 1	CORR ADD # 2	CORR ADD # 3	CORR ADD # 4	CORR ADD # 5	CORR ADD # 6	CORR ADD # 7	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
CG-20	925- 974	710 .40	810 .39	763 .34	775 .34	620 .31	669 .31	706 .29	719 .29	613 .28	581 .28	823 .27
CG-20	950- 999	788 .47	613 .40	585 .35	714 .32	562 .32	654 .32	721 .28	774 .28	690 .27	582 .26	751 .26
CG-20	951-1000	788 .47	613 .38	585 .36	562 .34	714 .32	654 .31	721 .30	774 .29	690 .28	751 .26	558 .26

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

CG OAK VS SOUTHERN VERMONT OAK MASTER
50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	CORR ADD # 1	CORR ADD # 2	CORR ADD # 3	CORR ADD # 4	CORR ADD # 5	CORR ADD # 6	CORR ADD # 7	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
CG-20	925- 974	797 .38	788 .37	779 .32	690 .32	710 .31	775 .28	801 .27	763 .27	729 .24	822 .24	762 .24
CG-20	950- 999	788 .43	811 .36	654 .36	821 .33	753 .28	719 .27	633 .27	668 .26	761 .23	655 .23	643 .22
CG-20	951-1000	788 .45	811 .37	654 .36	821 .32	753 .28	655 .27	719 .27	633 .26	668 .25	664 .24	761 .23

PART 8: DATE ADJUSTMENT FOR BEST MATCHES FOR COUNTED OR UNKNOWN SERIES

CG-OAK VS WESTMINSTER, VT OAK MASTER
50-YEAR SEGMENTS LAGGED 25 YEARS

SERIES	COUNTED SEGMENT	CORR ADD # 1	CORR ADD # 2	CORR ADD # 3	CORR ADD # 4	CORR ADD # 5	CORR ADD # 6	CORR ADD # 7	CORR ADD # 8	CORR ADD # 9	CORR ADD #10	CORR ADD #11
CG-20	925- 974	788 .42	779 .39	775 .37	797 .33	763 .25	784 .24	820 .23	822 .21	823 .17	814 .16	762 .16
CG-20	950- 999	788 .50	740 .29	759 .26	761 .22	741 .22	781 .21	731 .19	752 .19	793 .18	795 .17	779 .16
CG-20	951-1000	788 .50	740 .32	741 .28	759 .25	781 .22	761 .20	752 .20	731 .19	793 .18	795 .16	779 .16

The Granger House Project: Archaeology, History, and the Creation of a Community Museum in Castleton, VT

Matthew D. Moriarty and Ellen S. Moriarty

Vermont State University

Castleton Hidden History — Archaeology • Geography • History

A Place to Celebrate and Explore Local History

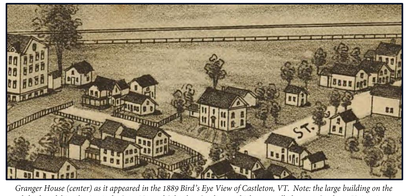
The Castleton Hidden History Project was established in 2021 to highlight a diverse and inclusive history of the town of Castleton, VT, through collaborative and interdisciplinary historical, archaeological, and geographic research. Investigations to date have focused on Granger House, a well-preserved 19th-century home located in the heart of the Vermont State University's Castleton campus, with the goal of creating an interactive community museum dedicated to educational outreach and experiential learning.

Since its inception, the project has emphasized undergraduate involvement through integrated coursework, paid internships, and participation in all aspects of research and museum planning, with the overall goal of increasing student engagement and interest in the humanities. Student interns have collaborated in archaeological excavations, archival research, 3D imaging and modelling, architectural studies, artifact analyses, community outreach, and museum design through coursework and paid internships.

This poster presents the early results of this work and highlights the ways in which collaborative student-oriented research can strengthen curricula, support student engagement, and build connections to the local community through educational outreach. Further, early student outcomes indicate a remarkably positive impact on undergraduate participants.

The Granger House's front (north) façade after completion of the first phase of renovation in Fall 2019.

A virtual reality model of Granger House, ca. 1800, as it appeared on Burlington, VT's NBC5 News. Model prepared by Dr. David Hixson, Jeff DeJarnette, Luke Koshy, and others.



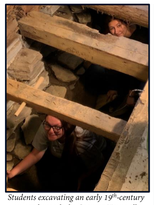
Granger House (center) as it appeared in the 1889 Bird's Eye View of Castleton, VT. Note: the large building on the left edge of this selection is the State Normal School at Castleton, which eventually became Castleton University.

Experiential and Collaborative Learning

The Granger House Project, a subproject of the Castleton Hidden History Project, was developed as a means to strengthen the humanities at Vermont State University by providing abundant opportunities for students to engage in collaborative, place-based research. New project-focused courses in Anthropology, Archaeology, Geography, History, and Museum Studies have trained students in archival research, cultural geography, field archaeology, exhibit development, and educational outreach, with exposure to diverse research methods, including ground-penetrating radar, dendrochronology, GIS spatial analysis, 3D imaging, ceramic analysis, and more.

The first year of the project culminated in a month-long, paid internship in summer 2022 for 25 students sponsored by a grant from the National Endowment for the Humanities. Interns received six academic credits, housing, and a small stipend as part of a field school in History, Archaeology, and Geography. During the internship they participated in archaeological fieldwork, archival research, and other investigations at Granger House while gaining hands-on experience with excavation, drone survey, educational outreach, 3D imaging, and more. Students also helped design the long-term plan for the Granger House Museum and Learning Laboratory through statewide museum visits, local surveys, and participation in strategic planning sessions.

Most of the students in the 2022 humanities field school have continued to contribute to the project through participation in ongoing archaeological research, volunteering as guides during open house events at Granger House, and leadership in educational outreach. Further, more than 50 additional students have completed internships focused on Granger House archaeological fieldwork, artifact analyses, and 3D imaging projects. Many students have also completed external internships with partner organizations focusing on museum cataloging, curation, and exhibit development.



Students excavating an early 19th-century cistern beneath the Granger House ell.

Student intern Devyn Cabral cleaning a whole vessel from Granger House.

Students and faculty at the Vermont State Archives looking for probate records for Granger House.

Students making a detailed architectural plan of Granger House's Thomas R. Dake Staircase.

The Granger House Project has been made possible in part by a major grant from the National Endowment for the Humanities: Sustaining the Humanities through the American Rescue Plan (SHARP) program. We gratefully acknowledge support and consultation from the Vermont Historical Society, the Preservation Trust of Vermont, the Elnu Abenaki, the Vermont Division for Historic Preservation, the Vermont Archaeological Society, and the Vermont Community Foundation. We are also grateful for generous assistance provided by Amanda Gustin, Stephen Perkins, Elizabeth Peebles, Dr. Jess Robinson, Yvonne Benney-Basque, Dr. David Hixson, the Slate Valley Unified School District, and many others. Forthcoming renovations to Granger House are supported by a grant from the Historic Preservation Fund of the National Park Service.

Student Outcomes and Academic Program Growth

The student response to these opportunities has been overwhelmingly positive, with faculty documenting significantly higher levels of course engagement and a notable increase in the quality of student research. Student participants have already presented at five professional conferences, submitted their own research for professional publication, and even developed an on-campus club – the Castleton University Historical Society – to continue their research into the history of the Castleton area.

Participation in the project has also reshaped student perspectives on humanities careers. Prior to 2022, only a small percentage of our programs' graduates considered advanced degrees or humanities careers. Project participation has fundamentally altered student outlook. Since the project inception, 14 student participants have graduated from Vermont State University (VTSU) in the History or Anthropology, Archaeology, and Geography (AAG) programs. Of these, six have been accepted to graduate MA or PhD programs in Archaeology or History. An additional five are currently working for CRM firms, for the National Park Service, or local museums, with many additional participants scheduled to graduate in 2025.

Critically, the Granger House Project has also helped to create important gains in humanities program enrollment. The Anthropology, Archaeology, and Geography program, the VTSU academic program most actively involved in the Granger House Project, has seen a four-fold increase in enrollment since the project's inception. New AAG students consistently point to the program's active field research program and the experiential learning opportunities it offers through the Granger House Project as the primary reason why they have chosen to attend Vermont State University and enroll in the AAG program.

Student interns and faculty supervisors from the 2022 NEH Granger House Project Field School in History, Archaeology, and Geography

Granger House's "Dake Staircase," ca. 1935. Completed in the first quarter of the 19th century by the noted local architect and house-joiner Thomas R. Dake. Historic American Building Survey, Library of Congress.

The Early History of Granger House

Much of the Granger House Project's initial research has focused on the home's earliest sets of residents. Noadiah Granger, an architect-joiner, is credited with building the house ca. 1800; however, in an unusual twist for the time period, the home and its property were legally owned by his wife, Rachel Moulton. Together, Noadiah and Rachel invested significant resources in the house, including an elegant spiral staircase by the noted local architect Thomas R. Dake. A review of Castleton deed records, though, indicates that the family suffered mounting debts, gradually selling off portions of the property between 1826 and 1841.

The next owners, Mary and Almon Warner, a local probate judge, were relatively well off and made lavish improvements to the house. The Warners expanded the kitchen ell and embraced the Greek Revival style through the addition of decorative moldings to the roof, pillars, entablature, windows, and interior doorways. These changes brought the home up to much of its present configuration and were likely accompanied by other significant improvements to the property identified through archaeological investigations (discussed below).

After a three-year ownership by Helen Howe, the home was purchased by Robert Maranville, a Vermonter returning to the state following terms as principal of the Fort Valley Male Academy and as a professor at Furlow Masonic College in Georgia. Maranville was an entrepreneur, first helping to advertise his brother Galusha's patented calendar clock, but later switching to patent medicine. From 1871 to 1872, Maranville produced and distributed his "Cherokee Balsam" patent medicine from the house. Although not critical to the physical structure of the house, the Maranville occupancy provides an interesting snapshot into the self-enterprising industries of post-Civil War Vermont.

Granger House Owners and Major Residents	
Noadiah & Rachel Granger	1800 – 1841
Almon & Mary Warner	1841 – 1865
Helen M. Howe	1865 – 1868
Robert Emmet Maranville	1868 – 1873
Henry & Elanor Lathrop	1873 – 1899
Mary P. Hitt	1899 – 1925
Raymond & Florence Ransom	1925 – 1956
Paul & Natalie Sweitzer	1956 – 1987
Mark Reinfurt	1987 – 2012
Vermont State Colleges	2012 – pres.

Surviving paper label for R.E. Maranville's Cherokee Balsam, ca. 1870-1872

The division of the Granger property from initial construction of the house to its purchase by the Warner family in 1841. Part of an animated GIS map prepared by Castleton student Willow Hogan.

Student interns excavating a brick walkway and possible privy outside Granger House.

Student interns and volunteers participating in archaeological investigations at Granger House.

The slate capstones for an 1,100-gallon cistern revealed by excavations south of the Granger House ell.

Archaeological Investigations at Granger House

Archaeological investigations at Granger House were initiated in 2019 as part of a renovation project designed to address long-term maintenance issues and to restore elements of the home's key architectural features, including its Greek Revival façade. Initial archaeological work focused on areas impacted by renovation work, including the rear entrance and kitchen garden as well as the area beneath the home's badly deteriorated ell.

In 2022, the overall focus of fieldwork shifted to examining household activities in relation to the home's sequence of owners while continuing to explore areas likely to be impacted by renovation work. This research is being conducted in conjunction with an archaeological field school and is aided by ground-penetrating radar survey.

These investigations highlight features that supplement our knowledge of the home's owners. Excavations beneath the ell documented a large (ca. 700-gallon) but expediently-made cistern, likely dating to the Granger phase. This was later supplanted by a much larger (ca. 1,100-gallon) masonry-lined cistern just to the south and likely dating to the Warner phase. Other features, including an early driveway, document major investments in the home.

This work is also leading to the recovery of rich household refuse, including personal items like bone toothbrushes, buttons, medicine bottles, and smoking pipes. Recovered ceramics include examples of expensive and decorated service vessels and significant quantities of imported wares, supporting the interpretation, derived from documentary sources, that the home's residents utilized various media to demonstrate their elevated status.

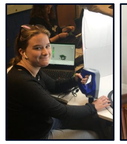
"Cough Killer" patent medicine bottle recovered in excavations.

Hand painted pearlware dish recovered in excavations.

Documenting the Past in 3D

To make the Granger House Project's results accessible to a wide range of audiences, students and faculty are 3D scanning a large sample of Granger House artifacts and features in collaboration with VTSU's Castleton Innovation Lab. Highly accurate 3D models of artifacts are 3D printed to provide haptic learning opportunities for K-12 outreach and for visually impaired visitors. 3D models are also being used in the preparation of an augmented reality model of Granger House that will allow visitors to experience the home at different points in time.

3D models of Granger House artifacts are posted to the Vermont State University Digital Archaeology Project page on Sketchfab.com (see QR code below) as soon as they are available. Models are freely downloadable, high resolution, and can be easily formatted to print on all 3D printers.



Student interns using an Artec Spider to 3D scan local artifacts (left) and an Artec Leo to 3D scan Granger House's Dake staircase (center). QR link (right) to the Vermont State University Digital Archeology Project on Sketchfab.com.

A sampling of the 3D models of Granger House artifacts available for download through the Vermont State University (previously Castleton University) Digital Archaeology Project on Sketchfab.

5th grade students counting and weighing coal, brick, and slate from Granger House excavations.

Chief Roger Longtoe Sheehan of the Elnu Abenaki shares items of material culture.

Museum Creation and Community Outreach

The ultimate goal of the Granger House Project is to create a vibrant museum of local history where humanities students can demonstrate their skills and gain valuable experience as researchers, educators, curators, and exhibit designers. Student interns have completed intensive coursework in museum management and exhibit design with staff from the Vermont Historical Society. The museum's first interactive displays and exhibits, designed through these experiences, are in production and will be installed later this year.

The museum's mission is also focused on providing engaging learning opportunities for local K-12 students. Since 2022, the project has hosted more than 450 students and educators on field trips to Granger House. Field trips begin with a welcome to the site by Roger Longtoe Sheehan, chief of the Elnu Abenaki (one of the Native groups with homelands in the Castleton region) including traditional stories, songs, and sharing cultural items. Guided by VTSU student interns and project staff, K-12 students then rotate through stations where they participate in active archaeological excavations, artifact analysis, and interactive tours of Granger House.

Surveys administered to students following their field trips indicate that these outreach efforts are impactful. Students as young as 9 are able to make compelling and in-depth connections between the tasks of archaeology and the world they live in; they see that utilizing the fields of archaeology and history to investigate the past allows us to better understand the present and plan for the future. The surveys also clearly demonstrate the power of presenting Native voices, with many students citing this part of the experience as a highlight. Future museum outreach programming will build on this strong foundation by partnering with local school districts and other organizations to institutionalize annual programming at the house and in collaboration with the local Native American community.

5th grade students learn excavation techniques from VTSU field school graduate Nina Neptune.

VTSU intern Luke Koshy leads a tour of Granger House.

Student interns learning to use Ground Penetrating Radar.

K-12 students learning about Abenaki history.

Prospects for the Future

The initial work undertaken by the Granger House Project highlights the rich potential and diverse opportunities created by local, collaborative, place-based research as a feature of undergraduate humanities training on a college campus. Students involved in the project have demonstrated a remarkable range of skills and engagement through their participation in professional research and public outreach, and many have utilized their experiences as a successful springboard into careers and further education.

As humanities programs across the country face significant cuts due to the perception that they do not provide necessary skills and career-ready training, the success of the Granger House Project provides a critical counterpoint. The launch of the museum, facilitated by forthcoming renovations sponsored by the National Park Service, will further strengthen training in the humanities at Vermont State University and deepen connections to the local community.

Castleton Hidden History — Archaeology • Geography • History

For more information, including regular updates and volunteer and research opportunities, find us on Facebook:

Castleton University 1787 — Vermont State University

On July 1, 2023, Castleton University became part of the new Vermont State University. For more information about program options related to Granger House, find us in the new Vermont State University Anthropology, Archaeology, and Geography program.

Salary Table 2025-BOS

Incorporating the 1.7% General Schedule Increase and a Locality Payment of 32.58%

For the Locality Pay Area of Boston-Worcester-Providence, MA-RI-NH-CT-ME-VT

Total Increase: 2.17%

Effective January 2025

Hourly Basic (B) Rates by Grade and Step
Hourly Title 5 Overtime (O) Rates for FLSA-Exempt Employees by Grade and Step

Grade	B/O	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9	Step 10
1	B	$ 14.20	$ 14.68	$ 15.15	$ 15.62	$ 16.09	$ 16.37	$ 16.84	$ 17.31	$ 17.33	$ 17.77
	O	*21.30*	*22.02*	*22.73*	*23.43*	*24.14*	*24.56*	*25.26*	*25.97*	*26.00*	*26.66*
2	B	15.97	16.35	16.88	17.33	17.52	18.04	18.55	19.07	19.58	20.10
	O	*23.96*	*24.53*	*25.32*	*26.00*	*26.28*	*27.06*	*27.83*	*28.61*	*29.37*	*30.15*
3	B	17.43	18.01	18.59	19.17	19.75	20.33	20.91	21.49	22.07	22.65
	O	*26.15*	*27.02*	*27.89*	*28.76*	*29.63*	*30.50*	*31.37*	*32.24*	*33.11*	*33.98*
4	B	19.56	20.22	20.87	21.52	22.17	22.83	23.48	24.13	24.78	25.43
	O	*29.34*	*30.33*	*31.31*	*32.28*	*33.26*	*34.25*	*35.22*	*36.20*	*37.17*	*38.15*
5	B	21.89	22.62	23.35	24.08	24.80	25.53	26.26	26.99	27.72	28.45
	O	*32.84*	*33.93*	*35.03*	*36.12*	*37.20*	*38.30*	*39.39*	*40.49*	*41.58*	*42.68*
6	B	24.40	25.21	26.02	26.84	27.65	28.46	29.28	30.09	30.90	31.72
	O	*36.60*	*37.82*	*39.03*	*40.26*	*41.48*	*42.69*	*43.92*	*45.14*	*46.35*	*47.58*
7	B	27.11	28.02	28.92	29.82	30.73	31.63	32.54	33.44	34.34	35.25
	O	*40.67*	*42.03*	*43.38*	*44.73*	*46.10*	*47.45*	*48.81*	*50.16*	*51.51*	*52.88*
8	B	30.03	31.03	32.03	33.03	34.03	35.03	36.03	37.03	38.04	39.04
	O	*45.05*	*46.55*	*48.05*	*49.55*	*51.05*	*52.55*	*54.05*	*54.78*	*54.78*	*54.78*
9	B	33.16	34.27	35.37	36.48	37.59	38.69	39.80	40.90	42.01	43.11
	O	*49.74*	*51.41*	*53.06*	*54.72*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*
10	B	36.52	37.74	38.95	40.17	41.39	42.61	43.82	45.04	46.26	47.48
	O	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*
11	B	40.13	41.46	42.80	44.14	45.47	46.81	48.15	49.49	50.82	52.16
	O	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*
12	B	48.09	49.70	51.30	52.90	54.51	56.11	57.71	59.32	60.92	62.52
	O	*54.78*	*54.78*	*54.78*	*54.78*	*54.78*	*56.11*	*57.71*	*59.32*	*60.92*	*62.52*
13	B	57.19	59.10	61.00	62.91	64.82	66.72	68.63	70.53	72.44	74.35
	O	*57.19*	*59.10*	*61.00*	*62.91*	*64.82*	*66.72*	*68.63*	*70.53*	*72.44*	*74.35*
14	B	67.58	69.83	72.09	74.34	76.59	78.84	81.10	83.35	85.60	87.85
	O	*67.58*	*69.83*	*72.09*	*74.34*	*76.59*	*78.84*	*81.10*	*83.35*	*85.60*	*87.85*
15	B	79.49	82.14	84.79	87.44	90.09	92.74	93.53	93.53	93.53	93.53
	O	*79.49*	*82.14*	*84.79*	*87.44*	*90.09*	*92.74*	*93.53*	*93.53*	*93.53*	*93.53*

* Rate limited to the rate for level IV of the Executive Schedule (5 U.S.C. 5304 (g)(1)).

Applicable locations are shown on the 2025 Locality Pay Area Definitions page:
https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/2025/locality-pay-area-definitions/

Salary Table 2025-BOS
Incorporating the 1.7% General Schedule Increase and a Locality Payment of 32.58%
For the Locality Pay Area of Boston-Worcester-Providence, MA-RI-NH-CT-ME-VT
Total Increase: 2.17%
Effective January 2025

Annual Rates by Grade and Step

Grade	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9	Step 10
1	$ 29,645	$ 30,639	$ 31,624	$ 32,607	$ 33,590	$ 34,166	$ 35,142	$ 36,124	$ 36,164	$ 37,083
2	33,333	34,126	35,230	36,164	36,570	37,645	38,720	39,795	40,870	41,946
3	36,372	37,584	38,796	40,007	41,219	42,431	43,643	44,854	46,066	47,278
4	40,828	42,190	43,551	44,913	46,274	47,636	48,998	50,359	51,721	53,082
5	45,679	47,201	48,723	50,245	51,767	53,289	54,811	56,333	57,855	59,377
6	50,920	52,617	54,314	56,011	57,708	59,405	61,102	62,799	64,496	66,193
7	56,584	58,470	60,357	62,244	64,130	66,017	67,903	69,790	71,677	73,563
8	62,664	64,753	66,843	68,932	71,022	73,111	75,201	77,290	79,380	81,469
9	69,213	71,520	73,827	76,134	78,441	80,748	83,055	85,362	87,669	89,975
10	76,219	78,759	81,299	83,840	86,380	88,920	91,460	94,001	96,541	99,081
11	83,742	86,532	89,323	92,114	94,905	97,696	100,486	103,277	106,068	108,859
12	100,371	103,717	107,064	110,410	113,756	117,103	120,449	123,795	127,142	130,488
13	119,355	123,334	127,313	131,291	135,270	139,249	143,227	147,206	151,185	155,164
14	141,041	145,743	150,444	155,145	159,846	164,548	169,249	173,950	178,652	183,353
15	165,901	171,431	176,961	182,491	188,021	193,551	195,200 *	195,200 *	195,200 *	195,200 *

* Rate limited to the rate for level IV of the Executive Schedule (5 U.S.C. 5304 (g)(1)).

Applicable locations are shown on the 2025 Locality Pay Area Definitions page:
https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/2025/locality-pay-area-definitions/

At-a-Glance

STYLE GUIDE

Vermont State University

To maintain consistency across all Vermont State University communications, the Vermont State Office of Marketing & Communications has adopted the following conventions for commonly used elements of written communications. Please follow these conventions in all communications you produce on behalf of the university.

Use of **Vermont State University**

Use the full name of the institution upon first mention in all communications. Use of **Vermont State** in subsequent mentions is preferred over **VTSU**, except in communications where Vermont State would be used repeatedly.

REMEMBER

First *Vermont State University*
then *Vermont State*
then *VTSU*

Vermont State University is a single institution with campuses in Castleton, Johnson, Lyndon, Randolph, and Williston, Vermont and learning centers across the state and beyond.

Vermont State offers more than 100 degree programs, and many are available in flexible formats for a variety of learning preferences. VTSU Admissions counselors are ready to answer all of your questions!

Refer to the physical campuses in **three ways**

1. Students on the **Vermont State University Johnson** campus enjoyed an outside concert Friday night.

2. **Vermont State Johnson** students enjoyed

3. **VTSU Johnson** students enjoyed

NOTE: We **do not use a hyphen** between Vermont State and the campus name.

✓ Vermont State Castleton
✓ VTSU Lyndon

✗ Vermont State University – Randolph
✗ Vermont State - Williston

Use of **Athletic Team Names**

There are three naming conventions used to refer to the athletic teams:

1. Vermont State + Campus + Mascot
Vermont State Castleton Spartans

2. VTSU + Campus + Mascot
VTSU Johnson Badgers

3. VTSU + Mascot
VTSU Knights

NOTE: We **do not use a hyphen** between Vermont State and the campus name or mascot name.

Use of **the word "university"**

When referring to the university in general, **use a lowercase "u"** rather than a capital "U."

EXAMPLE:

The **university** is committed to providing students with holistic support to achieve their personal, educational, and professional goals.

Vermont State **Web Address**

Capitalize the first letters in the institution name in the web address. Capitalize the first letter of any word/words that follow the slash in the web address. **Do not use www. or http:// in front of the web address.**

✓ VermontState.edu/Apply
✗ http://www.vermontstate.edu/apply

At-a-Glance

STYLE GUIDE

Vermont State University

Telephone Numbers

Use periods to separate the numbers.

- ✓ **802.555.2141**
- ✗ 802-555-2141 ✗ (802)555-2141 ✗ 1-800-555.2141

Email

Use capital letters for first letter in first and last name. Capitalize the first letters in the name of the university.

- ✓ **Jordan.Jones@VermontState.edu**
- ✗ jordan.jones@vermontstate.edu

Date and Time

Do not add "th" after the number.

- ✓ **February 10**
- ✗ February 10th

Use a.m. and p.m., not am/pm. Include a space between the number and a.m. or p.m.

- ✓ **The show begins at 4:30 p.m. and ends at 8 p.m.**
- ✗ The show begins at 4:30pm and ends at 8pm.

Comma

Vermont State University uses the serial comma. In a sentence containing three or more words or short phrases in a row, use a comma before the final article.

EXAMPLE:

There are many heated arguments, debates, and outright battles over whether to use a comma before the final article in a sentence that contains a list.

Friendships have been rattled, professional relationships have been left in ruins, and whole communities of grammar-focused individuals have crumbled over this contentious issue.

Form Fields

When creating a form, please use sentence case even if the field name is not a complete sentence.

- ✓ First name | Last name
- ✗ First Name | Last Name

Use of Ampersand (&)

Vermont State only uses an ampersand (&) for the word "and" when writing the name of a degree program or concentration in which "and" is part of the degree name and also in writing "and" as part of a department name or staff title that includes "and."

- ✓ **The student is working toward a bachelor's in Performance, Arts & Technology.**
  NOTE: Do not use serial comma when it precedes the & as in this example. It's likely the only exception to the comma rule!
- ✓ **The individual works with University Marketing & Communications.**
- ✗ The student is studying communications & playing soccer.

Capitalization of Degree Name and Concentrations

Always capitalize full degree name regardless of how it is used.

- ✓ **The student is pursuing a degree in Music Business & Industry with a Concentration in Audio Production.**
- ✓ **John is getting his bachelor's in Music Business & Industry.**
- ✗ Lee is getting a degree in music business and industry.
- ✗ The music business & industry faculty are all well-connected in the field.

Non-gendered language/Singular they

Best practice is to avoid gendered language if possible.

EXAMPLES:

Incorrect: A good teacher takes his or her job very seriously.

Undesirable but correct: A good teacher takes their job very seriously.

Best: A good teacher takes the job very seriously.

We suggest rewriting the sentence to avoid the need for a gendered pronoun unless it's precise. However, if there is no way around it, always use "they."