

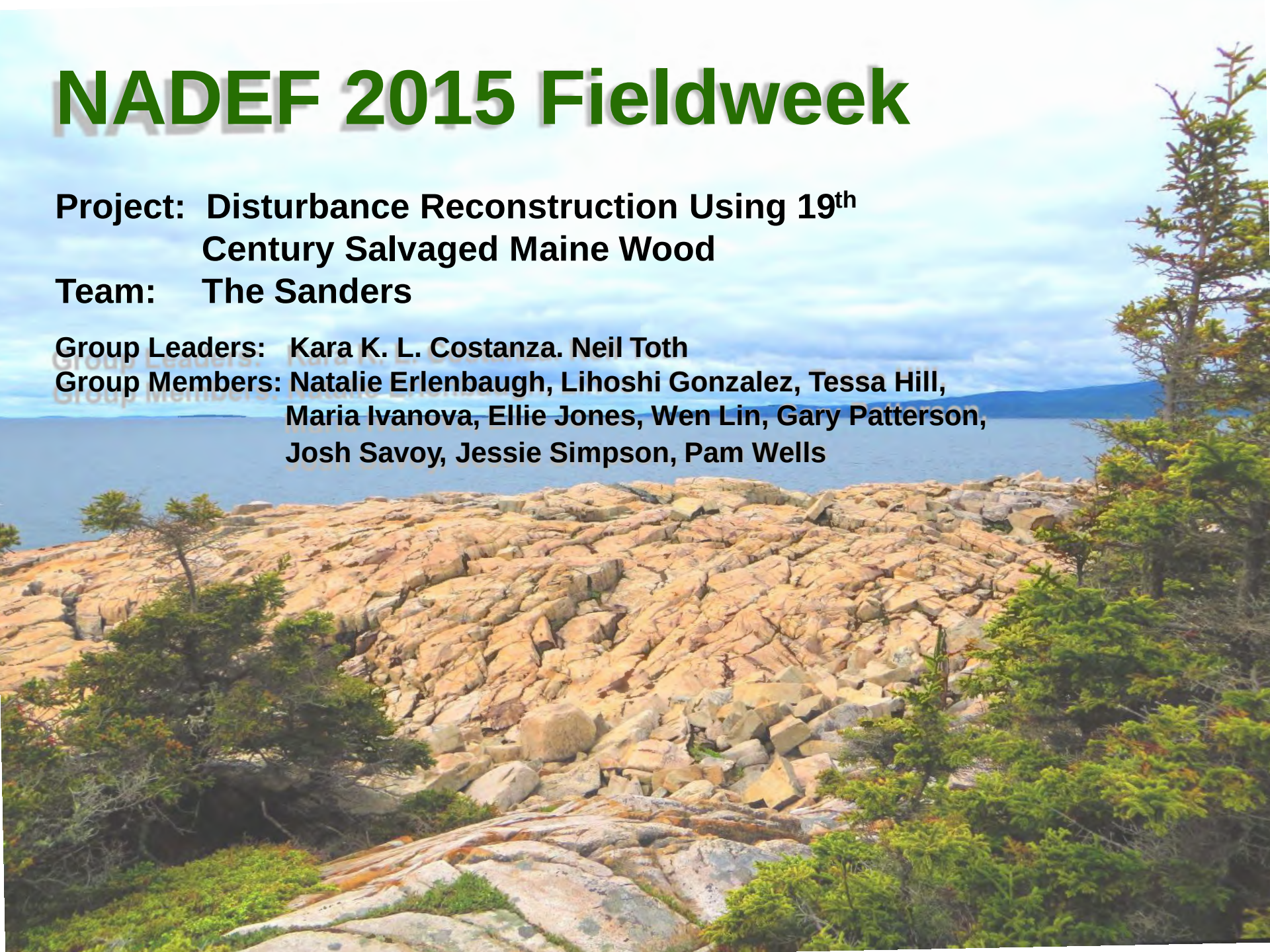
NADEF 2015 Fieldweek

**Project: Disturbance Reconstruction Using 19th
Century Salvaged Maine Wood**

Team: The Sanders

Group Leaders: Kara K. L. Costanza, Neil Toth

**Group Members: Natalie Erlenbaugh, Lihoshi Gonzalez, Tessa Hill,
Maria Ivanova, Ellie Jones, Wen Lin, Gary Patterson,
Josh Savoy, Jessie Simpson, Pam Wells**



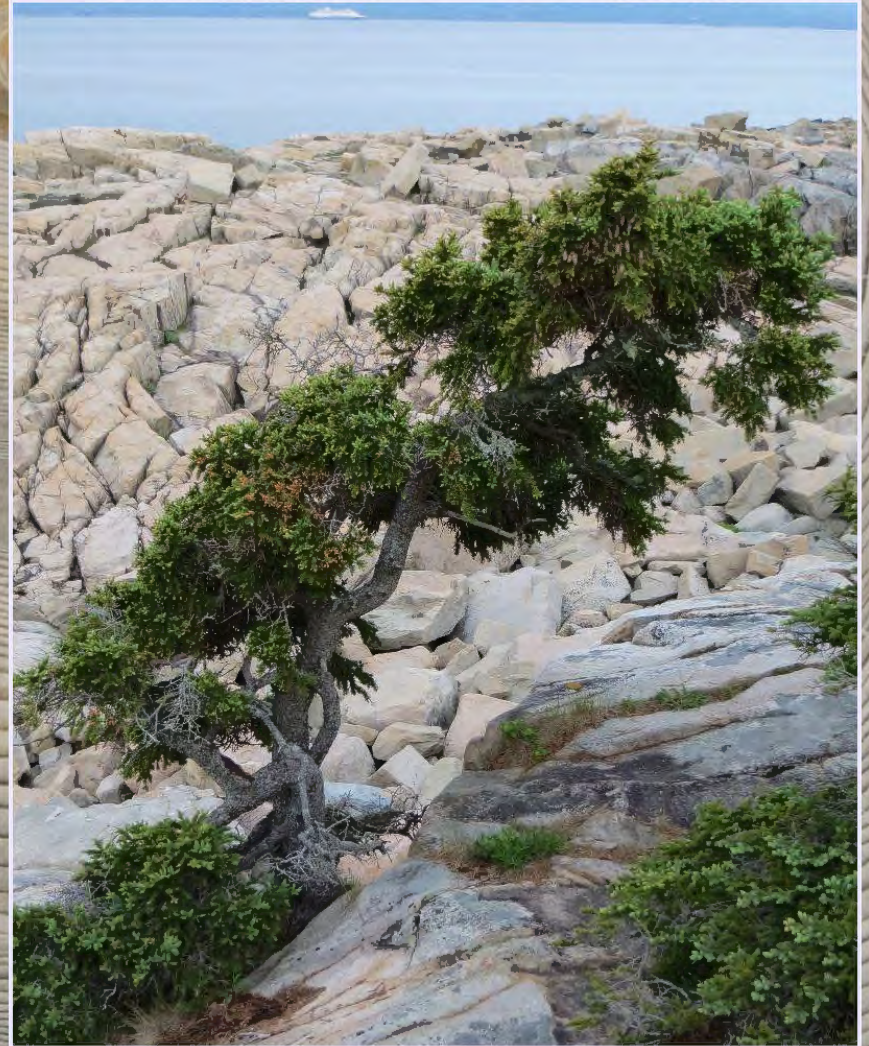
Objectives

- Learn basic dendrochronology techniques
- Develop a master tree-ring chronology for red spruce (*Picea rubens*) from Schoodic Peninsula.
- Identify evidence of SBW outbreaks prior to those already recorded by using reclaimed sinker-logs.



Outline

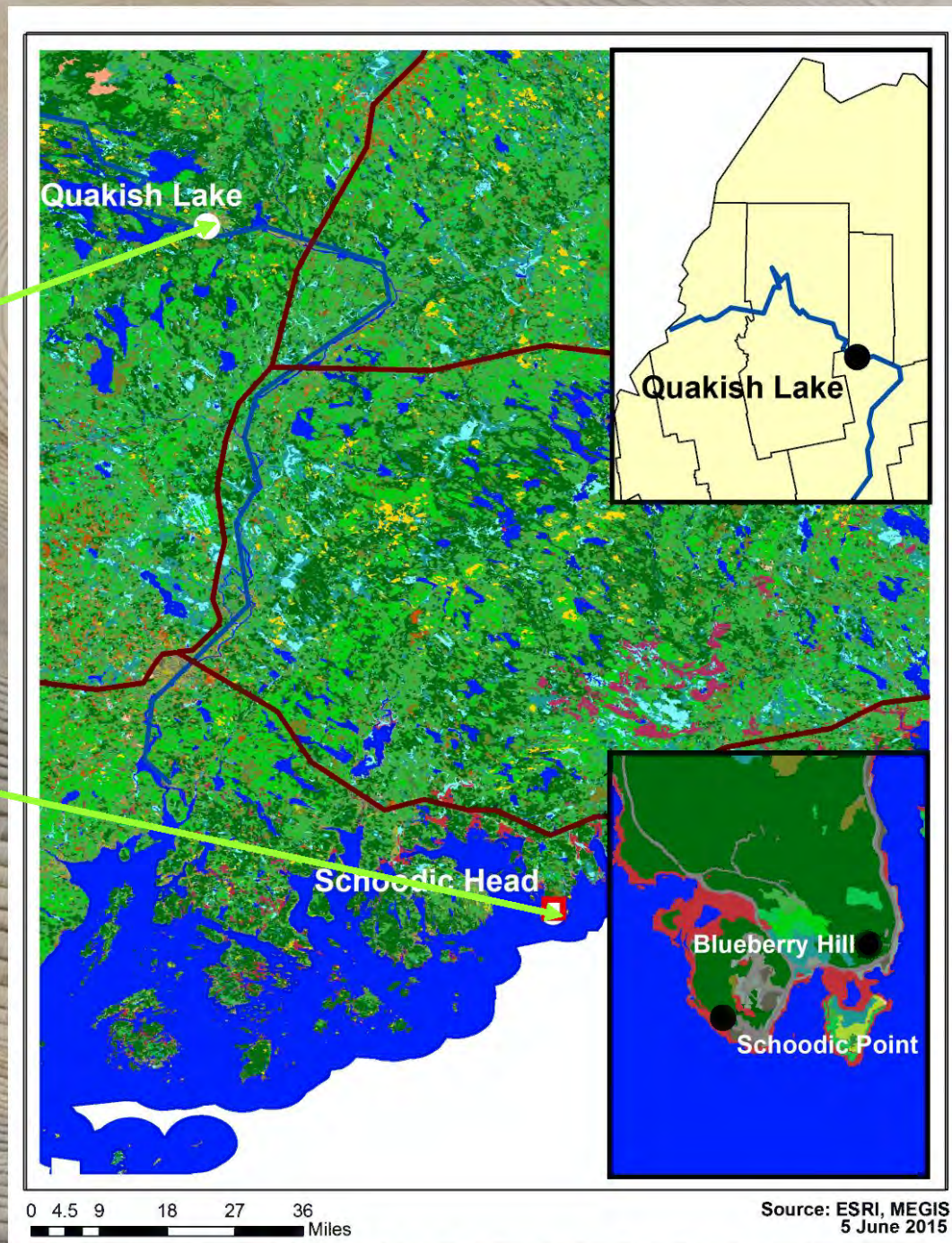
- Site Description
- Sample Collection
- Sample Preparation
- Sample Measurement
- Analysis of Data
- Conclusions/Discussion



Site Locations

Quakish Lake (Maine Heritage Timber) for reclaimed logs

Schoodic Head and Blueberry Hill for current core data



Site 1

Schoodic Head



Site 2

Blueberry Hill



Site 3

Quakish Lake



Sample Collection: Sites 1 & 2

Coring trees using increment borers



Sample Collection: Site 3

Cutting cross sections
with chainsaw



Sample Preparation: Sanding Cross Sections

Before



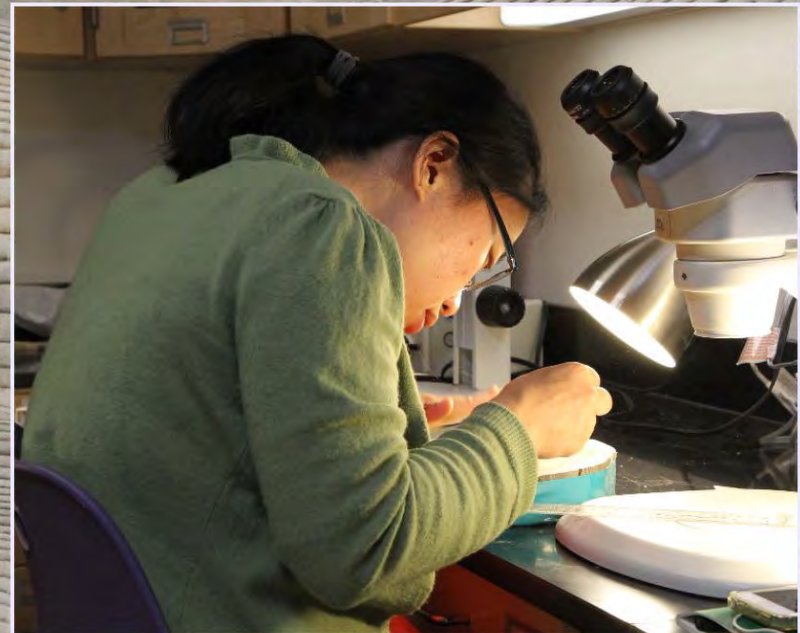
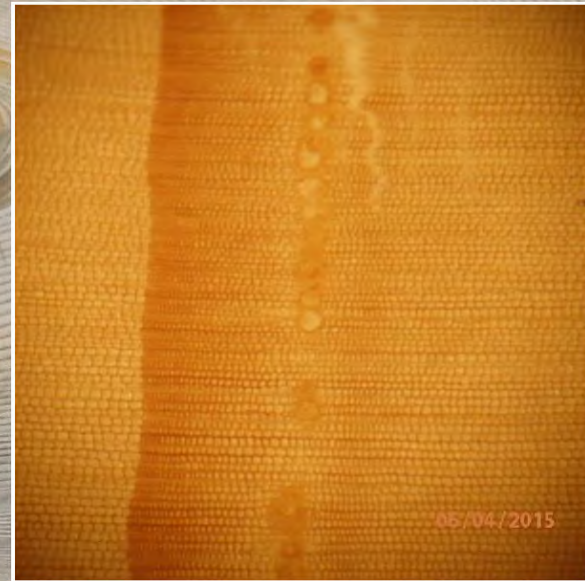
After



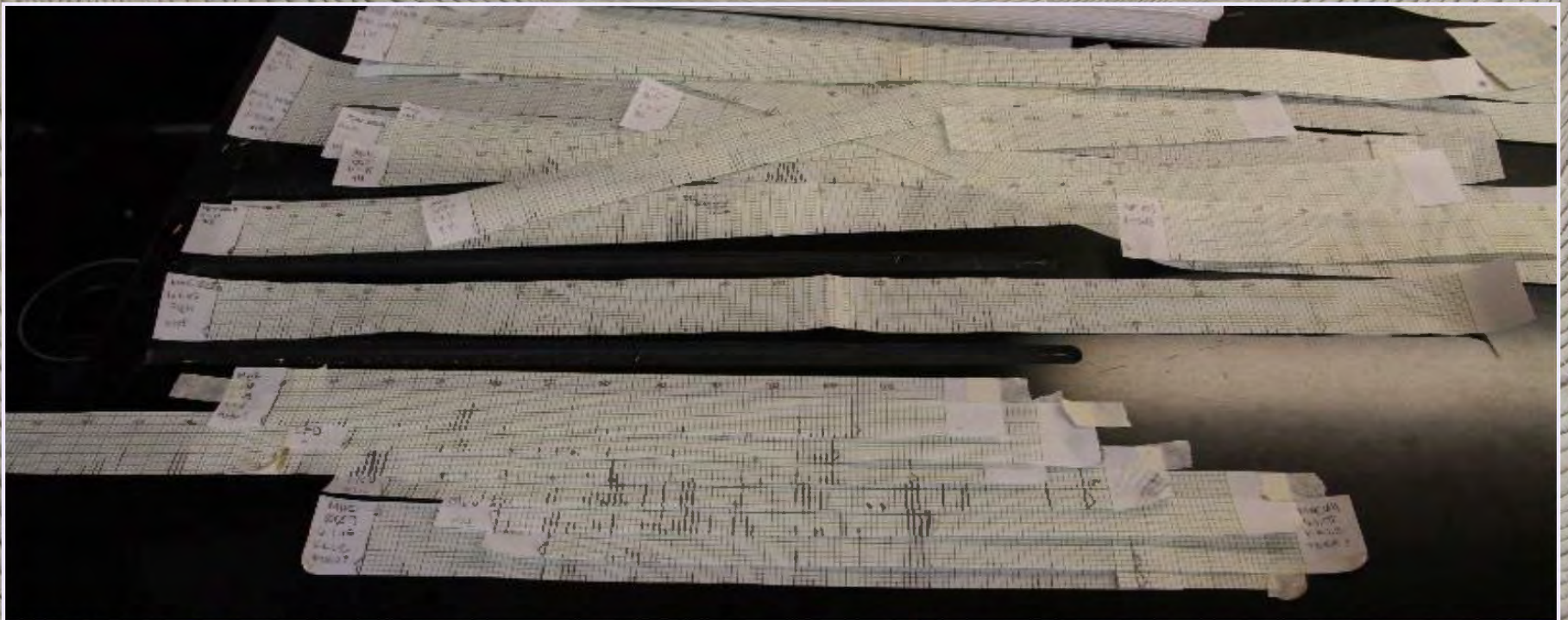
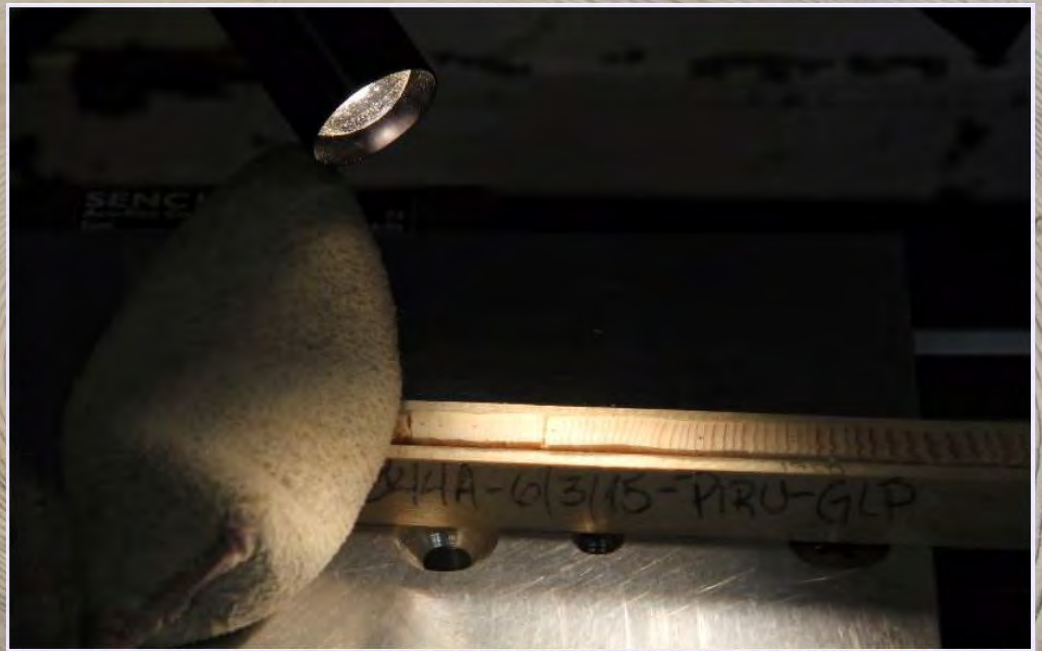
Sample Preparation: Core Sanding



Sample Preparation: Dot Dating



Sample Preparation: Skeleton Plotting



Results: Blueberry Hill

C Number of dated series 11 *C*
 O Master series 1870 2014 145 yrs *O*
 F Total rings in all series 934 *F*
 E Total dated rings checked 907 *E*
C* Series intercorrelation .481 *C
 H Average mean sensitivity .192 *H*
 A Segments, possible problems 3 *A*
 *** Mean length of series 84.9 ***

PART 7: DESCRIPTIVE STATISTICS: BlueberryHill.TestRun.3.11samples 08:15 Tue 09 Jun 2015 Page 6

		Corr //----- Unfiltered -----\\ //---- Filtered -----\\												
		No.	No.	No.	with	Mean	Max	Std	Auto	Mean	Max	Std	Auto	AR
Seq	Series	Interval	Years	Segmt	Flags	Master	msmt	msmt	dev	corr	sens	value	dev	corr ()
1	BH032A	1961 2014	54	2	0	.535	2.19	5.78	1.220	.877	.206	2.58	.422	.015 5
2	BH033A	1950 2014	65	2	0	.619	2.16	4.16	.960	.884	.168	2.69	.585	-.056 1
3	BH042A	1870 2014	145	5	1	.378	1.49	4.25	1.086	.921	.172	2.68	.384	-.022 1
4	BH045B	1958 2014	57	2	0	.566	1.99	4.20	.904	.809	.181	2.60	.524	-.022 1
5	BH046B	1934 2013	80	3	0	.456	1.31	4.32	1.131	.957	.158	2.75	.516	-.023 1
6	BH050B	1911 2014	104	4	0	.392	1.22	4.67	.720	.839	.236	2.84	.540	-.023 1
7	BH051B	1943 2014	72	3	0	.539	1.45	6.20	1.451	.871	.219	2.72	.560	.035 3
8	BH052A	1897 2014	118	5	1	.402	1.45	4.93	1.148	.941	.179	2.76	.434	.037 1
9	BH053A	1917 2014	98	4	0	.563	1.68	5.80	1.272	.940	.159	2.77	.601	.021 1
10	BH054A	1932 2014	83	3	0	.643	2.89	6.44	1.671	.903	.182	2.60	.443	-.074 2
11	BH055A	1957 2014	58	2	1	.314	1.01	4.34	.875	.809	.300	2.69	.505	-.004 1
Total or mean:			934	35	3	.481	1.67	6.44	1.131	.895	.192	2.84	.493	-.010

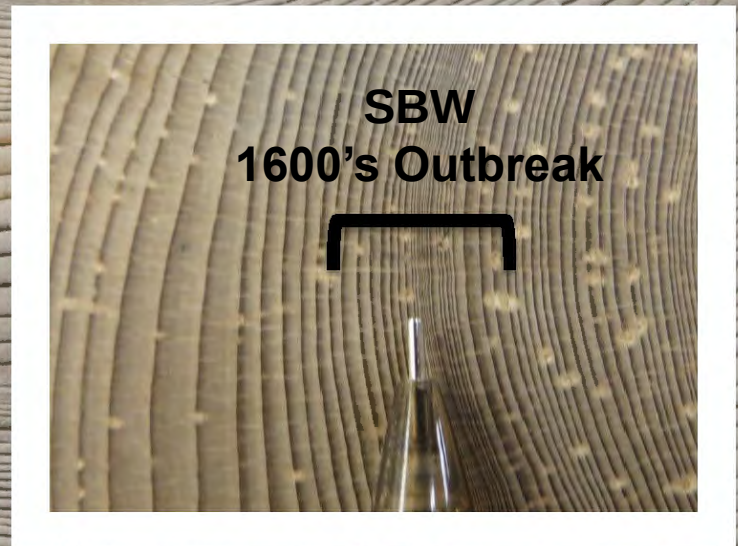
Results: Ironbound vs Blueberry Hill

```
*****
*C* Number of dated series          31 *C*
*O* Master series 1665 2014    350 yrs *O*
*F* Total rings in all series    5599 *F*
*E* Total dated rings checked    5599 *E*
*C* Series intercorrelation      .470 *C*
*H* Average mean sensitivity      .235 *H*
*A* Segments, possible problems   36 *A*
*** Mean length of series        180.6 ***
*****
```

PART 7: DESCRIPTIVE STATISTICS: Ironbound.VS.IntroGroup.11samples.Round2 08.21 Tue 09 Jun 2015 Page 7

Corr //----- Unfiltered -----\\ //---- Filtered ----\\															
		No.	No.	No.	with	Mean	Max	Std	Auto	Mean	Max	Std	Auto	AR	
Seq	Series	Interval	Years	Segmt	Flags	Master	msmt	msmt	dev	corr	sens	value	dev	corr	()
14	098103	1800	1982	183	7	1	.527	.96	2.48	.416	.880	.176	2.69	.371	-.028 1
15	098131	1834	1982	149	6	0	.615	.69	1.71	.307	.853	.185	2.72	.415	-.008 1
16	098132	1683	1982	300	12	2	.337	.67	2.76	.554	.925	.264	2.49	.270	-.069 1
17	098161	1677	1982	306	12	3	.366	.64	3.41	.653	.899	.314	2.59	.355	-.047 1
18	098162	1808	1982	175	7	0	.457	.35	2.01	.342	.913	.259	2.60	.343	-.025 2
19	098141	1665	1982	318	13	3	.468	.37	1.50	.248	.833	.330	2.69	.404	-.053 1
20	098142	1665	1982	318	13	5	.419	.51	2.58	.464	.922	.330	2.55	.397	-.033 1
21	BH032A	1961	2014	54	2	0	.501	2.19	5.78	1.220	.877	.206	2.58	.422	.015 5
22	BH033A	1950	2014	65	2	0	.597	2.16	4.16	.960	.884	.168	2.69	.585	-.056 1
23	BH042A	1870	2014	145	6	0	.427	1.49	4.25	1.086	.921	.172	2.68	.384	-.022 1
24	BH045B	1958	2014	57	2	0	.433	1.99	4.20	.904	.809	.181	2.60	.524	-.022 1
25	BH046B	1934	2013	80	3	0	.492	1.31	4.32	1.131	.957	.158	2.75	.516	-.023 1
26	BH050B	1911	2014	104	4	0	.447	1.22	4.67	.720	.839	.236	2.84	.540	-.023 1
27	BH051B	1943	2014	72	3	0	.520	1.45	6.20	1.451	.871	.219	2.72	.560	.035 3
28	BH052A	1897	2014	118	5	0	.491	1.45	4.93	1.148	.941	.179	2.76	.434	.037 1
29	BH053A	1917	2014	98	4	0	.513	1.68	5.80	1.272	.940	.159	2.77	.601	.021 1
30	BH054A	1932	2014	83	3	0	.575	2.89	6.44	1.671	.903	.182	2.60	.443	-.074 2
31	BH055A	1957	2014	58	2	0	.434	1.01	4.34	.875	.809	.300	2.69	.505	-.004 1
Total or mean:			5599	225	36		.470	.82	6.44	.529	.885	.235	2.84	.380	-.029

Results: Dated Sunken Wood



Results: Dated Sunken Wood

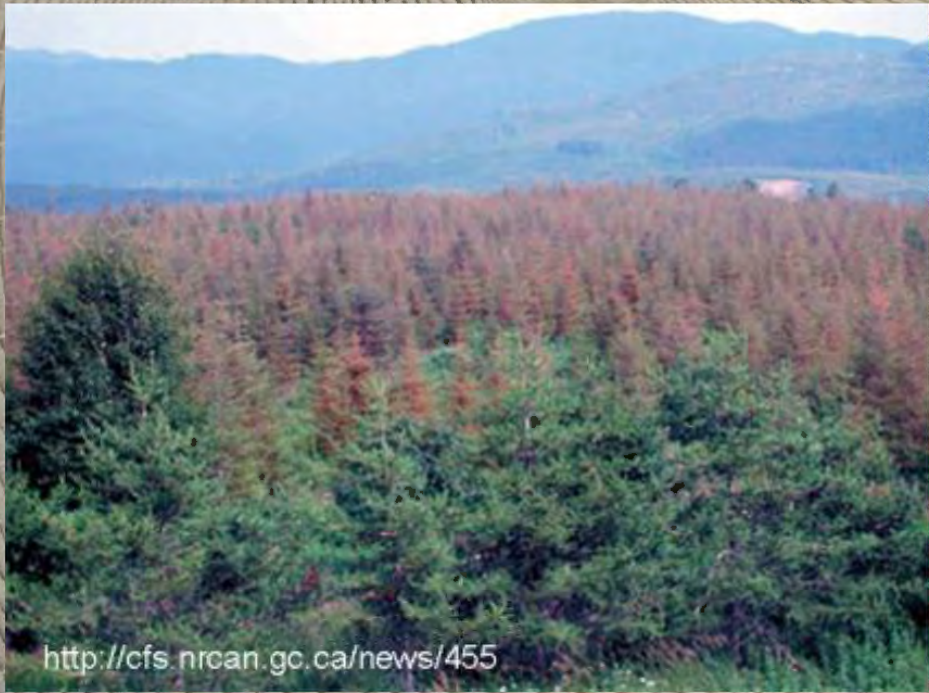
```
*****
*C* Number of dated series          779 *C*
*O* Master series 1649 2001      353 yrs *O*
*F* Total rings in all series     92779 *F*
*E* Total dated rings checked     92770 *E*
*C* Series intercorrelation        .521 *C*
*H* Average mean sensitivity       .271 *H*
*A* Segments, possible problems   446 *A*
*** Mean length of series         119.1 ***
*****
```

//----- Unfiltered -----\\ //---- Filtered -----\\

Seq	Series	Interval	No. Years	No. Segmt	No. Flags	Corr with Master	Mean msmt	Max msmt	Std dev	Auto corr	Mean sens	Max value	Std dev	Auto corr	AR ()
769	MM_4A02	1677 1990	314	12	2	.490	.71	3.53	.513	.873	.240	2.57	.293	-.033	3
770	MM_4B04	1682 1990	309	12	6	.291	.39	1.31	.248	.898	.268	2.61	.314	-.026	1
771	MM_4A03	1688 1990	303	12	1	.562	.84	2.38	.622	.929	.262	2.46	.265	-.013	1
772	ER_W233	1678 1999	322	12	5	.349	.25	1.41	.186	.868	.299	2.86	.396	-.064	1
773	ER_W151	1680 1999	320	12	3	.473	.58	2.06	.504	.936	.296	2.47	.270	-.011	2
774	MH003A	1658 1701	44	1	0	.484	2.02	3.66	.784	.562	.276	2.42	.418	.022	1
775	MH024A	1694 1879	186	8	3	.351	1.09	3.13	.632	.918	.185	2.70	.501	-.031	1
776	MHC014	1779 1849	71	2	0	.363	1.65	4.37	1.204	.934	.248	2.55	.478	.047	1
777	MHC015	1665 1905	241	10	2	.485	.99	2.67	.547	.868	.250	2.76	.433	-.053	1
778	MH017	1755 1896	142	5	3	.421	1.38	3.33	.558	.820	.190	2.97	.436	.050	1
779	MH006A	1718 1891	174	7	0	.474	.67	1.45	.309	.808	.246	3.04	.406	-.002	1

Total or mean:			92779	3634	446	.521	.96	6.47	.573	.853	.271	3.27	.428	-.030	

Results: Spruce Budworm Outbreaks



Results: Spruce Budworm Outbreaks

- **1976-1986**
- 1965-1969
- **1949-1952**

- **1765-1769**
- **1755-1760**
- **1708-1721**

- **Black=**
Unconfirmed
- **Red=**
Confirmed
- **Blue=**
Suspected

- **1868-1892**
- **1834-1845**
- **1805-1814**

- **1678-1690**



Discussion

- Findings:
 - Microclimatic data critical to cross-dating
 - 1670s SBW outbreak dated
- Interpretation
 - BH correlate with Ironbound Island (Cook 1982)
 - Cross sections compared to Maine dataset (Fraver et al. 2007)

Conclusion

- Study Limitations:
 - Low sample depth
 - Young modern chronology
- Future Work
 - Continue to partner with MHT to date samples
 - Hopeful continued monitoring at Acadia NP and SERC

Resources Used

Dendrochronological reconstruction of spruce budworm outbreaks in northern Maine, USA

Shawn Fraver, Robert S. Seymour, James H. Speer, Alan S. White

Canadian Journal of Forest Research, 2007, 37:523-529, 10.1139/X06-251

Spruce budworm outbreaks in eastern Quebec over the last 450 years

Yan Boulanger, Dominique Arseneault

Canadian Journal of Forest Research, 2004, 34:1035-1043, 10.1139/x03-269

The Sanders Family



Acknowledgements

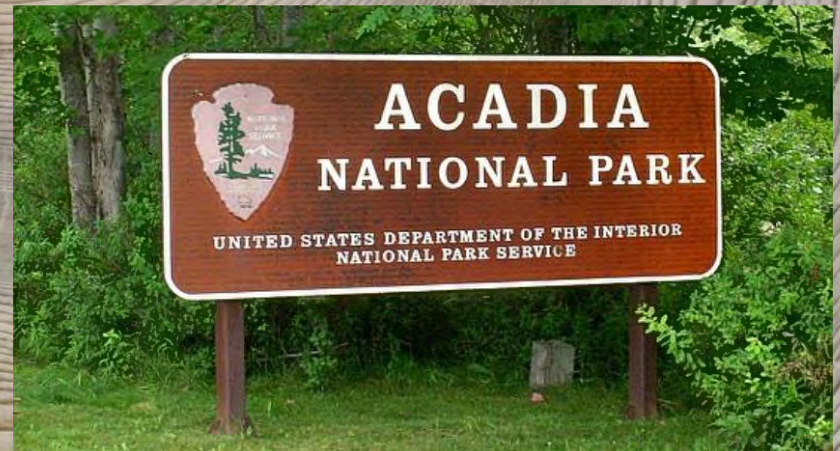


RECOVERING A FORGOTTEN FOREST



National Science Foundation

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Questions

