

Many small trees progressing
into few large trees.

→ Law of Liouville (1898)

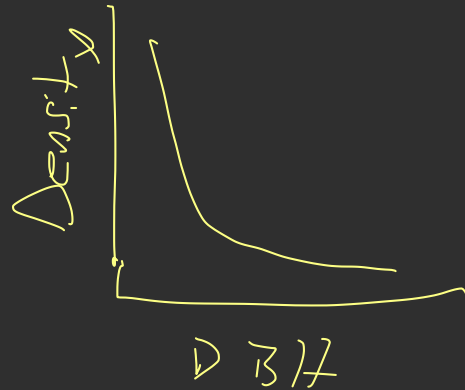


Image:
416 Fire
~ 1.5 years post fire
SW Colorado



What can we learn about forest health from a photo of this stand?

Think - pair - share -

- What observations can you make about this forest from a photo health lens?

- Is this forest sustainable, why or why not?

Image:
416 Fire
~ 1.5 years post fire
SW Colorado



Michael Renke Photography

What can we learn about forest health from a photo of this stand?

The past as a key to the future

Law of
Uniformitarianism

Lycell's

Principals
of Geology

Understanding the present allows
to understand the past and future.



Dead Tree!

Mortality is

the essence of
forest health!



Giant Sequoia Snag

In silvicultural
systems:
SAW =
Mechanism
of
mortality



Baseline Mortality_p

- Predicted mortality to sustain a stand

even-aged



"Reverse
J"

Balanced

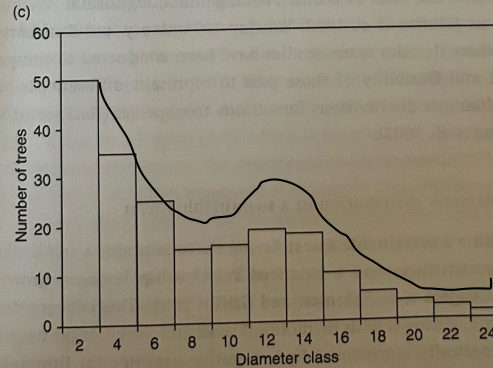
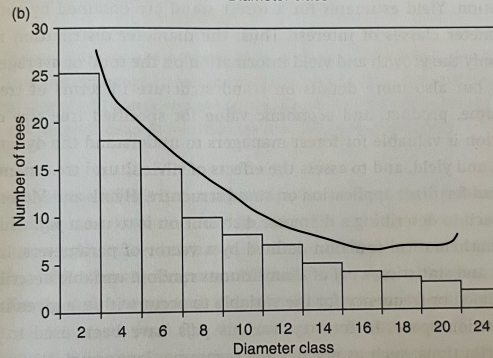
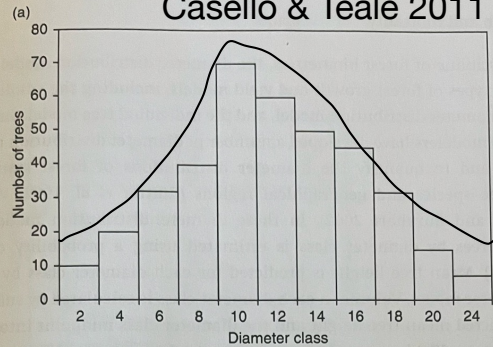
Un-even aged



Un-balanced

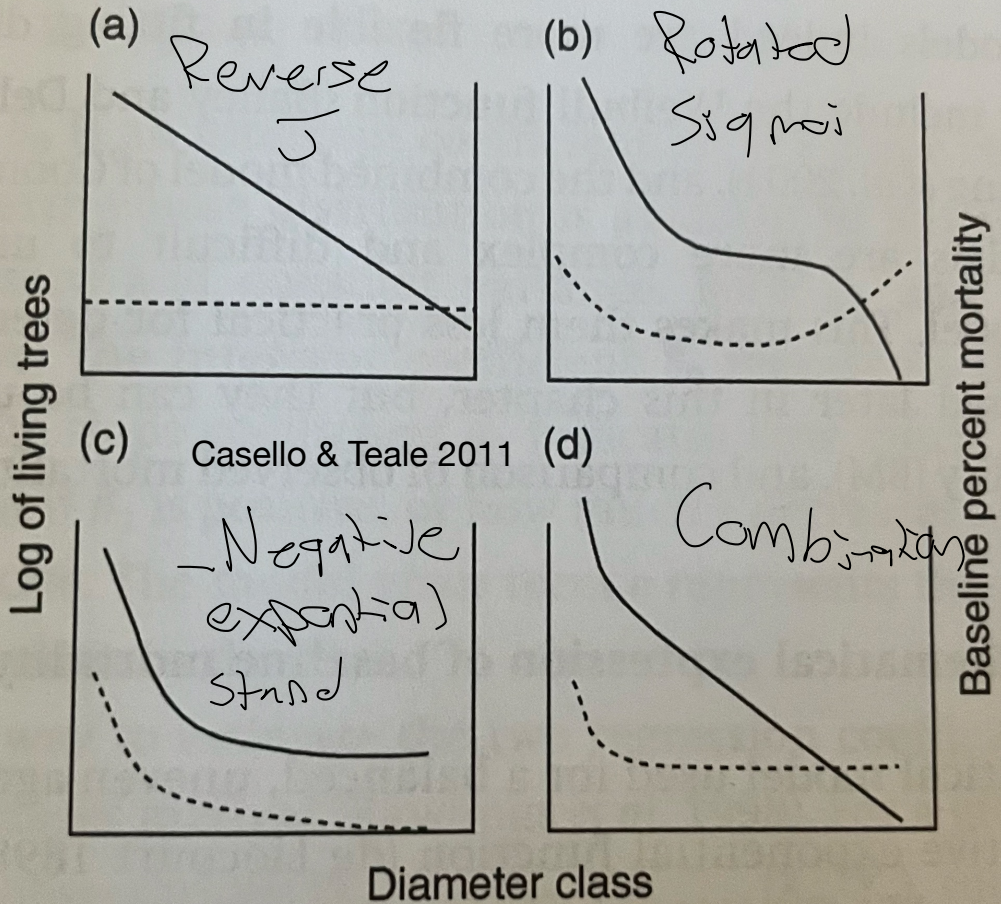
Un-even aged

Retarded sigmoid



—
= Tree density
on a log scale

— — —
= Baseline
Mortality
%



How do we assess whether
mortality exceeds predicted
baseline mortality?

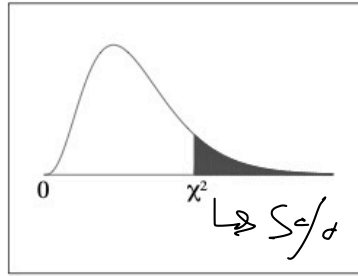
1) calculate baseline mortality

Regression of $\log^{(ln)}$ tree density \times size class

\hookrightarrow slope = baseline mortality

2) Chi-square test \rightarrow compare observed to predicted values

Chi-Square Distribution Table



The shaded area is equal to α for $\chi^2 = \chi^2_{\alpha}$.

df	$\chi^2_{.995}$	$\chi^2_{.990}$	$\chi^2_{.975}$	$\chi^2_{.950}$	$\chi^2_{.900}$	$\chi^2_{.100}$	$\chi^2_{.050}$	$\chi^2_{.025}$	$\chi^2_{.010}$	$\chi^2_{.005}$
1	0.000	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750

$$\chi^2 = \frac{(\text{observed} - \text{predicted})^2}{\text{predicted}}$$

○ Other tools for assessing
stand health

→ Stand profiling

- Category of infestation severity



Great Green Macaw in a fungal rot hole in Almendro tree



Fungi growing on downed wood and microsite benefiting plants



Pileated woodpecker in Birch

Write

Share and ask a question

Respond

Summarize

1. Write for 5 minutes about a forest health issue you are aware of
~ describe the species composition and if possible the stand structure and agent of mortality if you know it
2. Share with someone near you, read their writing and ask a question to add detail about the forest structure or sustainability
3. Switch back and respond to the question.
4. Summarize your written responses on your work sheet.

