

Problem # 13 "Birds in Trees"

State:

H₀: Nuthatches **do not** prefer particular types of trees when searching for seeds and insects.

H_a: Nuthatches **do** prefer particular types of trees when searching for seeds and insects.

Plan: Chi Square Goodness of Fit

Conditions: Random sample of 156 red-breasted nuthatches

All expected counts are > 5

The sample of $n < 0.1 N$ $156 < 0.1 * (\text{all nuthatches birds})$

Do:

Tree Types	Stated %	Observed	Expected	(O-E) ² /E
Douglas Fir	54%	70	84.24	2.407
Ponderosa Pine	40%	79	62.4	4.416
Other	6%	7	9.36	0.064
	total =	156		

"χ²" 7.418

"PVal" 0.024

"df" 2.

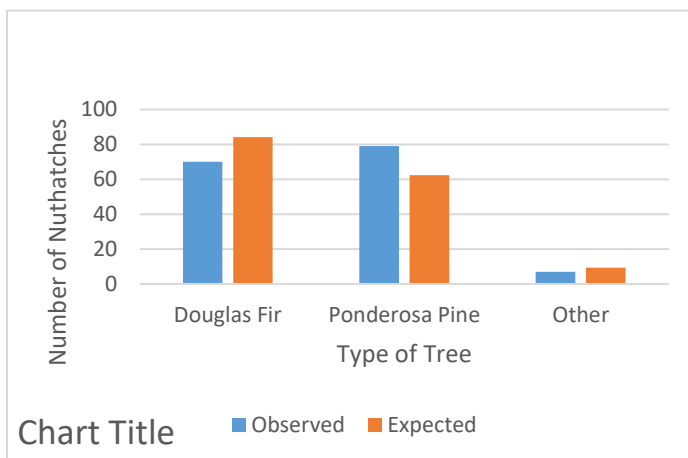
Conclude:

Reject H₀, the P-value of 0.024 is less than the alpha, α, level of 0.05.

There is convincing evidence to suggest that nuthatches do prefer particular types of trees.

There is only a 2.4% chance of getting the differences in distribution of nuthatches in these trees at least as extreme as we did by chance alone if H₀ is true.

Follow-up Analysis:



Looking at the graph and at the contributions to the chi square value, we can see that the observed number of Nuthatches in each type of tree is different than expected if Nuthatches did not have a preference in the type of tree they search for seeds and insects. In particular the largest contributor to the chi square value is the Ponderosa Pine, there were expected to be only about 62.4 nuthatches but instead 79 were found (difference of 16.6) and in the Douglas Fir, 84.24 were expected but only 70 were found (difference of 14.24) in that tree type. It seems as though Red-breasted Nuthatches prefer Ponderosa Pine trees to search for seeds and insects.