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1. An event in this sampling scheme would be the act of observing at one of the sample sites regardless of finding (or not finding) a bird at the site.
2. The sample space of the sampling scheme is the binary of found/not found across the 6 sites. Ex. 1:1/0, 2:1/0
3. There are 15 different combinations that the two presences can be arranged into. I found this using the combination formula $6!/2!(6-2)!$
4. I don't think that is an unusual event. Given that the likelihood of getting exactly 2 presences is ~25%, it may be uncommon, but not unlikely.
5. Bur oak= B, White oak= W, red oak = R
{BB, WW, RR, BR, BW, WR}
These events are combinations, given that the order doesn't matter.
6. {BB, WW, RR, BW, BR, WB, WR, RB, RW}
These events are permutations because the order (left pocket or right pocket) does matter