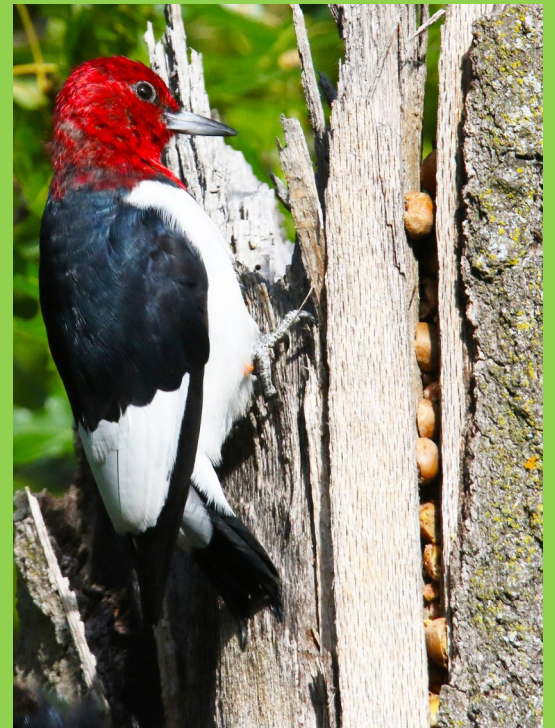


Acorn Abundance Determines Migration Decision in Red-headed Woodpeckers



Migrate Yes or No



Text and Photography by Siah L St. Clair
Graphs and Tables by James Howitz



The Red-headed Woodpecker Recovery project (RhWR) was organized in 2007 and is a 501(c)(3) tax-exempt non-profit organization.

Investigation and research activities about Red-headed Woodpeckers (RHWOs) at Cedar Creek Ecosystem Science Reserve began in 2008 when Cedar Creek ESR gave a permit to the RhWR to initiate those activities on site. The RhWR has continued investigation and research activities since 2008 both at Cedar Creek ESR and at other locations.

Field observation efforts for included information occurred between 2012 and 2025 in all 12 months of the year, with a combined 2,563 days and 15,438 hours by Siah St. Clair and work partner Jim Howitz. All observations were made during a succession of RHWO study and research projects. Some activities required extensive experience and expertise as well as special permits and permissions.

By conducting these observation activities new natural history behaviors of RHWOs have been documented and will be used to help reduce the decline of this species and other species impacted by the presence of RHWO.

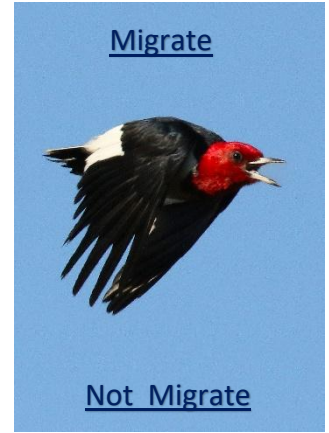
Unless otherwise noted, the information and photographs provided herein are based solely on observations by Siah L St. Clair and Jim Howitz, volunteers of the Red-headed Woodpecker Recovery project.

Acorn Production Determines if Red-headed Woodpeckers Will Remain on Site for the Winter or Migrate South

Observations, Text, and Photography by Siah L St. Clair—Graphs and Tables by James Howitz



**Acorn
Abundance
Determines
if
Red-headed
Woodpeckers
Will
Migrate
or
Stay on Site
Over Winter**



Red-headed Woodpeckers (RHWOs) are facultative migrants. Facultative migrants remain through the winter on their nesting grounds some years and other years they migrate away. While observing Red-headed Woodpeckers at Cedar Creek Ecosystem Science Reserve (Cedar Creek ESR) in East Bethel, Minnesota, we recorded some years when all or almost all the woodpeckers that had been present during the nesting season appeared to remain for the fall and winter, while there were some years when only some would remain, and other years when they all migrated away.

As we observed these differences over the years, we became curious as to what influenced the woodpeckers to make the decision to stay or leave in the late summer. We had observed that in the years the woodpeckers stayed that they were very busy all through the fall months caching northern pin oak acorns, and that during the winter, cached acorns were the only food we had observed them eating. We also observed that in the fall of some years there seemed to be many acorns present on the oak trees and other years there were very few.

We decided to see if we could document any correlation between acorn production at Cedar Creek ESR and the number of Red-headed Woodpeckers that overwintered. We received permission to place numbered tags on 100 healthy northern pin oaks and 100 healthy bur oaks. All these trees were scattered throughout the area where the RHWOs were nesting.

Bur and northern pin oaks are the dominant oak trees in the Red-headed Woodpecker nesting area at Cedar Creek ESR. We met with Johannes Knops on May 3, 2017, to set up the protocol to count acorn production. Knops and Walter Koenig had developed a protocol to determine acorn production in oak trees, and, coincidentally, their research was done at Cedar Creek ESR. The basic protocol required a person to record time and data while two counters would select different parts of a marked oak tree and, using binoculars, each count as many acorns as they could see in 15 seconds. Estimates of percent of the tree observed were recorded as well as a count of acorns on the ground, if any, within a meter circle under each tree.

While we had observed Red-headed Woodpeckers with bur oak acorns and had recorded the Woodpeckers feeding these acorns to their late brood nestlings, we had not seen or photographed them caching bur oak acorns for winter use. All the acorns we had observed being cached by Red-headed Woodpeckers were northern pin oak acorns at Cedar Creek ESR. Bur oak acorns ripen and fall at Cedar Creek ESR in late July and August, whereas northern pin oak acorns ripen and fall in late September and October. An interesting aspect of acorn production in these two different oaks is that the acorns of bur oaks are produced from flowers the same year, whereas northern pin oak acorns that ripen in the fall are the result of flowers from the previous year. That means that northern pin oak acorns are a year and a half old when they ripen and fall.



Northern Pin Oak Acorns ↑

Bur Oak Acorns ↓



Gathering Northern Pin Oak Acorns from the ground.

After conducting acorn production counts at Cedar Creek ESR for eight years, as well as counting Red-headed Woodpecker presence over the winter seasons on the Cedar Creek Bog Christmas Bird Count (CBC) each year, data comparison became possible. It is obvious from the data that bur oak acorn production does not correlate with Red-headed Woodpeckers overwintering at Cedar Creek ESR (see Graph 1). However, we have found a strong correlation between the number of northern pin oak acorns produced each year and the number of RHWOs that decide to overwinter at Cedar Creek ESR. ($p < 0.01$ = highly unlikely due to chance, making this result statistically significant).

The strong relationship between acorns and overwintering suggests that acorn production may be causative and not just correlational to the decision-making process of RHWOs to overwinter. See Table 1, and Graphs 1 and 2.



Gathering Northern Pin Oak Acorns from the tree.



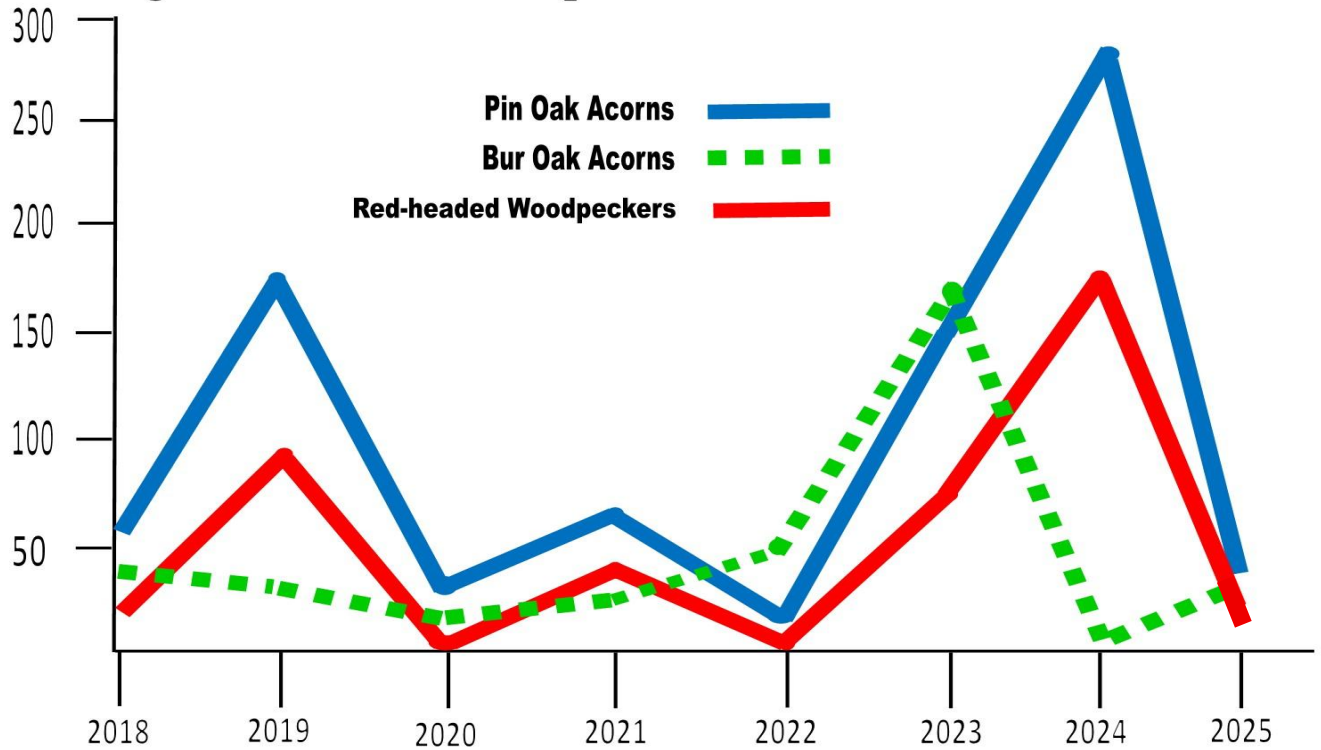
Caching acorn pieces in temporary exposed locations.



Caching acorn pieces in more hidden, final locations.

Graph 1: Showing the correlation of the number of overwintering Red-headed Woodpeckers with the availability of pin oak acorns, and no correlation with bur oak acorn availability.

Wintering # of Red-headed Woodpeckers and # of Bur and Pin Oak Acorns

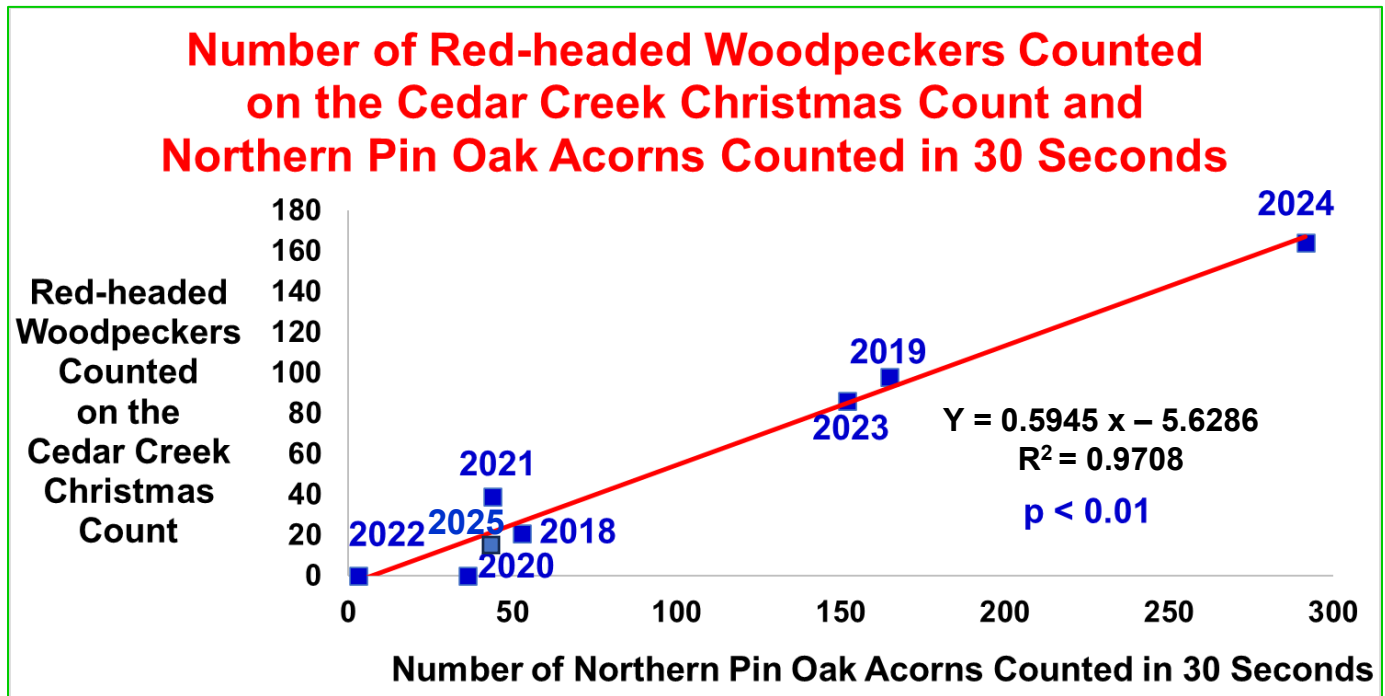


of Pin Oak Acorns Counted in 30 Seconds/Tree ■
 # of Bur Oak Acorns Counted in 30 Seconds/Tree ■
 # of Red-headed Woodpeckers on Christmas Bird Count ■

Table #1

Year	# of Pin Oak Acorns Counted in 30 seconds	# of Bur Oak Acorns Counted in 30 seconds	RHWOs Reported on CBC
2018	53	38	21
2019	165	34	98
2020	36	10	0
2021	44	28	39
2022	3	49	0
2023	152	170	86
2024	292	0.5	164
2025	44	29	15

Graph #2



While the sample size is small for each overwintering situation, the acorn production may be divided into three production categories as follows.

1. Small acorn production (< 37 acorns observed in 30 seconds per tree—occurred 2 years of 8)
2. Medium acorn production (between 44 and 53 acorns observed in 30 seconds per tree—occurred 3 years of 8),
3. Heavy acorn production (between 152 and 292 acorns observed in 30 seconds per tree—occurred 3 years of 8).

In the small acorn production years (2) all the Red-headed Woodpeckers migrated away from the site for the winter. Number of RHWOs on site = 0

In the medium acorn production years (3) less than half of the resident Red-headed Woodpeckers remained on site over the winter while the rest migrated away. Number of RHWOs on site = 21, 39, and 15.

In the heavy acorn production years (3) all or almost all of the resident Red-headed Woodpeckers remained on site for the winter. Number of RHWOs on site = 98, 86, and 164.

While there is a statistical significance in correlation between acorn production in pin oaks and RHWOs overwintering shown here, a longer study would need to be conducted to determine what the boundaries are for the three production categories, and if this relationship holds for other sites.

Actions of Red-headed Woodpeckers Overwintering on Site



When Red-headed Woodpeckers decide to stay for the winter they work all day every day gathering acorns, breaking them into pieces, and caching them in many places. This work continues until snow covers the remaining freely available acorns.



Juvenile Red-headed Woodpeckers also overwinter and learn how to cache northern pin oak acorns. This is a learning process, and we have observed them retrieving acorns that the adults allow them to use from their caches.



At Cedar Creek ESR Red-headed Woodpeckers in winter spend time moving moisture shrinking acorn pieces into more secure hiding places, usually close to their winter roost cavity. They will also eat the snow for fluid as no open water exists.

Acorn Counting Process



On the left above Jim Howitz records the number of acorns observed while volunteer Jerry counts the number of acorns seen in 15 seconds on this pin oak tree. Photographer Siah St. Clair then counted acorns on another part of the tree for 15 seconds.