

Anna's Hummingbirds in Washington State: Community Science Data Produce a New Awareness

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With Appreciation

This document is dedicated to the thousands of individuals who have contributed time and resources to gather data during community science projects. Your contributions are important and valuable. The data you submitted contribute to our understanding and knowledge of birds locally, state-wide, and globally.

A special thank you to the individuals who participated in the North Central Washington Audubon Society's Hummingbird Survey project. The data you submitted have been used to refine range maps and our understanding about hummingbirds, especially Anna's Hummingbirds, in North Central Washington.

A second special thank you to my friend and fellow photographer, Frank Cone, who found the 2023 Anna's nest in East Wenatchee, WA. Frank followed this nest from the initial nest-building to when the young fledged. In the process, he captured hundreds of still images and hours of high-quality videos.



Photo: Frank Cone, East Wenatchee, 2023

Anna's Hummingbirds in Washington State:

Community Science Data Produce New Awareness

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Abstract

Community science efforts rely on volunteers to collect and share observations and data on targeted questions or needs. Several forms of community science have added valuable data that provide the basis for adjusting and refining our understanding of the distribution and biological status of Anna's Hummingbirds (ANHU) in Washington State. Both the eBird and the Christmas Bird Count (CBC) databases contain information about when and where Anna's are seen in Washington. Other sources of information include Nest Watch, direct field observations and records, published accounts of Anna's presence at various locations and times, and public information exchanges in the form of electronic mailing list notices (listserv). Collectively, these efforts have provided sufficient data to allow species descriptions and range maps to be updated to show year-round presence and successful Anna's breeding in Washington State, especially in eastern Washington.

Introduction

It is not uncommon to see Anna's Hummingbirds in Washington State. Sightings of these small birds in eastern Washington during winter months are frequent enough to establish that the birds are in Washington year-round. Recent photo documentation provides solid evidence of successful nesting and fledging of Anna's Hummingbirds in the Wenatchee Valley. The inconsistency between local awareness that ANHU are present year-round and published data and maps can be resolved by using the vast amount of data collected through a variety of community science efforts.

One of the most important features of a modern bird field guide is the range map. These maps show the areas where one might see a species at different times of the year. The maps are extremely useful when trying to pin down the identification of a bird. Bird species with nearly identical appearances are often distinguished by geographic location. Woodhouse's and California Scrub-jays are a case in point, as are Eastern towhee and Spotted Towhee.

Range maps are ubiquitous and quite handy. Virtually all printed, web-based, or bird field guides on mobile device apps contain range maps. The National Audubon Society provides both paper and web-based field guides for North American birds. The Cornell Lab of Ornithology provides range maps on their "All About Birds", "Birds of the World", and eBird websites. Searching in Wikipedia will likely result in a comprehensive description of a bird species with a range map. Today, many people use bird apps on their phones. Apps from Audubon, Sibley, and a wide range of others all provide a range map to facilitate bird identification in the field.

The creation and maintenance of range maps requires extensive knowledge of a species' biology and how a species may change its habitat preferences in response to changes in vegetation or climate. It cannot be easy to maintain a range map for a single species, much less all the species in an area or on a continent. But, given the importance of the range map as a diagnostic tool used for bird identification,

range maps would, in an ideal world, represent what is known about locations of species throughout a year. Again, in a perfect world, it would be that a species' range map shown in one field guide or website would be the same or very similar to a range map for the same species in a different guide. We do not live in a perfect world. One is very likely to see widely different maps for a given species. Some show similar geographic patterns but differ in how they represent seasonality (spring, summer, winter) or life stage (breeding, non-breeding, migration). Others show maps that are quite different in both geographical extent and biological characteristics. Given the challenges of climate change and bird dynamics, as well as the cost in both time and finances to update a resource, it is totally understandable why such variability exists.

This paper is rooted in personal frustration over Anna's Hummingbird range maps that do not match what we know to be true in North Central Washington. At a minimum, accurate maps should show year-round presence in the Wenatchee area. If the maps showed that Anna's are successfully breeding in our area, all the better. Any printed field guide I reference does not come close to reality as we know it. The same situation applies to online range maps. The Anna's range map shown on the National Audubon website (Figure 1) shows "All Seasons – Common" on the west side of the Cascade mountains. The map does not show the presence of Anna's in eastern Washington. The current Anna's range map provided by the Cornell Lab of Ornithology (Figure 2) shows year-round Anna's presence in eastern Washington, but excludes the Wenatchee valley area and does not show successful breeding.

It is costly and time-consuming to update range maps to incorporate contemporary information. There is a high likelihood that field guides will soon be revised to make changes to species names. This presents an opportunity to revise range maps as well. This is where community science data provides valuable and credible insights.

Examples of existing Anna's Hummingbird range maps

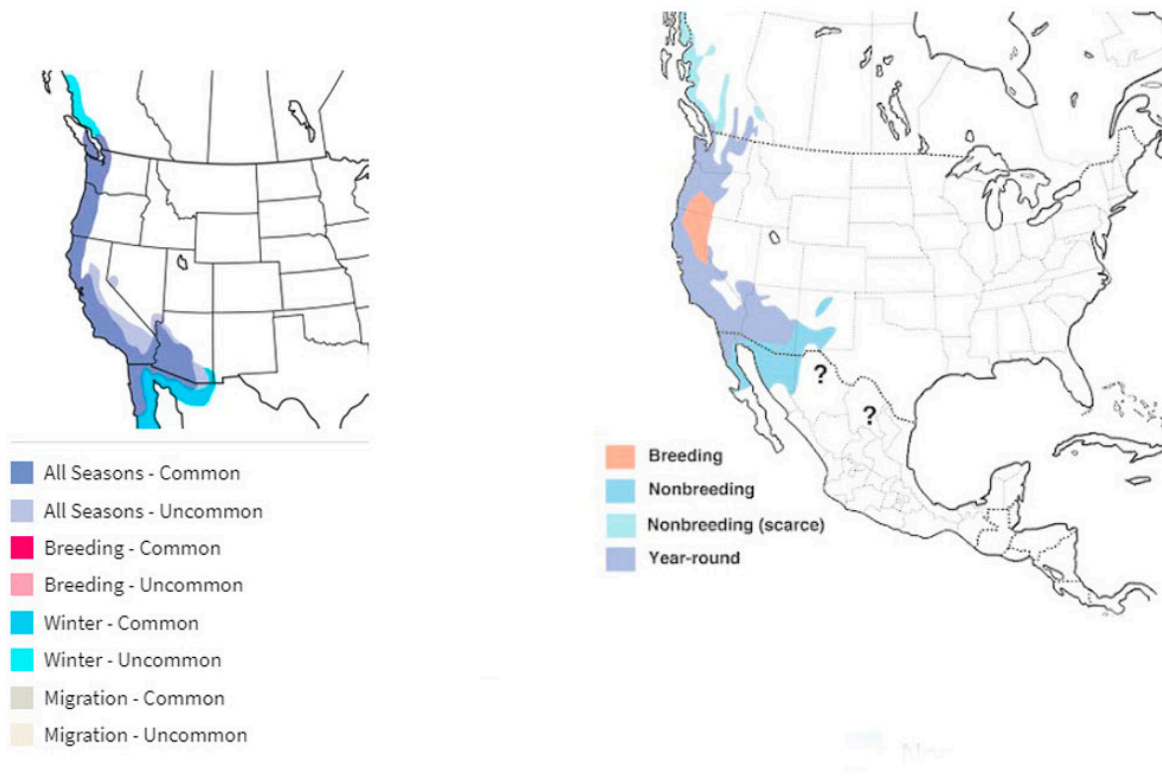


Figure 1. National Audubon Society

Figure 2. Cornell Lab of Ornithology

Sources of community science and associated data

The sources of community science data used in this report include:

- [eBird](http://www.ebird.org) (Cornell Lab of Ornithology (1967-2022), www.ebird.org). Anna's data within Washington State were downloaded directly from eBird for the period of record through 2022.
- [Christmas Bird Count](http://www.audubon.org/conservation/science/christmas-bird-count) (CBC) (1960-2022). CBC data was queried and a report for the period 1960-2022 for each survey circle's archive was produced. Anna's observations in the reports was transcribed to a spreadsheet for storage and use (www.audubon.org/conservation/science/christmas-bird-count)
- [NestWatch](http://www.nestwatch.org) (www.nestwatch.org). Tabular data were downloaded to allow mapping of documented nesting sites within Washington State
- [Breeding Bird Survey](http://www.audubon.org/conservation/science/bird-survey) data was downloaded from the website to determine if any Anna's observations are included.
- [North Central Washington Audubon Hummingbird Survey](http://www.audubon.org/conservation/science/hummingbird-survey). Volunteers made one-hour observations at sunrise or sunset on solstice and equinox dates. All data were submitted to eBird to increase the awareness of year-round presence, especially winter birds.

Two other data sources are included here:

- [Tweeters](https://wos.org/tweeters-archive/) – an email listserv maintained by the Washington Ornithological Society (<https://wos.org/tweeters-archive/>) The Tweeters archives were searched and over two hundred separate emails to the listserv were reviewed. Dates and locations of Anna's observations were documented.
- [The Birds of Yakima County](#) by Andrew Stepniewski, 1999, Yakima Valley Audubon Society. Stepniewski's book provides explicit statements about the timing and locations of Anna's sightings over time in Yakima County, Washington.

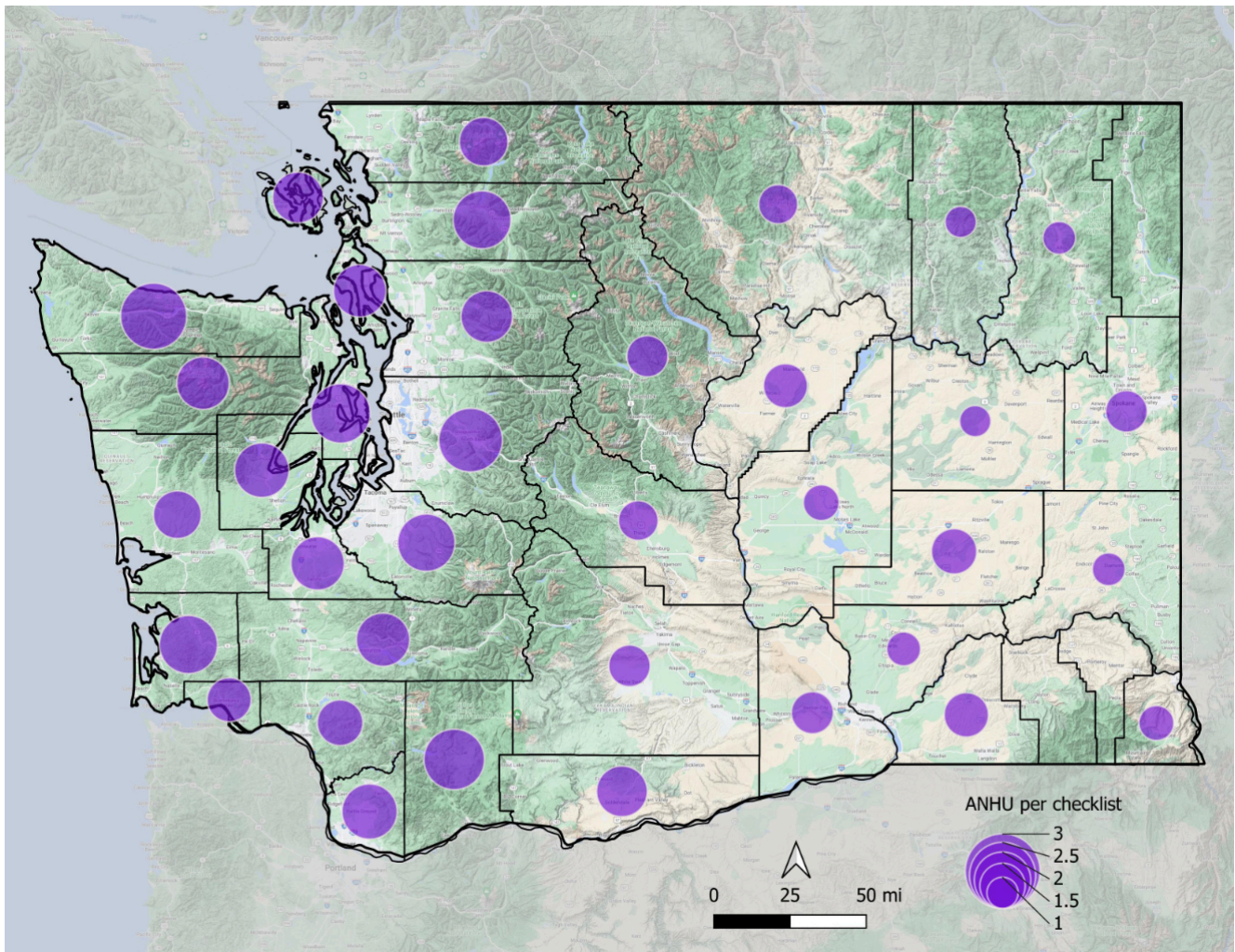
Displaying the data: Where?

- **Map 1:** normalized values of ANHU in each county. This map, based on eBird data, shows where ANHU have been reported using circles to show the proportional number of birds per checklist in each county.
- **Maps 2-3:** [NestWatch](#) maps showing documented ANHU nest sites.
- **Map 4:** [eBird range map](#) for Anna's Hummingbirds during all seasons.
- **Maps 5-12:** [eBird range maps](#) for ANHU during different life stages.

Displaying the data: When?

- **Figure 3:** eBird bar charts by county show the months in which ANHU have been observed. These charts show the number of eBird checklists that contain ANHU observations. The bars are proportional, allowing direct comparison between each county.
- **Figure 4:** a composite chart showing documented sightings of ANHU. It is organized by county on the y-axis and time on the x-axis. The chart contains documented sightings obtained from eBird, Christmas Bird Count, Tweeters, and Stepniewski's book.

Blue circles in Map 1 show which counties have reported ANHU to eBird. The circle sizes represent the proportional number of Anna’s Hummingbirds reported on each checklist in a county. The circle diameters are normalized by dividing the total number of ANHU reported in the county by the number of unique checklists. Shared checklists were removed to calculate an accurate total of birds.



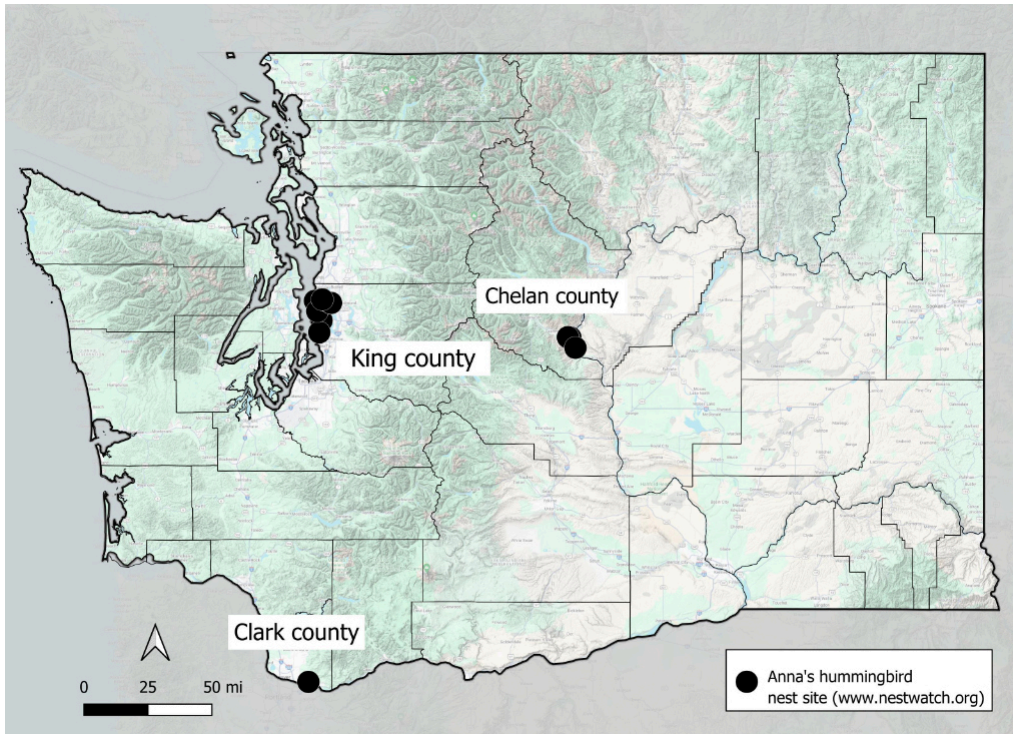
Map 1. The porportional number of Anna’s Hummingbirds on eBird checklists. The data is normalized by dividing the sum of ANHU counted by the number of checklists.

Take-away observations:

- More ANHU are represented in checklists submitted from the west side of the State than from the east side. This makes sense since the climate on the west side is milder than on the east side. Also, the density of urban yard gardens is likely larger on the west side, suggesting that there may be more food for ANHU during the longer local growing season and, possibly, in the winter.
- Pend Orielle, Garfield, and Columbia are the only counties without ANHU represented in eBird.
- This map should be recreated in ten years to see if the circle diameters on the east side more closely match those on the westside. I do not expect that the upper limit of the circles (3 ANHU per checklist) will increase, but it may be possible.

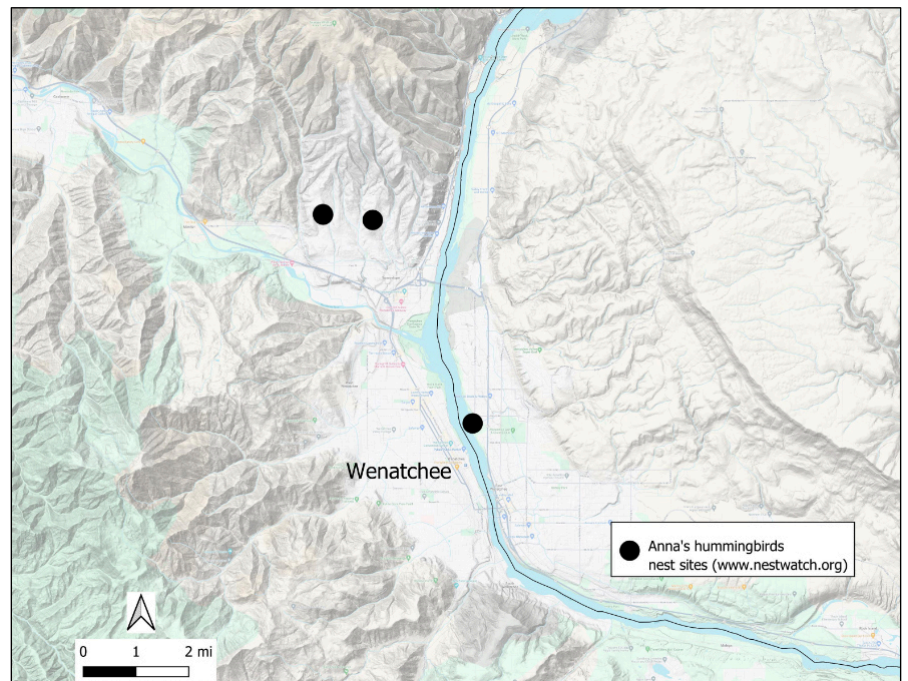
Interestingly, a Washington State record number of seventy-two (72) ANHU was reported on a single checklist in December 2022. This exceptional count occurred in Clark County. The person who submitted the checklist provides multiple feeding stations and regularly sees more than 20 ANHU at any given time.

Anna's Hummingbirds documented in the Cornell Lab of Ornithology
[NestWatch website](http://www.nestwatch.org)



Map 2. Documented Anna's Hummingbird nests in Washington (1990-2003) www.nestwatch.org

Map 3. Enlargement of Map 2 showing documented Anna's Hummingbird nests in Chelan county (2021-2023)

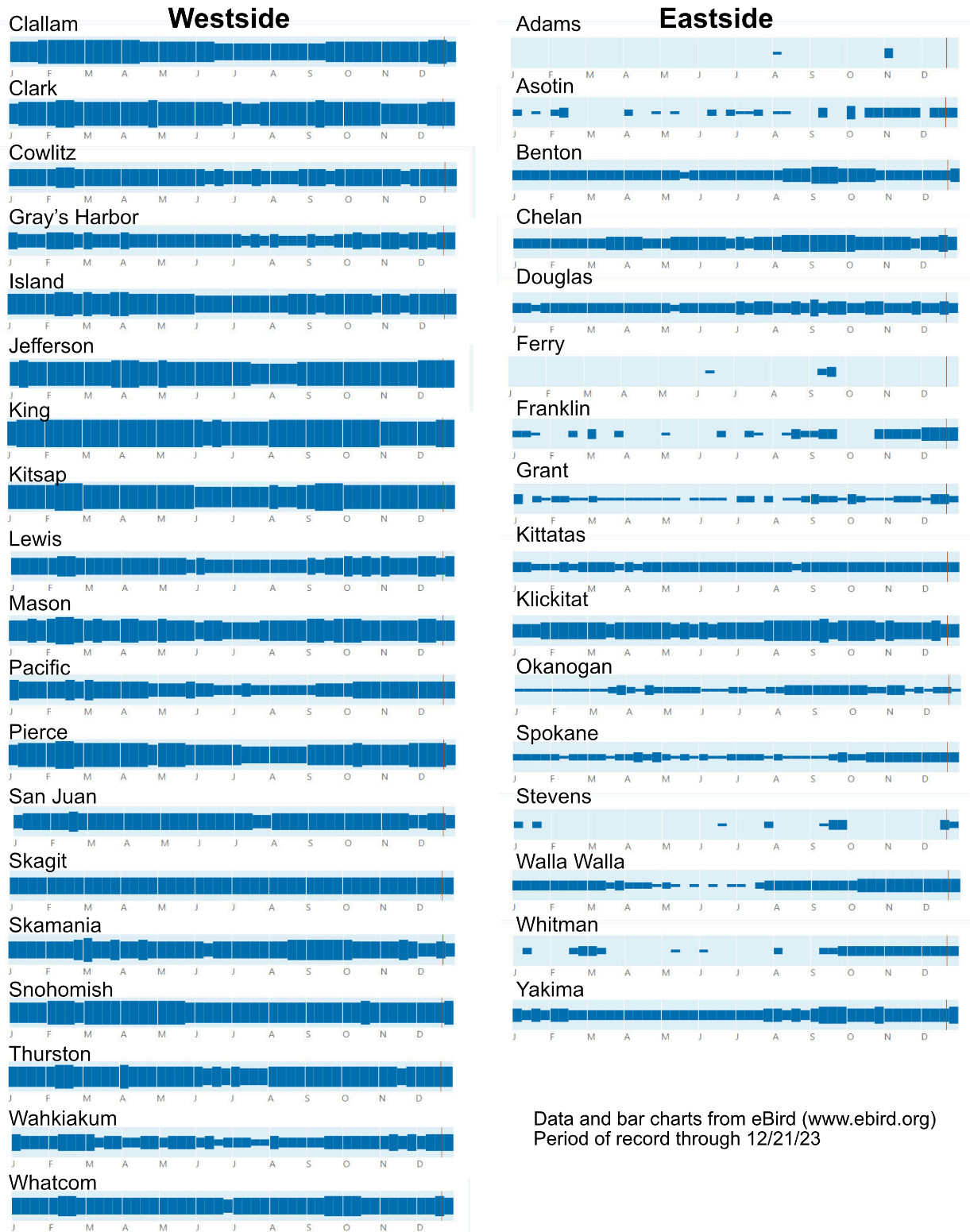


Take-away observation:

Documenting successful nesting is important and increases our understanding of Anna's behavior on the east side of the Cascades. Two young successfully fledged from each of the three nests. The northern two nests were active in 2021. The other nest was active in 2023. All nest records were submitted to NestWatch with supporting photographs and notes.

Monthly abundance of Anna's hummingbirds in Washington State counties

Taller bars indicate a species is reported on a large proportion of checklists from that area at that time of year



Data and bar charts from eBird (www.ebird.org)
 Period of record through 12/21/23

Figure 3. Monthly distribution of Anna's Hummingbirds in Washington State

Take-away observation: Westside counties experience robust populations of ANHU year-round. Eastside counties with year-round presence include Benton, Chelan, Douglas, Kittatas, Klickitat, Okanogan, Spokane, and Yakima. Of these, Benton, Chelan, Douglas, Klickitat, and Yakima show substantial year-round presence. It may be that the Columbia River exerts a significant influence on the presence of Anna's in many eastern Washington counties.

Records of Anna's hummingbirds in Washington State counties

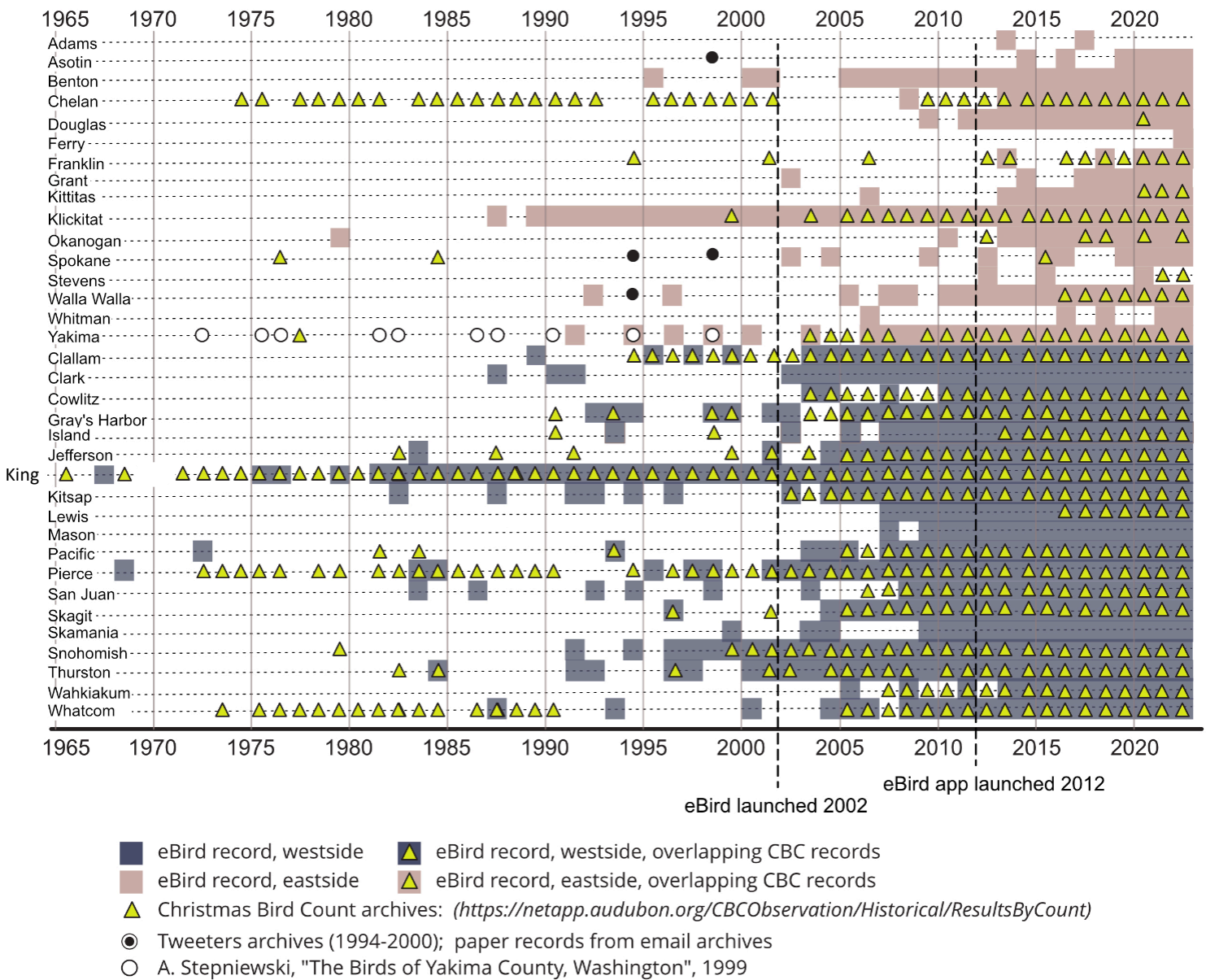


Figure 4. Documented sightings of ANHU in eBird, Christmas Bird Count records, Tweeters listserv email archives, and *The Birds of Yakima County* by Andrew Stepniewski.

Take-away observations: Figure 4 shows the value of using multiple data source to present extended timeframes for ANHU in much of Washington. The Christmas Bird Count (CBC) data in Chelan, King, Pierce, and Whatcom counties reveal a meaningful presence of ANHU that is not contained in eBird. Also, the CBC data are significant in that they indicate ANHU presence in winter months.

Establishing ANHU breeding in North Central Washington

The [North American Breeding Bird Survey](#) is a cooperative effort between the United States Geological Survey and the Canadian Wildlife Service to monitor the status and trends of North American bird populations. There are no observations of Anna’s Hummingbirds in the Breeding Bird Survey data for Washington State.

Smith, et.al.¹ list several notable dates of ANHU in Washington State.

- The first record of ANHU in Washington State lists a 1964 sighting in King county.
- The first breeding record is listed in 1976 in Tacoma (Pierce County)
- Summer birds in the Wenatchee valley (Chelan County) were recorded in 1989 and may eventually represent a sustainable breeding population.
- The map on page 255 shows one dot in Wenatchee as “possible breeding evidence.”

B. McCammon documented successful nesting and fledging at two nests in Wenatchee in 2021. This information was presented at the 2022 and 2023 Leavenworth Spring Bird Fests.

F. Cone photo documented successful nesting and fledging at a nest in East Wenatchee in 2023.

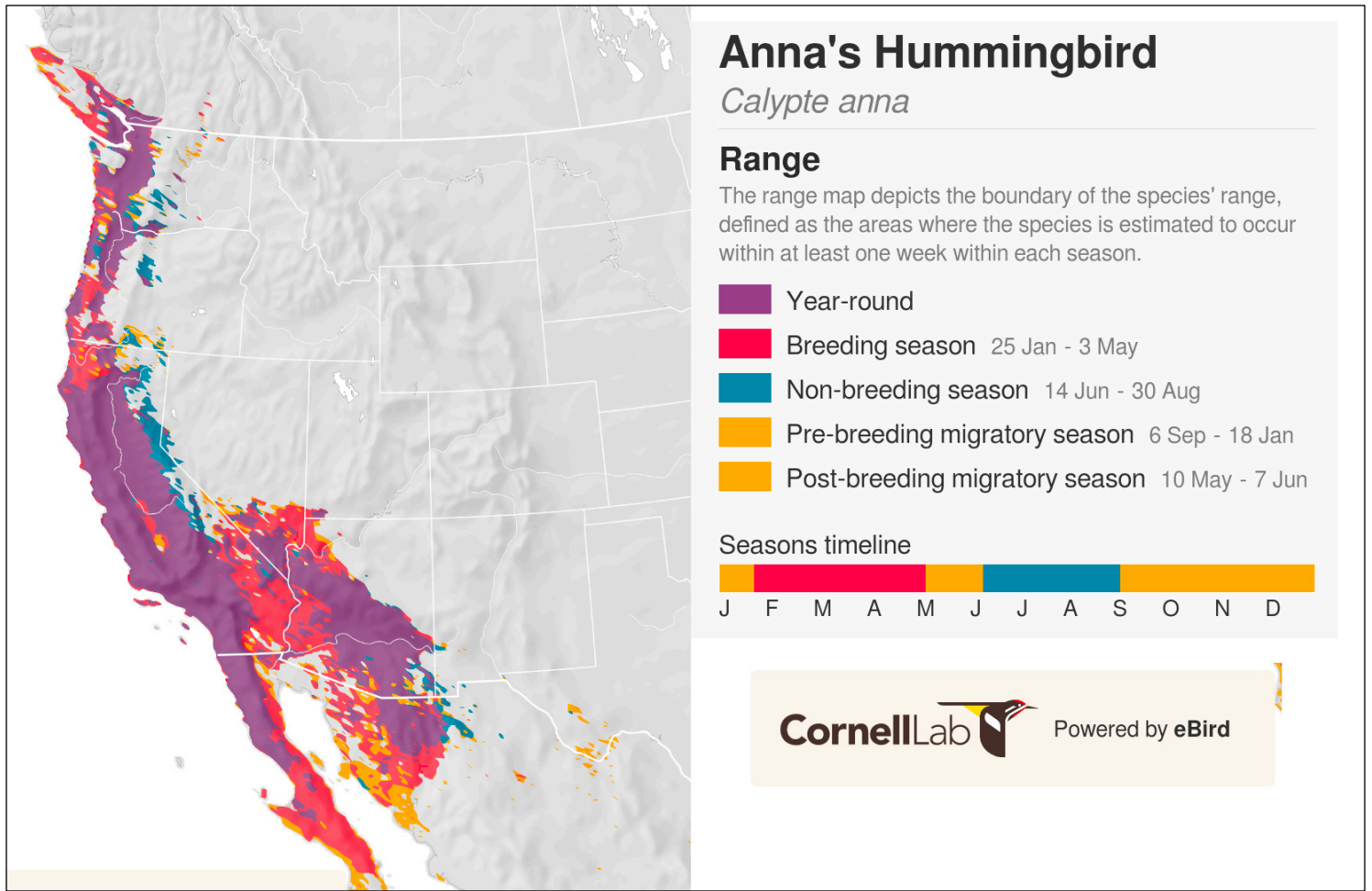
The eBird Science team² used state-of-the-art statistical models and machine learning to build visualizations and tools to allow users to better understand migration, abundance, and range boundaries.

An abundance map for ANHU can be viewed at [Anna's Hummingbird - Abundance map - eBird Status and Trends](#). The map displays five annual periods: Year-round, Breeding season (25 Jan-3 May), non-breeding season (14 Jun-30 Aug), pre-breeding migration season (6 Sep-18 Jan), and post-breeding migration season (10 May-7 Jun).

The Science team also allows people to download abundance maps, range maps, and animation movies. Importantly, they also allow users to download geospatial data layers for use in GIS. The GIS data are shown in Maps 5-12.

¹ Michael Smith, P. Mattocks, Jr., and K. Cassidy, [Breeding Birds of Washington State – Location Data and Predicted Distributions](#), 1997, Seattle Audubon Society. Page 254.

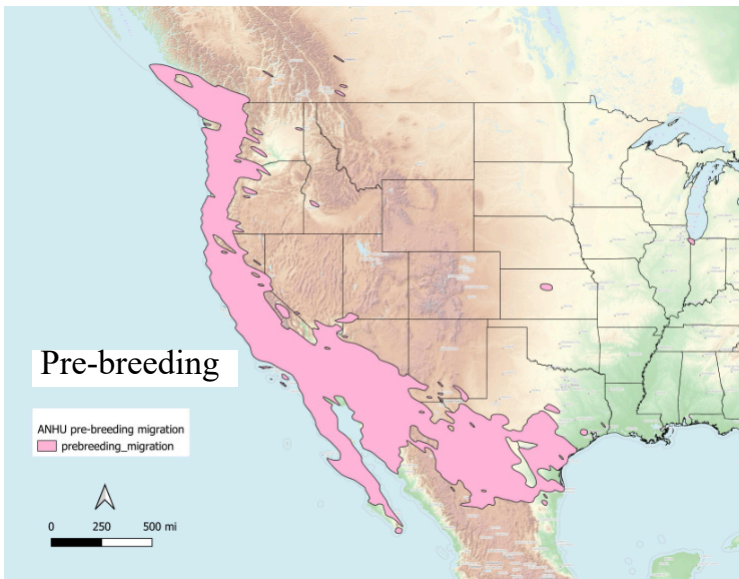
² Fink, D., T. Auer, A. Johnston, M. Strimas-Mackey, S. Ligocki, O. Robinson, W. Hochachka, L. Jaromczyk, C. Crowley, K. Dunham, A. Stillman, I. Davies, A. Rodewald, V. Ruiz-Gutierrez, C. Wood. 2023. eBird Status and Trends, Data Version: 2022; Released: 2023. Cornell Lab of Ornithology, Ithaca, New York. <https://doi.org/10.2173/ebirdst.2022>



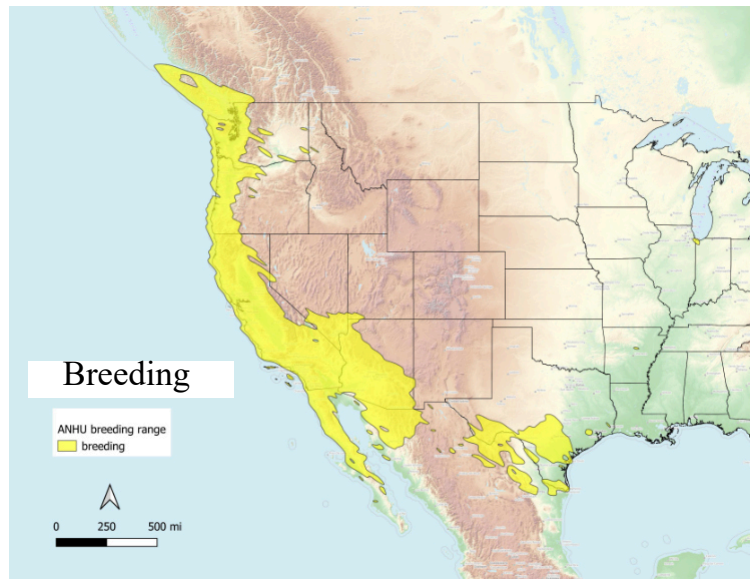
Map 4. eBird Status and Trends map of Anna's Hummingbird range - all seasons.

Map 4, while challenging to inspect for details, provides the most resolute description of the geographic distribution of Anna's Hummingbirds in western North America. Gone are the generalized broad areas shown in Figures 1 and 2 of this paper. Instead, we now see a clear presence, albeit small patches, of presence in eastern Washington and Oregon. We see an expansion in Arizona and a small, seasonal presence in Texas. The map provides a valuable benchmark for future comparison to explore the premise that Anna's Hummingbirds are expanding to the north and east.

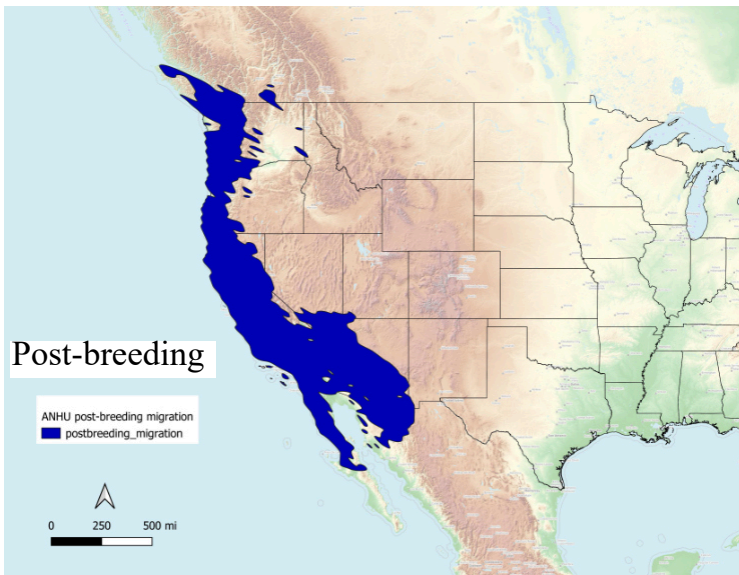
The following pages present several maps showing the above data in which four life-stage seasons are separated: Map 5: Pre-breeding migration season (6 Sep-18 Jan), Map 6: Breeding season (25 Jan-3 May), Map 7: Post-breeding season (10 May-7 Jun) and, Map 8: Non-breeding season (14 Jun-30 Aug). Isolating these seasons, one to each map, obscures the areas that are clearly overlapping or which represent slight expansion or contractions of the ranges within a season. Individually, the maps provide, finally, confirmation that Anna's Hummingbirds are present in North Central Washington year-round and that they are successfully breeding in several areas within eastern Washington.



Map 5. Anna's Hummingbird range. Pre-breeding



Map 6. Anna's Hummingbird range. Breeding



Map 7. Anna's Hummingbird range. Post-breeding

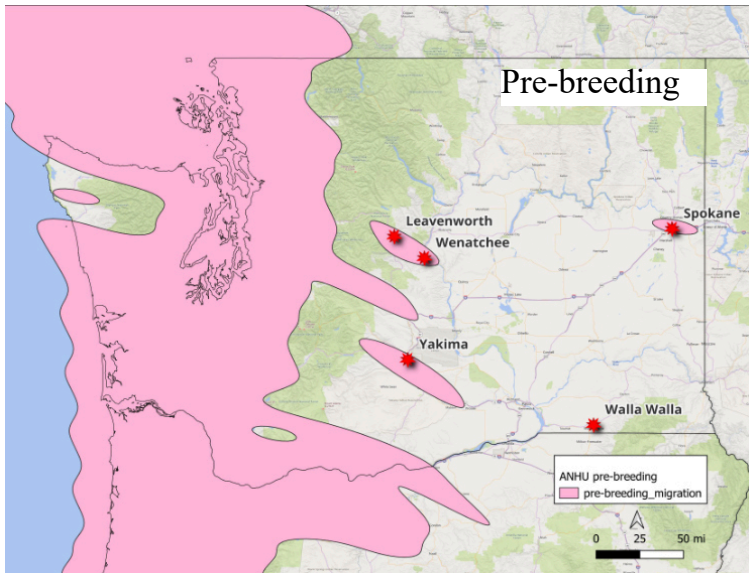


Map 8. Anna's Hummingbird range. Non-breeding

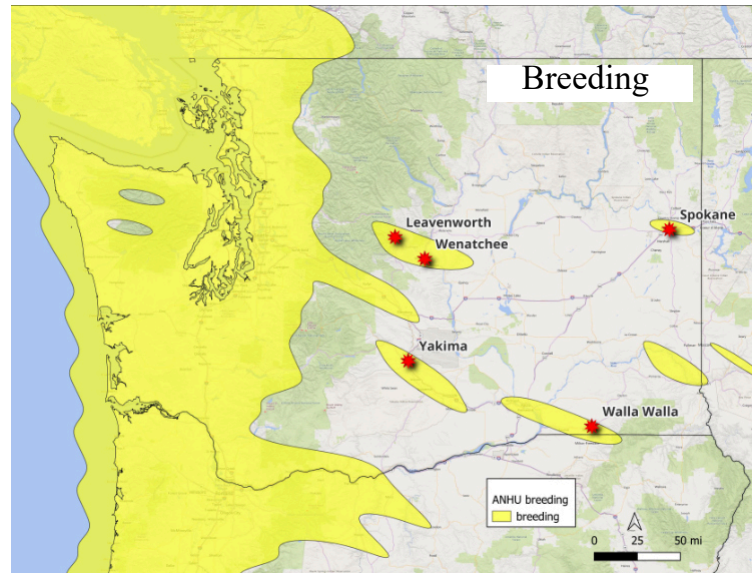
Anna's Hummingbirds are frequently referred to as being "non-migratory". Several references state that Anna's are prone to stay in an area if they find sufficient food and shelter. The notion that Anna's are non-migratory seems contradictory to the above maps showing "pre-breeding migration" and "post-breeding migration". In essence, these two maps represent the presence of Anna's during a specific calendar period. Since Anna's can also be considered "wide-ranging", the maps simply show that Anna's are present in the areas when they are neither breeding nor non-breeding. Clearly, the birds are moving into Texas for breeding purposes and back to Arizona and western states after breeding.

The modeling and analysis processes involved in creating these maps is well documented on the eBird Status and Trends FAQ page. The maps represent a significant improvement to currently published range maps. They will be revised over time as more data are submitted to eBird. For example, Robinson et.al.³ document in 2021 the successful breeding in the Boise, Idaho area but the maps do not show this successful breeding. Over time, confirmed instances of known breeding success will become incorporated into the mapping.

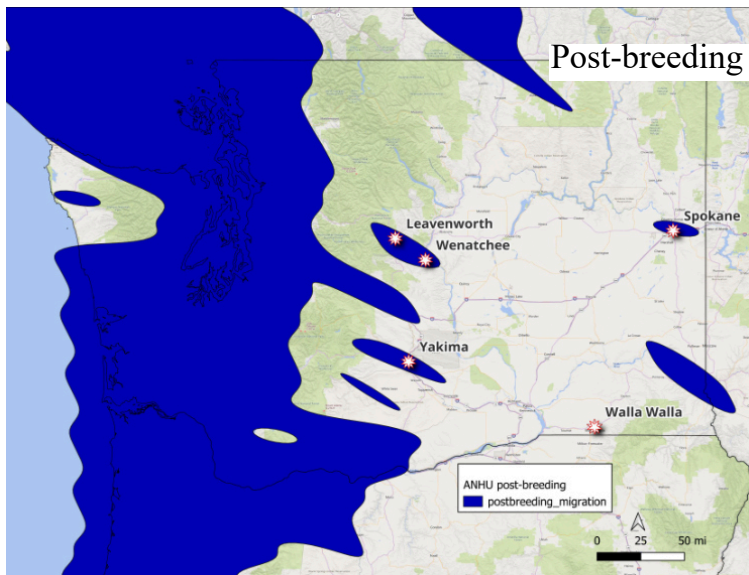
³ B.W. Robinson, Pollock, Carlisle, Hayes, and Engle, "First Documentation of Successful Breeding for the Anna's Hummingbird in Idaho", *Western Birds*, 52:76-79, 2021.



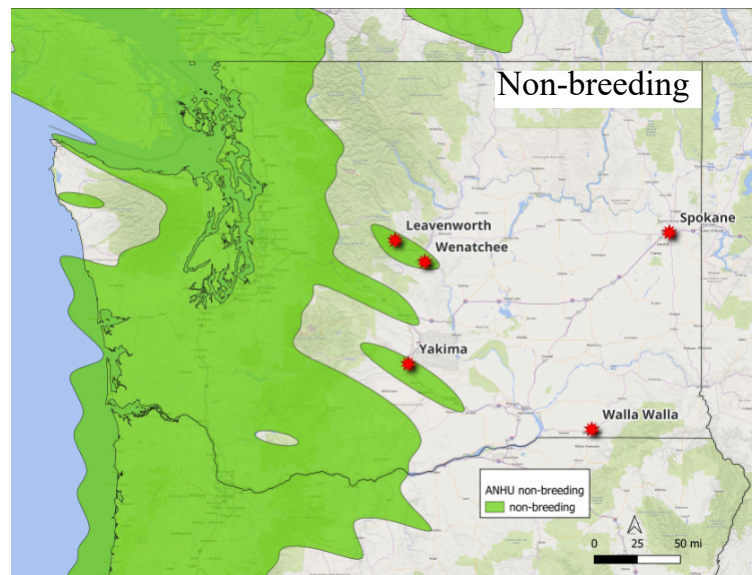
Map 9. Anna's Hummingbird range. Pre-breeding



Map 10. Anna's Hummingbird range. Breeding



Map 11. Anna's Hummingbird range. Post-breeding



Map 12. Anna's Hummingbird range. Non-

The maps above are enlargements of Maps 5-8. Observations of Anna's Hummingbirds over the course of each year, along with data included in NestWatch, form the basis for showing year-round presence in eastern Washington and breeding zones in six eastern Washington areas.

Conclusions:

- Community Science efforts provide valuable and useful information.
- It is important to make data available to scientific databases and publish findings when possible.
- eBird continues to be the most prolific community science source of bird data.
- Transparency of data gathering and analysis processes is incorporated well in eBird, CBC, NestWatch, Breeding Bird Surveys. Availability of data for use by others is much appreciated.
- Anna's Hummingbirds are established as having year-round presence and successful breeding in eastern Washington.
- Historic range maps need to be revised to incorporate available data and analysis of presence, status, and trends.