Earthwatch 2017 Annual Field Report

FOLLOWING FOREST OWL COMMUNITY AND POPULATION DYNAMICS IN DIFFERENT FOREST TYPES IN THE WESTERN UNITED STATES

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MAY 2017 – JULY 2017

Greetings!

2017 was the second season for this effort and we continued to learn much from the owls, the trees, and each other. This year we banded quite a few of the local birds, including 13 recaptures (9 in UT and 4 in AZ)—hopefully we'll encounter many of these and others in future seasons as we work to determine whether and where they are nesting, how those efforts go, and how well they survive. We changed things up a little this season and after training each team, turned over trapping setup and duties to participants. It was rewarding to see teams gain skill and confidence during the course of an expedition. They also performed quite well as we captured and banded 85 owls.

Once again, we learned that while finding owls in the Chiricahua Mountains is easy, locating nest-cavities takes time and luck. Our Utah network of nestboxes regularly used by Flammulated and Northern Saw-whet owls made locating nests easier here, but we were very excited to locate 2 natural cavity Flammulated Owl nests in addition to those in boxes.

Between the two sites we found and mapped 585 cavities—a huge effort and great contribution to our goal of understanding the dynamics of these habitat elements that are so important to owls and other cavity-nesting wildlife. This wouldn't be possible without the time and willingness of volunteers to learn how to ID different trees and scan for and document cavity characteristics.

Field Team Leaders and I continue to be impressed with just how dedicated, hard-working, and fun Earthwatch volunteers can be. Team members ranged in age from 15 years old to 76 years young and all contributed. It brings a smile to my face every time someone from the back of the vehicle yells something to the effect of "Stop!! I just saw a fantastic tree cavity, we have to look inside!". It happens every trip. Earthwatchers are amazing and we gain large amounts of energy and inspiration working alongside and sharing your owl encounters.

Thank you so much for the hard work, contribution to conservation, and good times; come back, tell your friends! Tell strangers!

Strigologically yours,

Dave, Markus, Nikki, Felicia, and Claire

SUMMARY

Earthwatch teams in Arizona and Utah mapped and measured tree cavities within 58 quarter-hectare plots, finding a total of 585 total cavities! Teams detected 151 owls during nighttime surveys and trapped and banded 85 owls—six different species: Elf Owl- *Micrathene whitneyi*; Flammulated Owl- *Psiloscops flammeolus*; Northern Pygmy Owl- *Glaucidium gnoma*; Northern Saw-whet Owl- *Aegolius acadicus*; Western Screech-owl- *Megascops kennicottii*; and Whiskered Screech-owl- *Megascops trichopsis*. We located and monitored 16 nests (5 natural, 11 nestbox).

GOALS, OBJECTIVES, AND RESULTS

We fielded seven expeditions overall this season with three in Utah and four in Arizona (including IGNITE teen groups at both sites). Field teams accomplished much at each location, especially considering the size of our teams trended smaller than in 2016.

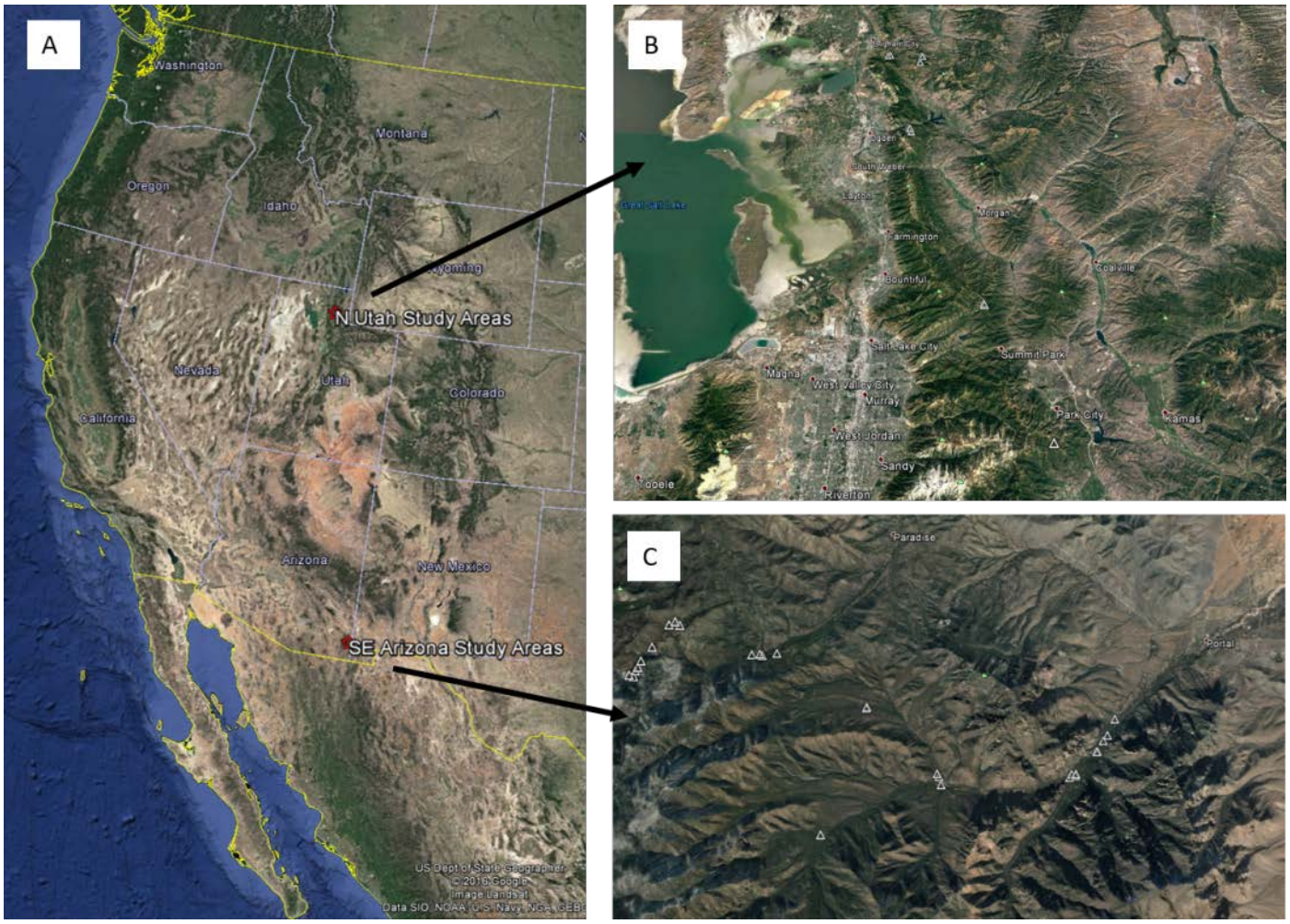

Figure 1. Location of Forest Owl study areas in Utah and Arizona. A. Locations of study areas in western North America, B. Location of northern Utah study areas, C. Location of southeast Arizona Study areas.

Tree cavity mapping and habitat measurements:
One of our more ambitious research goals is to document tree cavity density in different western forest types, and to develop a better understanding of how the dynamics of these important habitat elements vary by forest type and in the light of global climate change. To accomplish this goal teams search quarter-hectare (50 meter x 50 meter) sections of forest with the goal of locating, mapping, and measuring characteristics of every cavity that can be located. Teams measured canopy, tree density, and mapped cavities within 58 quarter-hectare plots within five different forest types in northern Utah and southeast Arizona (Fig 1 B and C)—mapping a total of 501 cavities inside those plots and 585 cavities in and adjacent to the plots. Riparian forest had the most cavities and highest canopy coverage on average of the five forest-types sampled and coniferous forest had the lowest number of cavities (Table 1).

Surveying Owl Communities
Another goal is to explore how cavity distribution influences the guild of secondary cavity nesting owls that rely upon cavities for breeding and roosting. To do this we document both the presence of territorial owls and monitor nest metrics when we can locate the nests of focal species. Forest type and climate change could each influence the output and timing of reproduction for some small forest owl species. We conduct nighttime surveys and use pole-mounted 'cavity-cameras' to check cavities for nests while mapping cavities in plots during the day. Efforts to monitoring nests are aided at most (4 of 6) of our Utah study sites by the presence of nest-boxes, which are used by Flammulated Owls *(Psiloscops flammeolus)* and Northern Saw-whet Owls *(Aegolius acadicus)*. In Utah we monitored 11 Flammulated Owl nests (9 in nestboxes, 2 in natural cavities) and 2 Northern Saw-whet Owl nests. In Arizona we located 2 Northern Pygmy Owl *(Glaucidium gnoma)* nests, and 1 Elf Owl *(Micrathene whitneyi)* nest. Additionally, we delineated additional territories for these species and for Whiskered Screech-owls (*Megascops kennicottii)*, and Flammulated Owls (3). We are learning that locating owl nests in cavity rich riparian areas is indeed a challenge.

Table 1. Cavities per ha, canopy cover, basal areas and trees per acre measured in plots during 2017 expeditions by forest type, samples size in parentheses. (values are mean±SE).

Forest Type	Cavities/ha	Canopy Cover (%)	Basal Area (ft2/acre)	Trees/acre
Aspen (21)	30.8±4.0	56.8±3.1	105±15.8	376.7±82.5
Coniferous (5)	15.3±7.8	59.3±13	160±36.7	79.5±13.2
Oak Scrub/Conifer (7)	31.4±13.1	64.9±4	86.4±14	172.9±30.8
Oak Scrub/Riparian (4)	51±11.1	71±8	120±8.2	173.6±42.4
Riparian (18)	65.8±5.5	73.9±2.8	133.1±10	175.6±26.6
Grand Total (58)	39.7±3.8	62.2±2.6	113.4±6.3	217.9±23

Table 2. Owls detected during nighttime surveys in Arizona during the 2017 Fielding season

Species	Total number of detections
Elf Owl	50
Flammulated Owl	3
N. Saw-whet Owl	1
Mexican Spotted-owl	5
Northern Pygmy Owl	2
Western Screech-owl	18
Whiskered Screech-owl	72

Arizona team setting a mist-net during night work.

In 22 nights and at 73 points of surveying in Arizona, we detected 151 owls of seven different species. Whiskered Screech-owl was the most commonly encountered species, followed by Elf Owl, Western Screech-owl, Flammulated Owl, and Northern Pygmy Owl (Table 2).

Banding efforts

We capture and band individual owls at our study areas in order to learn more about longevity, survival, individual reproductive output, recruitment into the breeding population, territory fidelity, and mate fidelity. We use a combination of mistnets with playback, hand-grabbing nestlings and adults in nest boxes, or hand-capture of recently fledged owlets. We measure birds, band them with USFWS aluminum bands and release them. In 2017 expedition teams captured 85 owls of six species (Table 3). Whiskered Screech-owl was the most commonly heard and captured species in Arizona, followed by Elf Owl and Western Screech-owl. Flammulated Owl was the most commonly heard and captured owl in Utah, followed by Northern Saw-whet Owl. An exciting outcome this year was that four of the 23 Whiskered Screech-owl were recaptures—birds that we banded in 2016. This tells us not only that they survived the winter, but that each held exactly the same territory in 2017 as the previous year.

Note: In order to avoid unnecessary disturbance to birds, we do not disclose the locations of nests, territories, or banded birds.

Pictured Above: Nestling Flammulated Owls after banding during a nest check in Utah.

Pictured Right: Recently fledged N. Pygmy owls during banding in Arizona.

Table 3. Owls captured and banded during the 2017 Fielding Season by study location and age class.

	Arizona		Utah		2016 and 2017
Species	1st yr	Adult	1st yr	Adult	Total
Elf Owl	1	8			11
Flammulated Owl			19	21	82
Northern Pygmy Owl	3	1			5
Northern Saw-whet Owl			1	4	15
Western Screech-owl		4			10
Whiskered Screech-owl		23			36

Invertebrate prey sampling

Along with cavity availability, food resources in and area can influence the owl community and the nesting success and survival of individuals. This season expedition members helped set up and collect malaise traps in both Utah and Arizona study areas.

Outlook for 2018

We learned a lot during the 2017 season, especially at our Arizona sites. We'll start 2018 with a much clearer picture of what to expect and where to start our nest searching efforts. We will dedicate additional time, both day and night, in trying to locate nest cavities for known territorial pairs. We'll revisit some reference plots to check on cavities that teams mapped this season and map any new ones. We'll also map new areas as we search for owl nests and continue gathering data to unlock the story of owl communities, the cavities they rely on, and how each could be impacted by a changing climate. Also exciting is that we'll be fielding teams earlier in the spring at both sites, which will allow for better insight into nesting phenology, particularly for early nesting species.

PROJECT IMPACTS

1. **Increasing Scientific Knowledge**
   - ***a.*** **Total citizen science research hours:** *Fifty-four citizen scientists provided approximately 4,020 hours of service to this project in 2017. Thank you!!!*
   - ***b.*** **Peer-reviewed publications:** *n/a*
   - **c.** **Non-peer reviewed publications:** Technical reports, white papers, articles, sponsored or personal blogs

     Various posts on HWI social media and websites

EARTHWATCH INSTITUTE

2. Mentoring

Oleyar and Mika mentored two young scientists that joined the team in 2017. Claire Sykes was an undergraduate intern from the University of Wisconsin, La Crosse. Claire focused invertebrate sampling as a senior project while also assisting field teams in Utah. Felicia Aragon has an undergraduate degree in Wildlife Ecology from Humboldt State University in California, and helped lead teams in Arizona and Utah. Each gained valuable scientific and outreach experience during the field season and each is likely to rejoin the project in 2018.

3. Partnerships – list your current active professional partnerships that contribute to your project and indicate the type of support these partners provide

Partner	**Support Type(s)**[1]	**Years of Association** (e.g. 2006-present)
Southwestern Research Station-AMNH	*Logistics, permits*	*2016-present*
Weber State University	*Logistics*	2016-present

1. Support type options: funding, data, logistics, permits, technical support, collaboration, academic support, cultural support, other

4. Contributions to management plans or policies - list the management plans/policies to which your project contributed this year

Plan/Policy Name	**Type**[2]	**Level of Impact**[3]	**New or Existing?**	**Primary goal of plan/policy**[4]	**Stage of plan/policy**[5]	**Description of Contribution**

2. Type options: agenda, convention, development plan, management plan, policy, or other (define)
3. Level of impact options: local, regional, national, international
4. Primary goal options: cultural conservation, land conservation, species conservation, natural resource conservation, other
5. Stage of plan/policy options: proposed, in progress, adopted, other (define)

5. Conserving natural and sociocultural capital

a. Conservation of taxa –

i. List any focal study species that you did not list in your most recent proposal

Species	**Common name**	**IUCN Red List category**	**Local/regional conservation status**	**Local/regional conservation status source**
Strix occidentalis lucida	**Mexican Spotted Owl**	**Threatened**	**Threatened**	**AGFD, TNW 1988**
Note: Not focal species, but present in AZ research area				

RESEARCH PLAN UPDATES

1.	**Have you added a new research site or has your research site location changed?**	☐Yes	☒No
2.	**Has the protected area status of your research site changed?**	☐Yes	☒No
3.	**Has the conservation status of a species you study changed?**	☐Yes	☒No
4.	**Have there been any changes in project scientists or field crew?**	☐Yes	☒No

Details – provide more information for any 'yes' answers
