

LMVJV BOARD MEETING

**NE Texas Avian Community Sampling with
Automated Recorders**

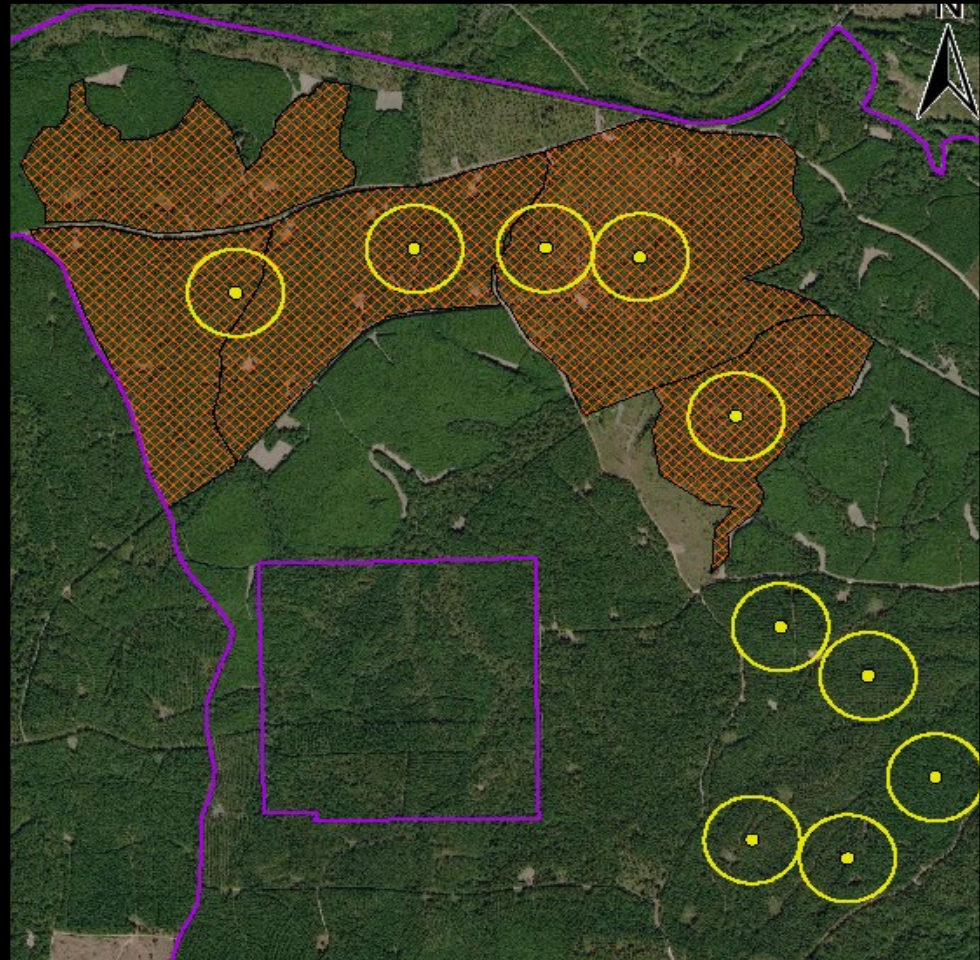
17 October 2019

Cypress Bend, Louisiana

Avian Monitoring Protocol

Points represent Songmeter locations.

- Identify sample locations
- Each point has a 200m buffer.
- Buffers don't overlap.
- Buffers do not include more than one stand type.
- Deploy ARUs at designated points.



Bobcat Ridge

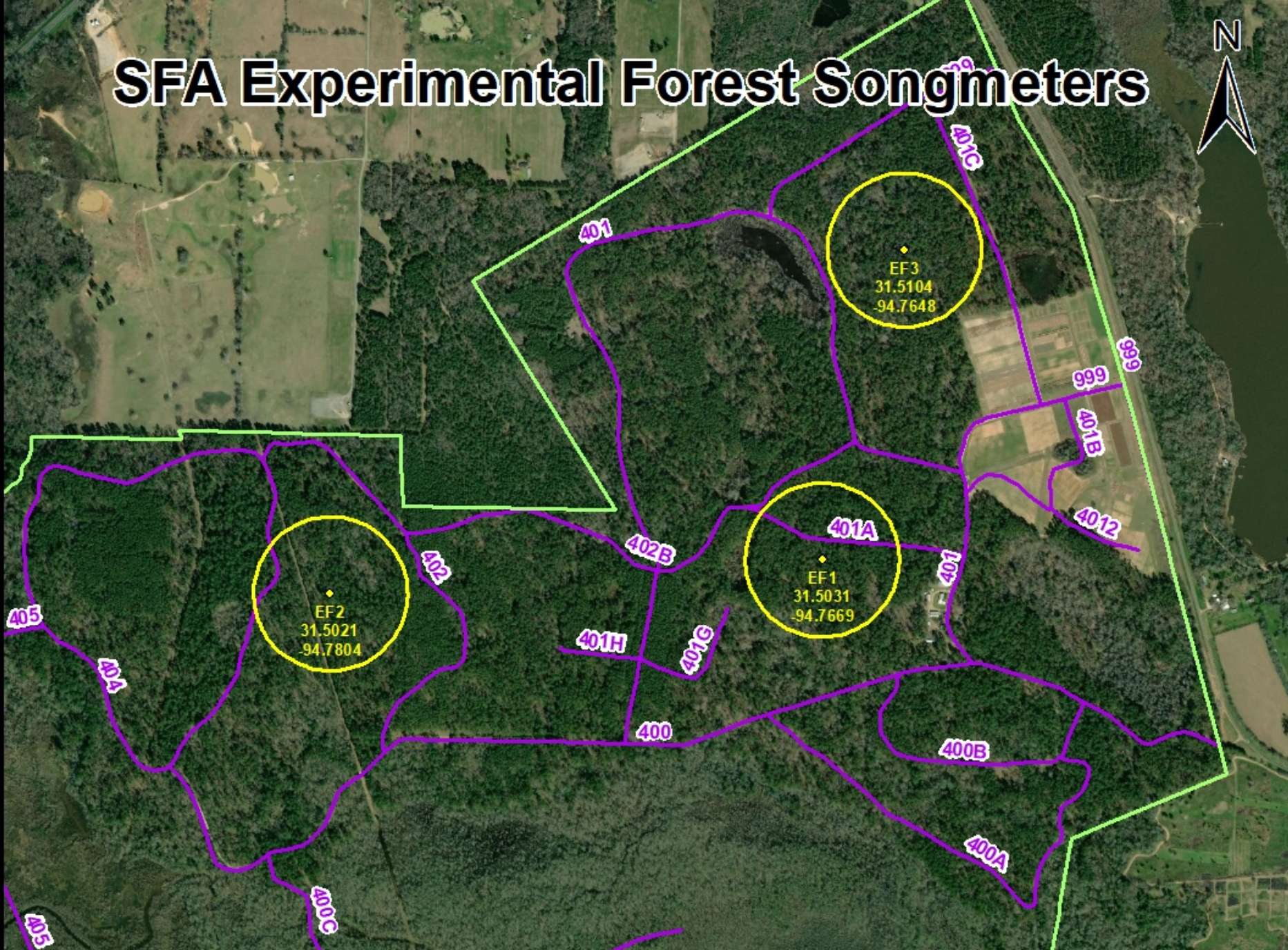


Bobcat Ridge Burned



Bobcat Ridge Unburned

SFA Experimental Forest Songmeters



EF2
31.5021
-94.7804

401A
EF1
31.5031
-94.7669

EF3
31.5104
-94.7648





Wory

A handwritten label 'Wory' in black ink is positioned in the center of the image. A black arrow points from the top of the 'W' towards a tree trunk on the left side of the frame. The background is a dense forest with many thin, vertical tree trunks and green foliage.

SFA Experimental Forest

Winston 8 Ranch Songmeters



W83
31.5264
-94.7306



W81
31.5199
-94.7196



W82
31.5171
-94.7271





Winston 8

Couch Mountain Songmeters



CM2
32.92273
-94.85698

CM1
32.92236
-94.8502



0 0.75 1.5 3 Kilometers



Couch Mountain

ARU Installation





SM4 Audio Recorder

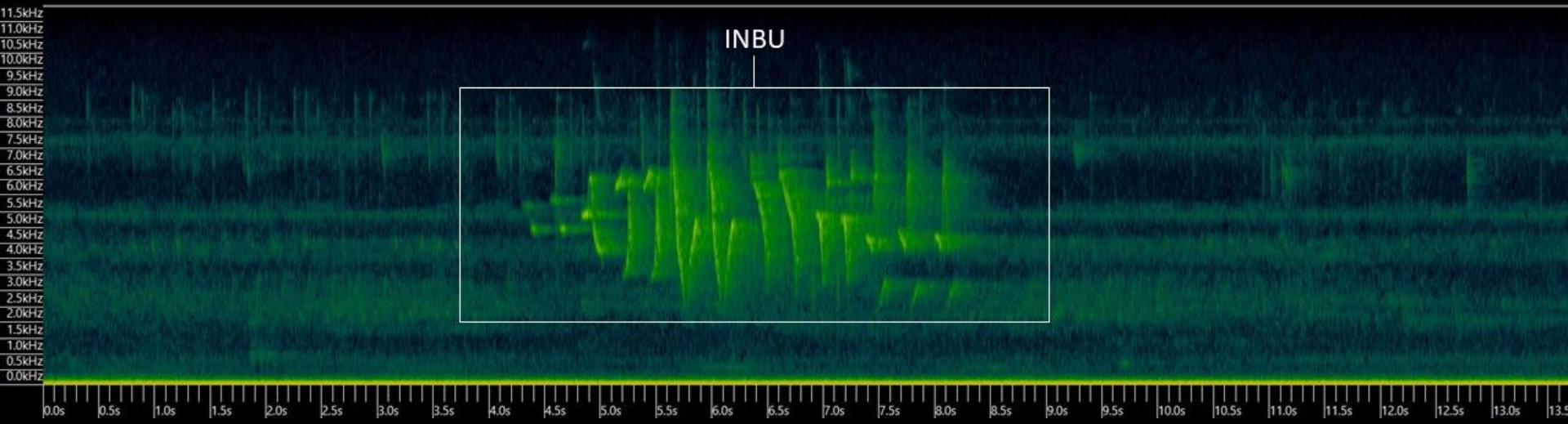
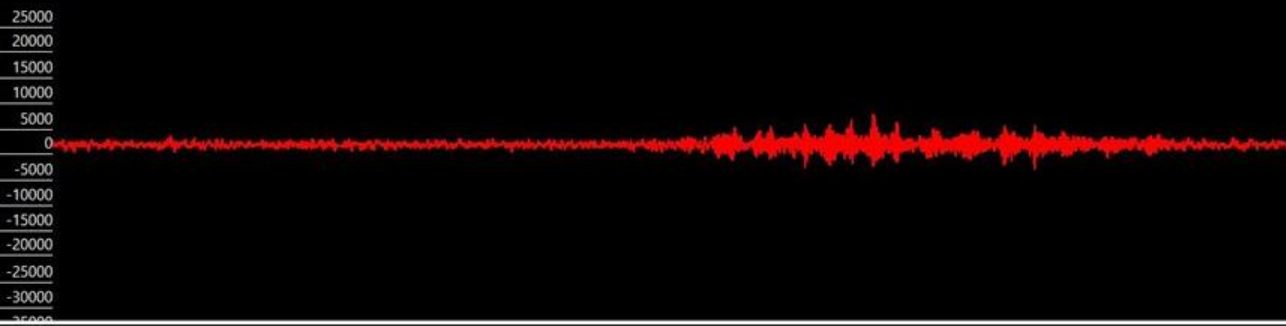


Recorders set to record for 10 minutes and 1 hour

Recorders set to record for 10 minutes and 1 hour each day.

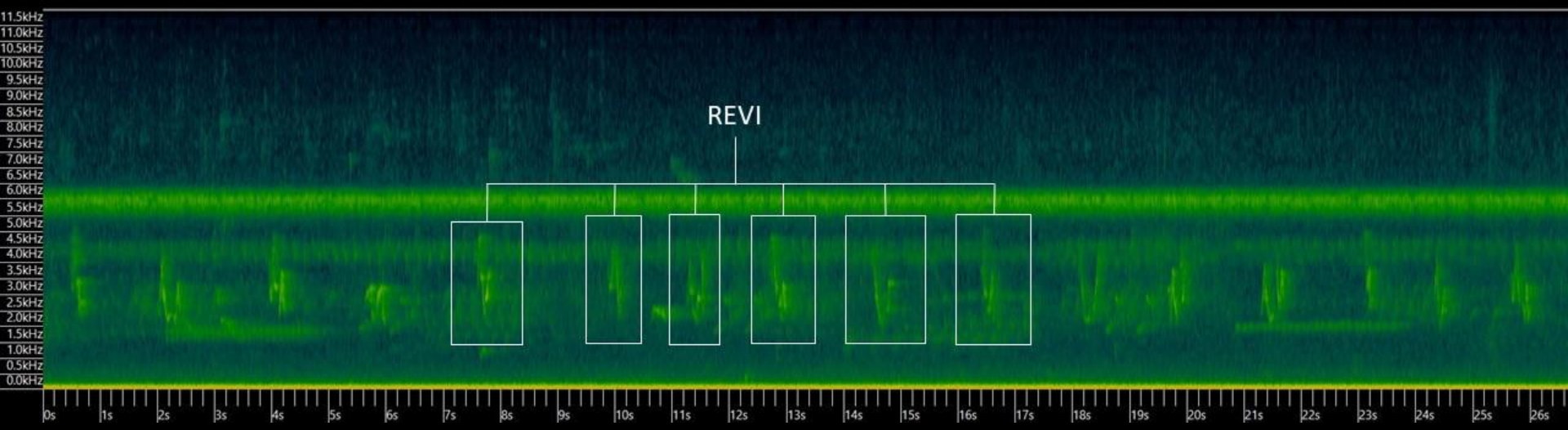
Kaleidoscope Software





Indigo Bunting Vocalization

30000
25000
20000
15000
10000
5000
0
-5000
-10000
-15000
-20000
-25000
-30000
-35000



Red-eyed Vireo Vocalization



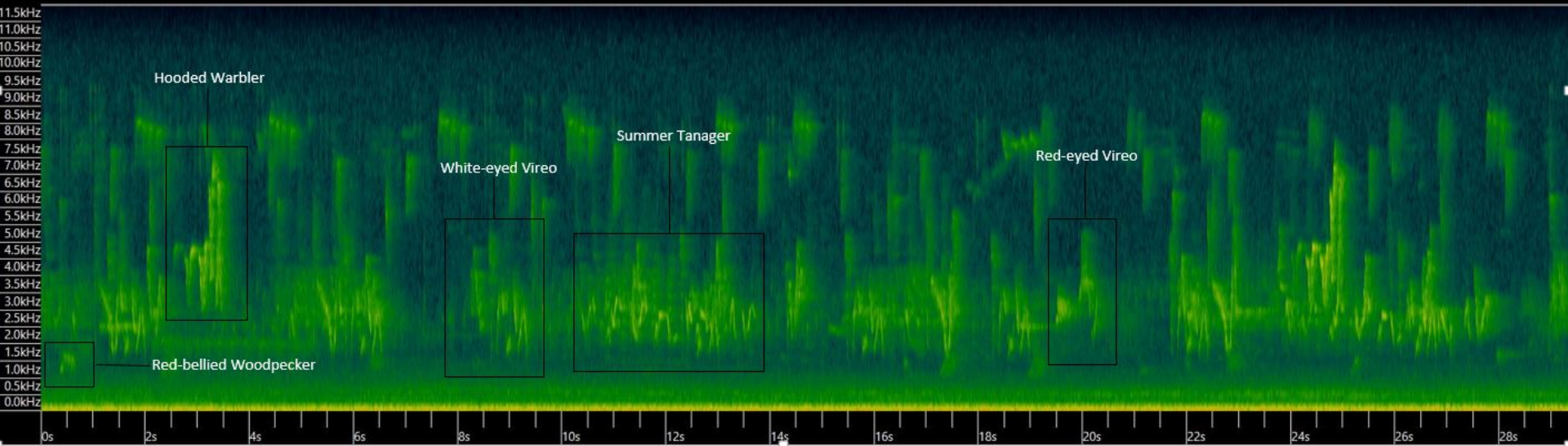
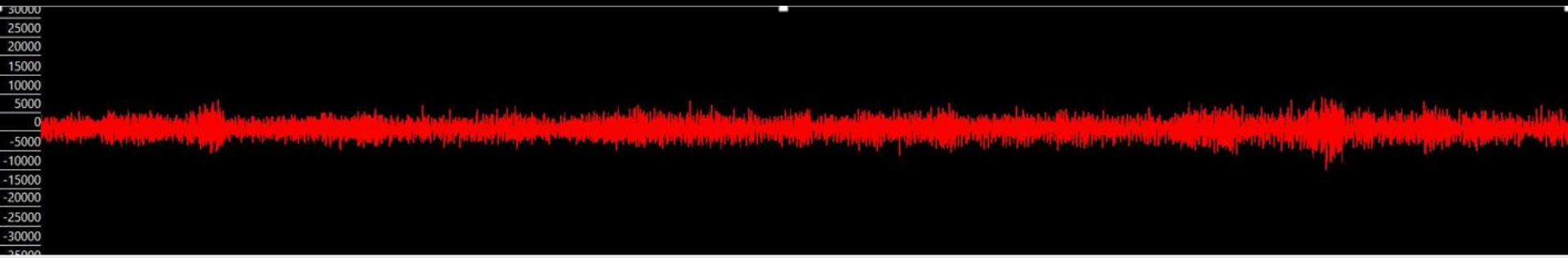
PIWA

CHSP



Pine Warbler vs Chipping Sparrow

Field Test vs R8 Bird Survey



Observer 1
conducted R8 bird
survey and recoded
with SM4
simultaneously.



Results

Observer 1: (field and lab)

- Counted 9 species in field
- Counted 10 in the lab


Observer 2: (lab only)

- Counted 11 species with confidence

Observer 3: (lab only)

- Counted 11 species

Autonomous sound recording outperforms human observation for sampling birds: a systematic map and user guide

KEVIN DARRAS ^{1,5} PÉTER BATÁRY ^{1,2} BRETT J. FURNAS ³ INGO GRASS,¹ YENI A. MULYANI,⁴ AND TEJA TSCHARNTKE¹

September 2019

SOUND RECORDING VS. HUMAN OBSERVATION

Article e01954; page 1251

TABLE 1. Comparison of strengths (+) and weaknesses (–) of point count and automated sound recording methods for surveying birds. Equal signs (=) denote similar performance.

Criteria	Autonomous sound recordings	Point counts	Main justification
Visual detections†	–	+	sound recordings are audio only
Avoidance effect	+	–	humans disturb birds
Overlooked birds†	+	–	recordings can be played back
Rare species	+	–	rare species easily detected with longer recordings
Number of detections†	–	+	easier to measure in point counts
Density	=	=	densities can be estimated
Species richness	+	–	recorders more effective overall
Occupancy	+	–	easier to collect replicates with sound recorders
Behavior†	–	+	no visual observation data for sound recorders
Phenology	+	–	long periods of time easily sampled with recorders
Acoustic indices	+	–	measurable only with sound recorders
Vocal activity†	+	–	measurable easily with sound recorders
Standardization†	+	–	identical sampling possible with multiple recorders
Verification and updates†	+	–	audio evidence always available
Travel time†	+	–	recorders superior when there are three or more visits per site
Scaling	+	–	sound recorders can sample anytime and cover large regions
Expert labor†	+	–	sound recorders rely less on human expertise
Material and labor costs	=	=	context dependent
Mobility	+	–	recorders can be deployed in many places
Sampling after rain	–	+	wet microphone windscreens block sound

† Denote criteria for which regular sound recorders deliver the same results as autonomous sound recorders.

Preliminary Results

18 Sites:

SFAEF – 3 sites

CM – 2 sites

Win 8 – 3 sites

BC – 10 sites

Protocol:

26 May- 14 June 2019

5-minute day samples

10-minute night samples



Species list (47 Species)

Acadian Flycatcher

American Crow

American Kestrel

Barred Owl

Black-and-White Warbler

Blue Jay

Brown-headed Cowbird

Brown-headed Nuthatch

Blue-gray Gnatcatcher

Blue Grosbeak

Carolina Chickadee

Carolina Wren

Chipping Sparrow

Chuck-will's-widow

Eastern Bluebird

Eastern Kingbird

Eastern Phoebe

Eastern Screech Owl

Eastern Wood-pewee

Fish Crow

Great-crested Flycatcher

Great Horned Owl

Hairy Woodpecker

Hooded Warbler

Indigo Bunting

Kentucky Warbler

Mourning Dove

Northern Cardinal

Northern Mockingbird

Northern Parula

Pileated Woodpecker

Pine Warbler

Purple Martin

Red-eye Vireo

Red-headed Woodpecker

Red-bellied Woodpecker

Red-shouldered Hawk

Scissor-tailed Flycatcher

Summer Tanager

Swainson's Warbler

Tufted Titmouse

Yellow-billed Cuckoo

Yellow-breasted Chat

Yellow-throated Vireo

Yellow-throated Warbler

White-eyed Vireo

Wild Turkey

Wood Duck

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Eastern Phoebe

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Eastern Wood-pewee

Fish Crow

Great-crested Flycatcher

Great Horned Owl

Hairy Woodpecker

Hooded Warbler

Indigo Bunting

Kentucky Warbler

Mourning Dove

Northern Cardinal

Northern Mockingbird

Northern Parula

Pileated Woodpecker

Pine Warbler

Purple Martin

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Yellow-breasted Chat

Yellow-throated Vireo

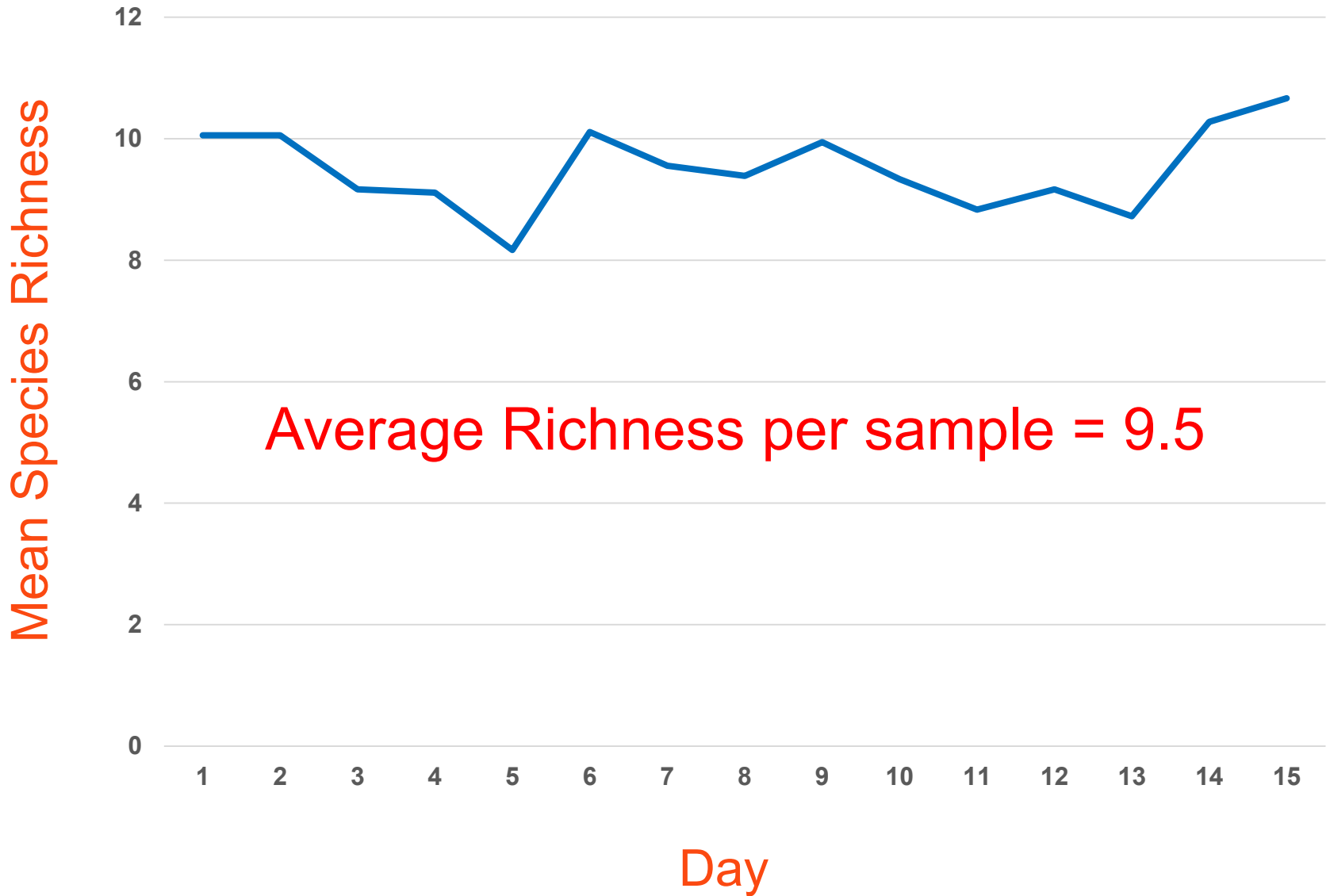
Yellow-throated Warbler

White-eyed Vireo

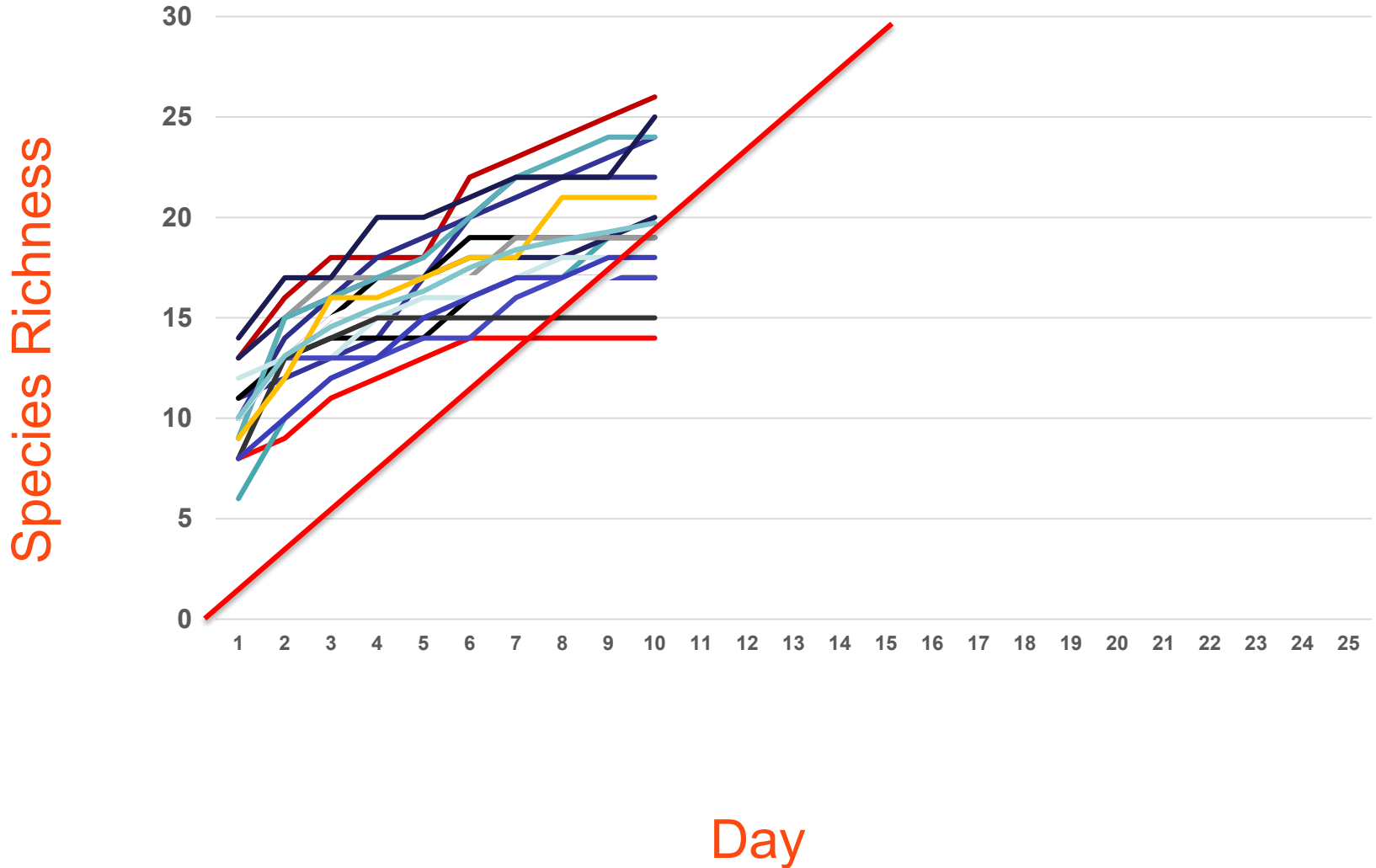
Wild Turkey

Wood Duck

Mean Daily Richness

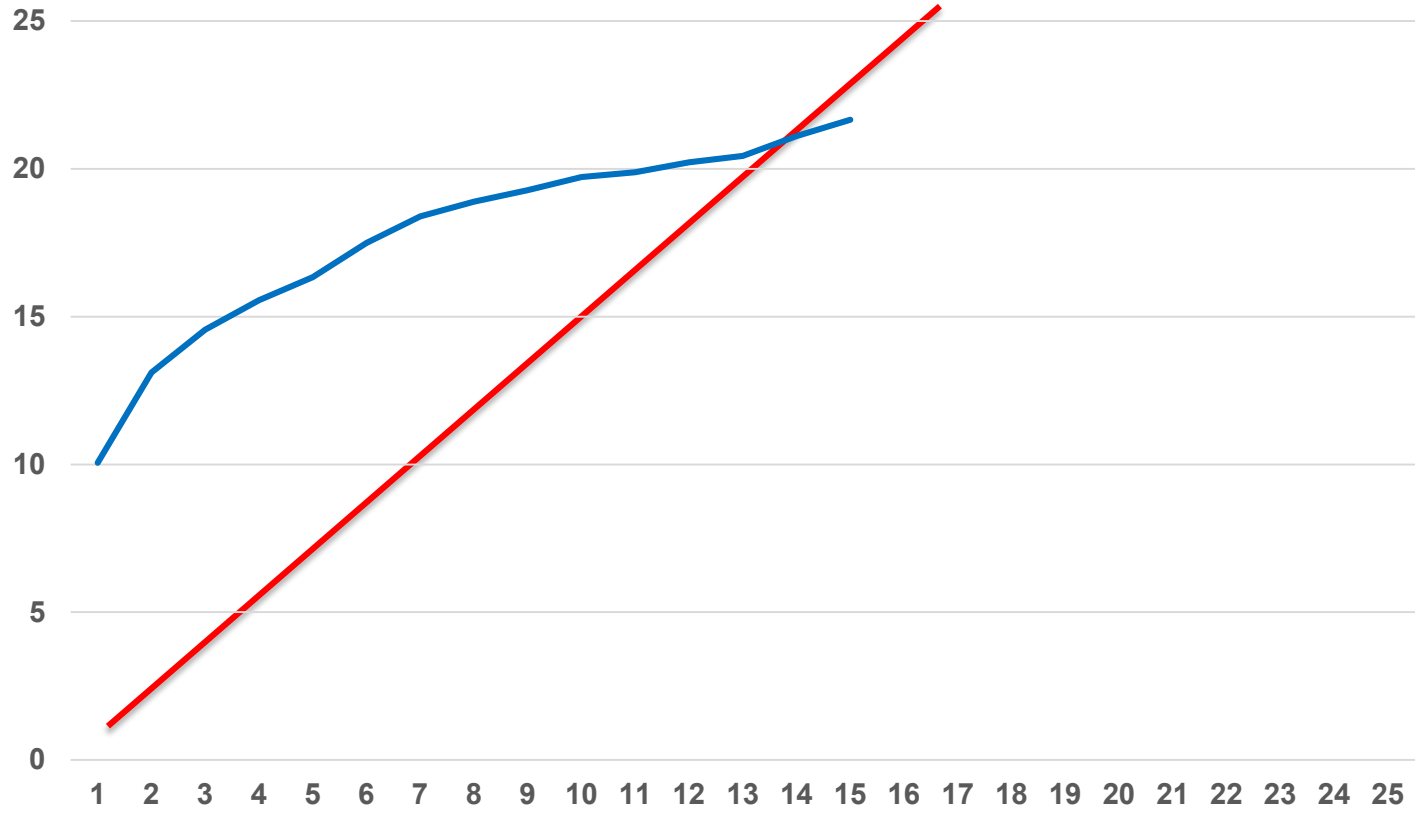


Species Accumulation



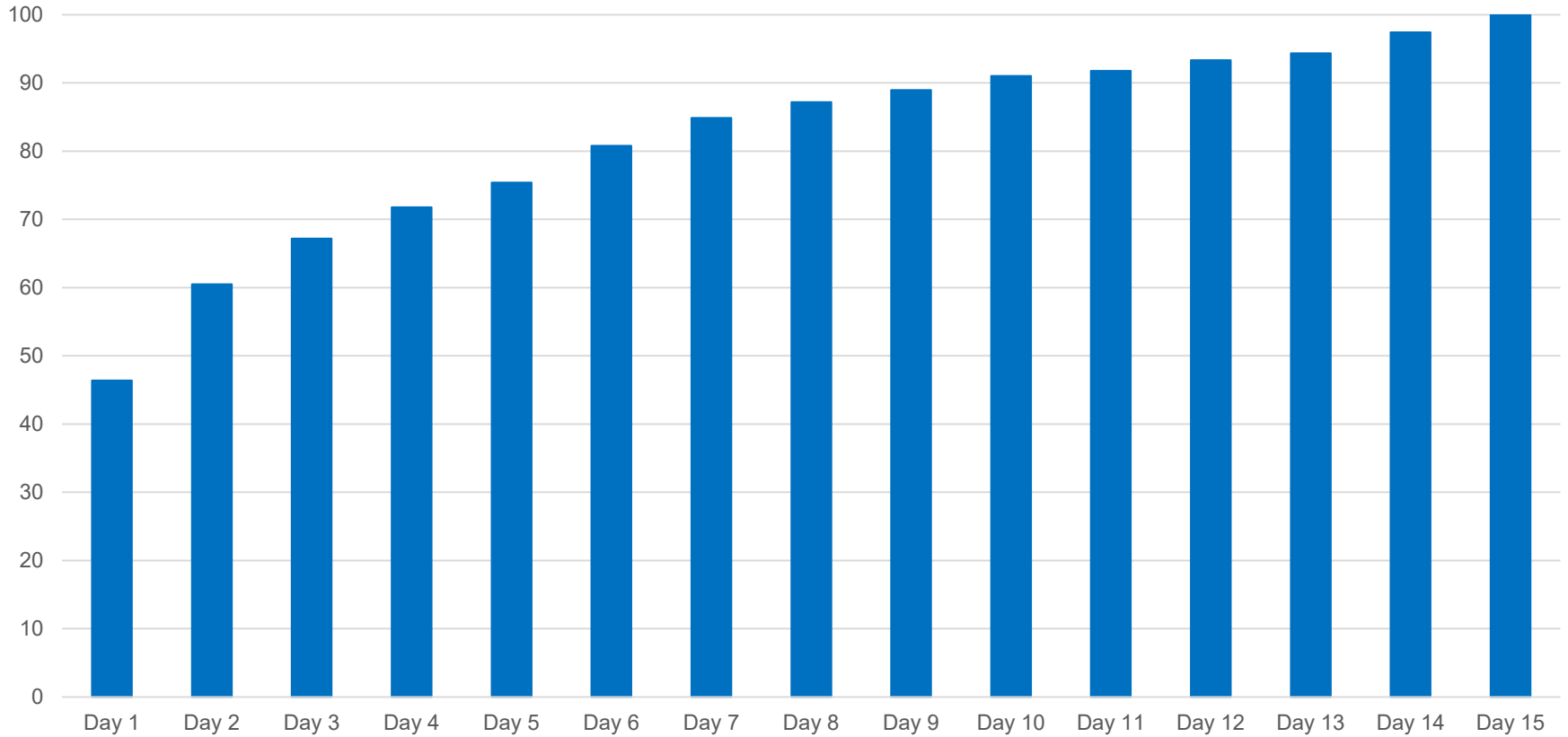
Species Accumulation

Species Richness



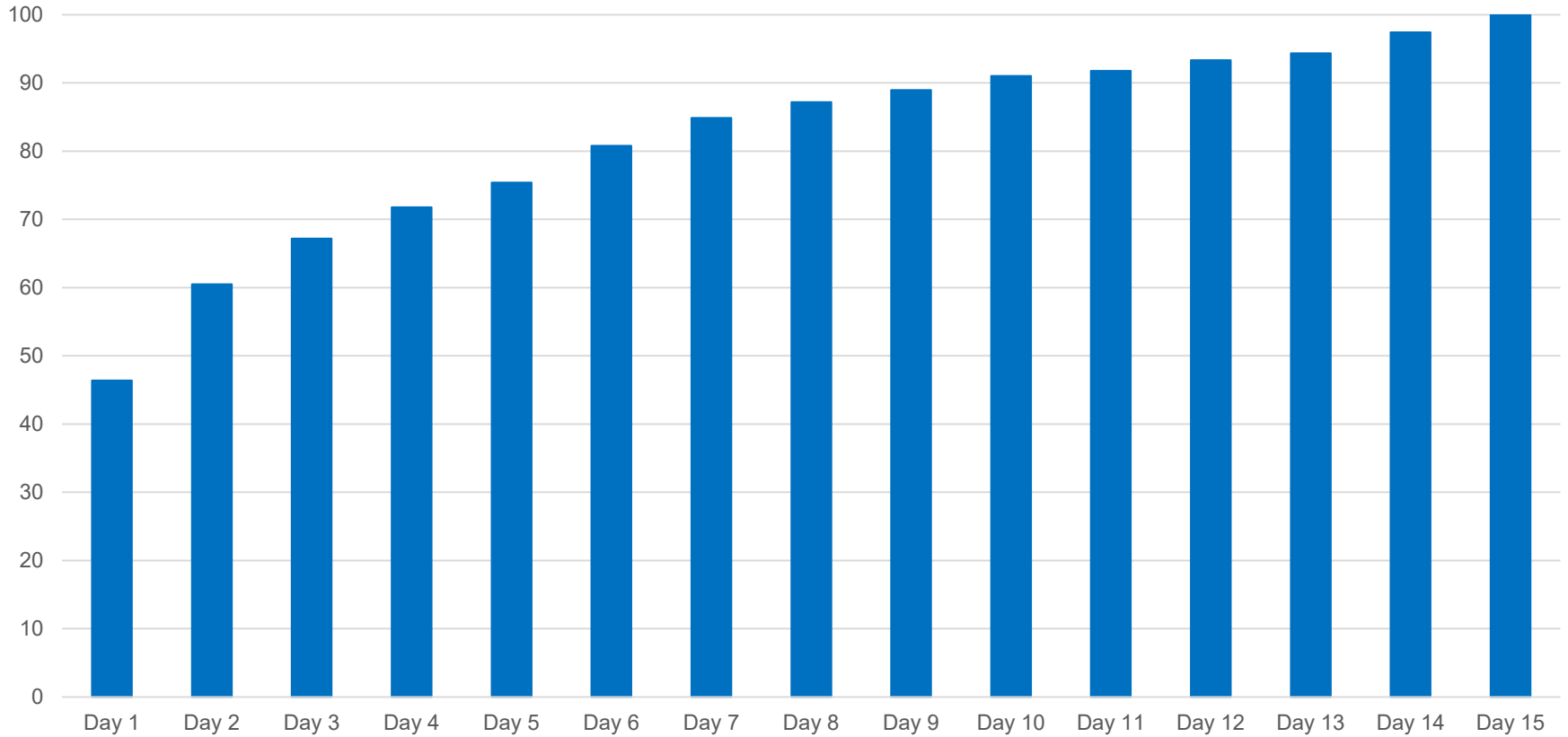
Day

Percent of Total Richness



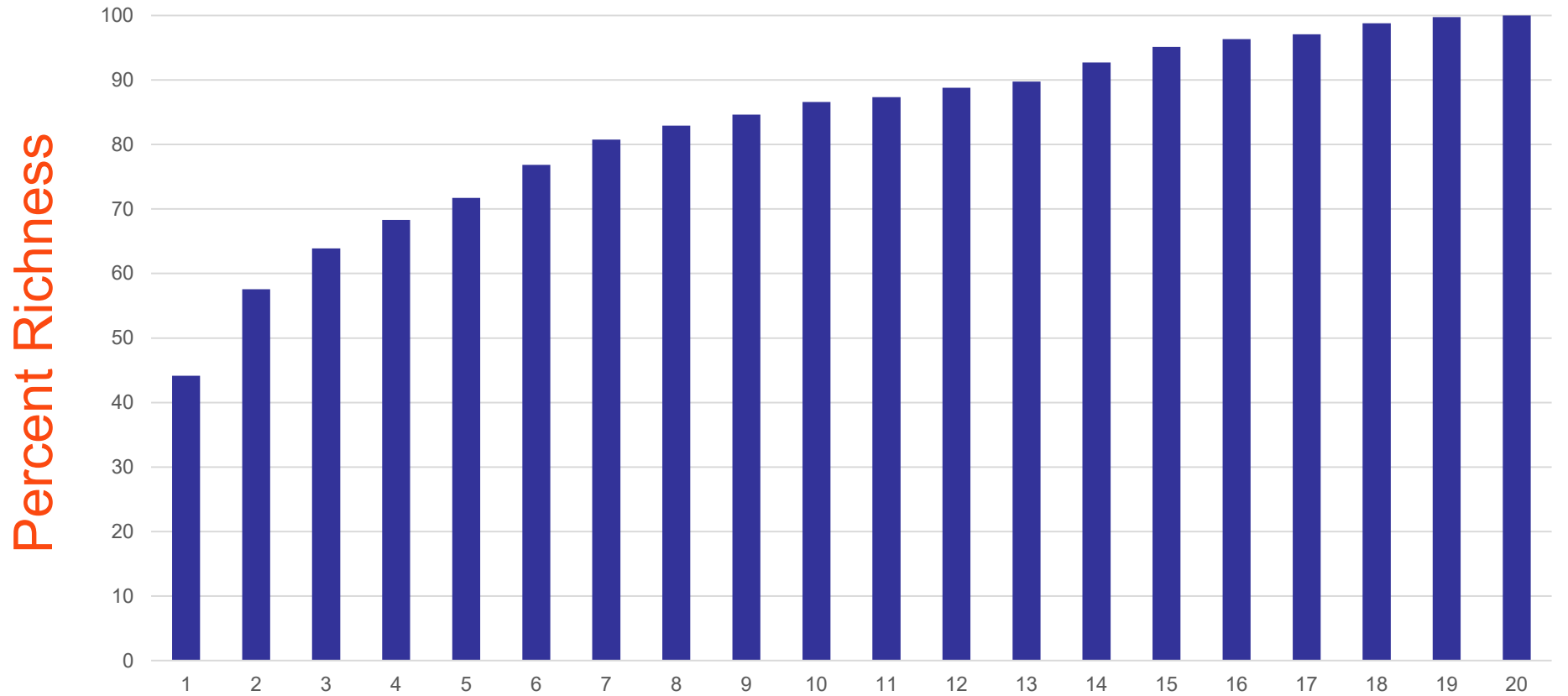
Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15
46.4%	60.5%	67.2%	71.8%	75.4%	80.8%	84.9%	87.2%	88.9%	91%	91.8%	93.3%	94.4%	97.4%	100%

Percent of Total Richness



	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15
%R	46.4%	60.5%	67.2%	71.8%	75.4%	80.8%	84.9%	87.2%	88.9%	91%	91.8%	93.3%	94.4%	97.4%	100%
R	10.1	13.1	14.6	15.6	16.3	17.5	18.4	18.9	19.2	19.7	19.9	20.2	20.4	21.1	21.6

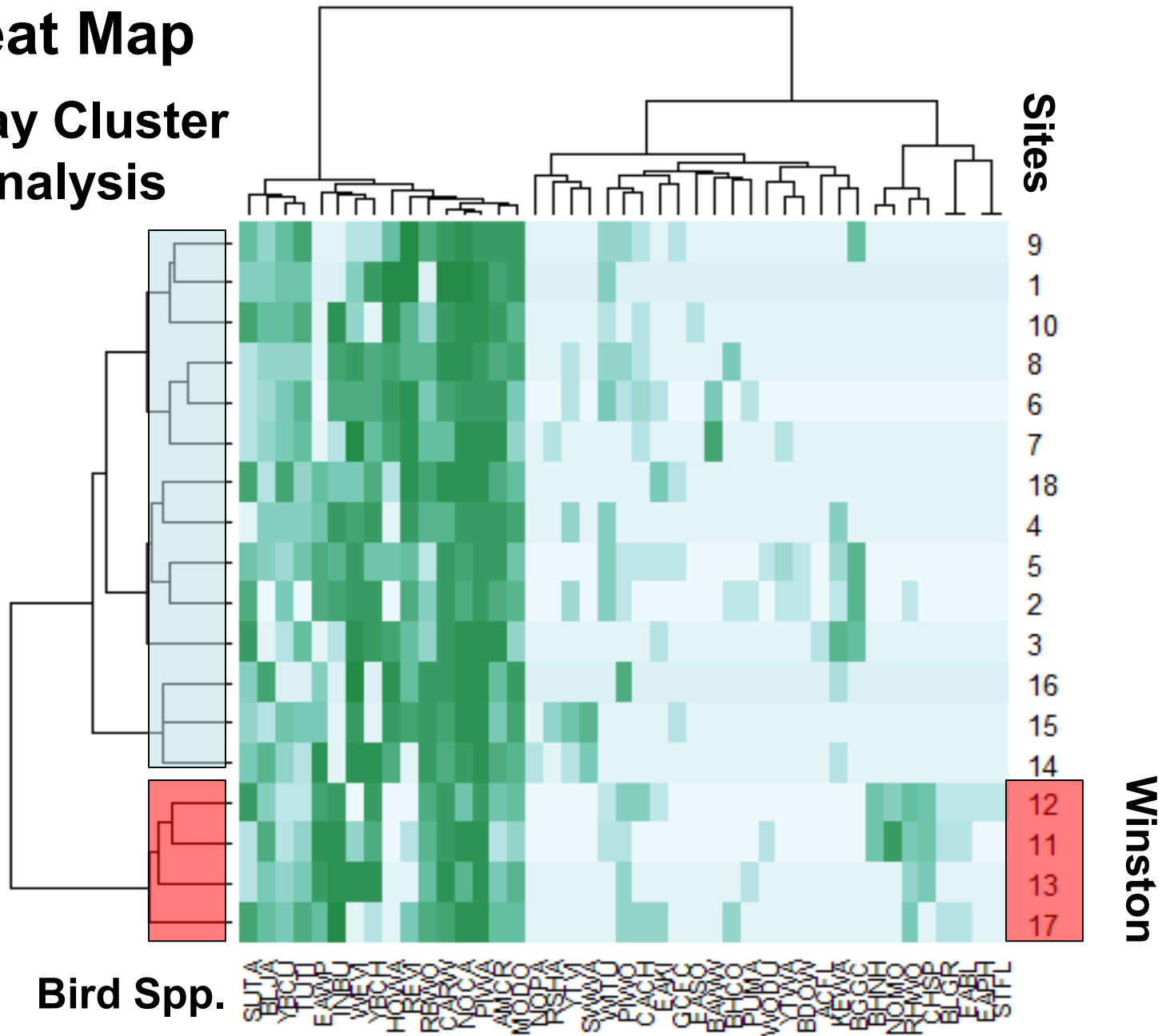
Percent of Total Richness



	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16	Day 17	Day 18	Day 19	Day 20
%R	44.1	57.6	63.9	68.3	71.7	76.8	80.7	82.9	84.6	86.6	87.3	88.8	89.8	92.7	95.1	96.3	97.1	98.8	99.8	100
R	10.1	13.1	14.6	15.6	16.3	17.5	18.4	18.9	19.2	19.7	19.9	20.2	20.4	21.1	21.6	21.9	22.1	22.5	22.7	22.8

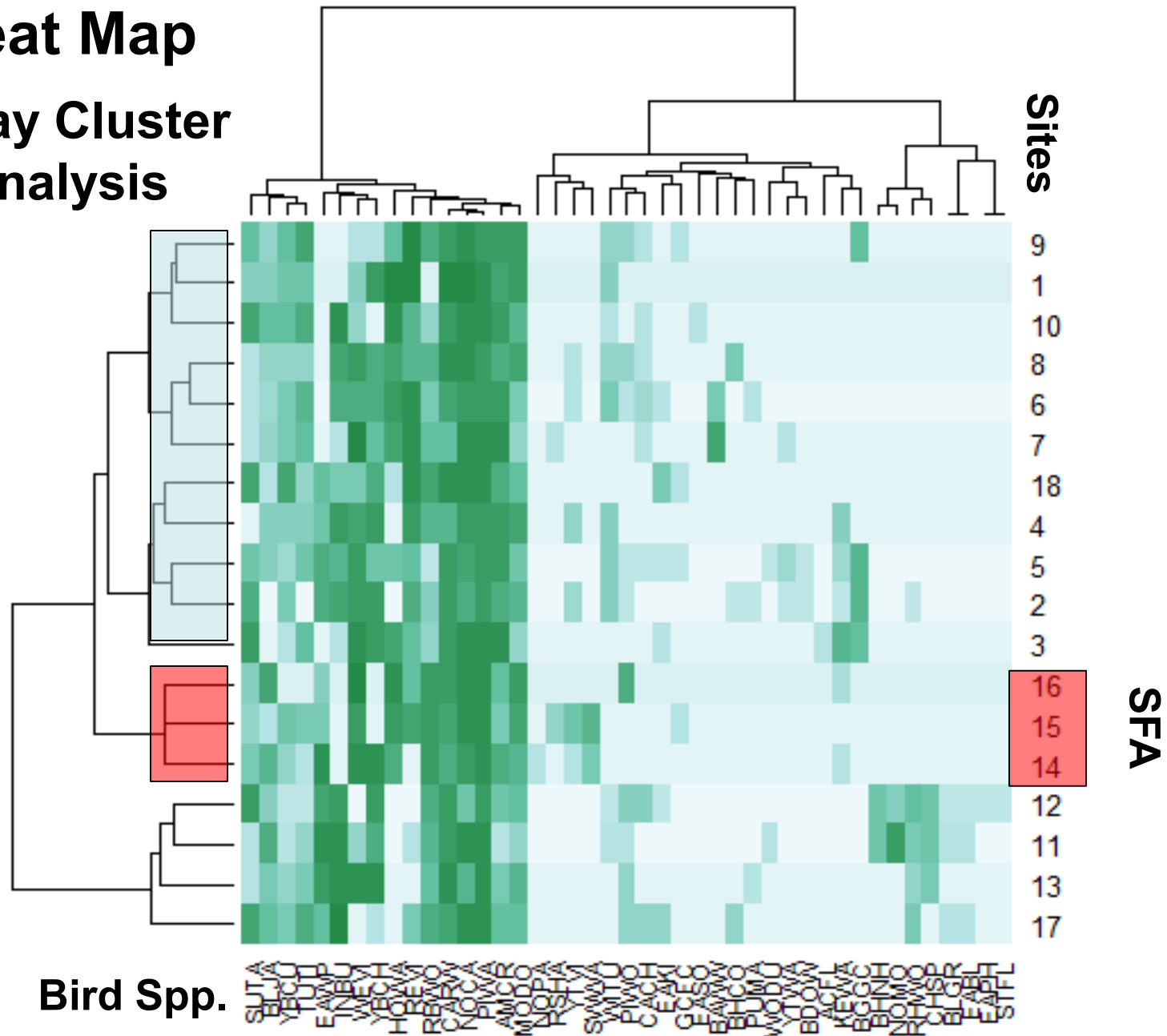
Heat Map

2-way Cluster Analysis



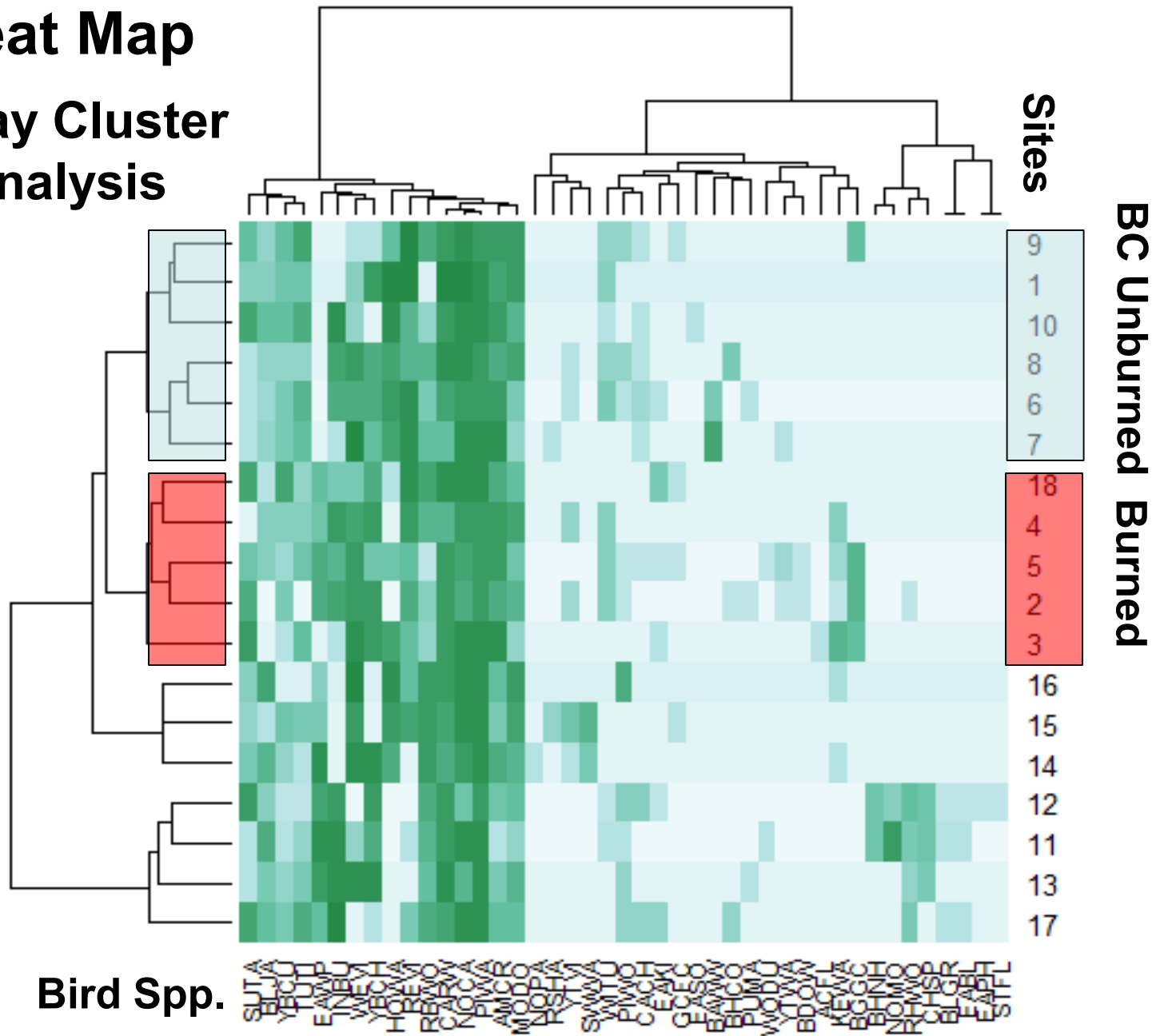
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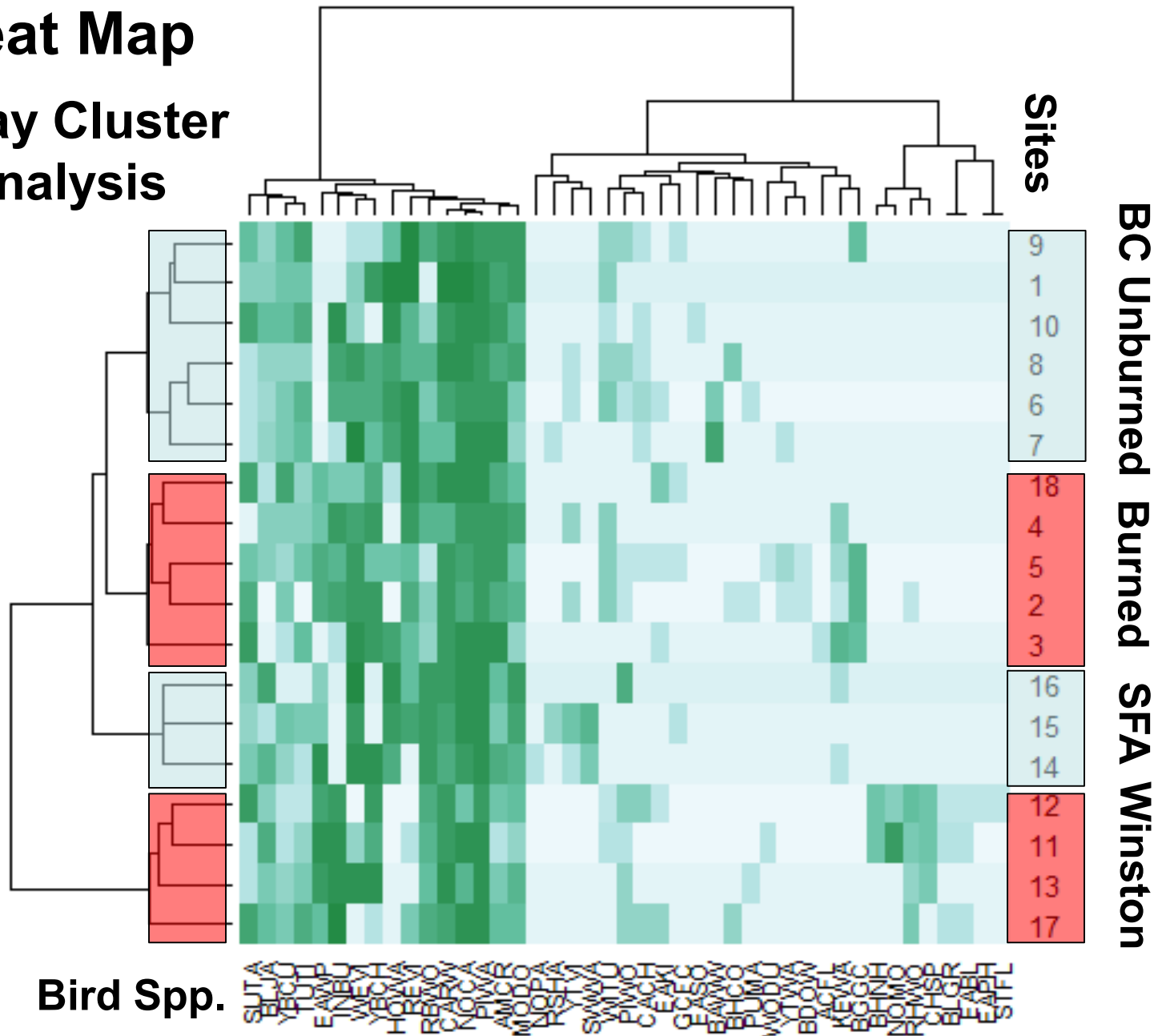
Heat Map

2-way Cluster Analysis



Heat Map

2-way Cluster Analysis





24.2 Species

21 Species

Burned vs Unburned

Habitat Analyses



Stand age

Stand height

BA

Canopy closure

Snag density

Midstory density

Understory fol density

Ground cover

Target Priority Species: Open Pine bird species, including:

Eastern wild turkey (*Meleagris gallopavo silvestris*)

American kestrel (*Falco sparverius paulus*)

Red-headed woodpecker (*Melanerpes erythrocephalus*)

Brown-headed nuthatch (*Sitta pusilla*)

Northern bobwhite (*Colinus virginianus*)

Red-cockaded woodpecker (*Picoides borealis*)

Prairie warbler (*Setophaga discolor*)

Bachman's sparrow (*Peucaea aestivalis*)

Henslow's sparrow (*Ammodramus henslowii*)

Le Conte's sparrow (*Ammodramus leconteii*)

Sedge wren (*Cistothorus platensis*)

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~~Le Conte's sparrow (*Ammodramus leconteii*)~~

~~Sedge wren (*Cistothorus platensis*)~~



Eastern Wild Turkey

Detected at 11 sites
(Winston 8 & BCR)

Detection Probability
16.8%



American Kestrel

Detected at 1 site
(Couch Mountain)

Single Detection



Red-headed Woodpecker

Detected at 8 sites
(All Properties)

Detection Probability
18.8%



Pine Warbler

100% Occupancy

Detection Probability

93%



Brown-headed Nuthatch

Detected at 2 sites
(Only Winston 8)

Detection Probability
32.5%



Chuck-will's-widow

Detected at 12 sites
(BCR & Couch Mountain)

Detection Probability
68.3%