YOUR FAVORITE BIRD?

FLIGHT

Joel Maes

BIRDS

RECOVERY PROCESS

TEMPORAL TRENDS

HABITATS

FLOOD AT THE TURN OF THE 19TH CENTURY DEPOSITED BUTTE MINE WASTE IN THE SILVER BOW CREEK FLOODPLAIN.

SILVER BOW CREEK REMEDIATION

Remove 6.1 MM CY Mine Waste

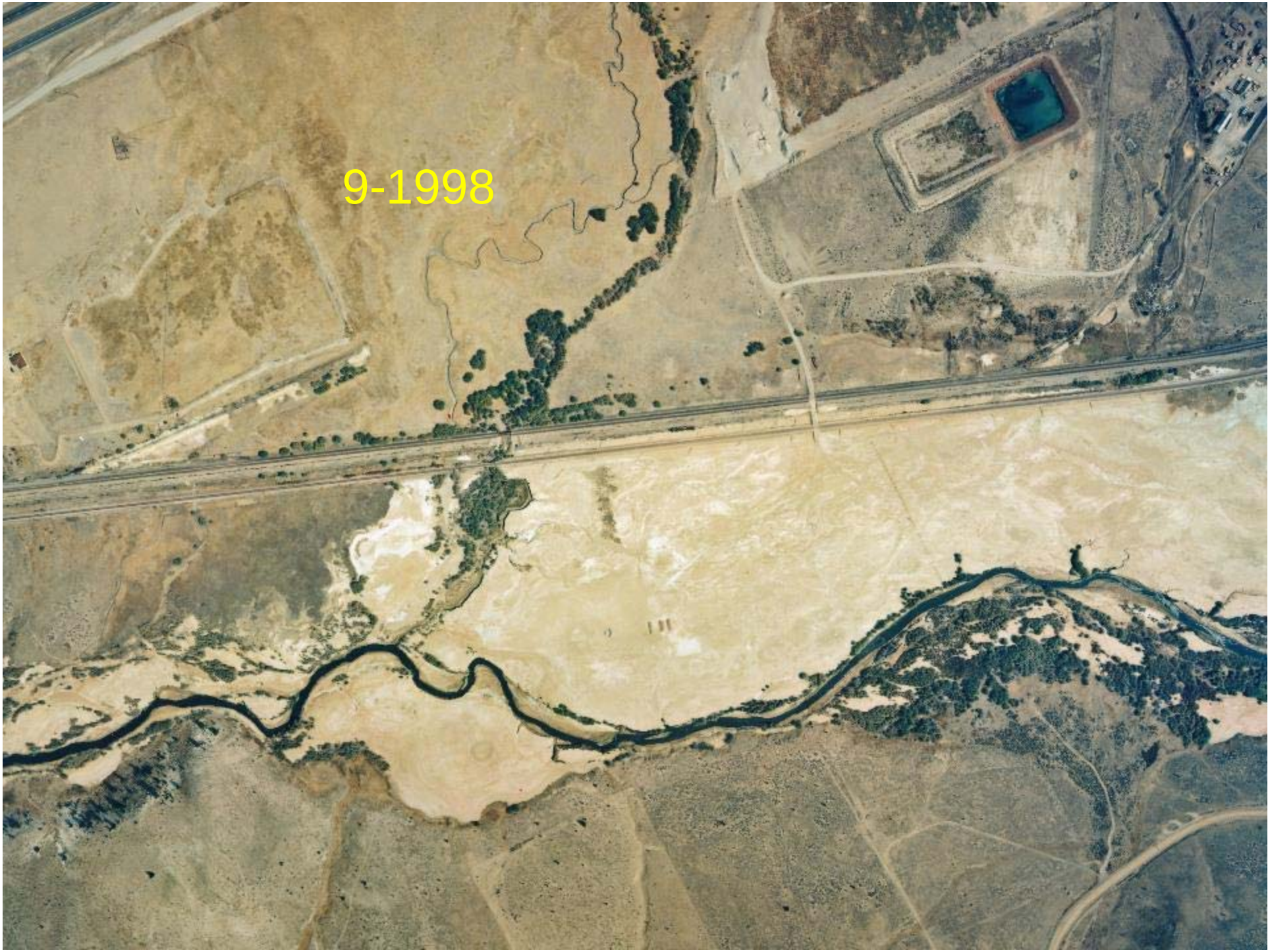
Relocate stream

Coversoil to grade

Revegetate 2000-2014

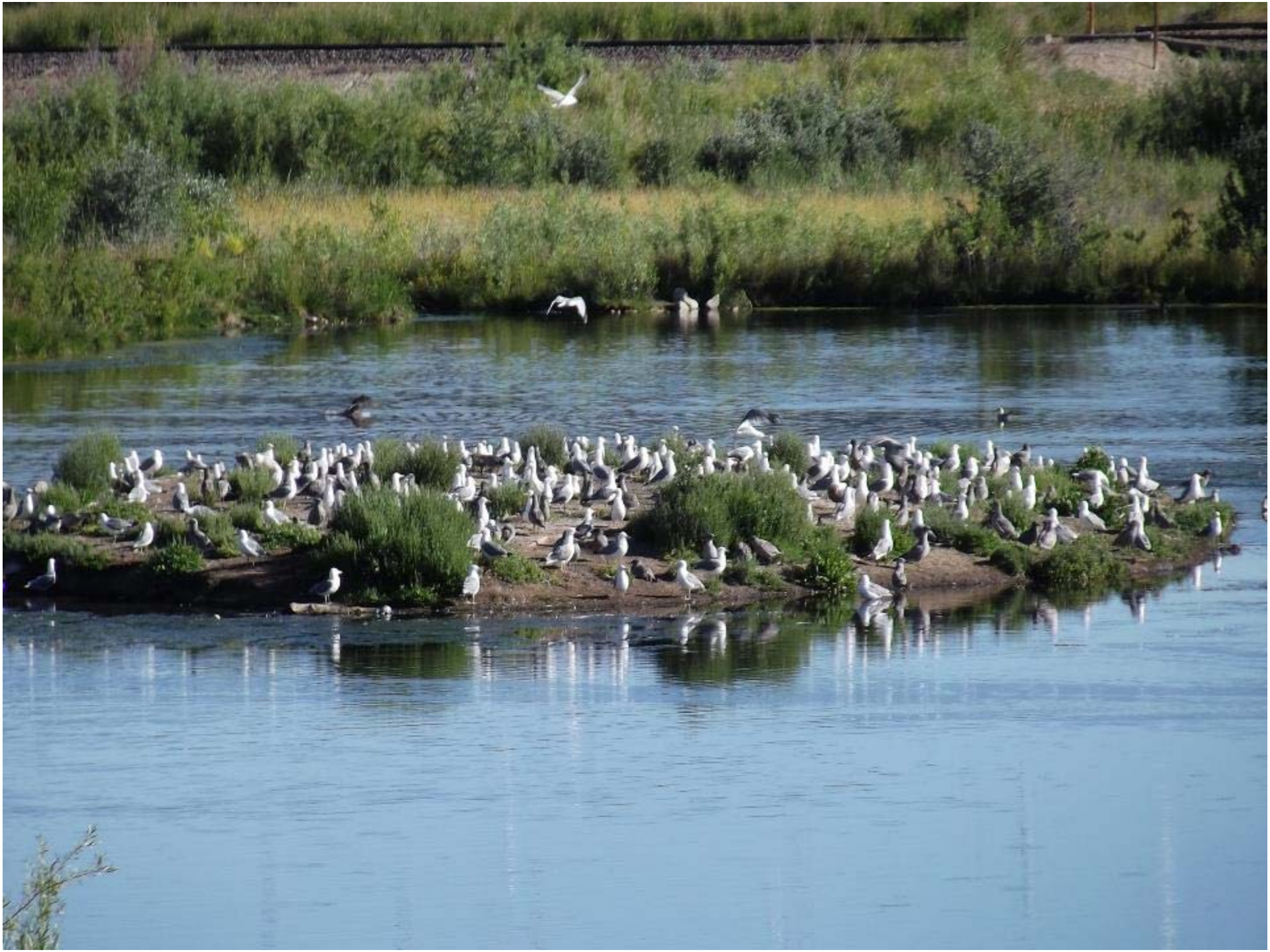
RECOVERY PROCESS

BIRD USE IN A RESTORED RIPARIAN CORRIDOR, SOUTHWEST MONTANA


9-1998

RAMSAY
Ramsay
2002
Google Earth
Imagery Date: 6/1/2002

9/4/2014
Ramsay
2014
Google Earth
1995
Imagery Date: 9/4/2014 12 T 369004.40 m E 5095653.78 m N elev 5305 ft eye alt 12292 ft



SAMPLE SUBAREAS IN ROTATION – NOT EACH ONE EACH YEAR.

START AT DAWN. SAMPLE EACH STATION (20/SUBAREA) FOR FIVE MEASURED MINUTES.

RECORDS BIRDS BY SIGHT AND SOUND

4 MONTHS: LATE MARCH, APRIL, MAY, AND JUNE.

CAPTURES MIGRATORY BIRDS AND SUMMER RESIDENTS

TAKES <4 HRS. PER SUBAREA

SAMPLED 15 YEARS

SAME METHODS

SAME APPROXIMATE DATES

SAME OBSERVER

CLSW	13%
MALL	12%
RBGU	8%
CAGO	6%

	39%

JOEL MAES

Nissler Wetland

BIRD HABITAT USE VARIES– MOBILITY….

MAY MOVE SEASONALLY OR DAILY EVEN HOURLY TO MEET HABITAT PREFERENCES

FOOD, WATER

COVER (THERMAL, SECURITY)

SPECIAL HABITATS: NESTING, SLEEPING, MATING.

HUMAN AND DOG VISITS

Passeriformes
120 count SA 2 April 2009

PARAMETERS

BIRD COUNTS OR DENSITY
SPECIES RICHNESS
SPECIES DENSITY
SPECIES EQUITABILITY OR EVENNESS
TROPHIC CLASSES
HABITATS

SPECIES

FUNDAMENTAL UNIT OF TAXONOMY AND INVENTORY

BUT NOT DIVERSITY

DIVERSITY

Traditional measures of species diversity treat all species as being equal in all respects except their abundance.

RICHNESS: MERE # OF SPP.

SHANNON INDEX: EVENESS OR EQUITABILITY

$$H' \text{ (Shannon Index)} = -\sum_{i=1}^{S} p_i \ln p_i$$

Where: p_i is the relative abundance of entity P expressed as a decimal. Lower bound 0; upper bound Ln S.

100 BIRDS 5 SPECIES

96,1,1,1,1 SHANNON = 0.22

20,20,20,20,20 SHANNON = 1.61

145 bird species comprising 19,152 birds were tallied sampling.

38% Breed Locally

28% Yearlong Residents;

56% Summer Residents;

3% Winter Residents;

and 13% Migrants.

TROPHIC	SPECIES %	BIRDS %
Herbivores	10	10
Omnivores	38	54
Invertebrates	35	34
Vertebrates	17	2

WHAT IS A SUBAREA?

We focus on the oldest habitats to track temporal trends.

COMPARING DATA SETS

$$\text{Sorenson (1948) Similarity Index} = \frac{2C}{A + B}$$

SUBAREA 1 μ = 66%

2005	100				
2006	66	100			
2010	86	61	100		
2013	60	56	64	100	
2017	60	50	82	71	100
	2005	2006	2010	2013	2017

SUBAREA 2 μ = 66%

2009	100			
2012	60	100		
2014	81	72	100	
2016	56	64	63	100
	2009	2012	2014	2016

#1. SIMILARITIES ARE RATHER LOW, NO PATTERN

FORETELLS WEAK TEMPORAL RELATIONS

IS SAMPLING ADEQUATE TO REVEAL TEMPORAL TRENDS?

Figure 1. Mean Species per Station from Double Sampling

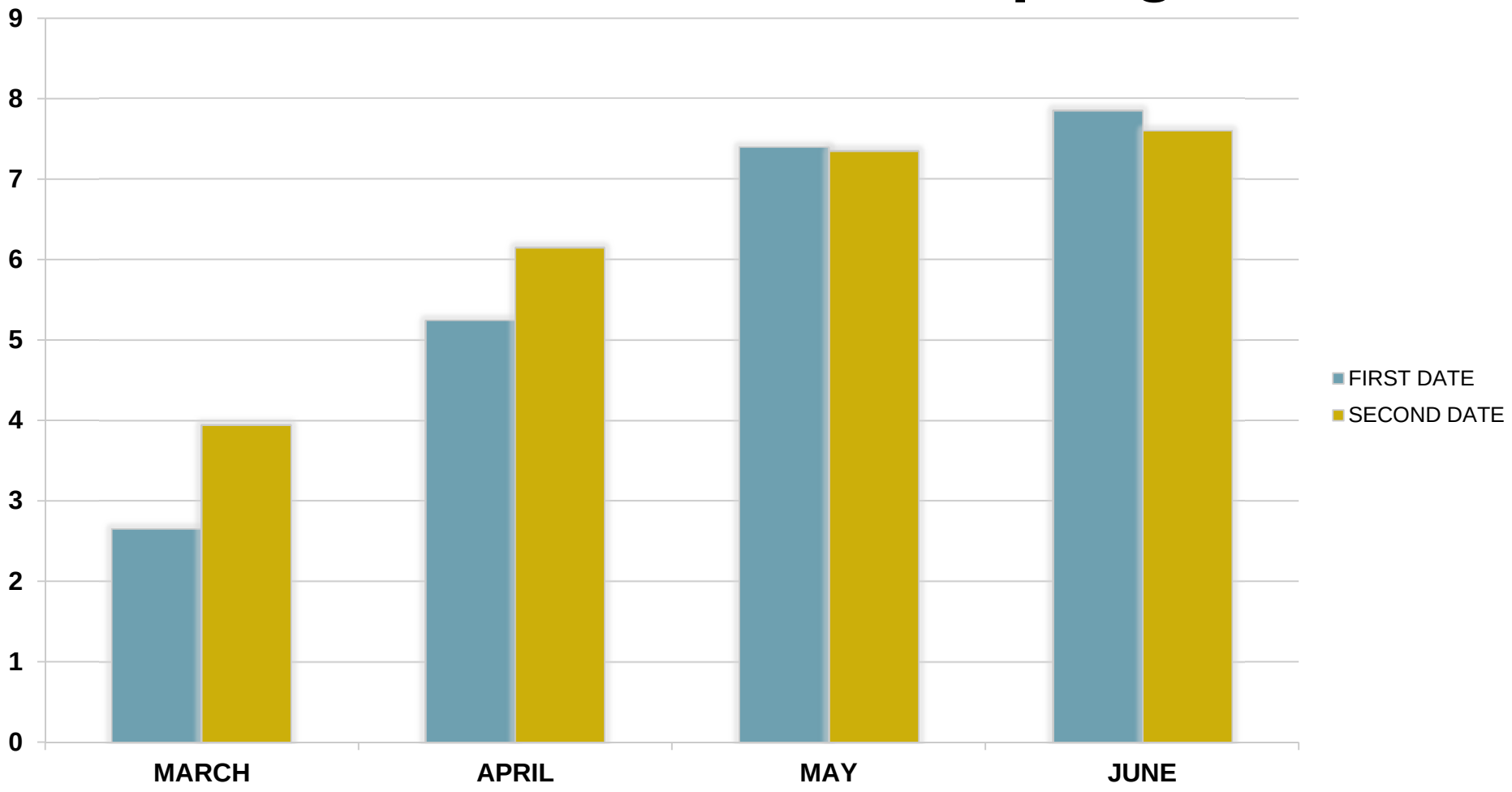


Figure 2. Species Density 2014 SA 2

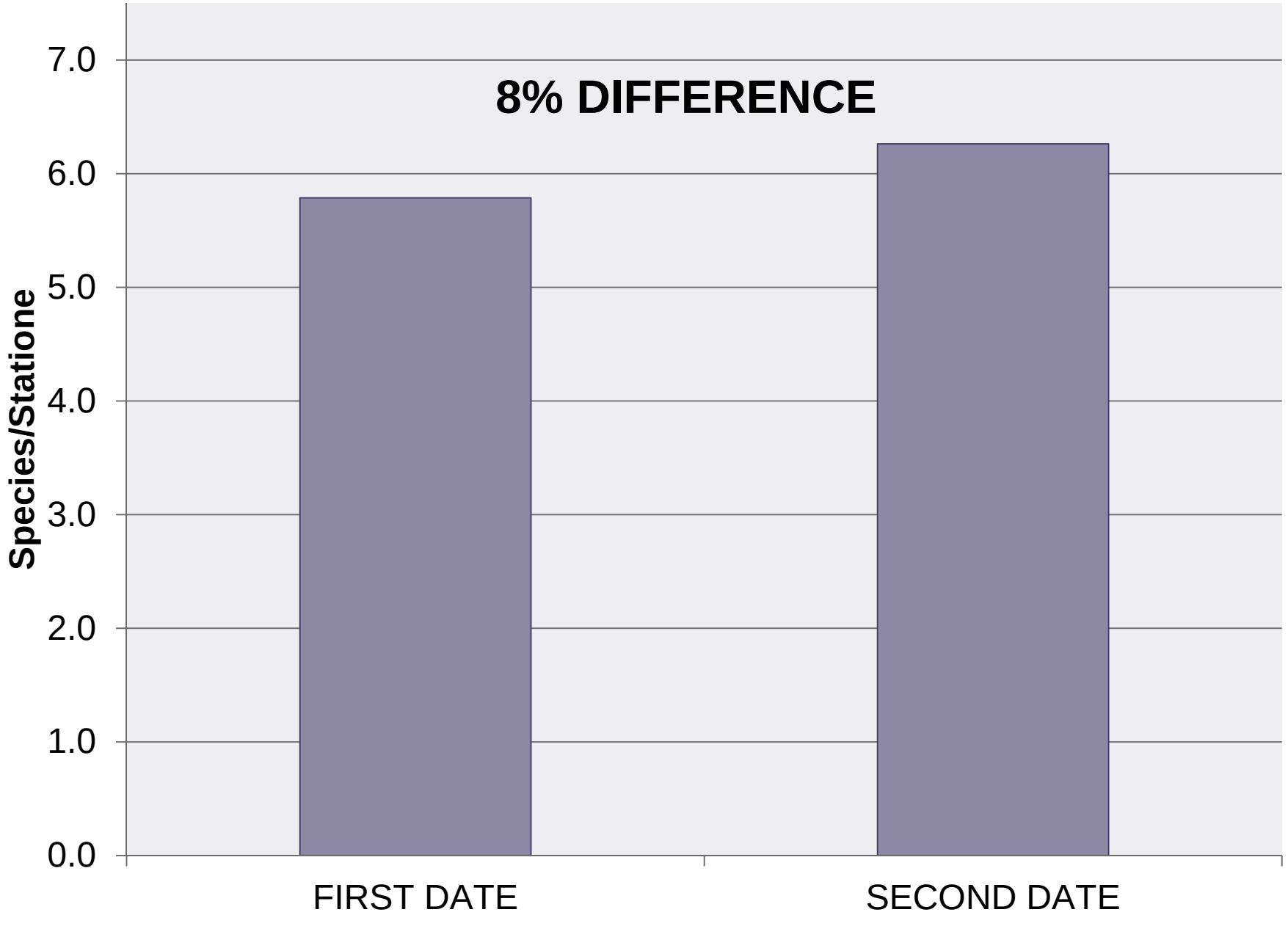


Figure 3. Mean Birds per Station from Double Sampling

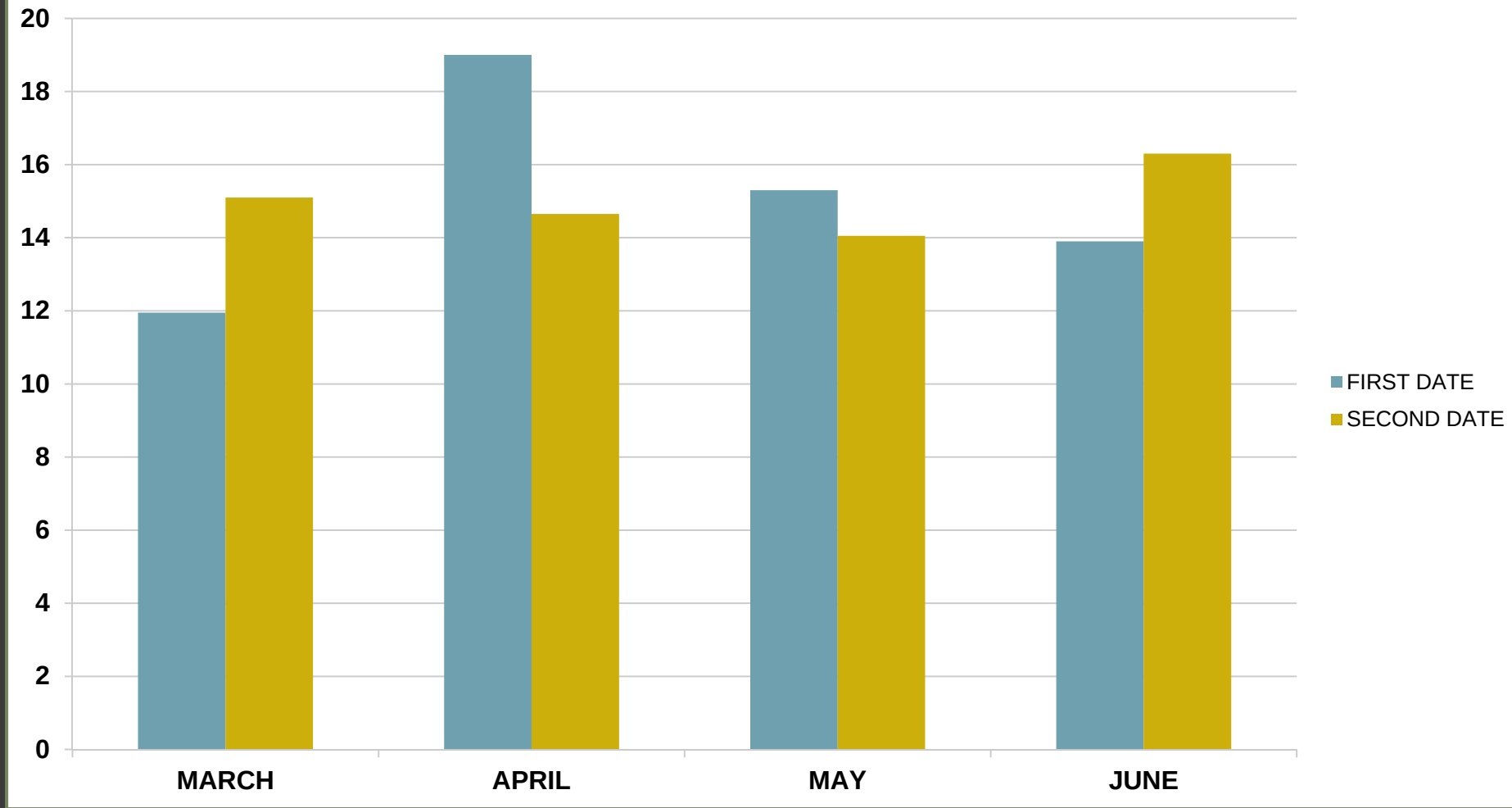


Figure 4. Mean Birds/Station from Double Sampling

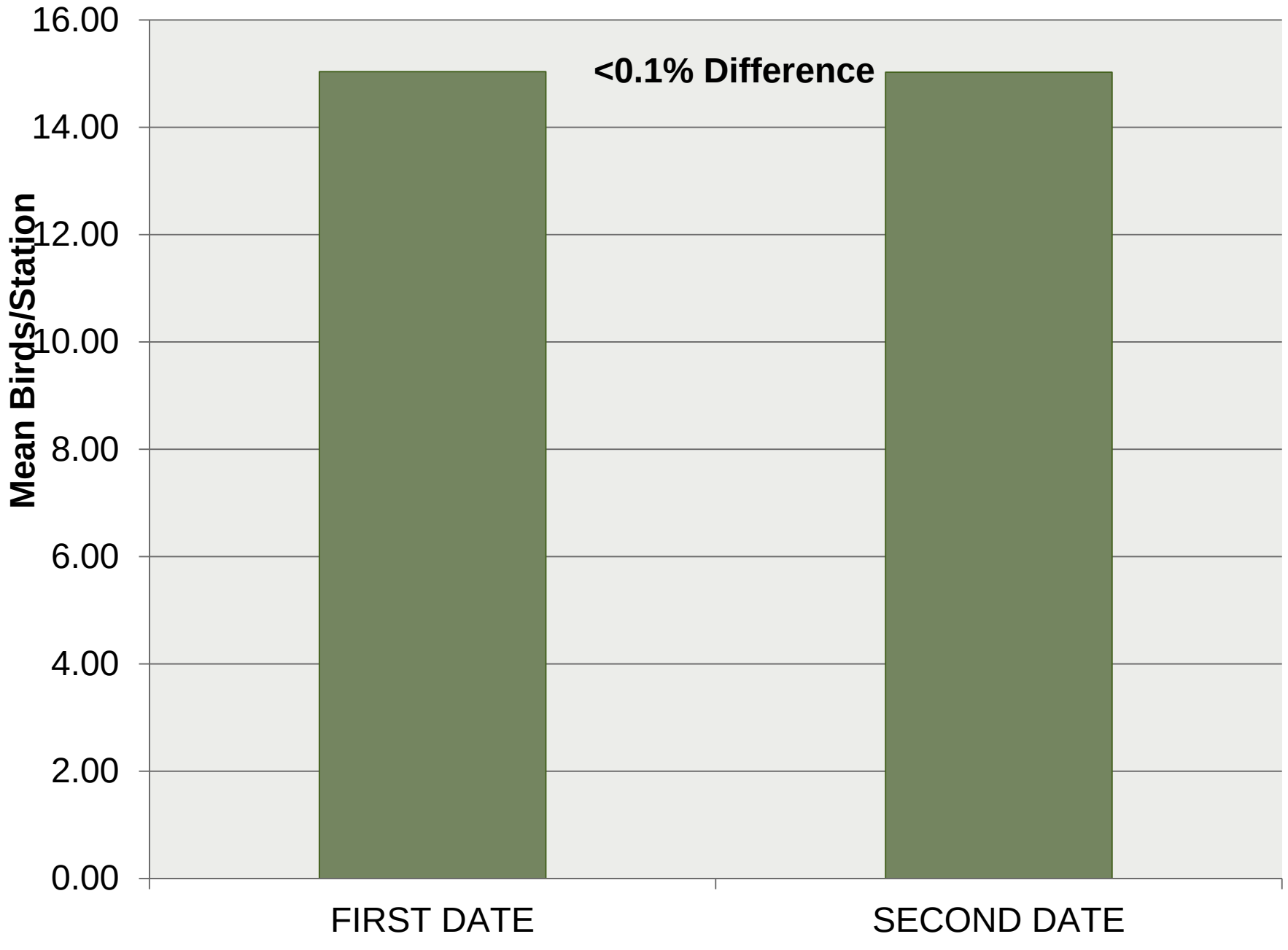


Figure 5. Species Equitability among Species from Double Sampling

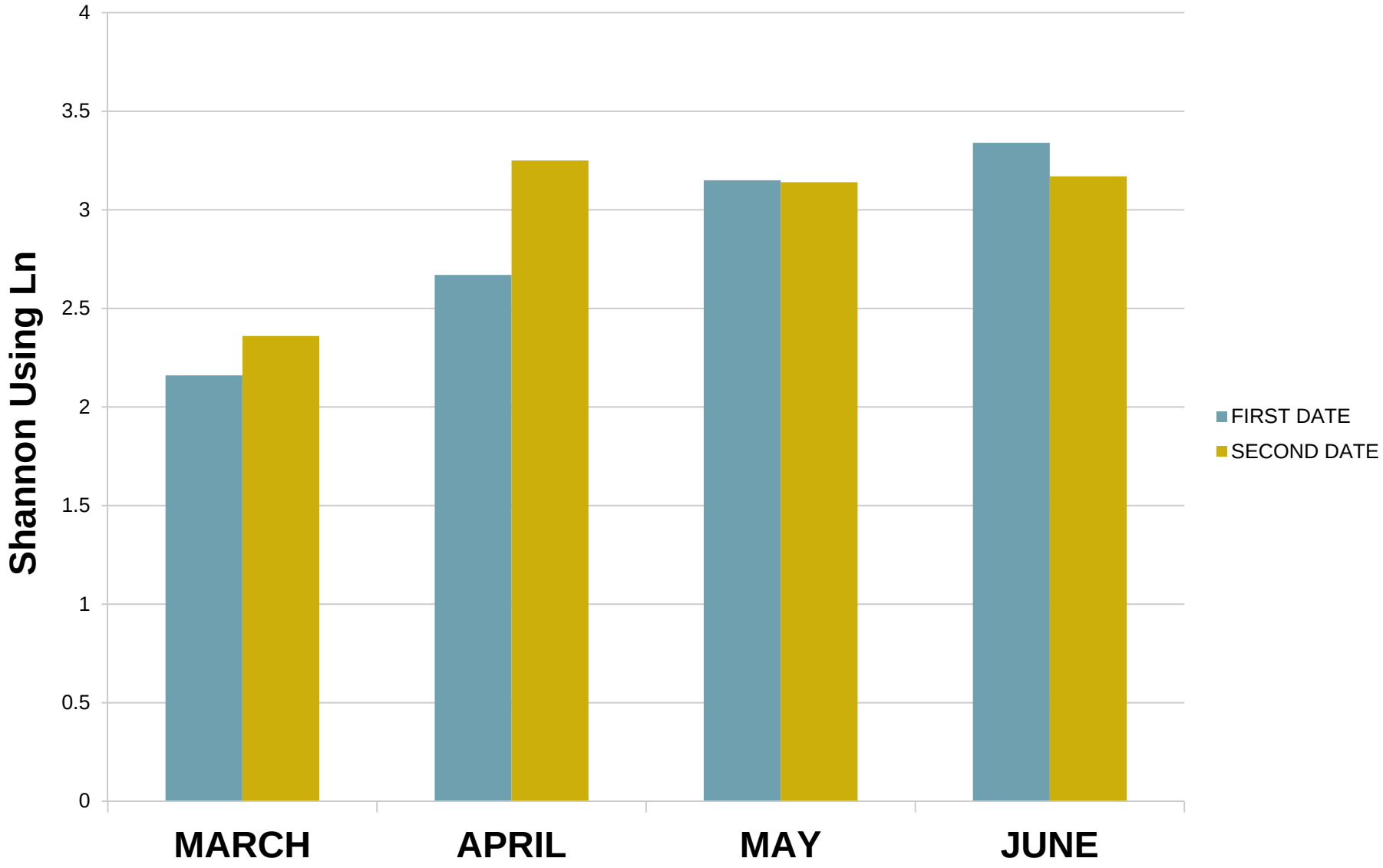
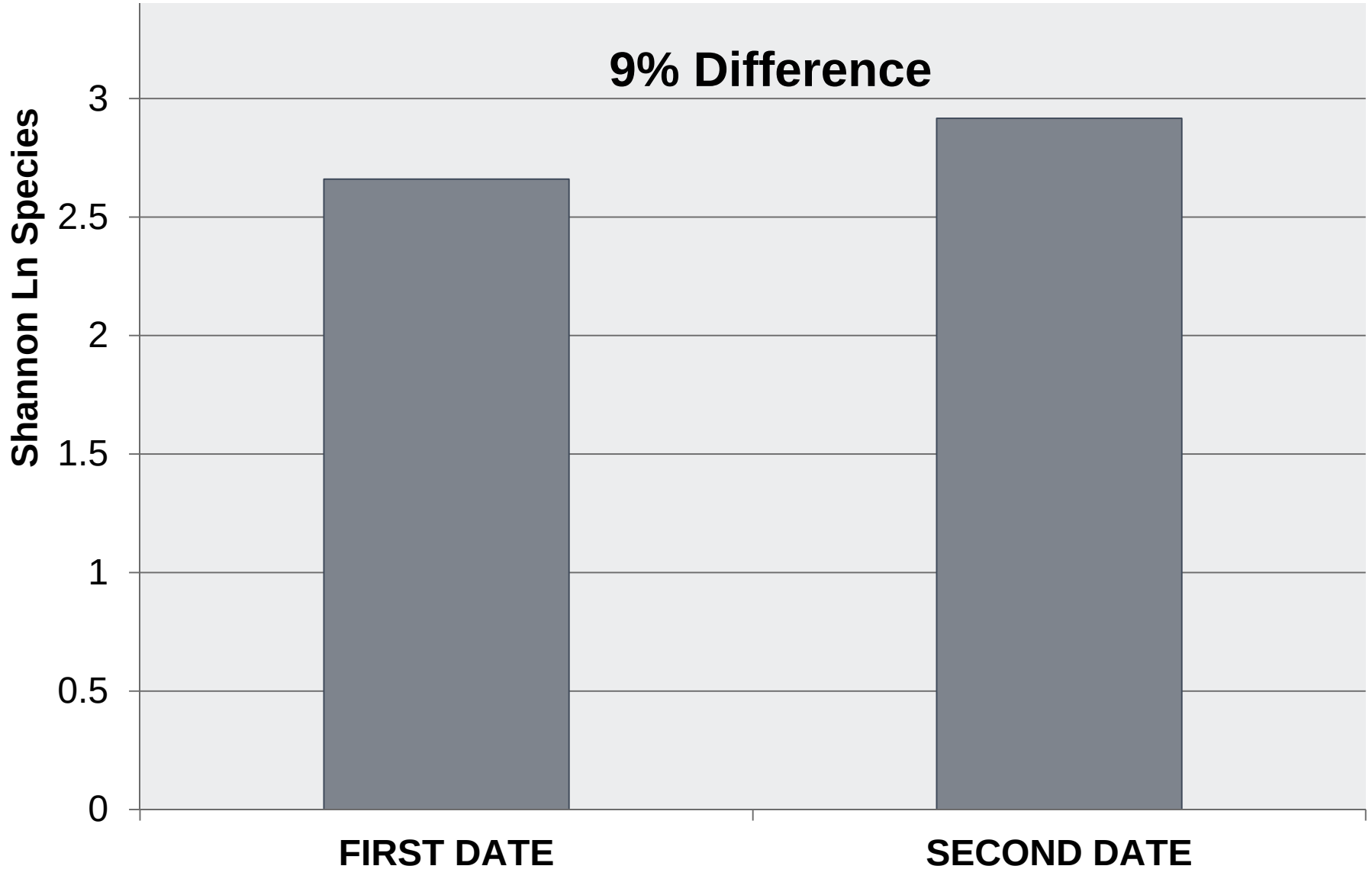


Figure 6. Equitability among Species from Double Sampling



FOR SIGNIFICANT DIFFERENCES:

20% OF MEAN IN MARCH and APRIL

5% OF MEAN MAY AND JUNE

FOR POOLED MONTHS, NO DIFFERENCE to 10%.

TRENDS IN BIRD QUANTITY

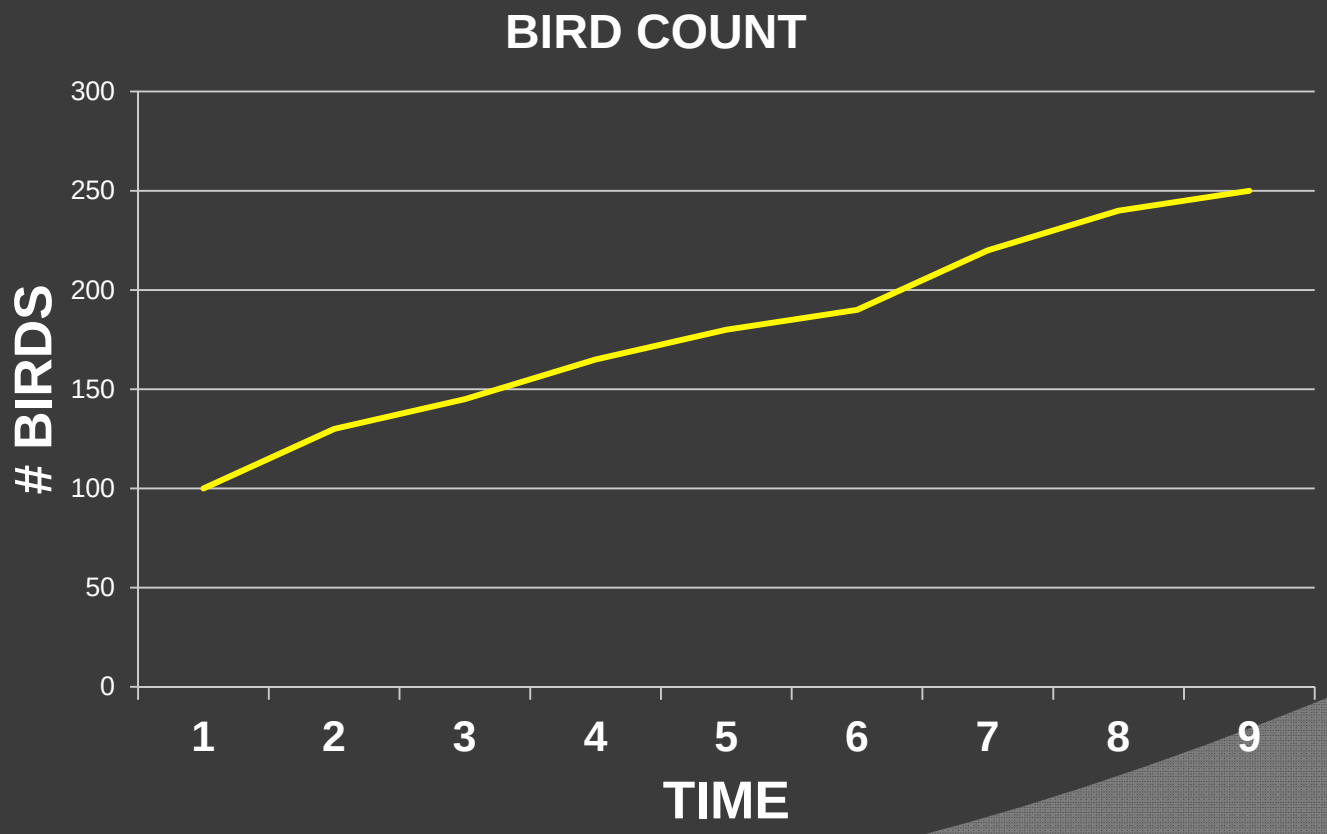


FIGURE 7. BIRD CENSUS, SA 1, 2005-2017

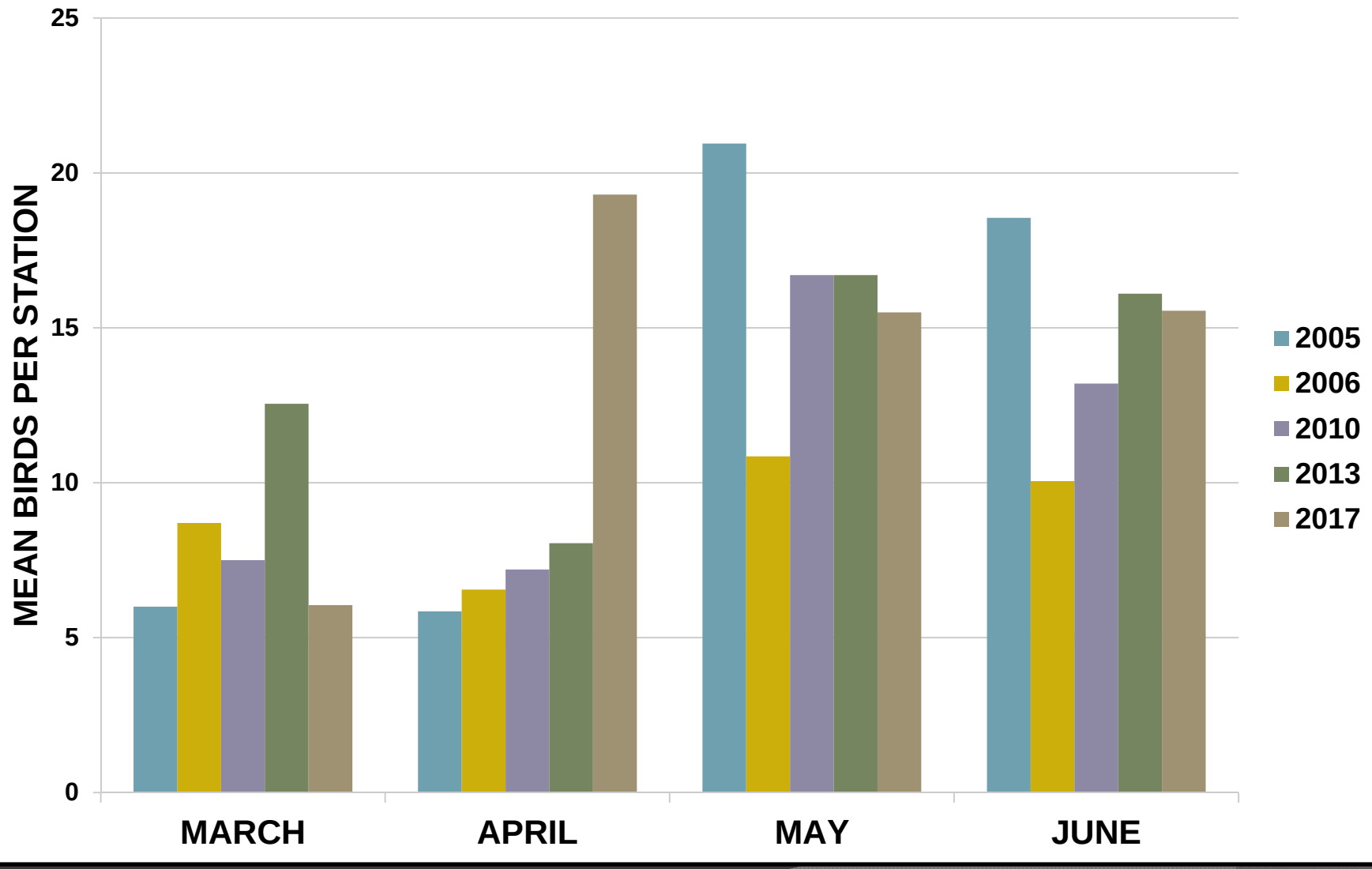
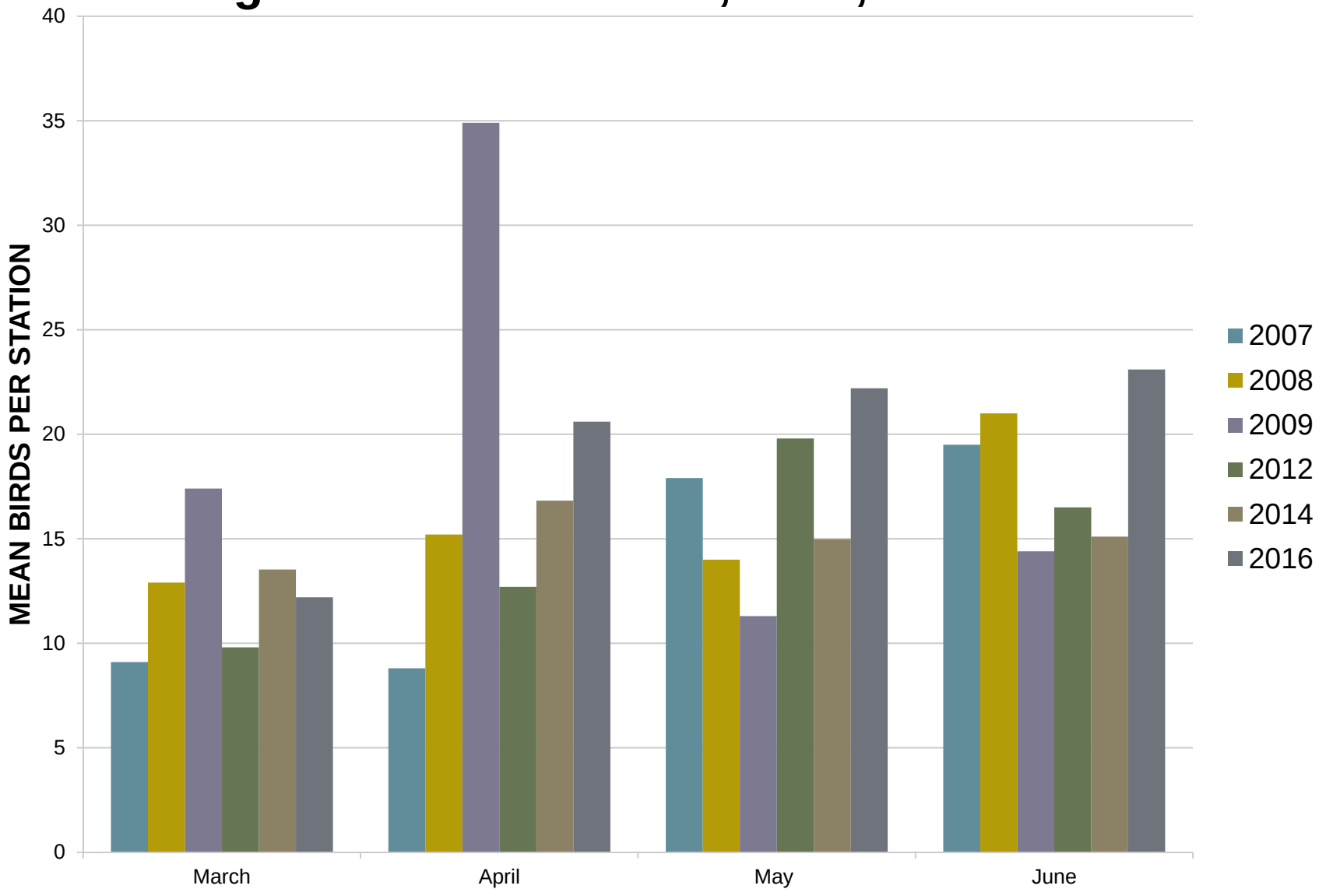


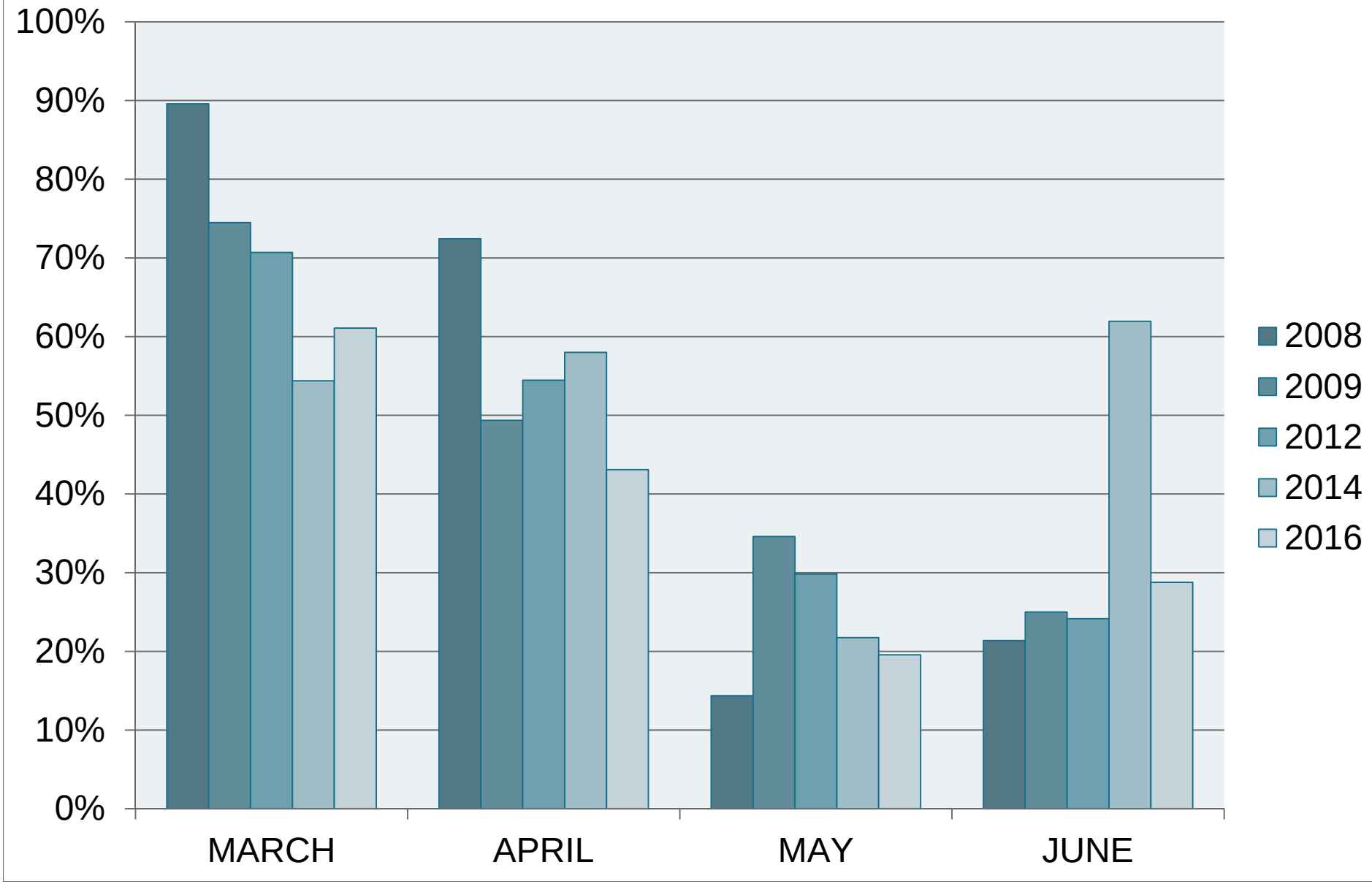
Figure 8. Bird Census, SA 2, 2007-2016



LESSON #2.

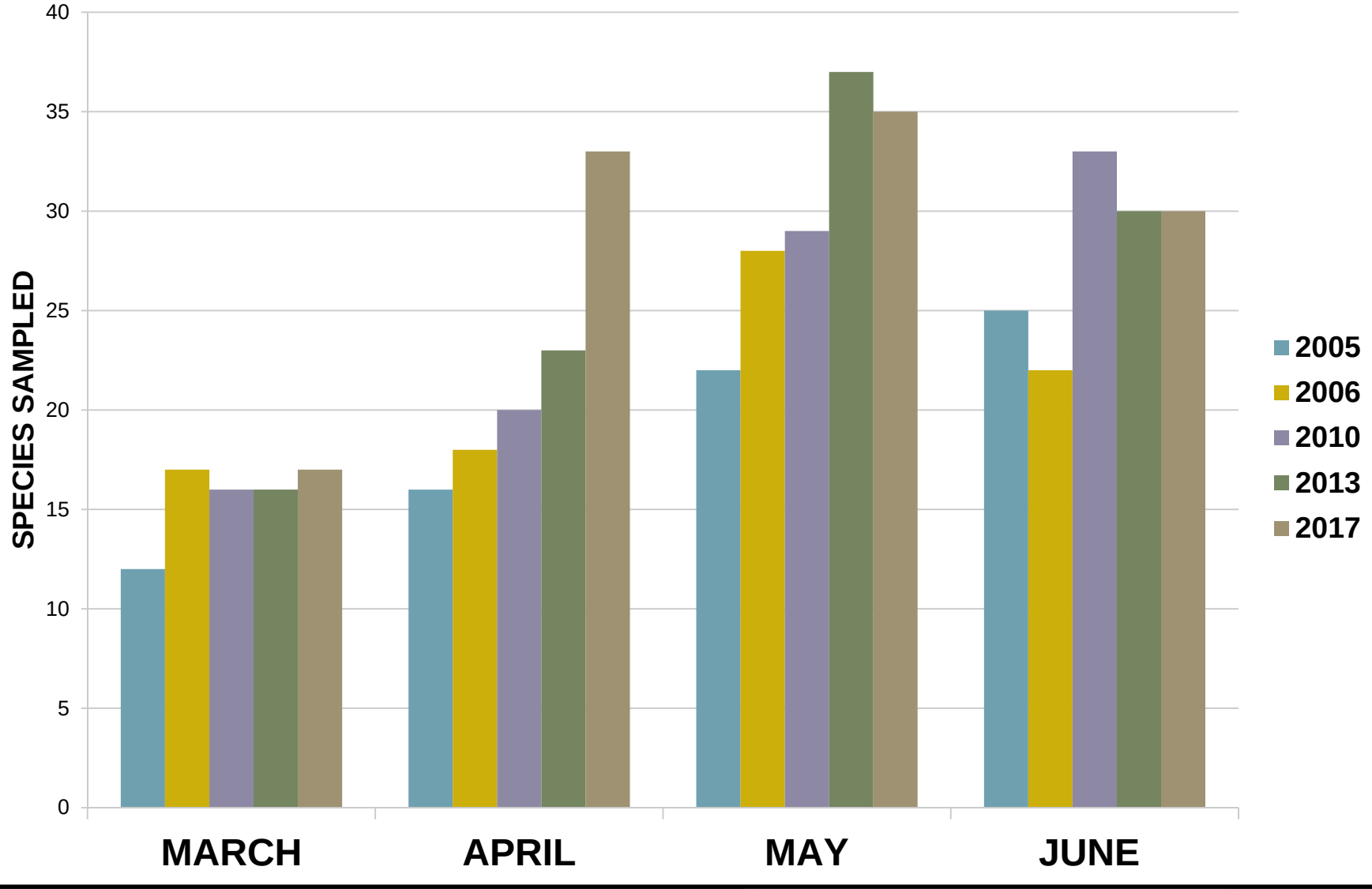
IF YOU BUILD IT,
BIRDS COME QUICKLY
AND NOT MANY MORE
COME LATER.

Figure 9. Waterfowl as a Percent of Total Birds Reaches F, G, H



TRENDS IN SPECIES RICHNESS AND EQUITABILITY

FIGURE 10. BIRD RICHNESS, SA 1, 2005-2017



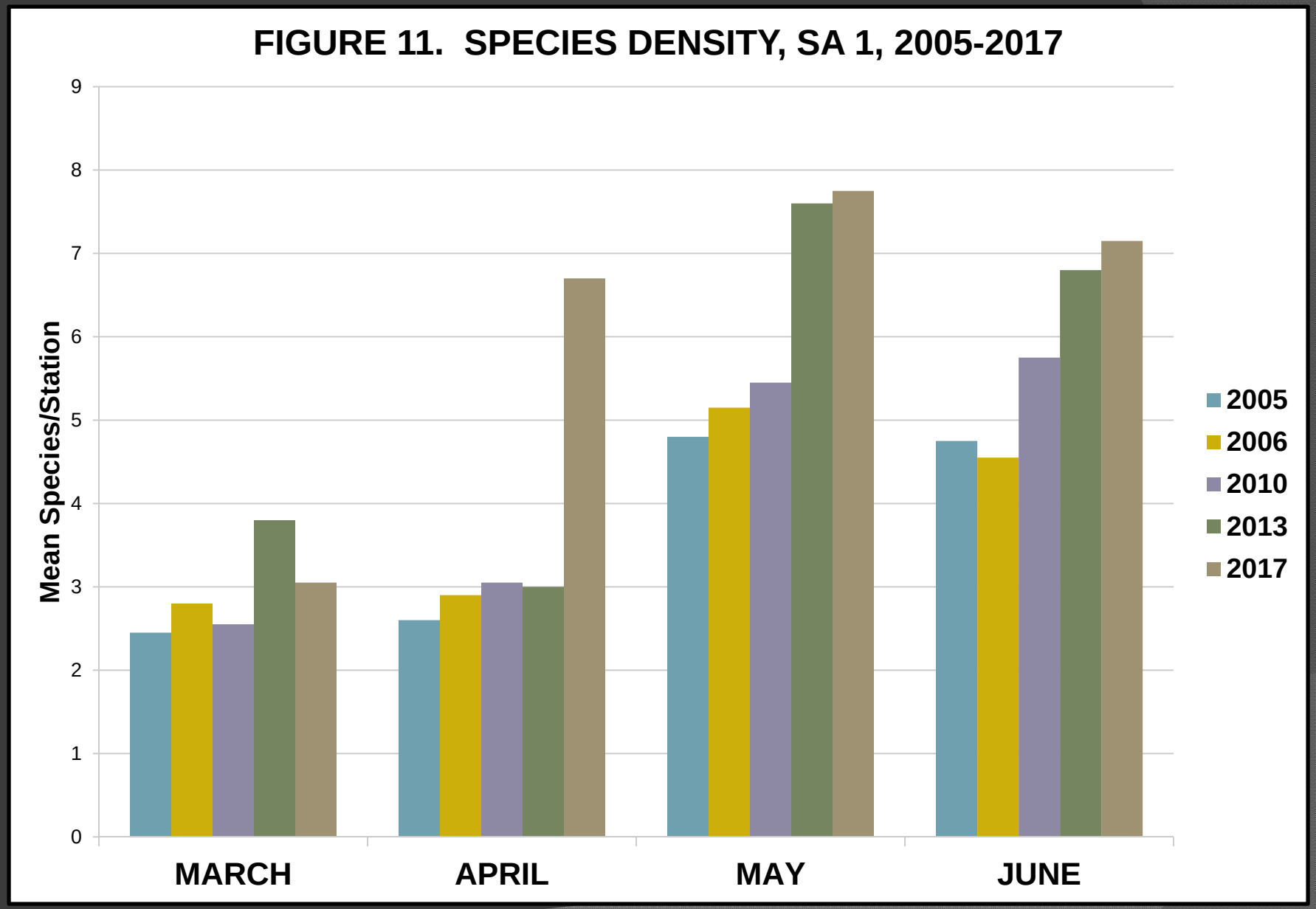


FIGURE 11. SPECIES DENSITY, SA 1, 2005-2017
Mean Species/Station
0
1
2
3
4
5
6
7
8
9
MARCH
APRIL
MAY
JUNE
2005
2006
2010
2013
2017

Figure 12. Species Densitiy, SA 2, 2007-2016

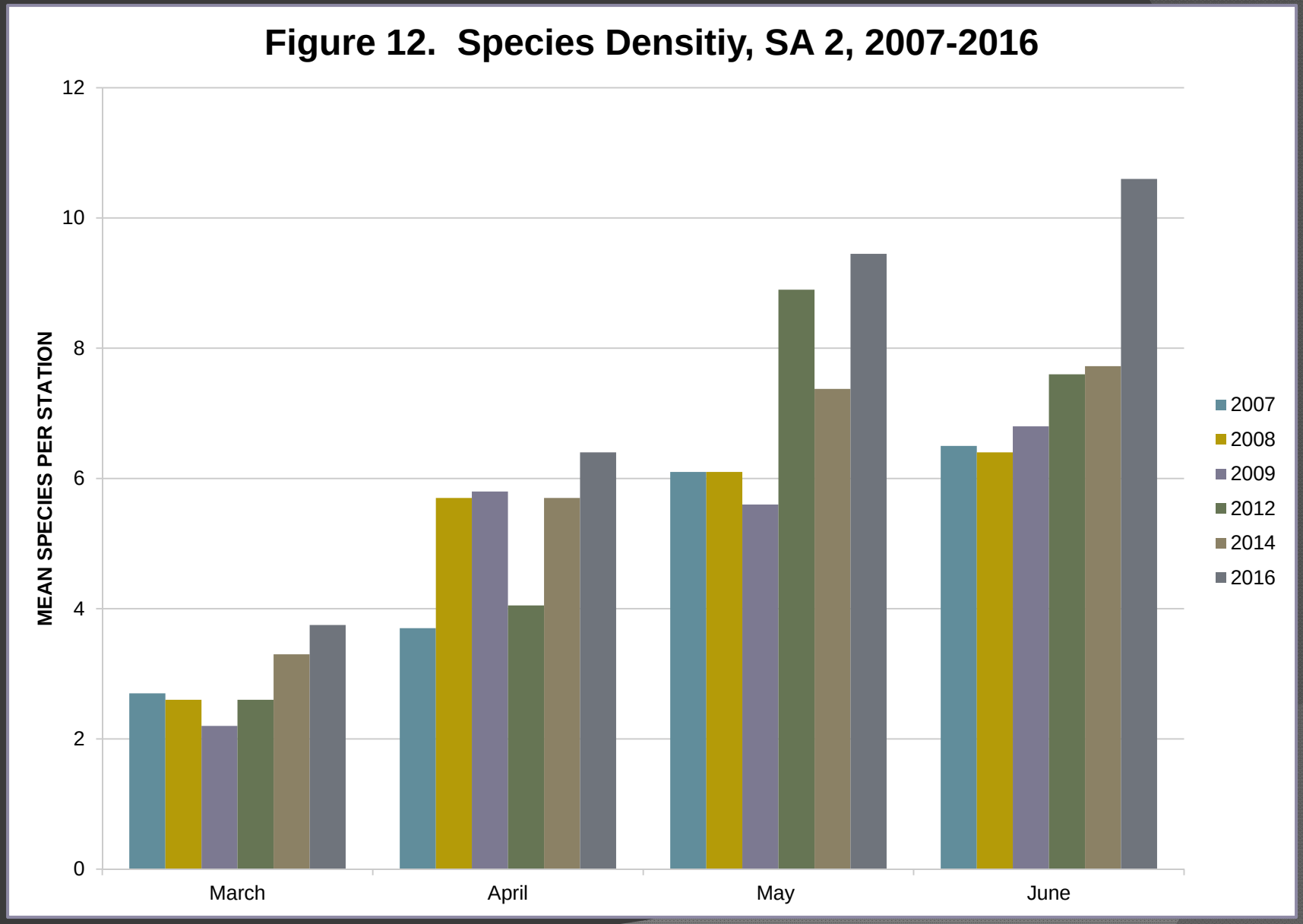


Figure 13. Species Equitability, SA 1, 2005-2017

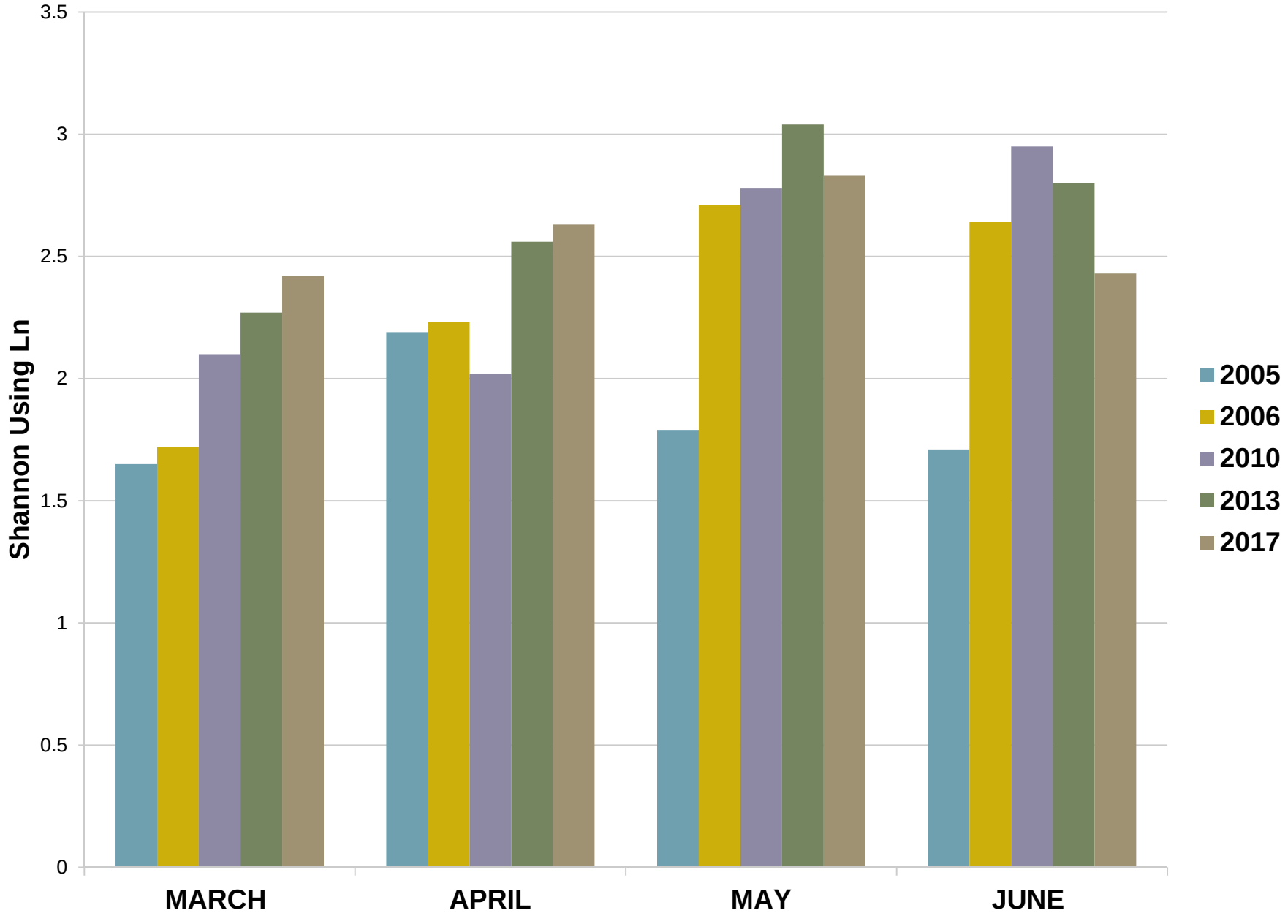
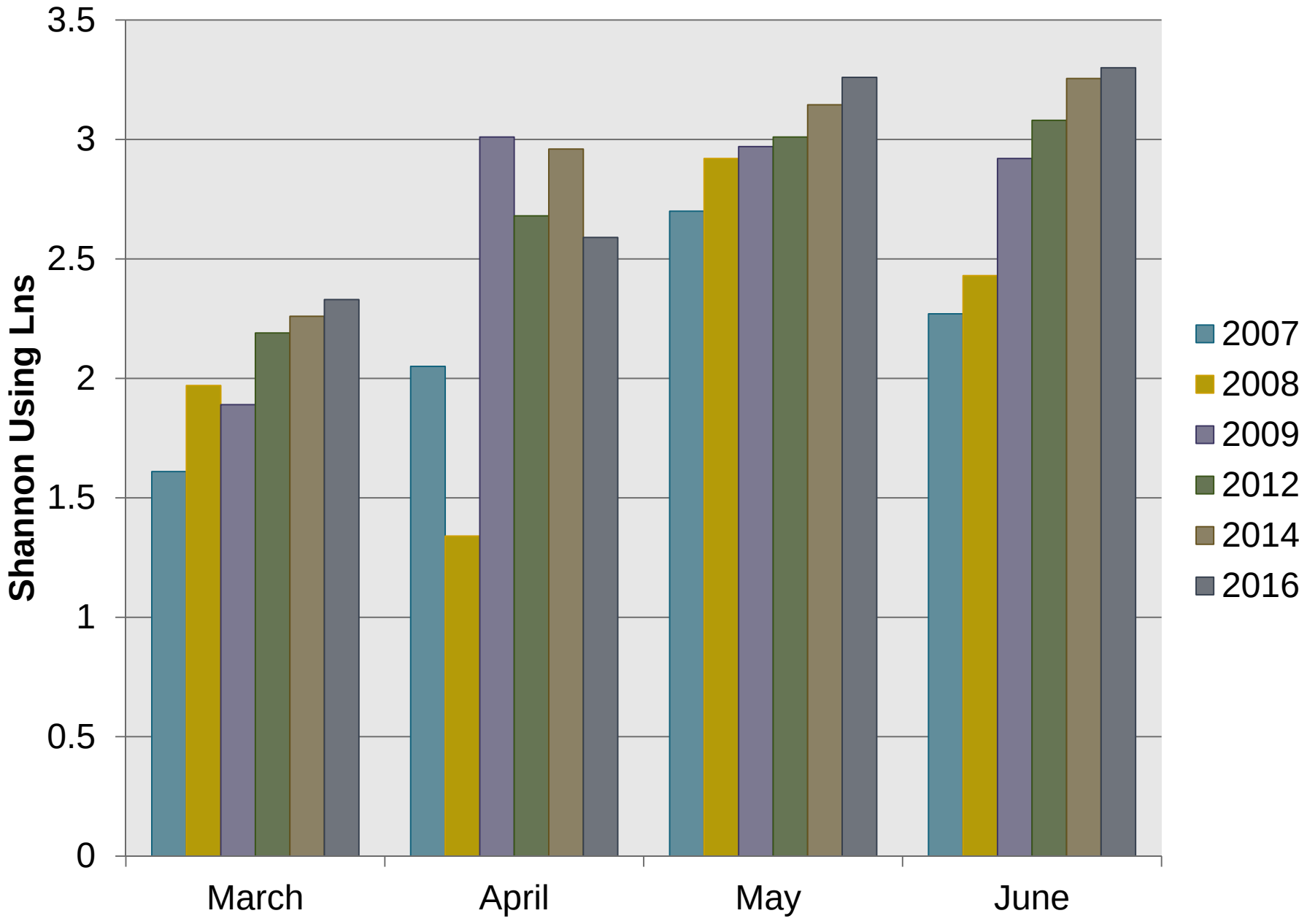


Figure 14. Species Equitability, SA 2, 2007-2016



LESSON #2.

BIRD DIVERSITY INCREASES OVER TIME IN MAY AND JUNE. AND ALSO BUT LESS RELIABLY IN MARCH AND APRIL.

TROPHIC STRUCTURE

OMNIVORES
HERBIVORES
INVERTEBRATES
VERTEBRATES

FIGURE 15. TROPHIC CLASSES, SA 1, 2005-2017.

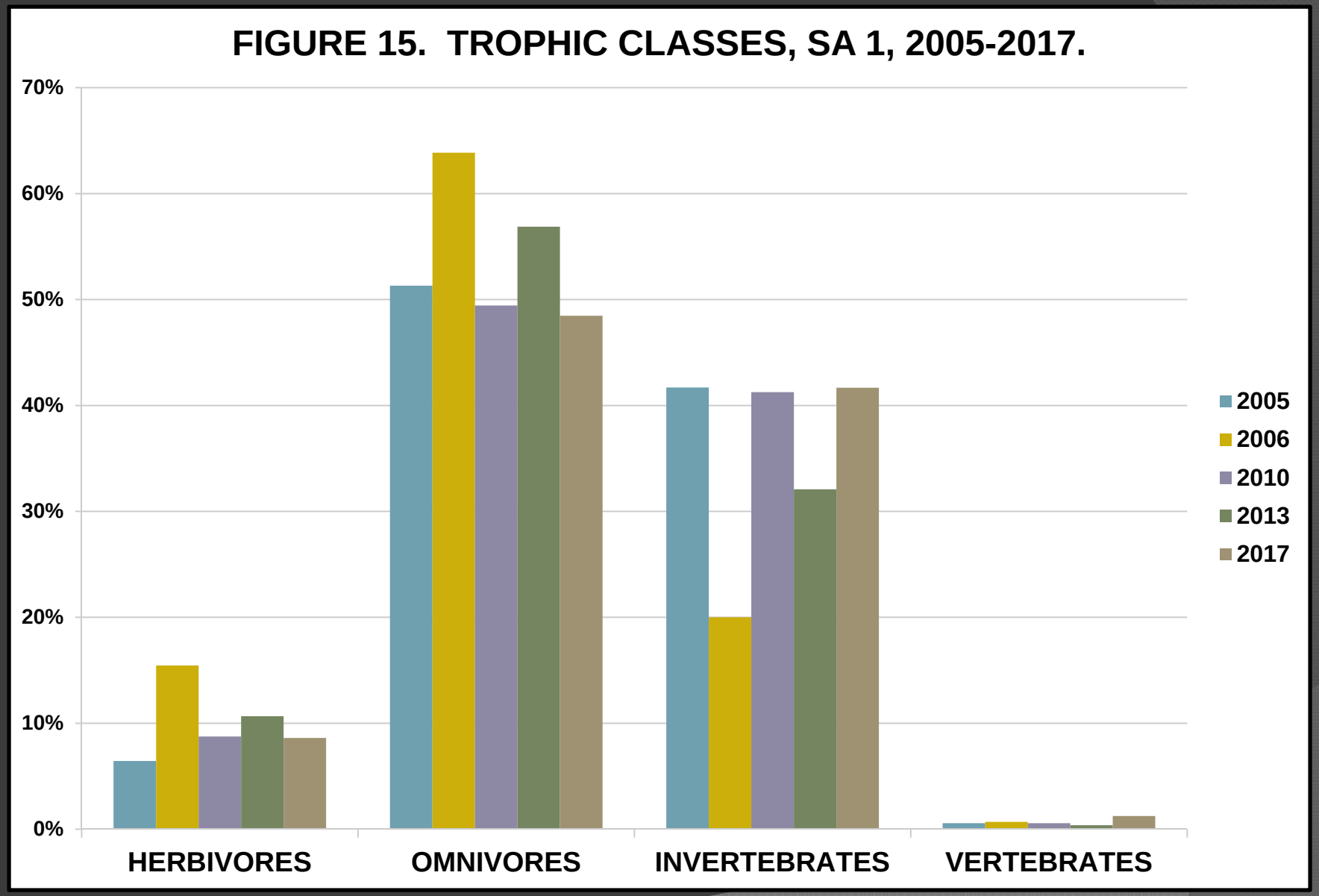
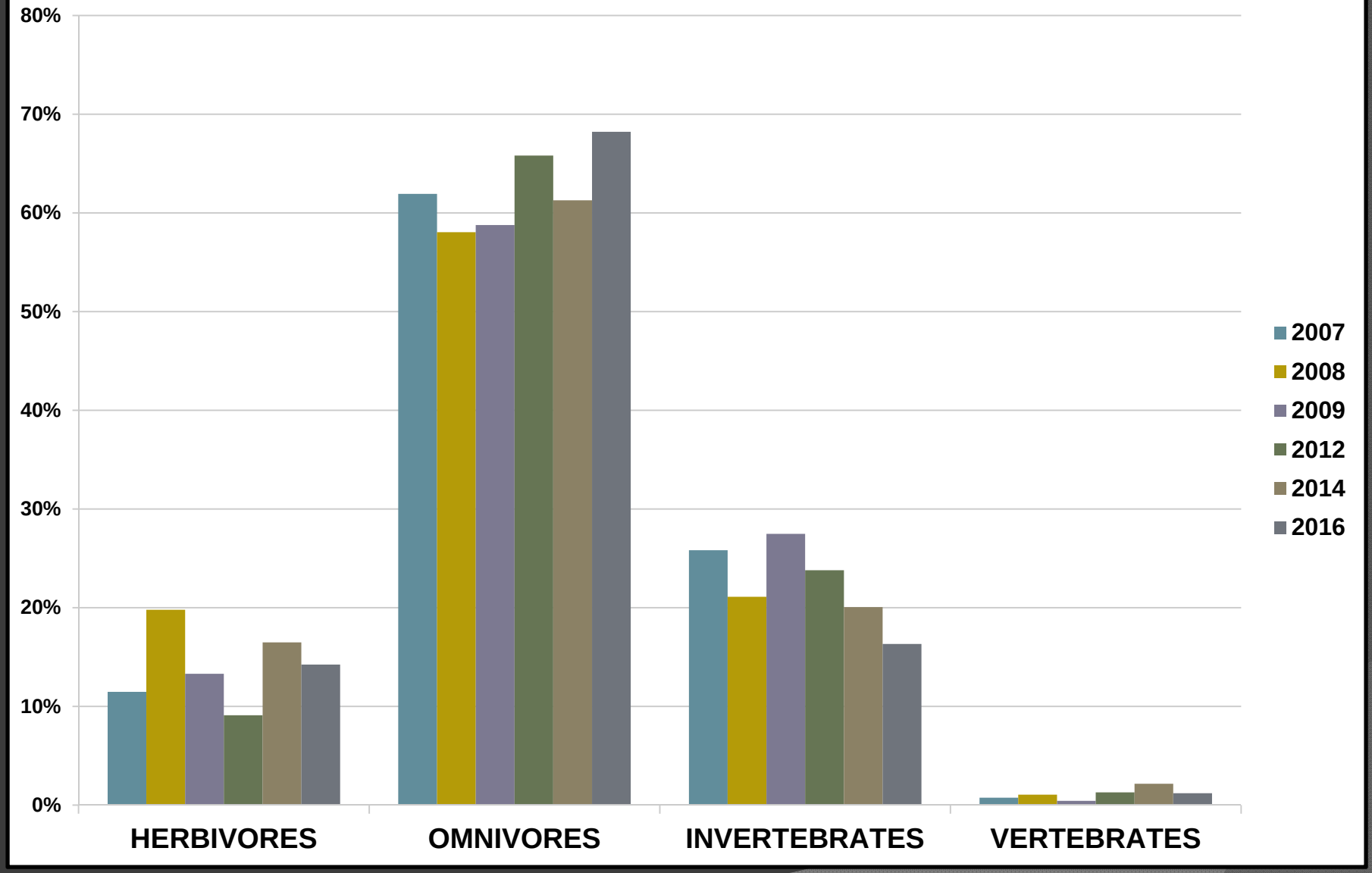


FIGURE 16. TROPHIC CLASSES, SA 2, 2007-2016



LESSON #3

NO TREND IN TROPHIC STRUCTURE

TRENDS IN HABITAT USE AND HABITAT HETEROGENEITY

FIGURE 17. AVERAGE BIRDS COUNTED PER STATION, SA 1, 2013 AND 2017

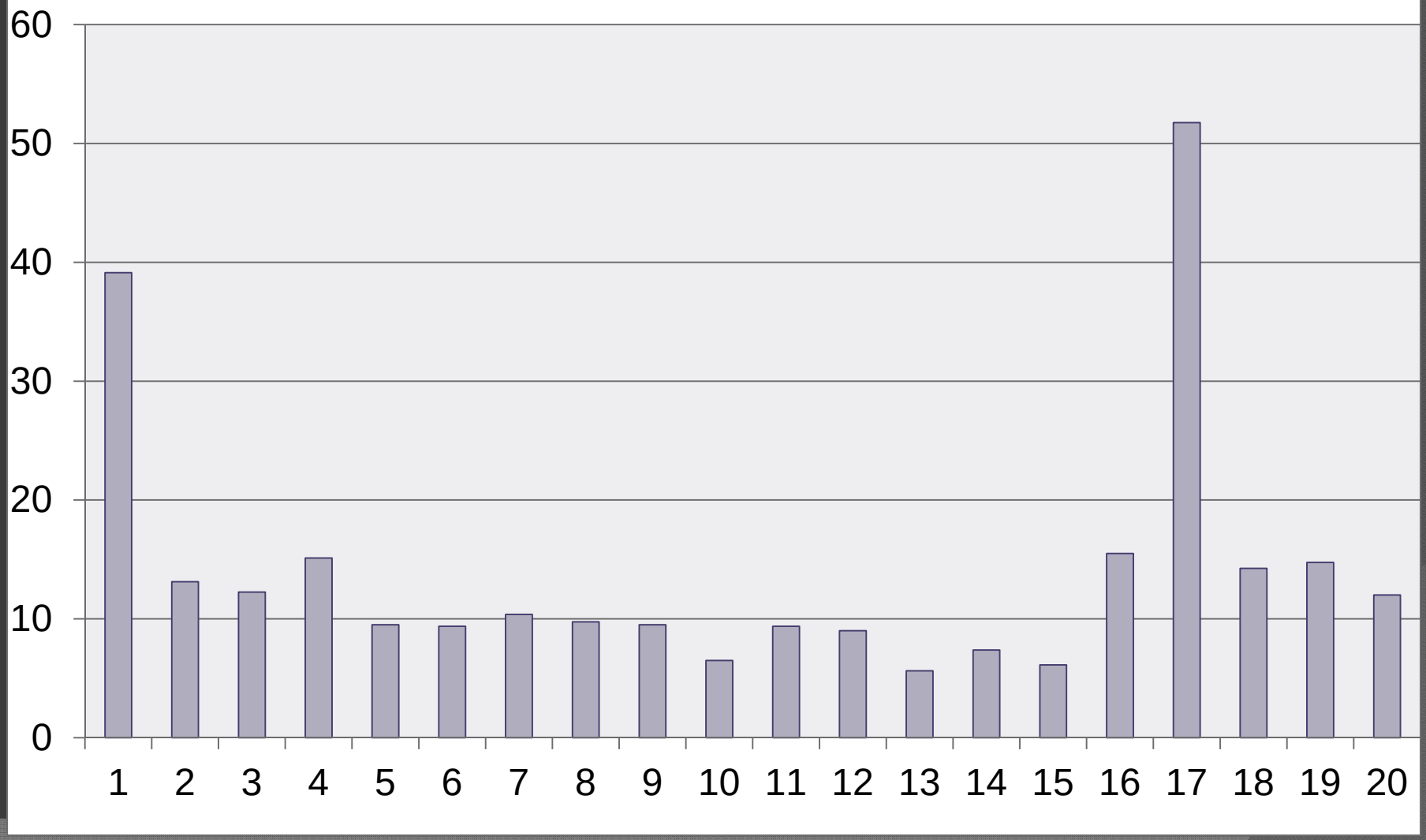
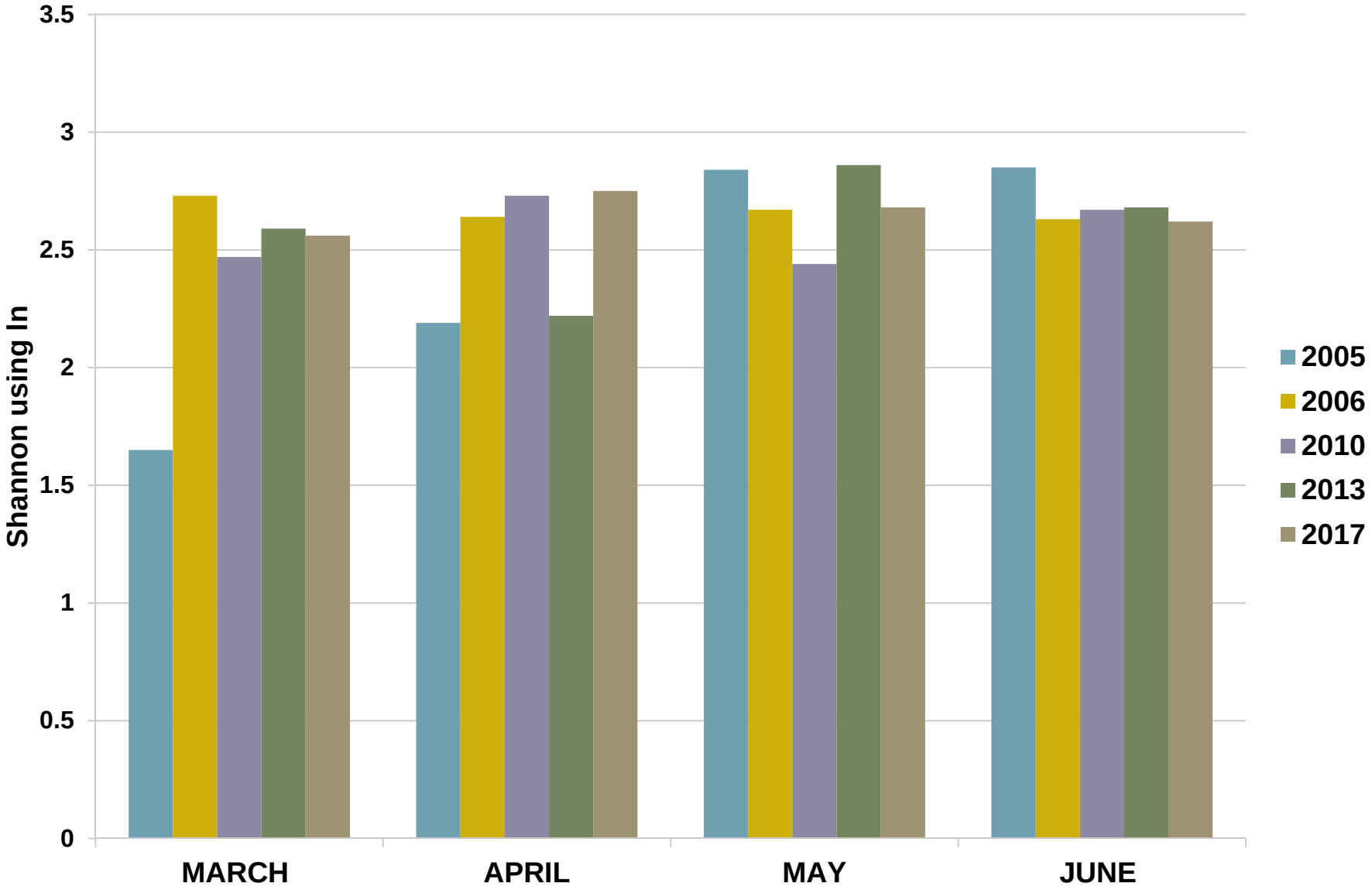


FIGURE 19. BIRD COUNT EQUITABILITY AMONG STATIONS, SA 1, 2005-2017



LESSON #4

HUGE HABITAT DIFFERENAIAL WITHIN SUBAREAS

POPULATION PATTERN IS PRETTY CONSTANT OVER TIME

SPECIAL HABITATS

FLUVIAL TALL SHRUB TYPE

#1 HABITAT

46% OF STATIONS

10 YEARS OLD

2017

FIGURE 18. BIRD COUNTS IN THE FLUVIAL TALL SHRUB TYPE

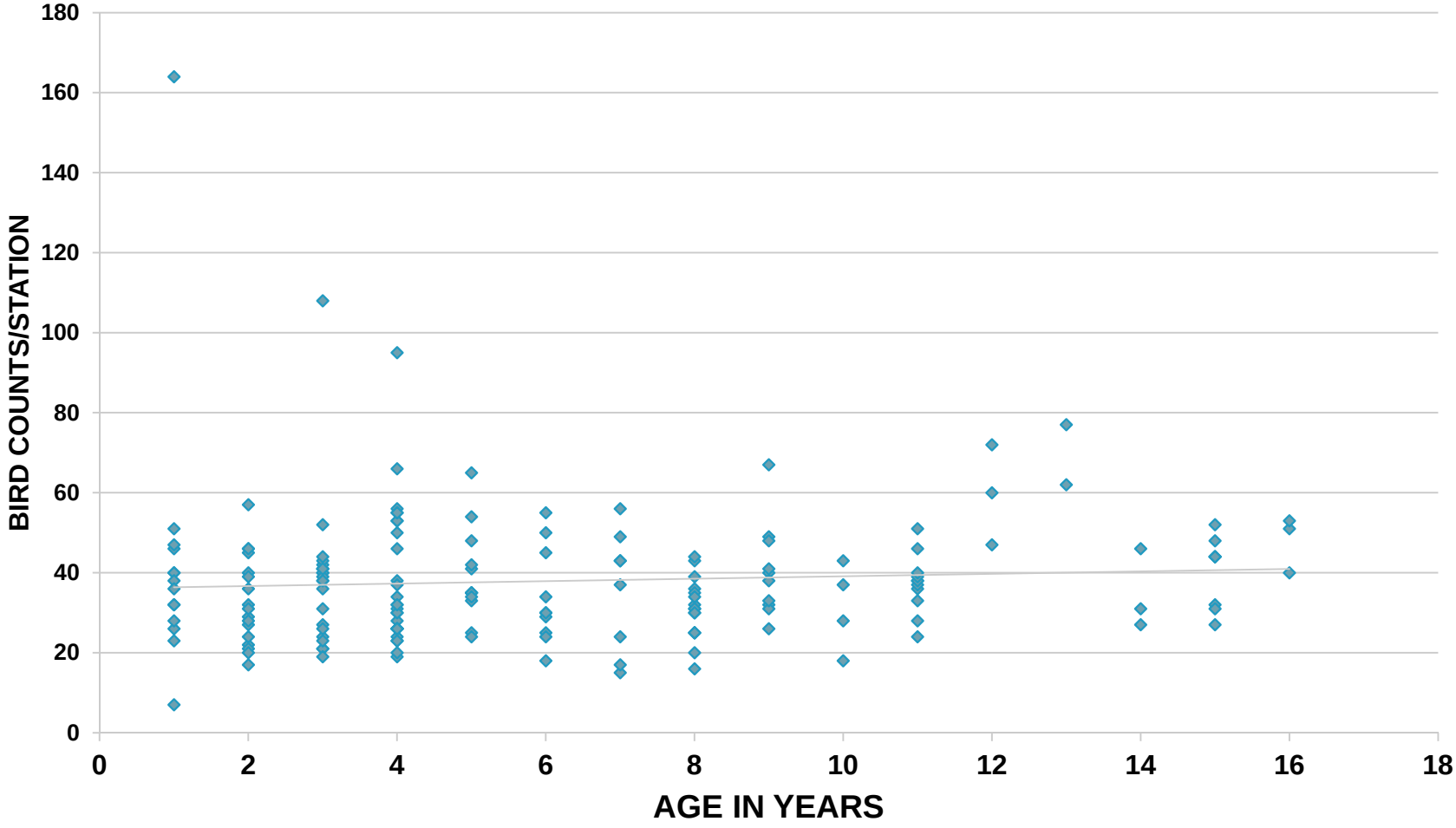
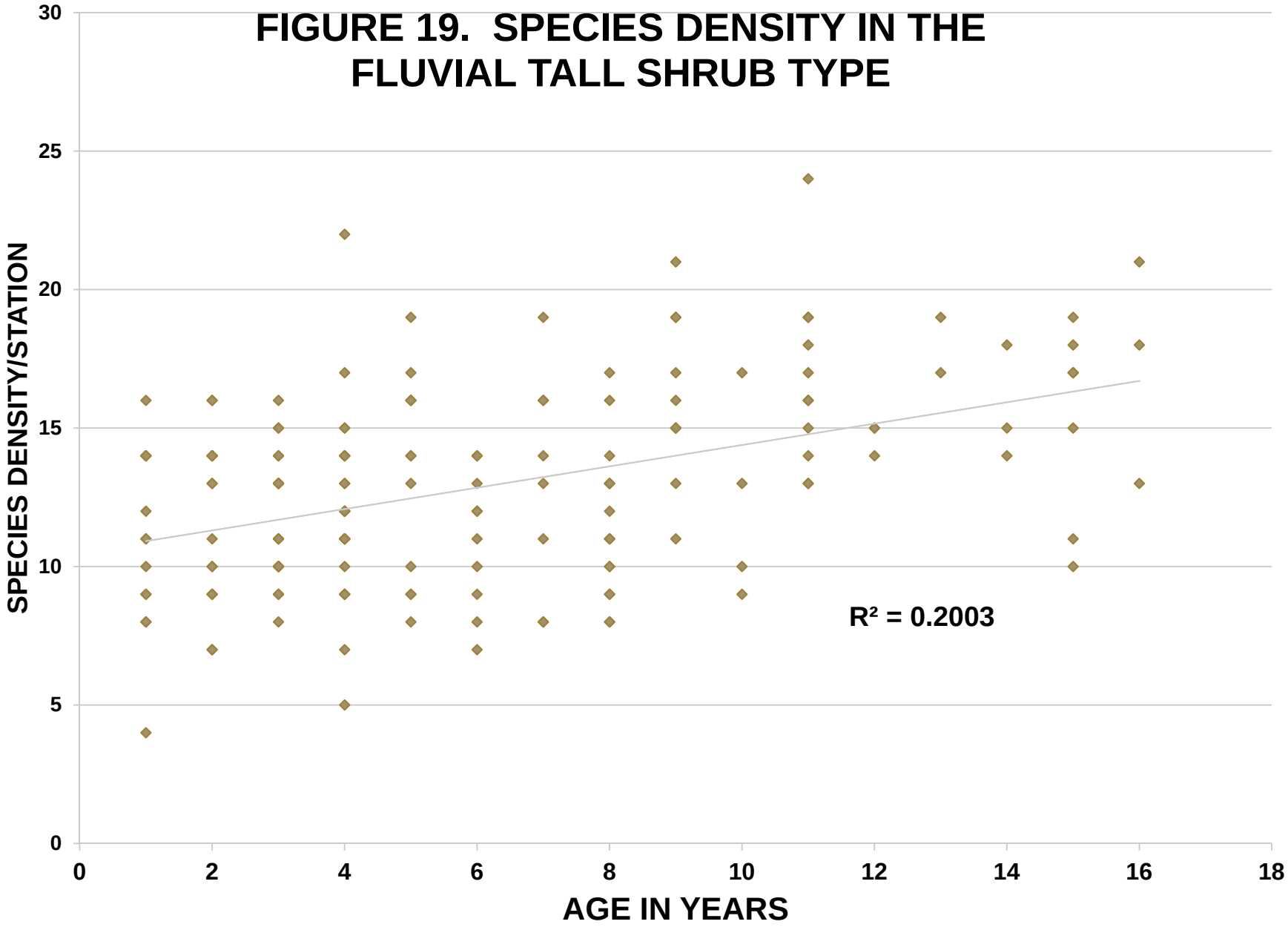


FIGURE 19. SPECIES DENSITY IN THE FLUVIAL TALL SHRUB TYPE



SO FAR BIRDS ARE MERE NUMBERS

The cumulative summaries provided so far blend sometimes contrary trends for different species and can mask differential use by habitat specialists.

WE SEE ONLY THE NET EFFECT FROM COUNTING

LOOK AT THREE HABITAT SPECIALISTS

1. WILLOW FLYCATCHTER

INSECTIVOROUS – AERIAL FORAGER

DARTS OUT FROM ELEVATED PERCHES

SOUTHWESTERN SSP. ENDANGERED

WILLOW AGE YEARS			
	6-10	7-13	11-17
WIFL COUNTS IN JUNE			
SA 1	2	14	18
SA 2	2	9	12

FIRST WILLOW FLYCATCHER SEEN
7 YRS. AFTER WILLOW PLANTING

WETLANDS PALUSTRINE

#2 HABITAT

21% OF STATIONS

EMERGENT PLANTS: cattails, spike rush, bulrushes, water sedge, tufted hairgrass, American speedwell. Some woody plants, e.g., certain willows and buffaloberry.

Reach F SA 2

FIGURE 20. BIRD COUNTS IN WETLANDS

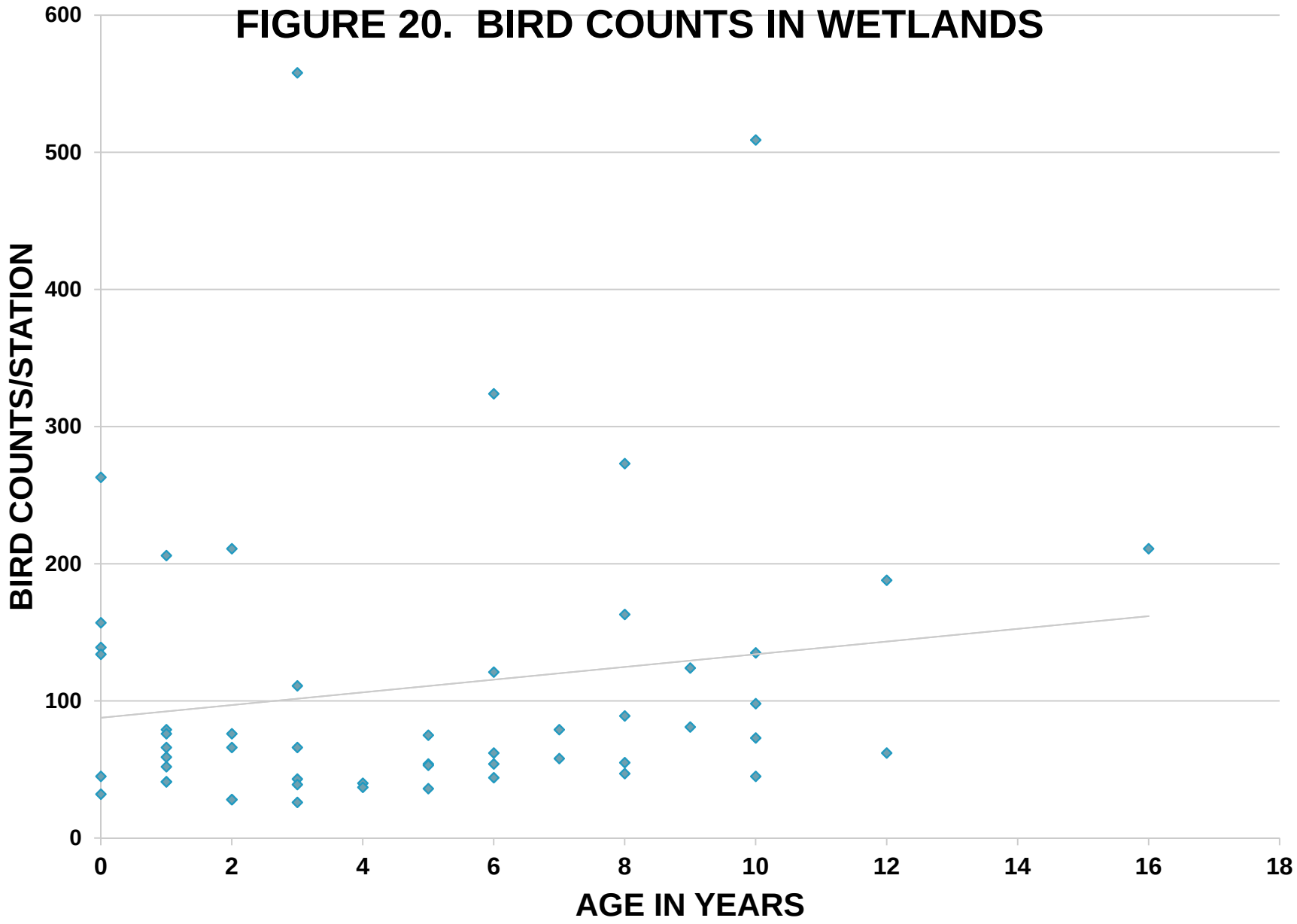
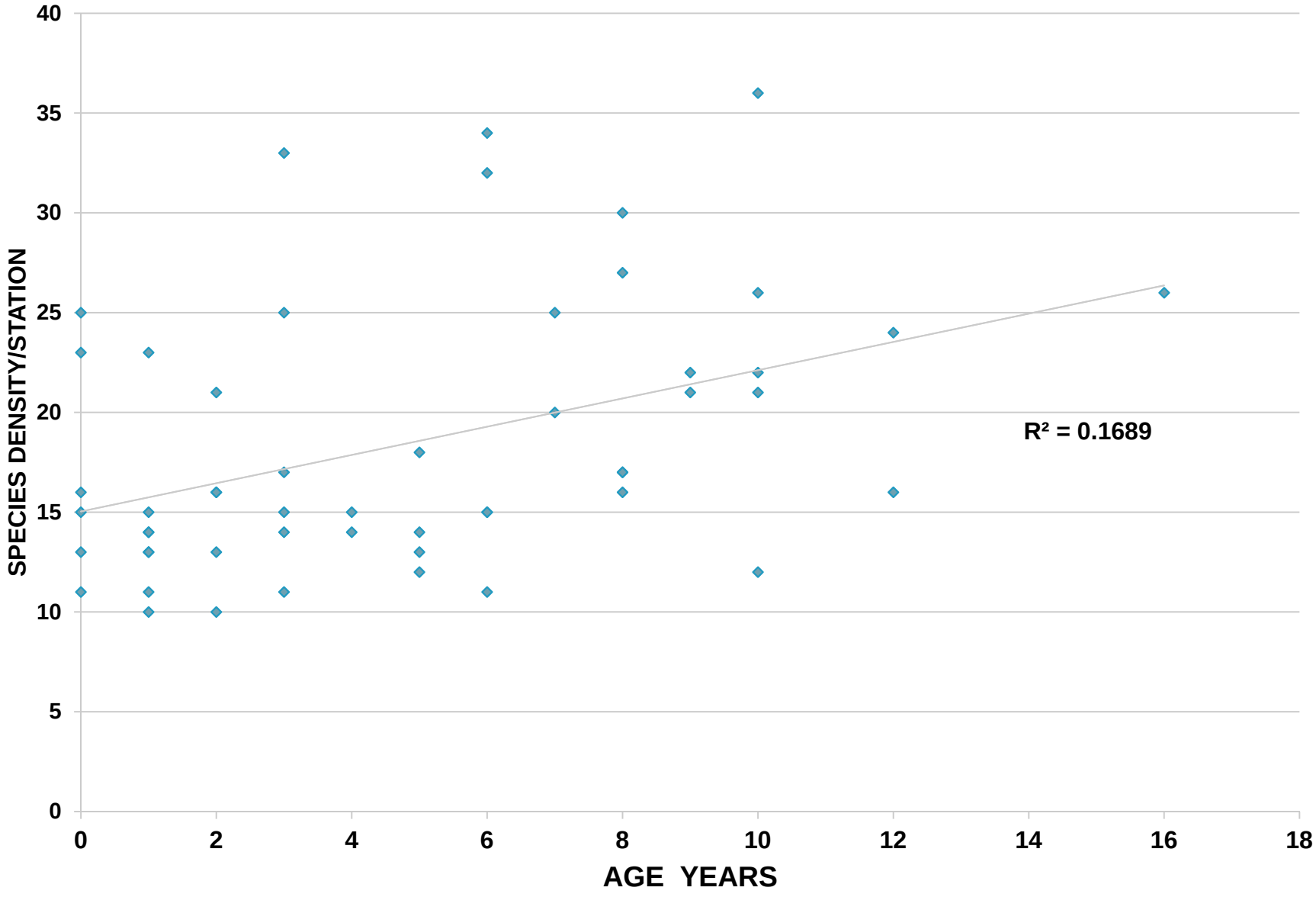


FIGURE 21. SPECIES DENSITY IN WETLANDS



2. MARSH WREN – INSECTIVORE SUMMER VISITOR

Their abundance tracks the succession of tall herbaceous plants such as cattails and bulrush and their spread in wetlands.

SA 2
MAWR COUNTS

	2014	2016
APRIL	0	3
MAY	0	7
JUNE	0	10

Reach E SA 1

SOME HABITAT SPECIALISTS PREFER MORE OPEN HABITATS

3. SPOTTED SANDPIPER

SUMMER SHOREBIRD FEEDS ON INVERTEBRATES

Bob Martinka

SUBAREA 4 LOTS OF POND MARGINS

SPSA COUNTED	
JUNE 2014	JUNE 2016
38	27

SA 1

2005	2006	2010	2013	2017
17	13	4	4	4

SA 2

2009	2012	2014	2016
27	28	6	14

EARLY SERAL HABITAT

SUMMING UP:

Birds instantly colonize fresh habitat with no discernible increase in the following decade.

SUMMING UP:

Bird species composition is rather dissimilar among even consecutive years. Temporal trends are weak.

SUMMING UP:

Species richness, species density, and species equitability increase modestly over the ensuing 15 years.

SUMMING UP:

As habitats change through vegetational development or disturbance, bird habitat specialists wax and wane.

MONTANA NATURAL RESOURCES DAMAGE PROGRAM