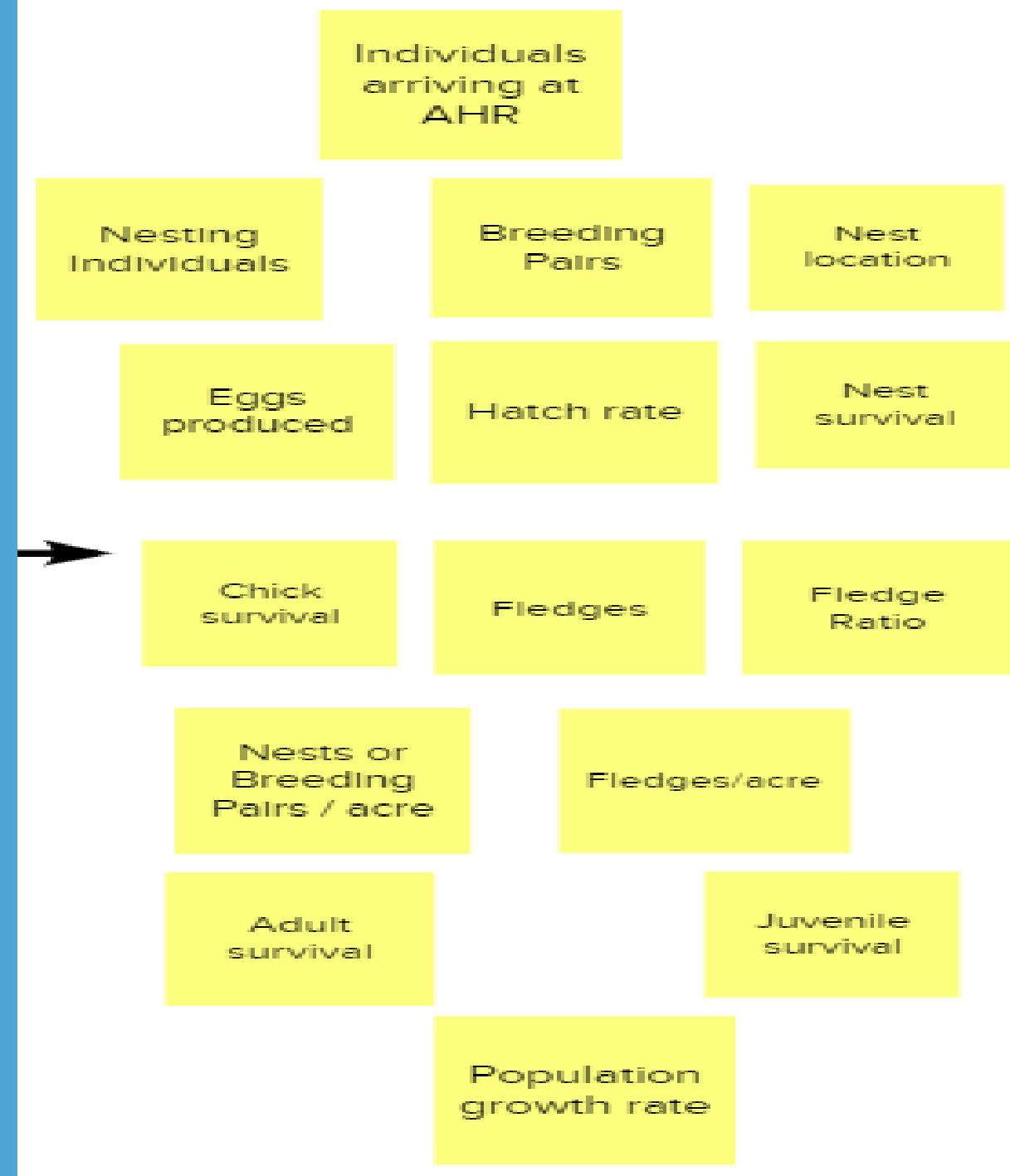




Adaptive Management Working Group Meeting 03 November 2020

Platte River Recovery Implementation Program

Performance Indicators



BIG QUESTIONS for LT and PP



Go to www.menti.com and use the code 40 89 42 1

What don't we know about LT and PP that we need to know to improve production?



Variation in forage resources on sandpit islands over time and space for Piping Plovers. LETE and PIPL behavioral ecology for young rearing diverge highly in this regard, and models should not conflate the two species.

What is the fate of unknown nests and chicks which is always a large portion of the failures.

Actions that improve on-river production.

Does the AHR serve as a source or sink to the overall Northern Great Plains population? How do we know?

-More information related to tern and plover productivity and predation (terrestrial and avian).-Program's role for LT after de-listing.-How to fully maximize existing Program water to benefit target species.-Carrying capacity of existing habitat

Forage value of sandpit habitats for PIPLs, particularly examining how that changes with the age of artificial islands.

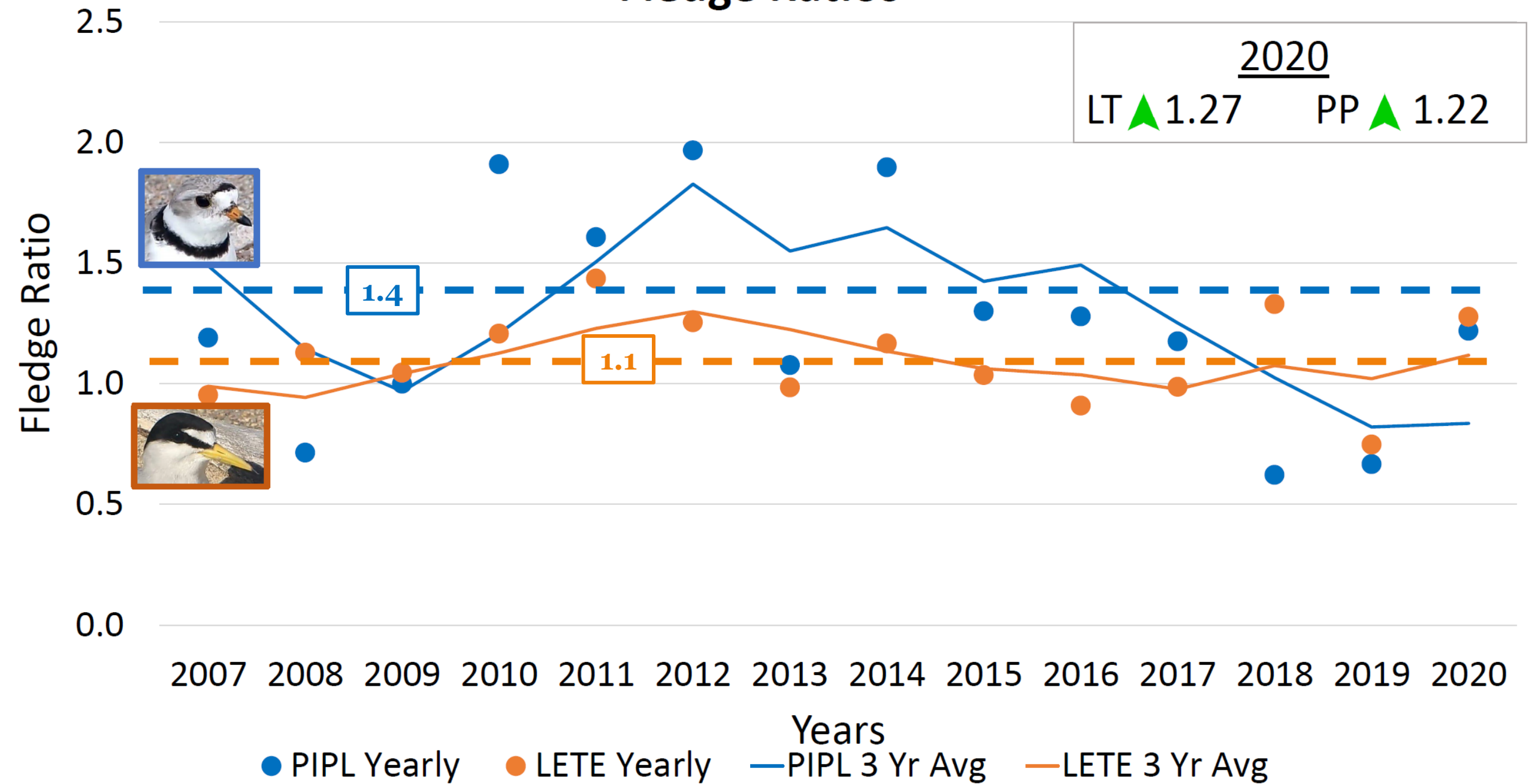
Big Questions for LT and PP – What don't we know that we need to know?

- **Program's role for LT after de-listing?**
- **Is there a need for continued AM? Or, should the Program simply shift focus towards managing existing habitat to the best of their ability?**
- **More information related to tern and plover productivity and predation (terrestrial and avian).**
- **What is the fate of unknown nests and chicks which is always a large portion of the failures?**
- **Variation in forage resources on sandpit islands over time and space for Piping Plovers. LETE and PIPL behavioral ecology for young rearing diverge highly in this regard, and models should not conflate the two species.**
- **Forage value of sandpit habitats for PIPLs, particularly examining how that changes with the age of artificial islands.**
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- **Is there a need to evaluate reproductive success at a site specific level to help guide management practices at a given location?**
- **Does the AHR serve as a source or sink to the overall Northern Great Plains population? How do we know?**
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- **How to fully maximize existing Program water to benefit target species.**

What do we know and what do we need to know ?

Here are the data on predation and unknown fates.

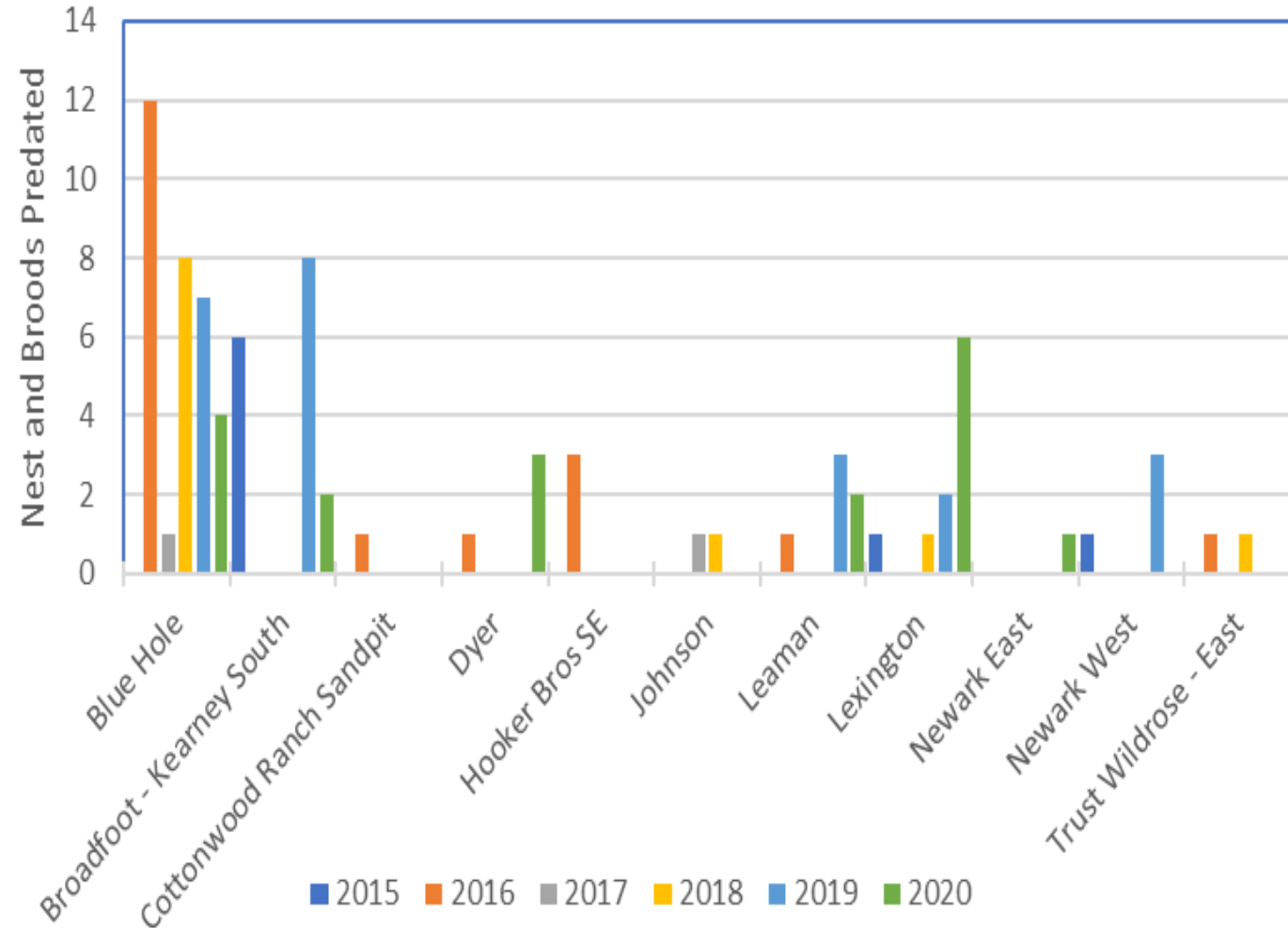
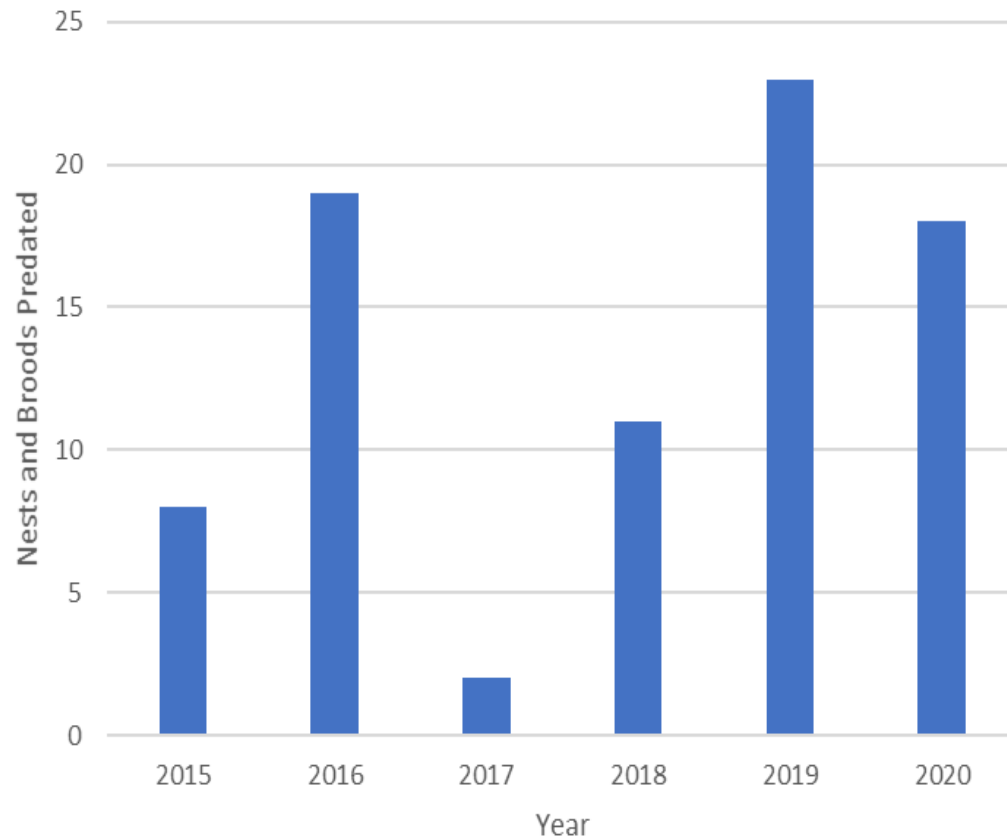
Fledge Ratios





Role of Predation on LT and PP Productivity

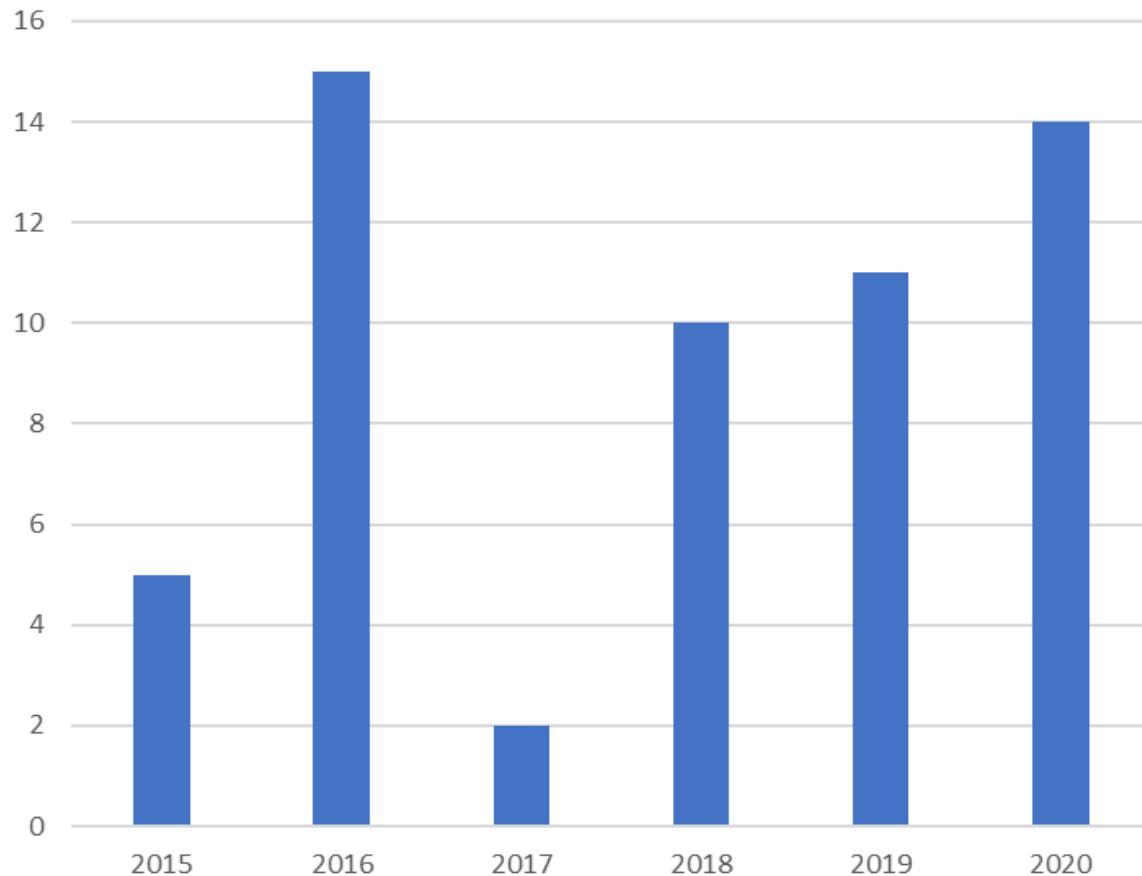
Nests and Broods Predated Across All Sites by Year



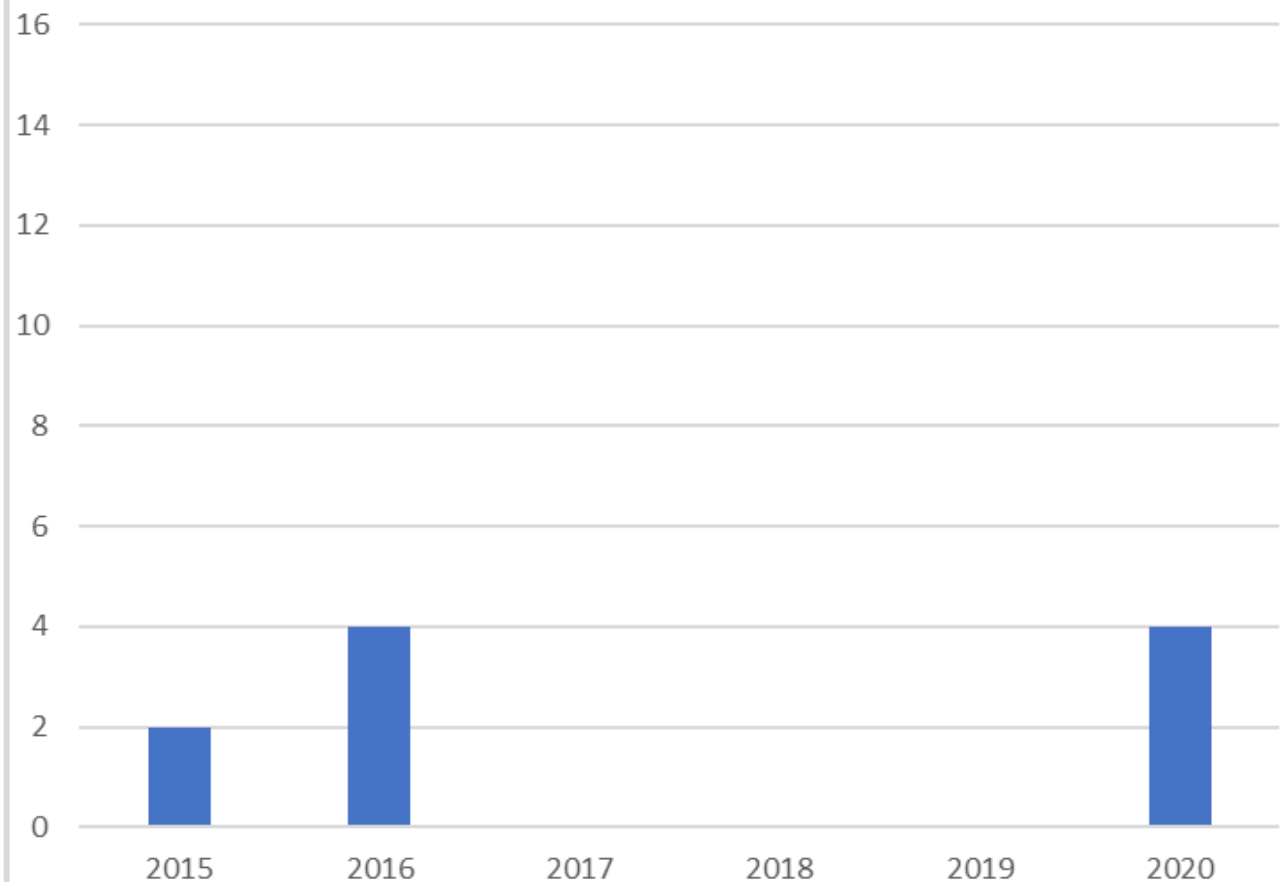


Role of Predation on LT and PP Productivity

Nests Predated Across All Sites by Year

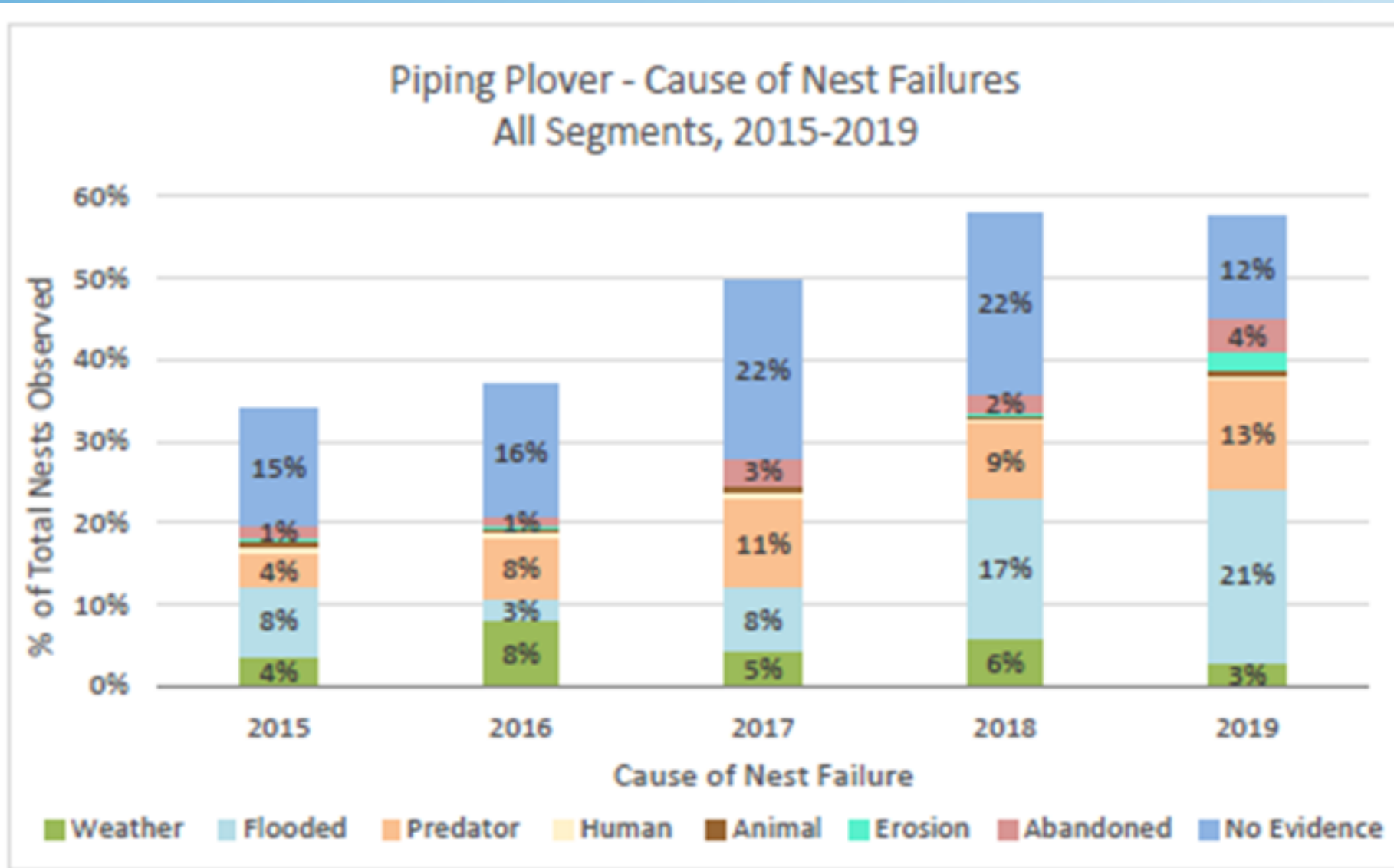


Broods Predated Across All Sites by Year



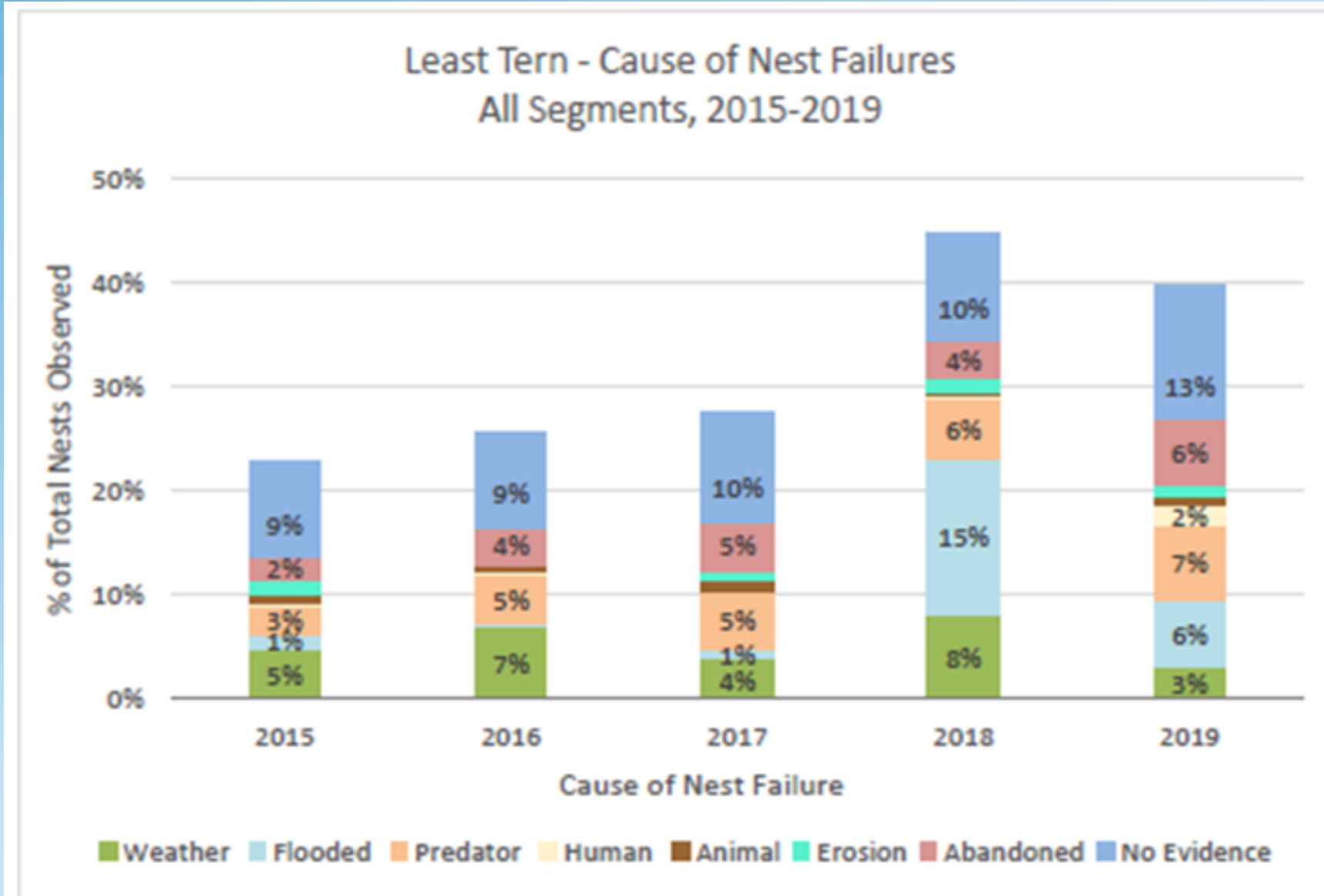
Effect of Predation on PP Productivity

□ 2019 MRRP ESA AM Compliance Report



Effect of Predation on LT Productivity

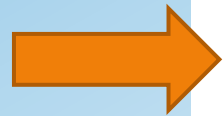
□ 2019 MRRP ESA AM Compliance Report





Role of Predation on LT and PP Productivity

Evidence from nest
Track surveys
Cameras

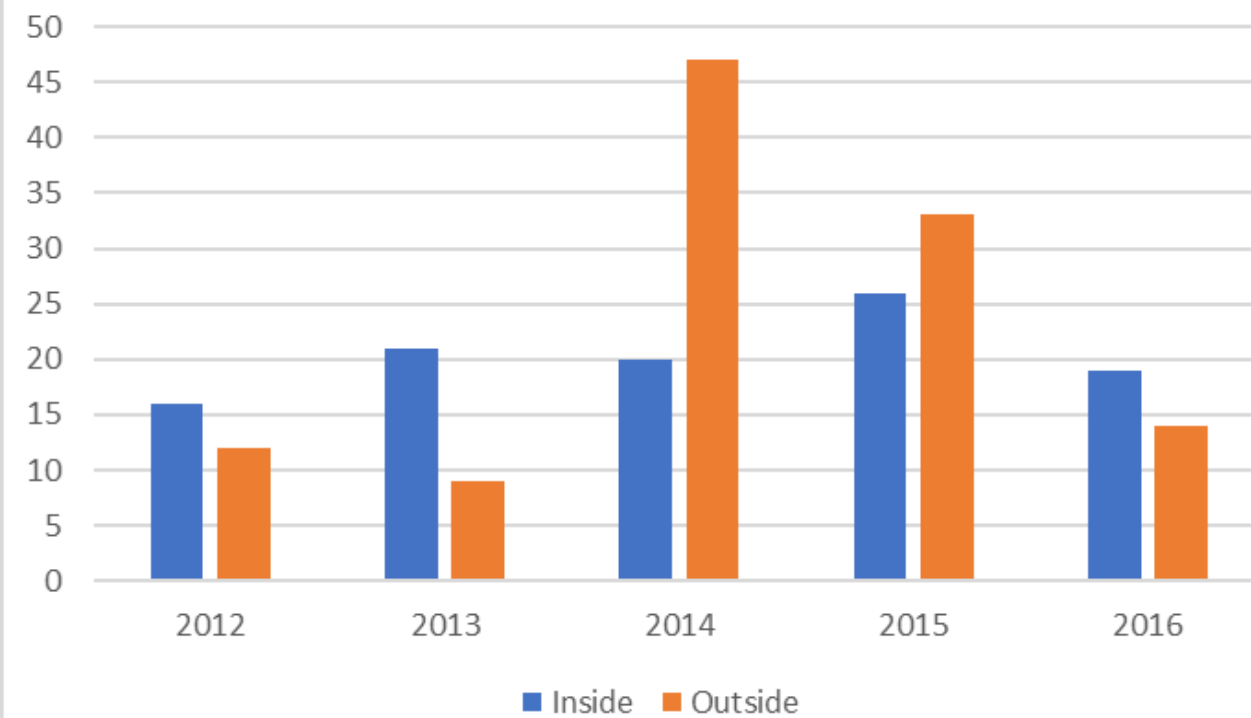


Failed Nests and Broods Terns and Plovers

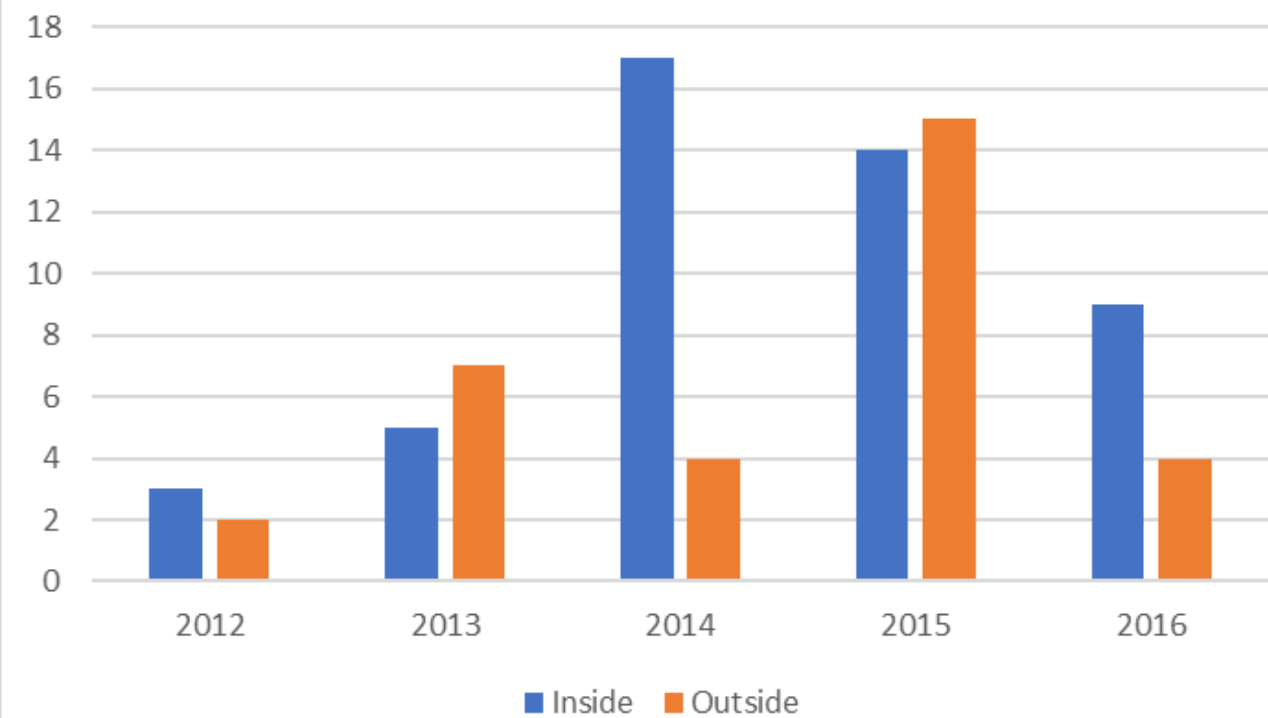
Status	2019	2020
Predated	23	18
Weather/ Flooding	18	0
Failed Unknown	87	32 nests 26 broods 58
Abandoned	1	3
Total	129	79



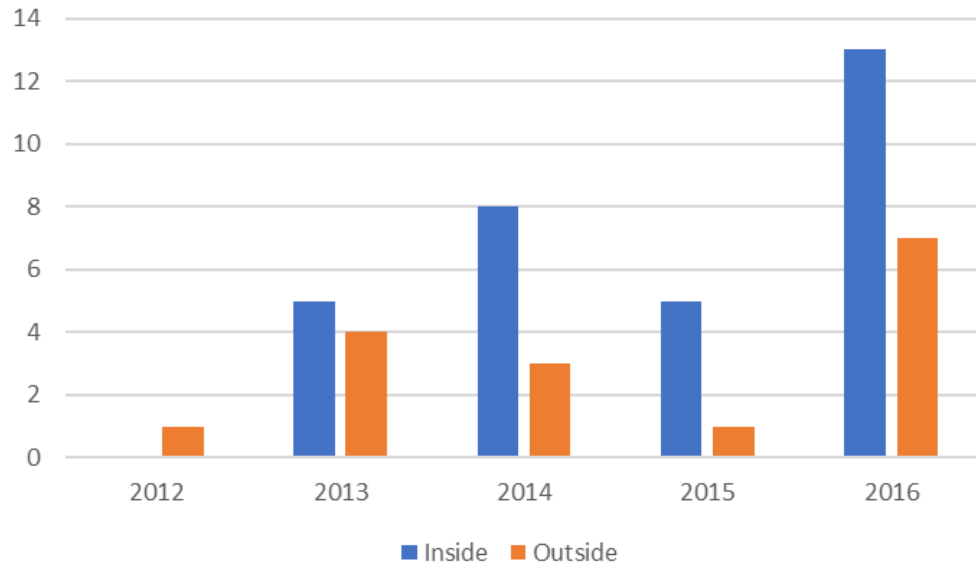
FUNK Nests



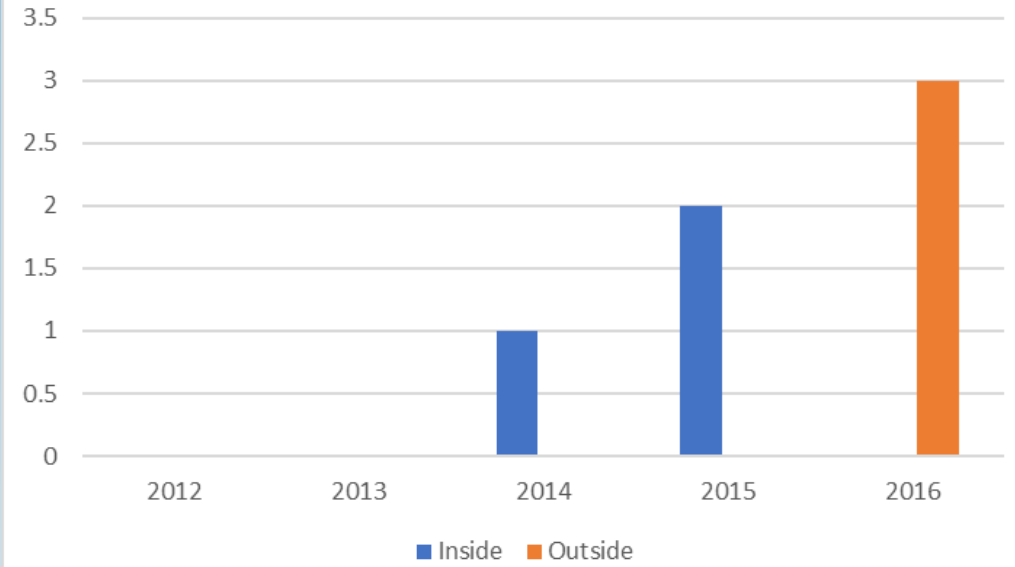
FUNK Broods



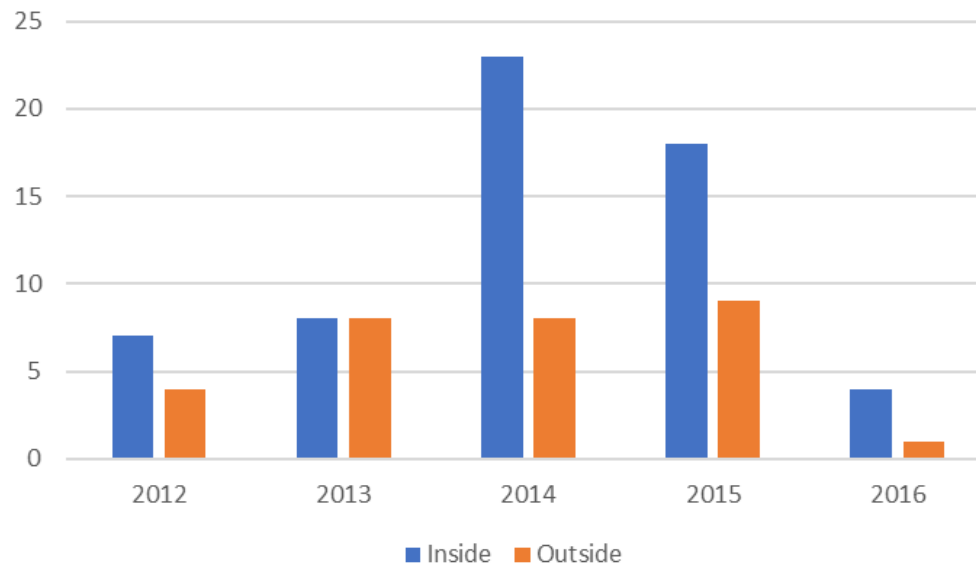
Predated Nests



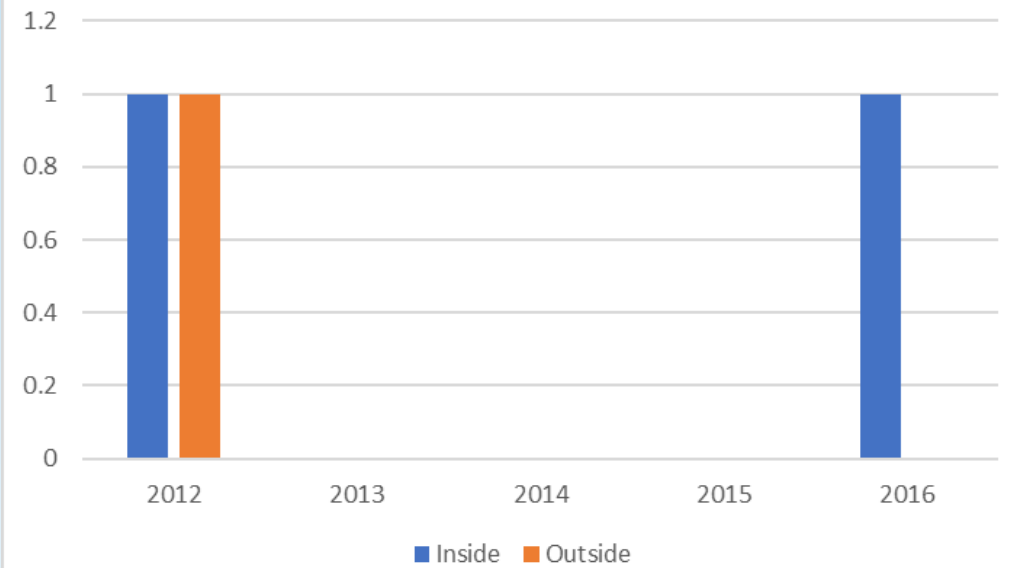
Predated Broods



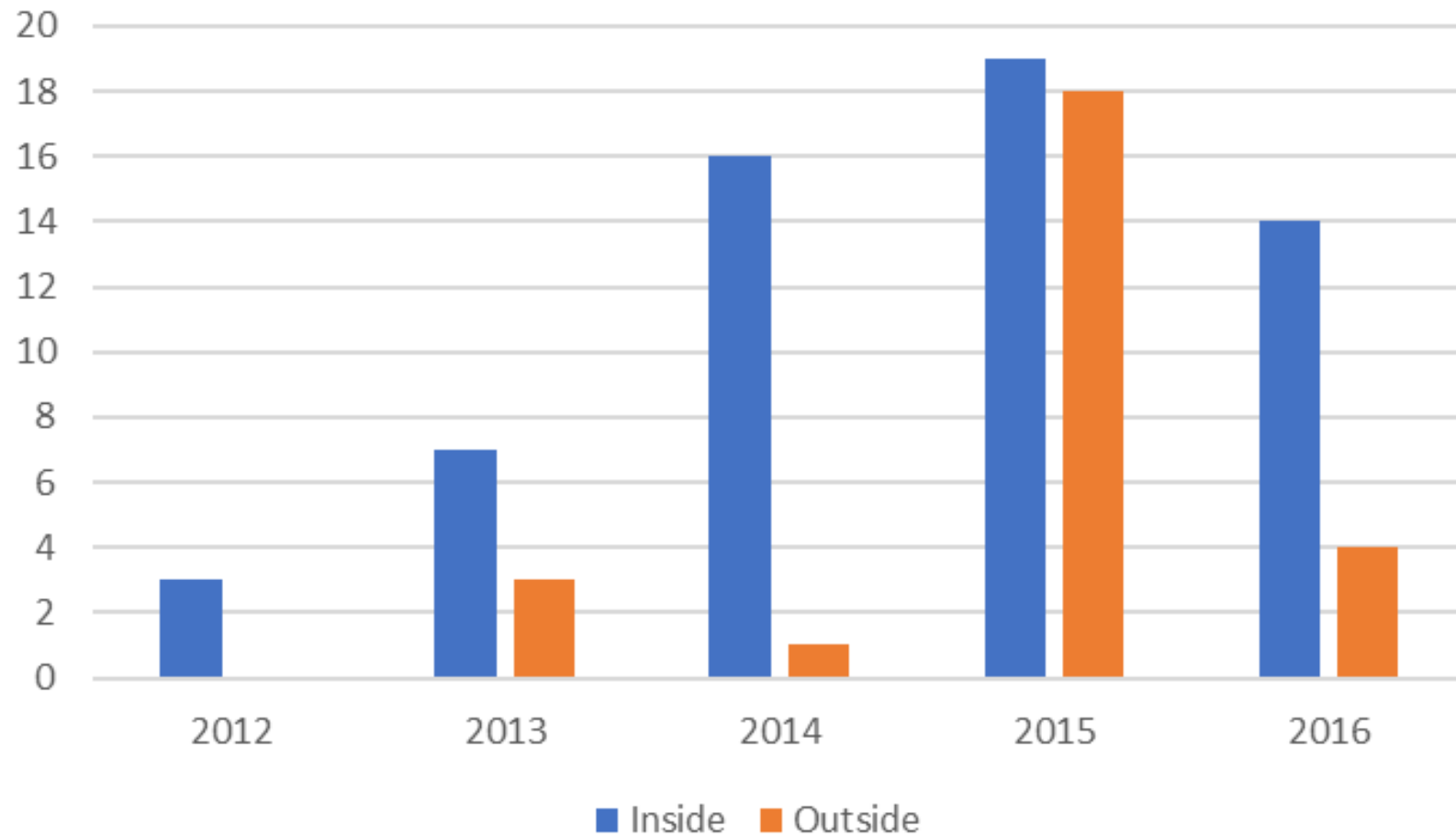
Total Failed Flooded and Weather Nests



Failed Flooded and Weather Broods



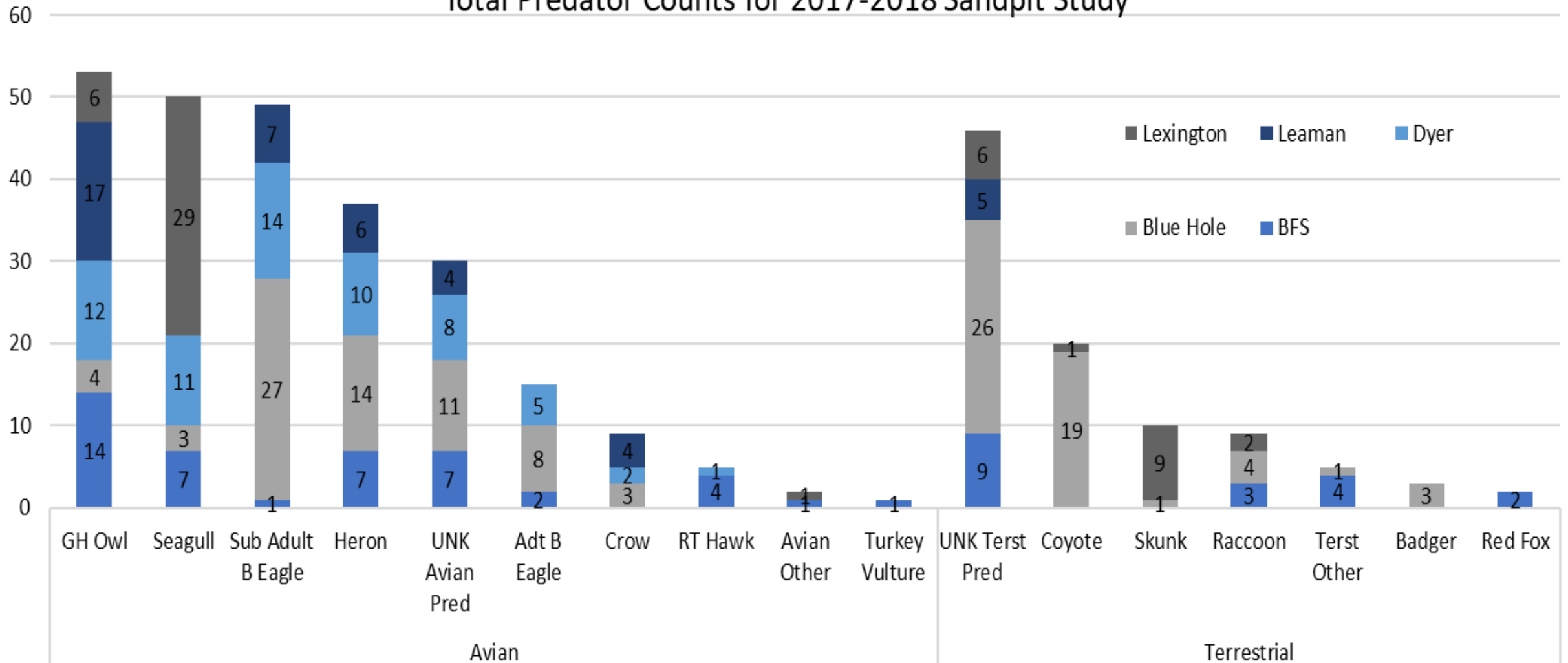
Total Abandoned Nests





Role of Predation on LT and PP Productivity 2017-2018

Total Predator Counts for 2017-2018 Sandpit Study





Role of Predation on LT and PP Productivity 2017-2018

of Mammalian Panel Wing Registers for 2017-2018

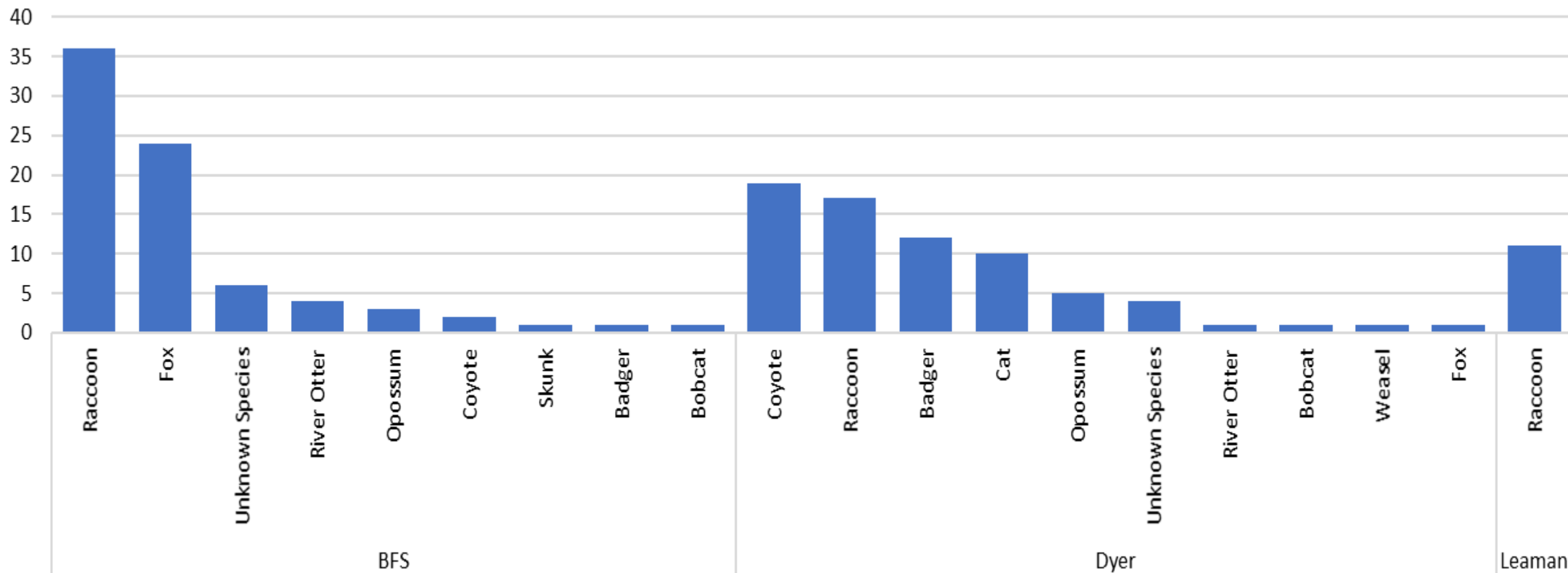


Table 2. Daily nest survival model selection results using Akaike Information Criterion adjusted for small sample sizes (AICc).

Role of
Predation on LT
and PP
Productivity

5 off-channel sites

BFS

Lexington

Blue Hole

Dyer

Leaman

2017-2018

34 site-level cameras

Model	df	logLik	AICc	delta	weight
MinTD	3	-217.31	440.62	0.00	0.34
DTWL	3	-217.54	441.09	0.47	0.27
MaxTD	3	-218.74	443.49	2.87	0.08
Raccoon	3	-219.25	444.51	3.90	0.05
Tall Veg500	3	-219.81	445.63	5.01	0.03
Species	3	-220.08	446.17	5.56	0.02
Null	2	-221.12	446.25	5.63	0.02
Forest500	3	-220.21	446.42	5.81	0.02
Crow	3	-220.32	446.65	6.03	0.02
Gull	3	-220.39	446.79	6.17	0.02
Tall Veg	3	-220.50	447.00	6.38	0.01
Coyote	3	-220.53	447.07	6.45	0.01
GH.Owl	3	-220.58	447.18	6.56	0.01
DTPP	3	-220.69	447.38	6.76	0.01
Sand	3	-220.72	447.46	6.84	0.01
Site Size	3	-220.80	447.62	7.00	0.01
AvianPred	3	-220.85	447.72	7.10	0.01
TerrPred	3	-220.88	447.77	7.15	0.01
Short Veg	3	-220.96	447.93	7.31	0.01
AveWaterDist	3	-221.04	448.10	7.48	0.01
Short Veg500	3	-221.10	448.21	7.59	0.01
Heron	3	-221.11	448.23	7.61	0.01
SA Bald Eagle	3	-221.12	448.24	7.62	0.01



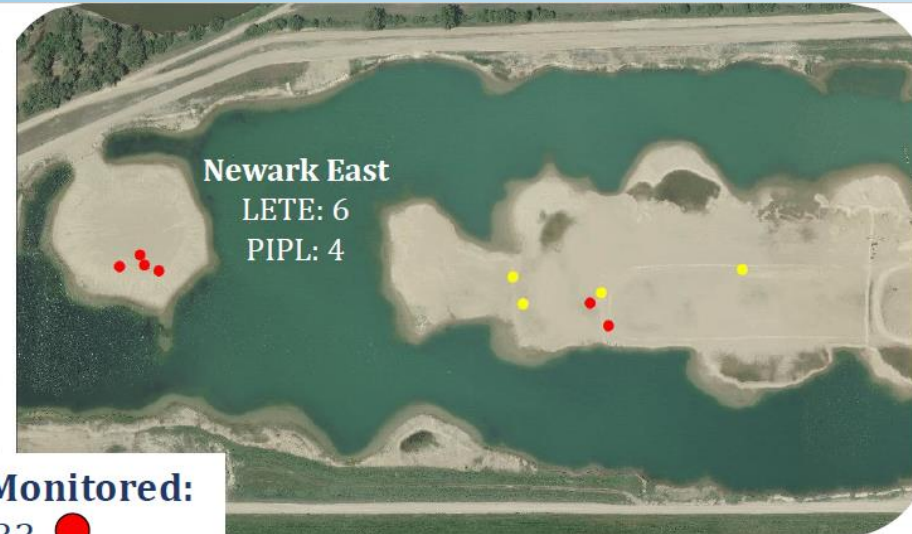
Table 2. Fledgling count model selection results using Akaike Information Criterion adjusted for small sample sizes (AICc).

	Model	df	logLik	AICc	delta	weight
Role of Predation on LT and PP Productivity	Tall Veg	3	-138.44	283.09	0.00	0.58
	Raccoon	3	-140.64	287.51	4.41	0.06
	Tall Veg500	3	-140.79	287.80	4.71	0.06
	Forest500	3	-141.01	288.24	5.15	0.04
	Null	2	-142.51	289.14	6.04	0.03
	MaxTD	3	-141.70	289.63	6.54	0.02
5 off-channel sites	Sand	3	-141.74	289.70	6.61	0.02
	BFS	3	-141.81	289.83	6.74	0.02
	Lexington	3	-141.81	289.84	6.75	0.02
	Blue Hole	3	-141.82	289.86	6.77	0.02
	Dyer	3	-141.96	290.15	7.05	0.02
	Leaman	3	-142.00	290.22	7.13	0.02
2017-2018 34 site-level cameras	Species	3	-142.11	290.43	7.34	0.01
	MinTD	3	-142.18	290.57	7.48	0.01
	Forest	3	-142.35	290.92	7.83	0.01
	Short Veg	3	-142.37	290.96	7.87	0.01
	Coyote	3	-142.37	290.96	7.87	0.01
	SA Bald Eagle	3	-142.43	291.07	7.98	0.01
	Heron	3	-142.49	291.20	8.11	0.01
	AveWaterDist	3	-142.50	291.21	8.12	0.01
	AvianPred	3	-142.50	291.21	8.12	0.01

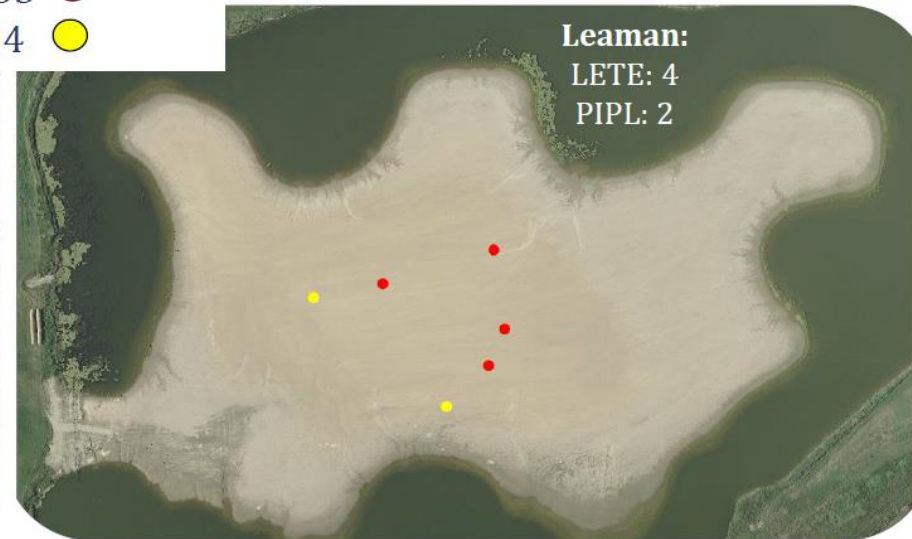
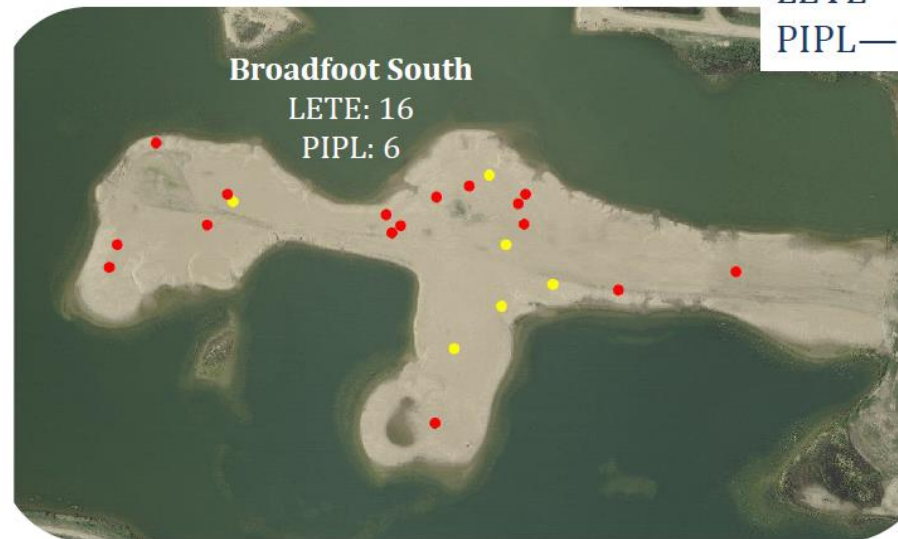




Role of Predation on LT and PP Productivity 2020



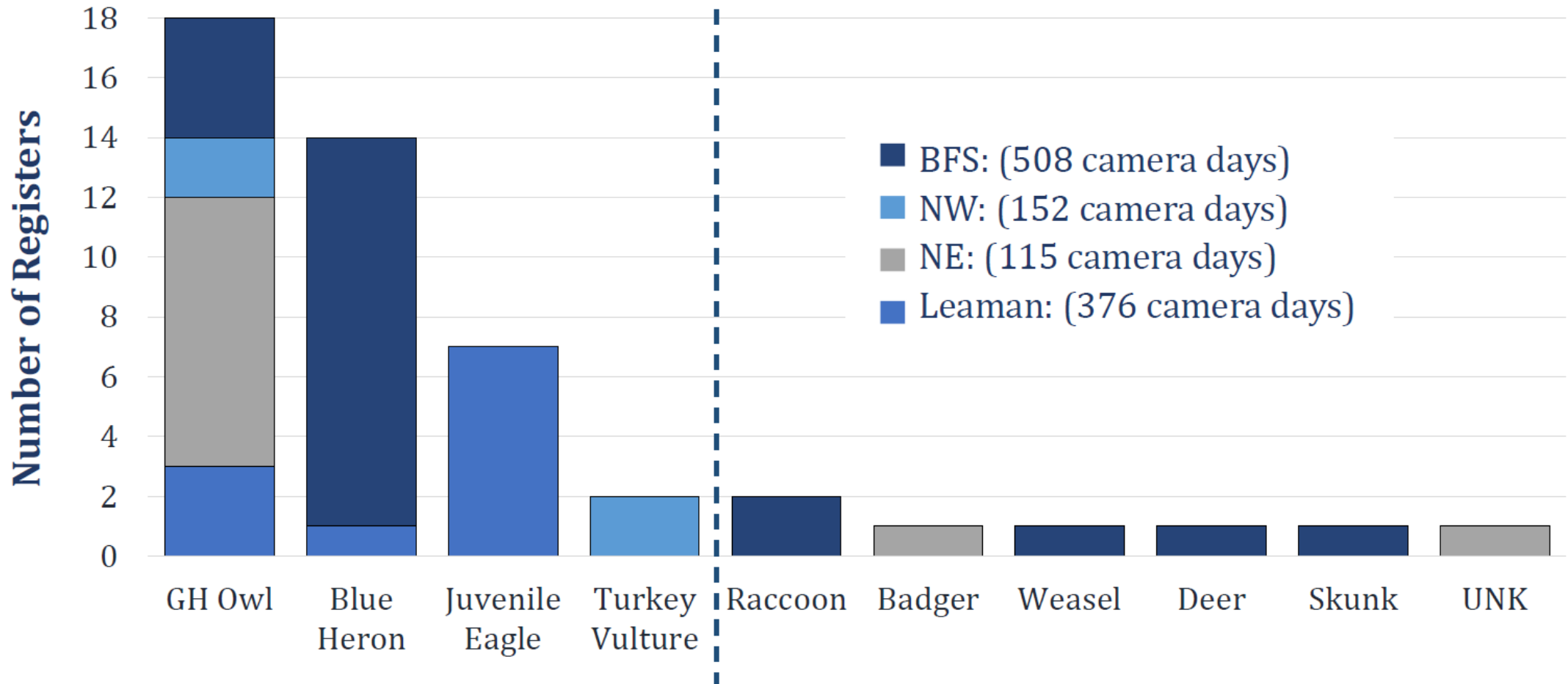
Nests Monitored:
LETE—33 ●
PIPL—14 ●





Role of Predation on LT and PP Productivity 2020

Predator Species Registered by Nest Cameras





Role of Predation on LT and PP Productivity 2020

Site	Nest ID	PRRIP Out Nest ID	Predation Caught on Camera			Grand Total	Fating	
			No	Unsure	Yes		Failed Predated	Failed Unknown
BFS	BFS-04-20	O-BFS-01-20	2			2		Yes
BFS	BFS-07-20	O-BFS-18-20	1			1		Yes
BFS	BFS-08-20	O-BFS-38-20	1			1		
BFS	BFS-17-20	O-BFS-35-20	1	1		2	Yes (track survey)	
BFS	BFS-19-20	O-BFS-36-20	2			2		
BFS	BFS-20-20	O-BFS-37-20	3			3		
BFS	BFS-21-20	O-BFS-39-20	10			10		
Leaman	LES-03-20	O-LES-05-20			1	1	Yes (track survey and camera)	
Leaman	LES-04-20	O-LES-07-20	7			7		
Leaman	LES-06-20	O-LES-08-20	1			1		
NE	NE-02-20	O-NE-06-20	1			1		
NE	NE-07-20	O-NE-18-20	1		1	2	Yes (camera)	
NE	NE-08-20	O-NE-13-20	1	2		3		
NW	NW-01-20	O-NW-03-20	1			1		
NW	NW-09-20	O-NW-10-20	3			3		Yes
Grand Total			35	3	2	40		

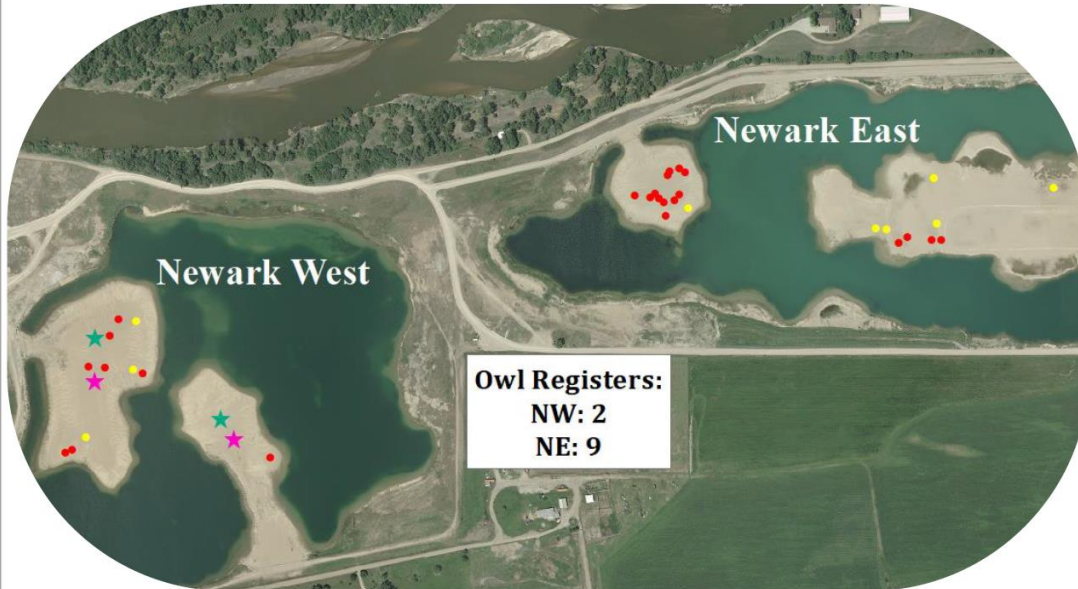




Role of Predation on LT and PP Productivity

2020

Predator Deterrent Lights



★ Motion Light ★ Random Light ● PIPL Nest ● LETE Nest



Species	Site	Treatment	2020		2016-2019	
			Breeding Pairs	Fledglings Per Breeding Pair	Ave Breeding Pairs	Ave Fledglings Per Breeding Pair
PIPL	Newark East	No lights	4	0.75	2	2.46
	Newark West	Lights	1	2	4.75	1.14
LETE	Newark East	No lights	15	1.33	14	2.49
	Newark West	Lights	8	1.38	10.25	0.95



Role of Predation on LT and PP Productivity 2020

Turtle Fence Effectiveness

Barrier



Track Surveys
Outside Observations
Fence Cameras



Breach





Role of Predation on LT and PP Productivity 2020



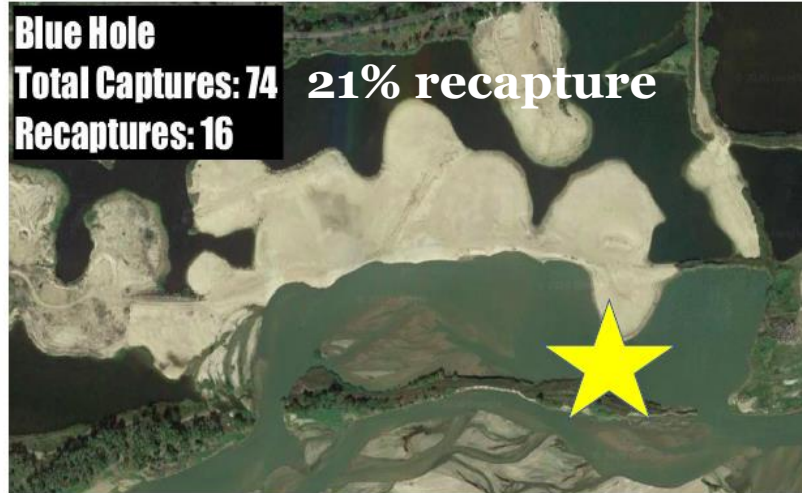
Turtle Captures

- Highlight high use areas.
- Evaluate and improve trap effectiveness.
- Estimate population size.

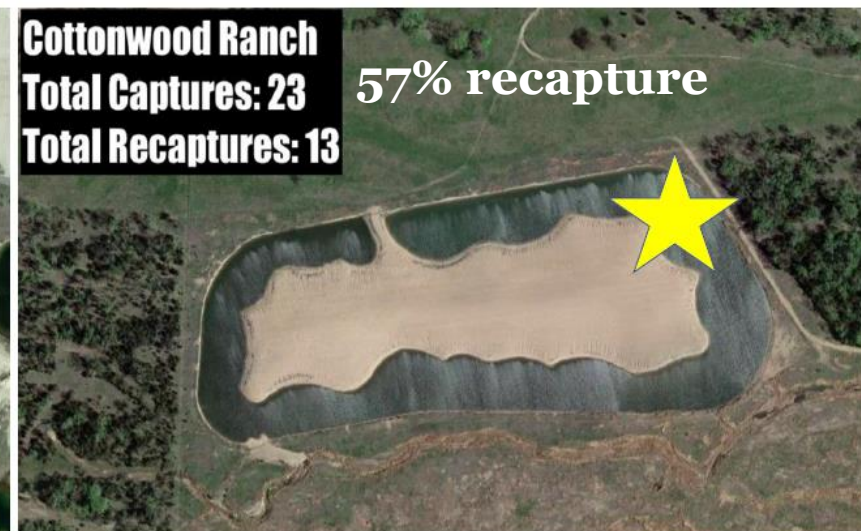


Role of Predation on LT and PP Productivity 2020

25 Trap Days

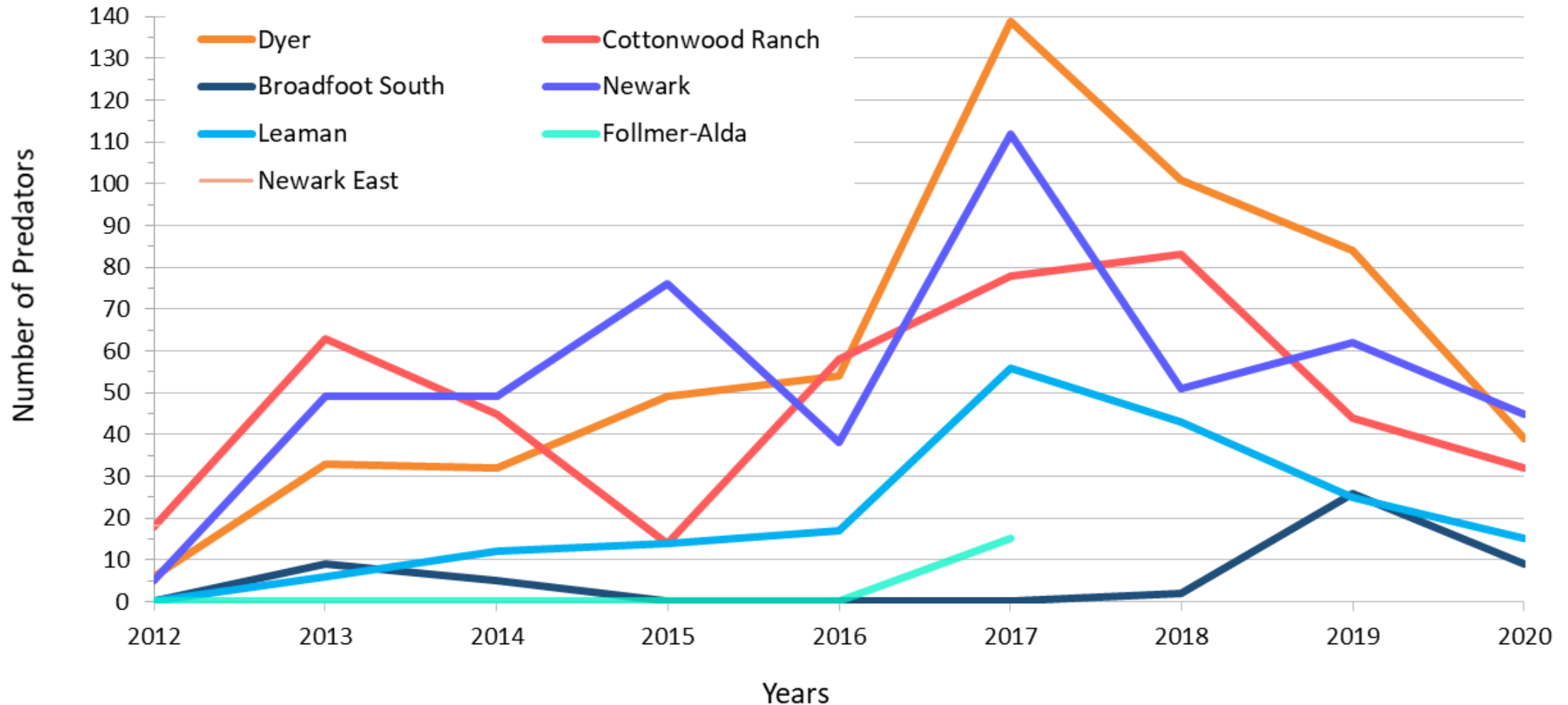


16 Trap Days

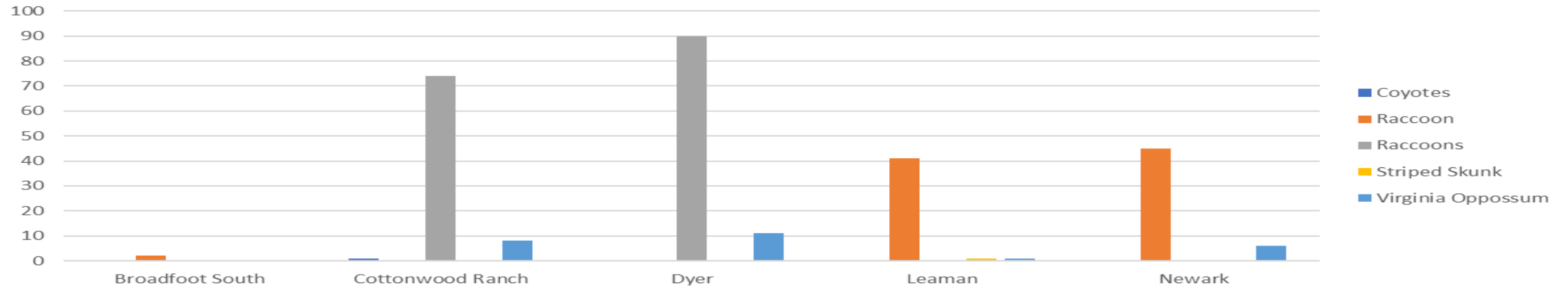


USDA-APHIS Mammal Trapping

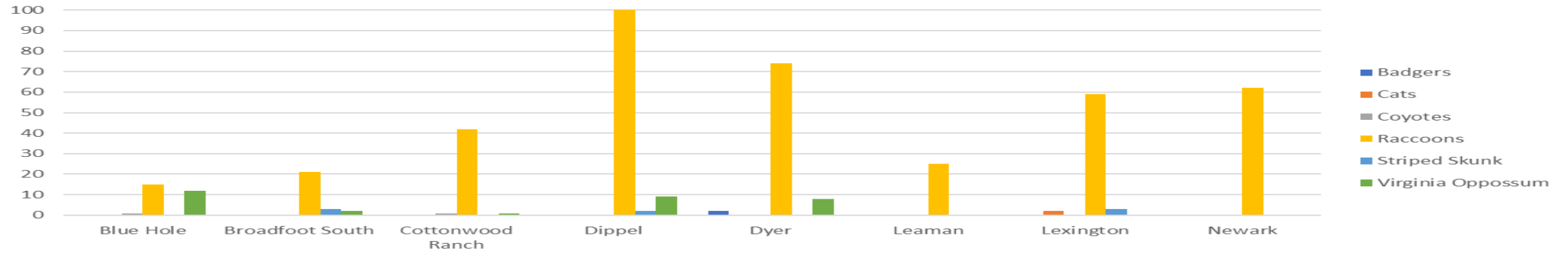
Total Predators Trapped at Program Off-Channel Nesting Sites



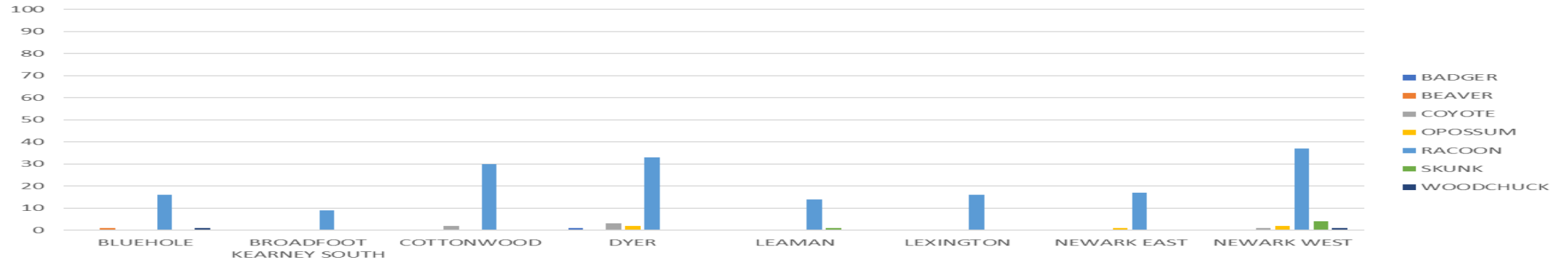
2018



2019



2020



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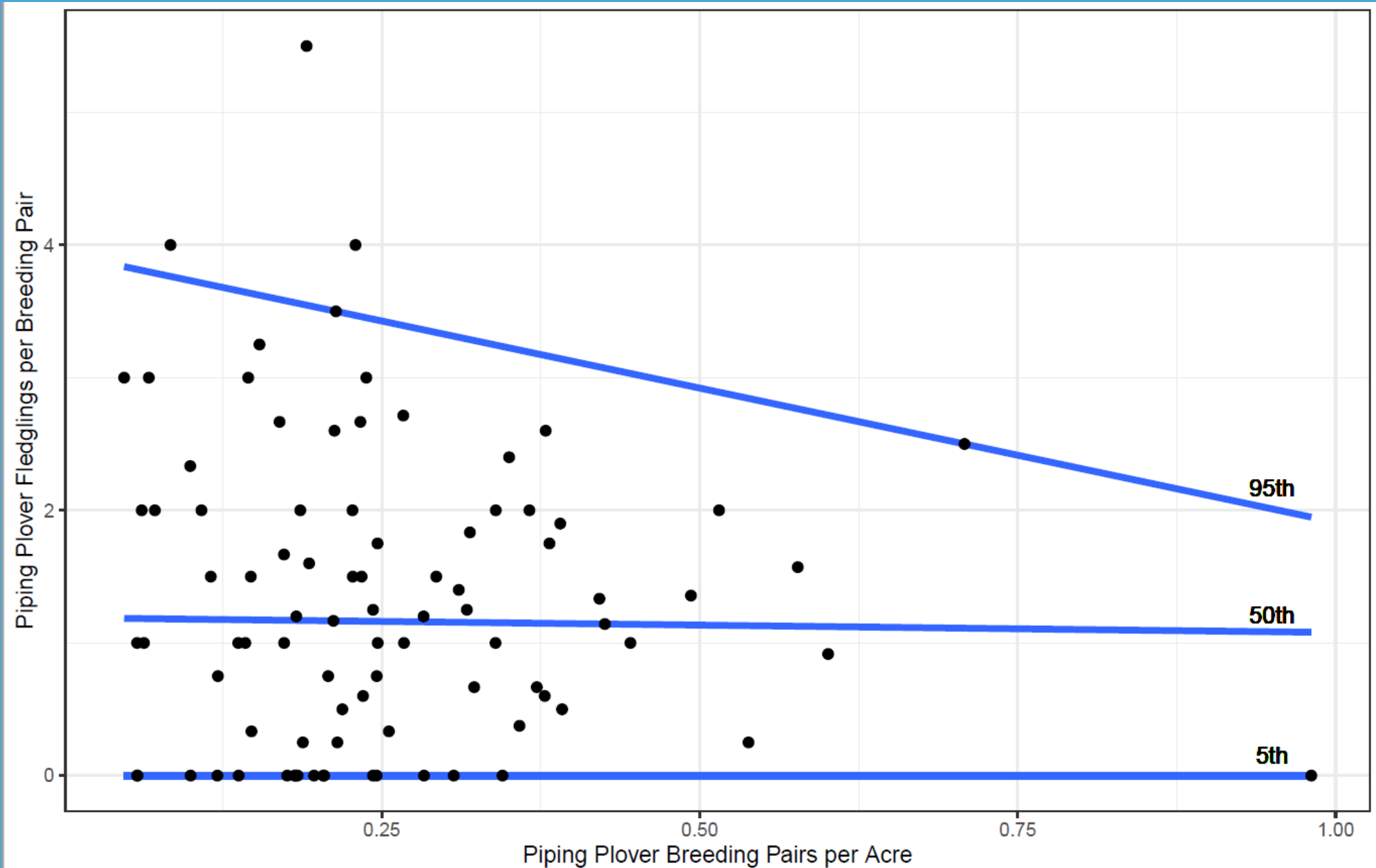
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- What are the answers/information to be gained by answering these questions?
- How do we use this information to increase LT and PP productivity?
- How much of an impact on productivity will we have by answering these questions?

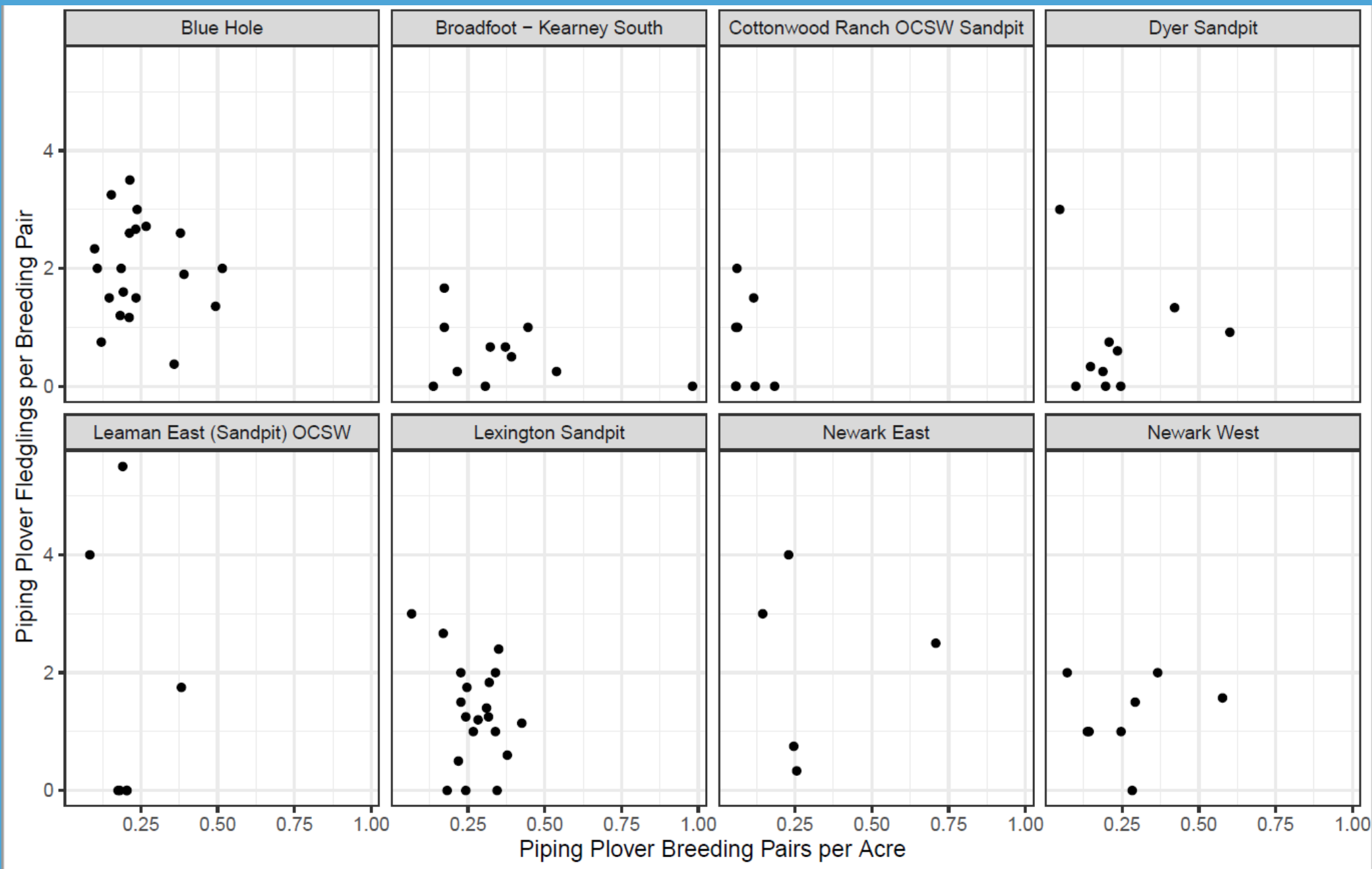
What do we know and what do we need to know ?

Here are the data on density limitations on productivity and site age.

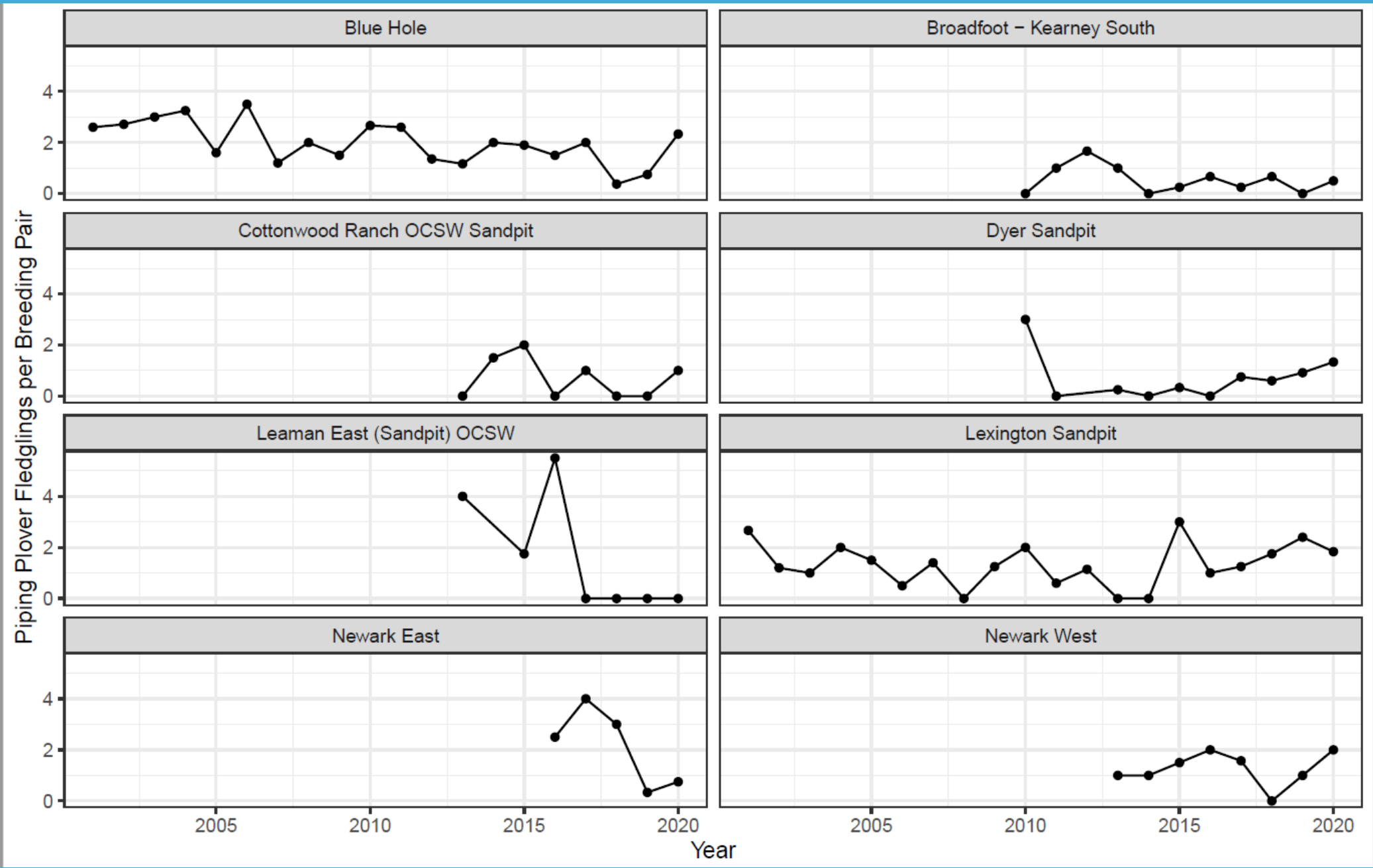
Density Limitations on Plover Productivity



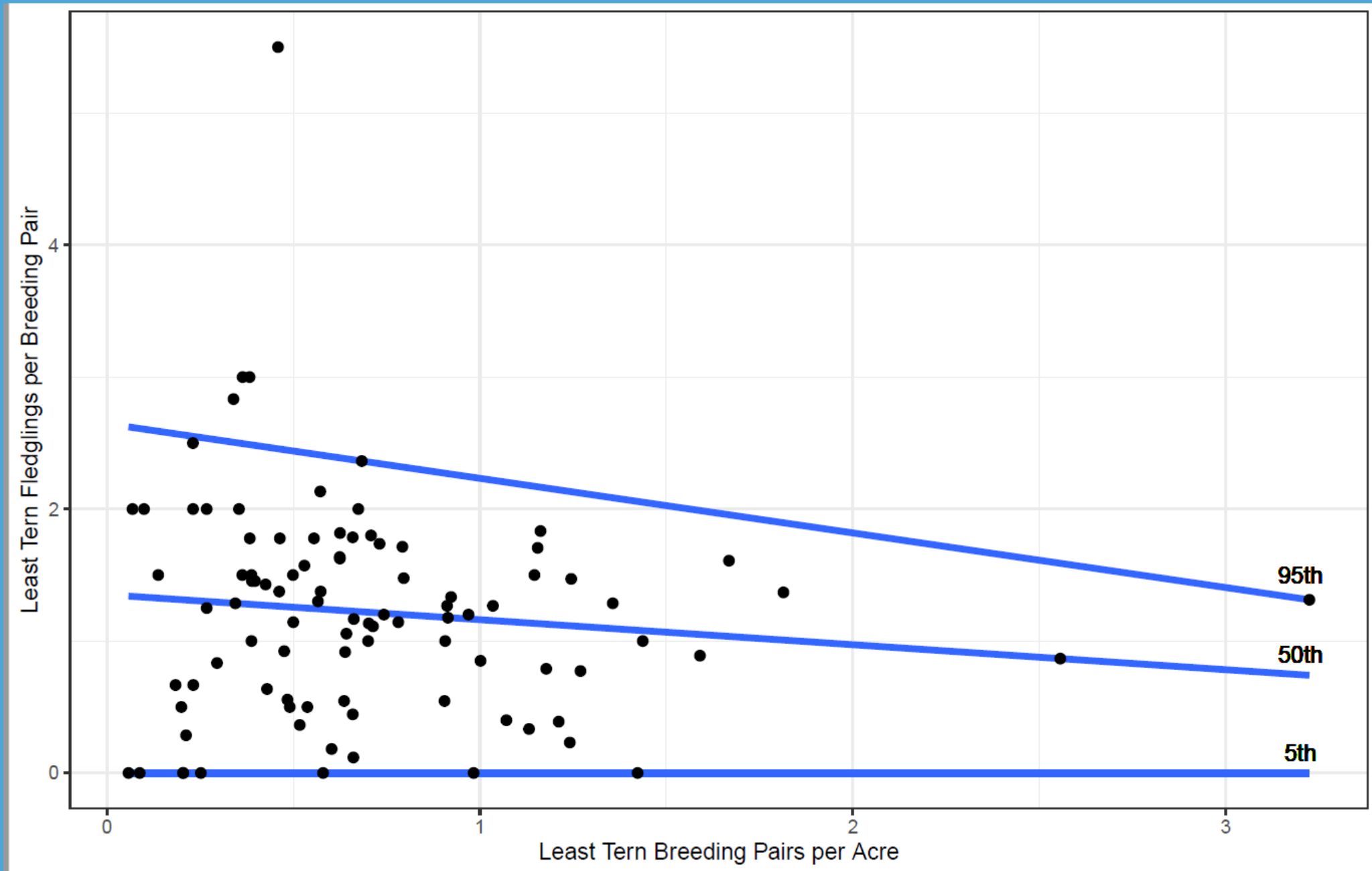
Site-specific Density Limitations on Plover Productivity



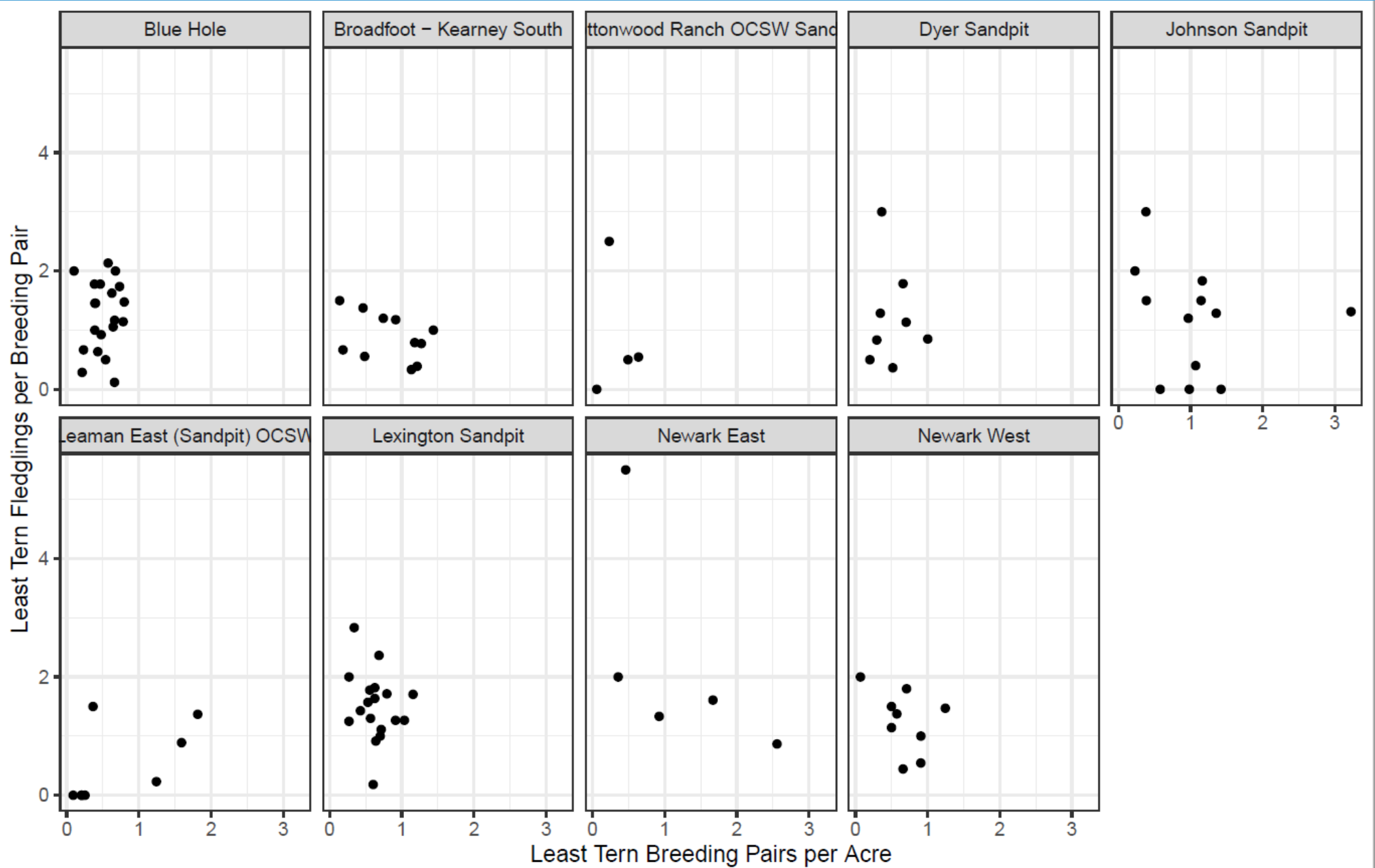
Site age vs. Plover Productivity



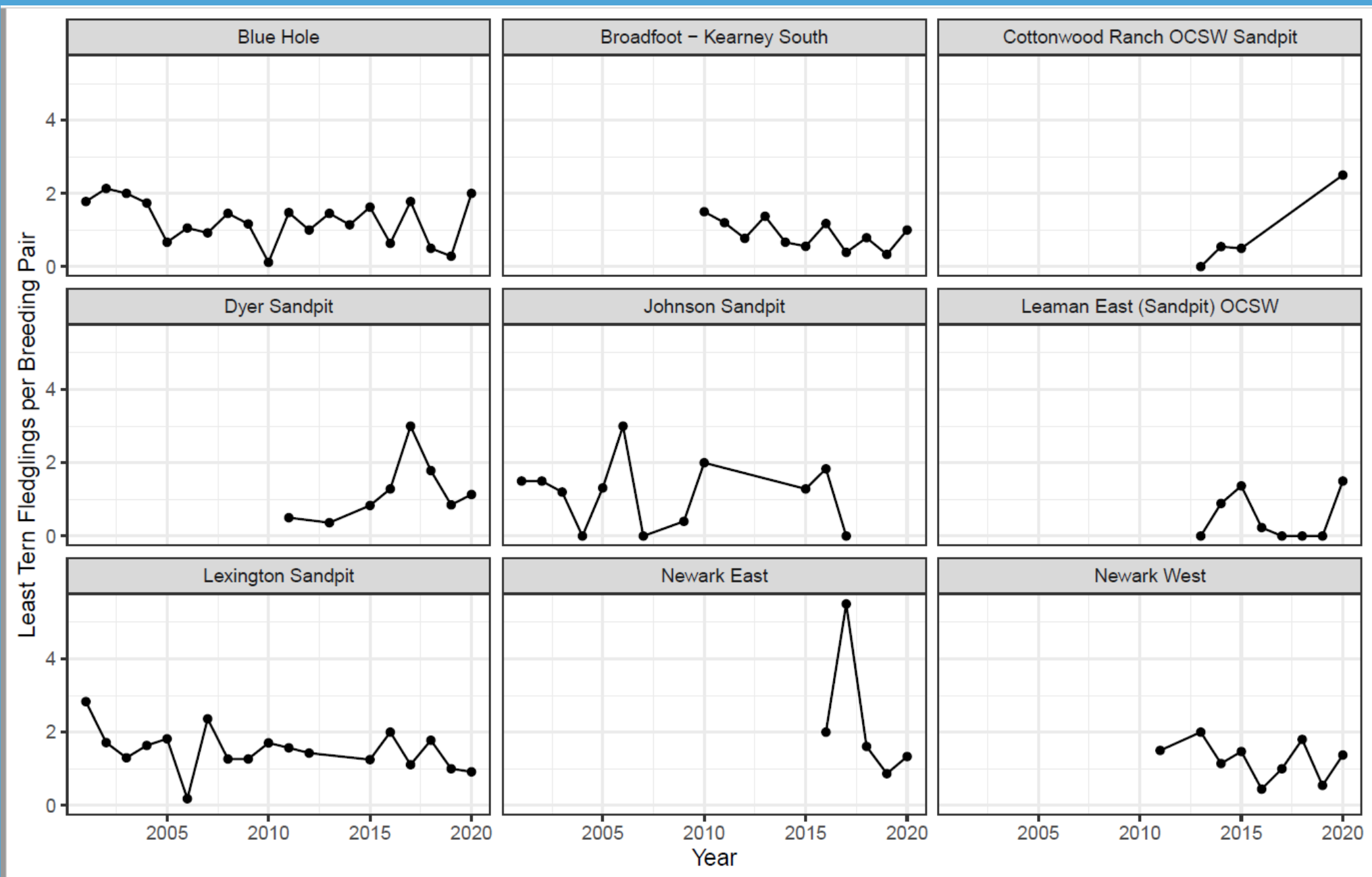
Density Limitations on Tern Productivity



Site-specific Density Limitations on Tern Productivity



Site age vs. Tern Productivity



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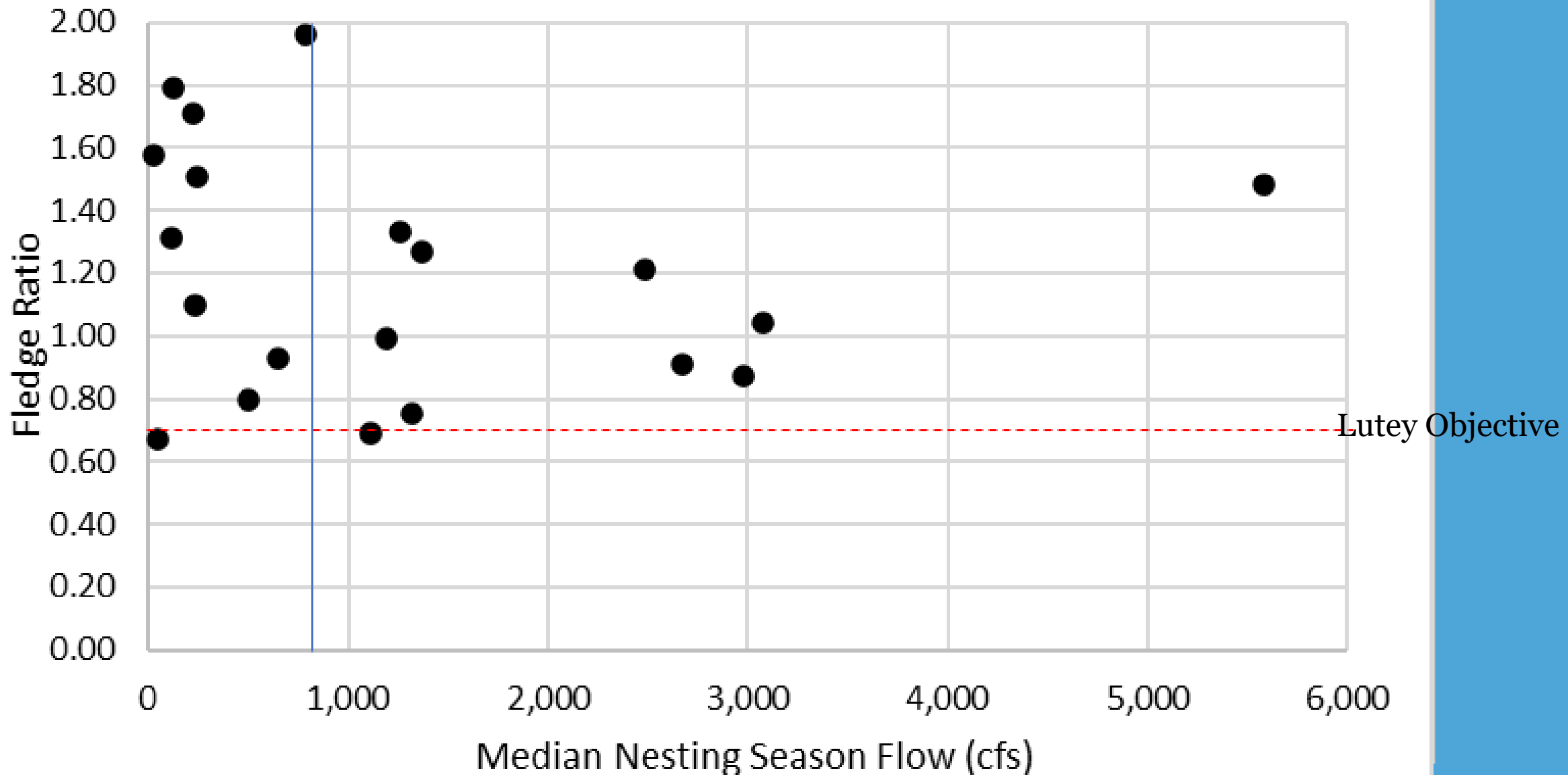
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- What are the answers/information to be gained by answering these questions?
- How do we use this information to increase LT and PP productivity?
- How much of an impact on productivity will we have by answering these questions?

What do we know and what do we need to know ?

Here are the data on on-channel forage resources and productivity.

Tern Productivity versus Flow (2001 - 2020)



Cumulative Fledge Rates versus Minimum Flow (2001-2019)

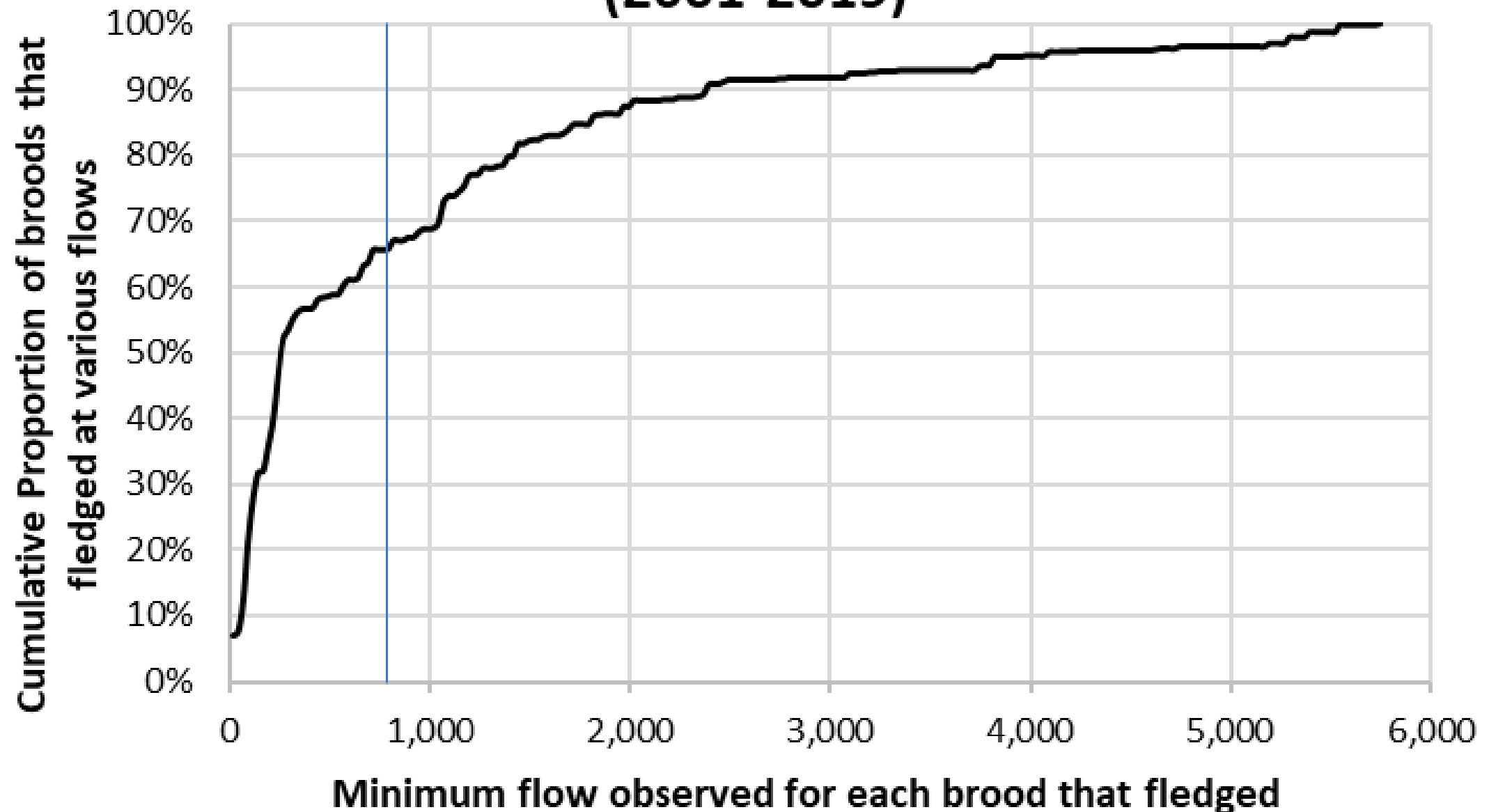


Table 10. Least tern and piping plover off-channel nesting incidence and productivity by year, 2007–2019.

Year	Least Tern					Piping Plover				
	*Br. Pairs	Nests	Succ. Nests	Fledglings	Fledglings Per Pair	*Br. Pairs	Nests	Succ. Nests	Fledglings	Fledglings Per Pair
2007	31	40	20	38	1.23	20	23	13	18	0.90
2008	29	44	20	35	1.21	11	16	7	7	0.64
2009	40	52	31	42	1.05	10	13	8	11	1.10
2010	51	80	44	64	1.25	18	22	18	36	2.00
2011	62	90	53	89	1.44	28	34	27	45	1.61
2012	66	88	63	84	1.27	29	45	31	55	1.90
2013	63	95	51	64	1.02	27	31	23	28	1.04
2014	98	143	54	91	0.93	29	41	24	55	1.90
2015	133	174	113	146	1.09	34	47	33	51	1.50
2016	86	117	74	80	0.93	42	58	39	54	1.29
2017	77	118	63	76	0.99	40	51	30	47	1.18
2018	88	113	79	117	1.33	37	47	35	23	0.62
2019	95	132	67	71	0.75	45	60	31	30	0.67
Mean	68.67	96.17	55.42	77.17	1.15	27.08	35.67	24	35.83	1.31

*Breeding pairs within table 10 represent numbers of breeding pairs present on off-channel nesting sites the day breeding pairs within the system were maximized. See Table 8 for maximum off-channel breeding pairs by site.

Table 9. Least tern and piping plover on-channel nesting incidence and productivity by year, 2007–2019.

Year	Least Tern					Piping Plover				
	*Br. Pairs	Nests	Succ. Nests	Fledglings	Fledglings Per Pair	*Br. Pairs	Nests	Succ. Nests	Fledglings	Fledglings Per Pair
2007	11	13	2	2	0.18	1	4	2	7	7.00
2008	10	20	7	9	0.90	3	5	1	3	1.00
2009	3	8	5	4	1.33	2	2	1	1	0.5.0
2010	0	0	0	0	0.00	4	11	4	10	2.50
2011	0	0	0	0	0.00	0	0	0	0	0.00
2012	0	0	0	0	0.00	1	1	1	4	4.00
2013	0	0	0	0	0.00	0	0	0	0	0.00
2014	0	2	0	0	0.00	1	2	1	4	4.00
2015	8	14	3	0	0.00	5	7	1	1	0.20
2016	2	2	0	0	0.00	2	2	1	1	0.50
2017	0	0	0	0	0.00	0	0	0	0	0.00
2018	0	0	0	0	0.00	0	0	0	0	0.00
2019	0	0	0	0	0.00	0	0	0	0	0.00
Mean	2.62	4.54	1.31	1.15	0.19	1.46	2.62	0.92	2.38	1.60

*Breeding pairs within table 9 represent numbers of breeding pairs present on in-channel islands the day breeding pairs within the system were maximized; therefore, nests and fledglings per breeding pair are occasionally disproportionately large.

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- Is there a need to evaluate reproductive success at a site specific level to help guide management practices at a given location?
- Does the AHR serve as a source or sink to the overall Northern Great Plains population? How do we know?
- Actions that improve on-river production.
- How to fully maximize existing Program water to benefit target species.

Big Questions for LT and PP – What don't we know that we need to know?

- What are the answers/information to be gained by answering these questions?
- How do we use this information to increase LT and PP productivity?
- How much of an impact on productivity will we have by answering these questions?

BIG QUESTIONS

Indirect Productivity Factors

PRRIP
Actions

Physical

Habitat

Direct Productivity Factors

Performance Indicators

Individuals
arriving at
AHR

Nesting
Individuals

Breeding
Pairs

Nest
location

Eggs
produced

Hatch rate

Nest
survival

Chick
survival

Fledges

Fledge
Ratio

Nests or
Breeding
Pairs / acre

Fledges/acre

Adult
survival

Juvenile
survival

Population
growth rate

Ranking in terms of impact, uncertainty, control, anticipated effectiveness

Go to www.menti.com and use the code 93 86 04 0

How would you rate terrestrial predation in terms of impact on LT and PP productivity?:

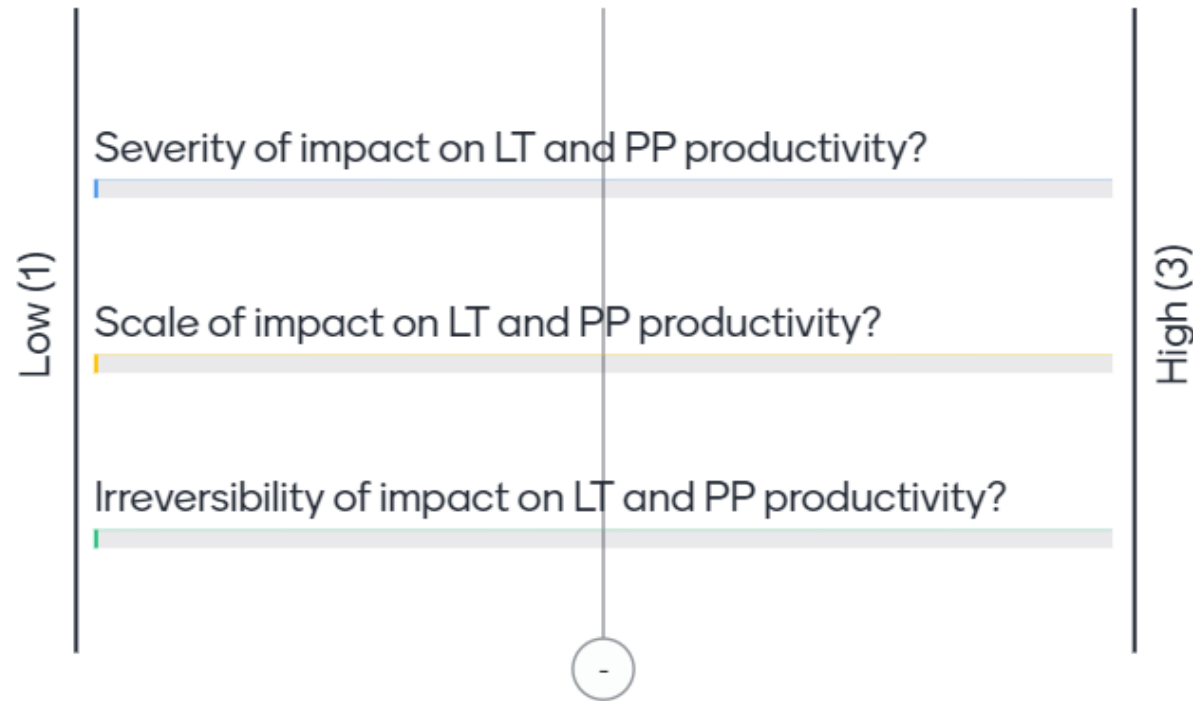
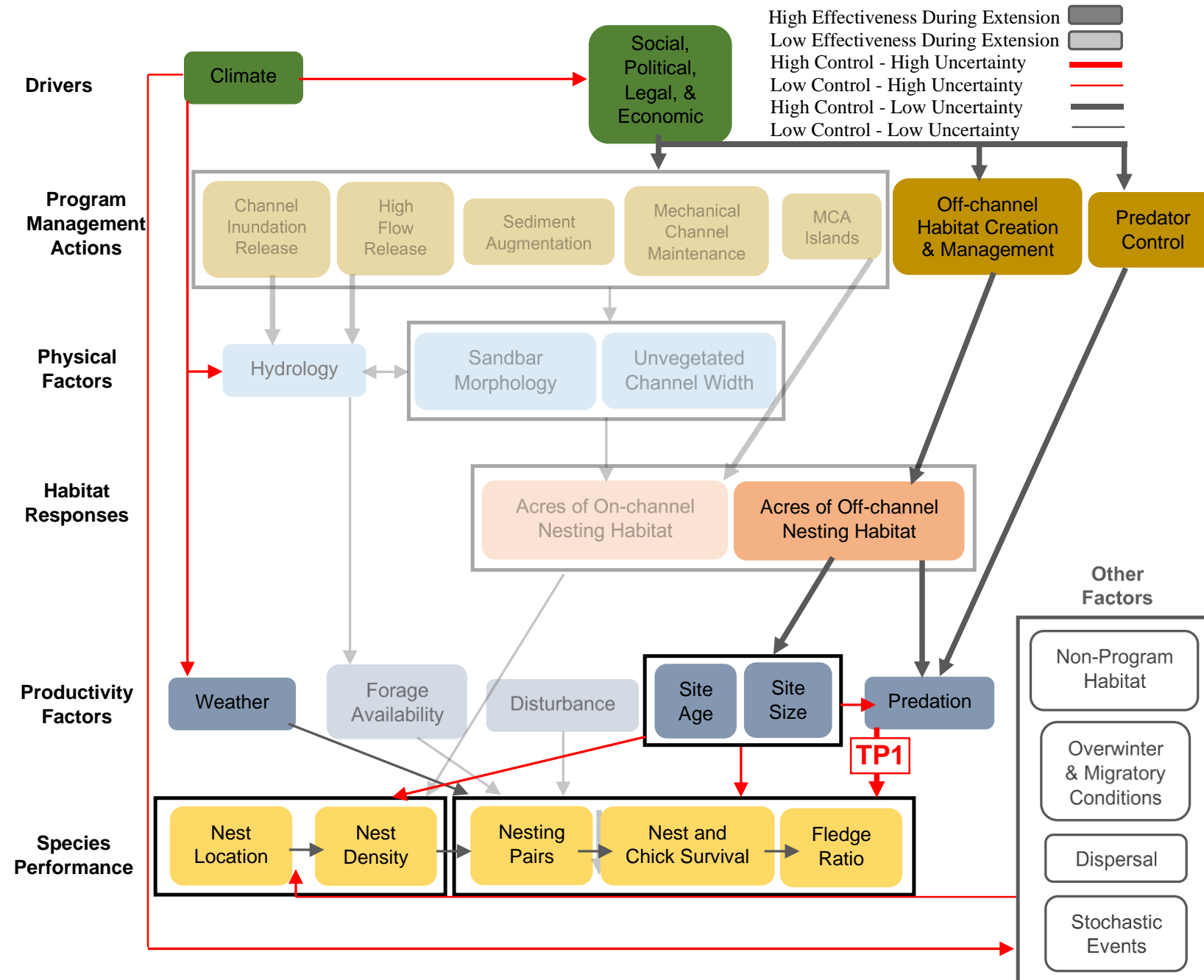
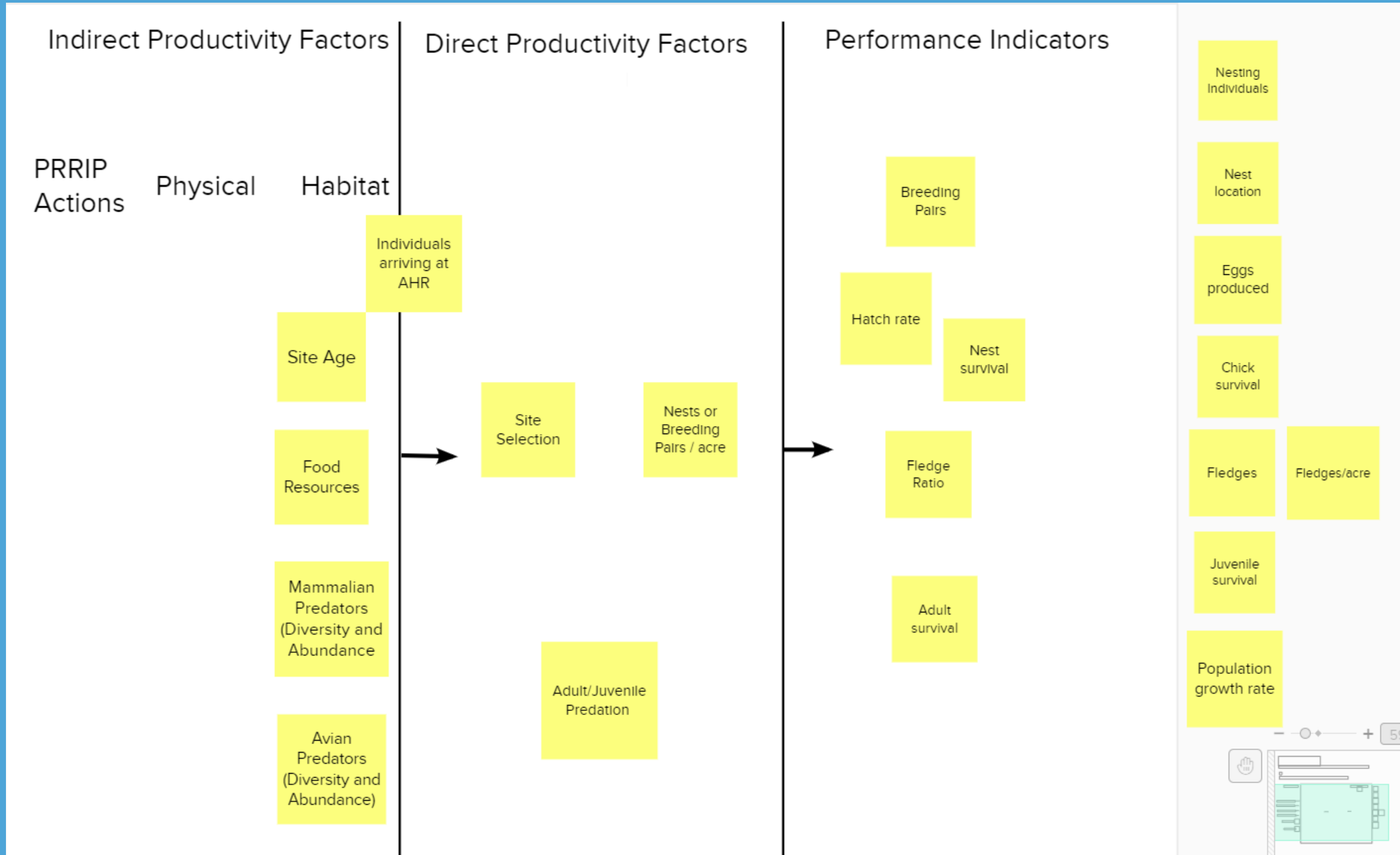


Figure 1. Tern and Plover Conceptual Ecological Model



Piping Plover CEM from LT and PP specialist group



Meeting Review and Wrap-Up

- Agenda suggestions for next meeting
- Action Items
- Meeting Feedback
- Key Insights

