

Investigating Drivers of American Oystercatcher Chick Survival on Metompkin Island, Virginia

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Outline of Projects on Metompkin Island



Chick Survival Project

What is driving seemingly low oystercatcher chick survival since 2016?



Ghost Crab Activity Project

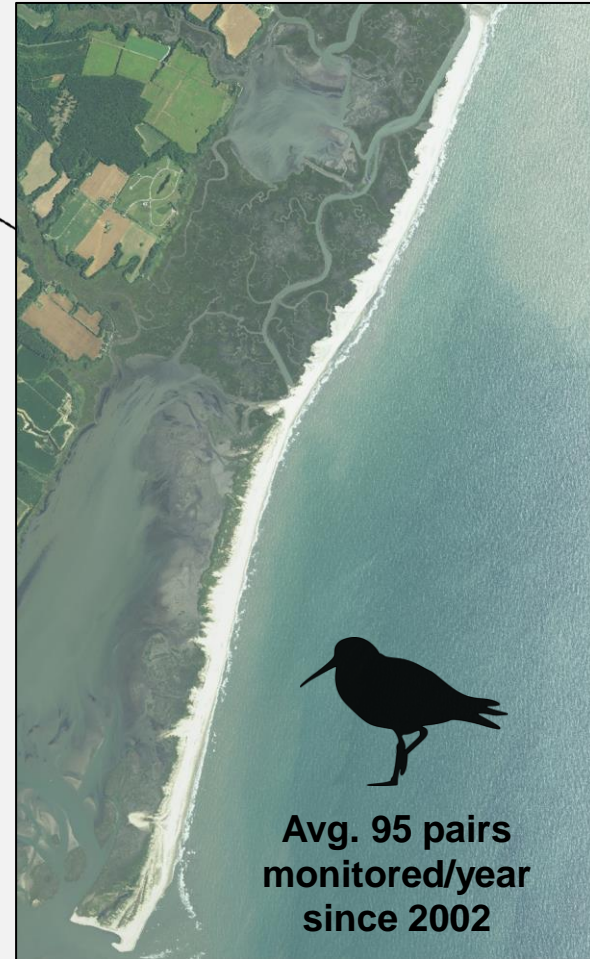
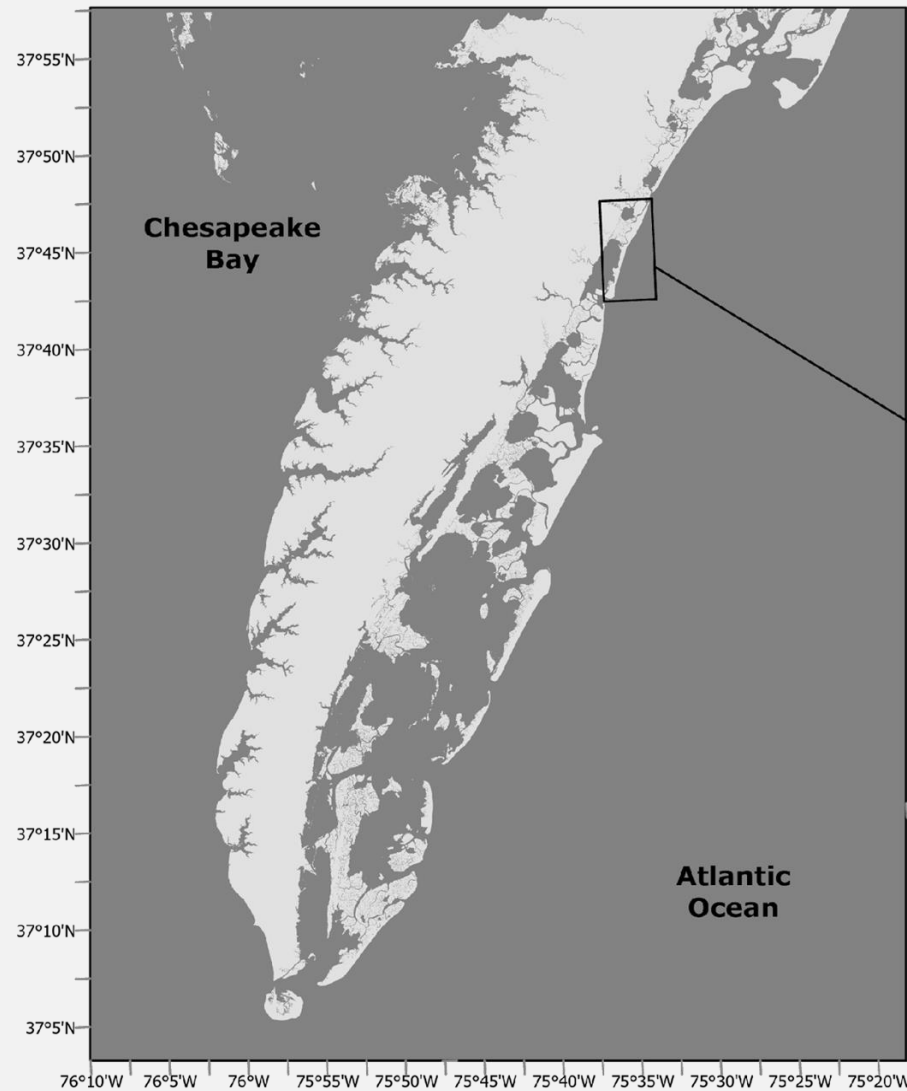
What factors predict ghost crab activity throughout the shorebird breeding season?

** Thanks to our REU Rasheed Pongnon for his work on this project!! **

Metompkin Island is a significant breeding location for oystercatchers



Background



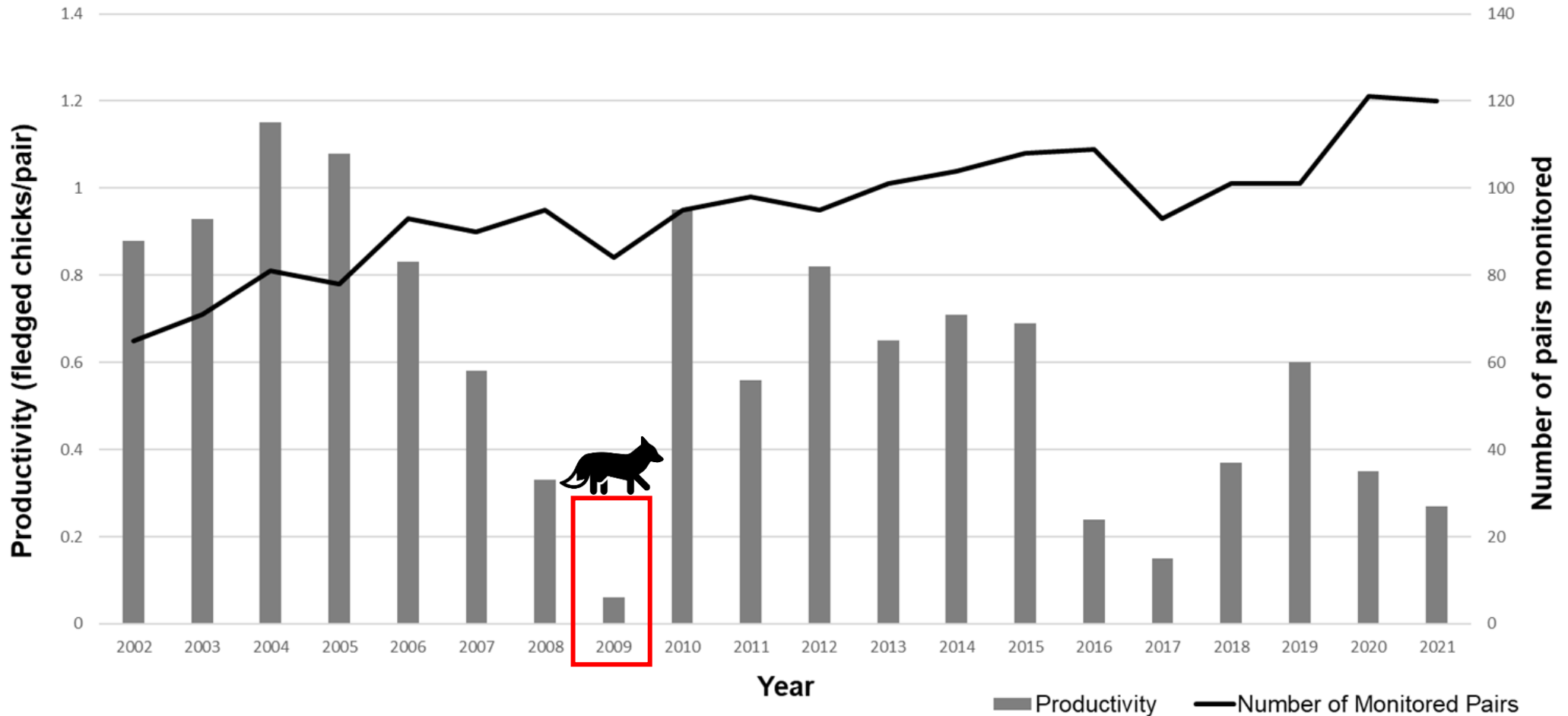


Low productivity on Metompkin Island motivated chick survival study

Background



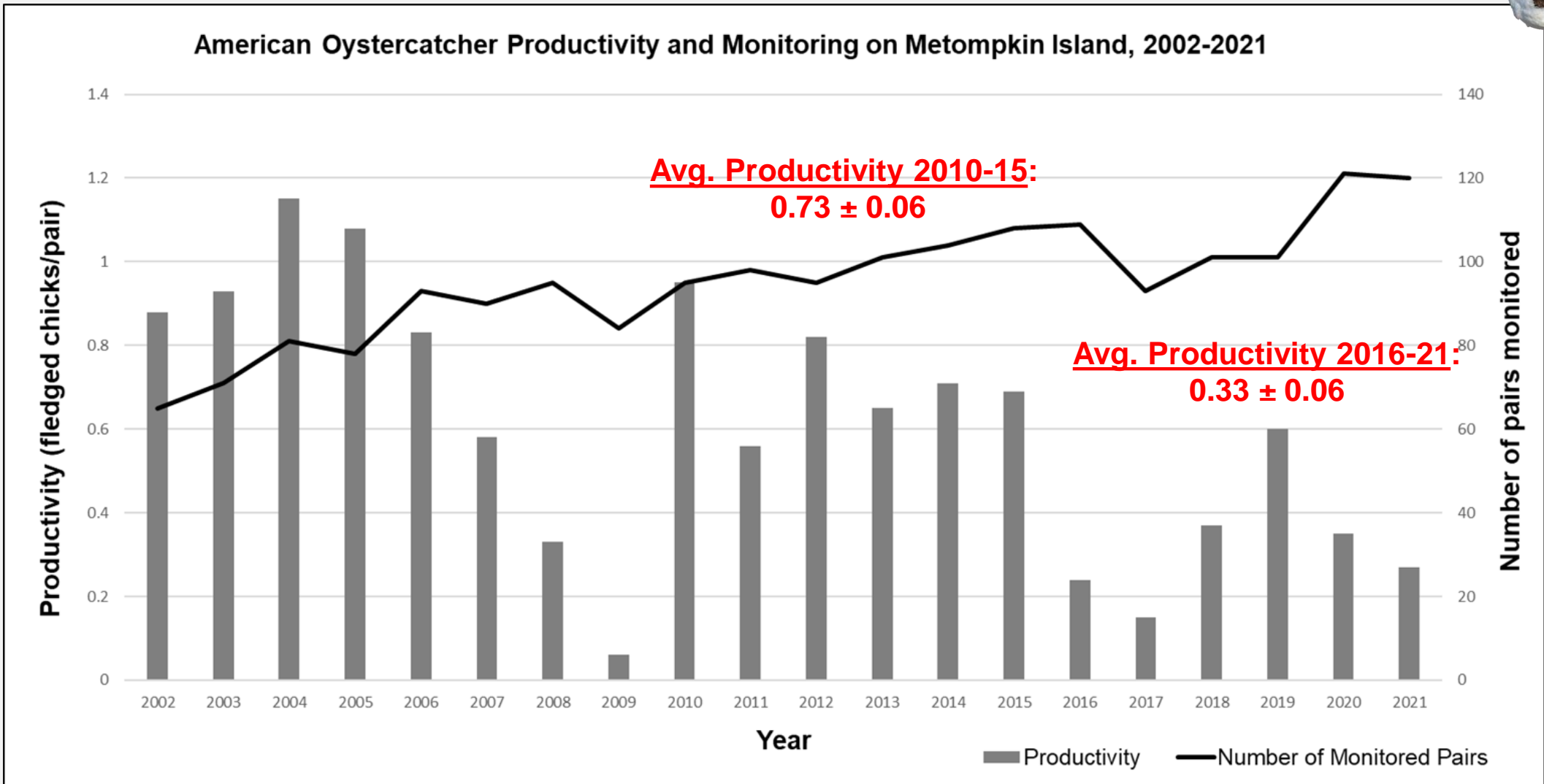
American Oystercatcher Productivity and Monitoring on Metompkin Island, 2002-2021





Low productivity on Metompkin Island motivated chick survival study

Background



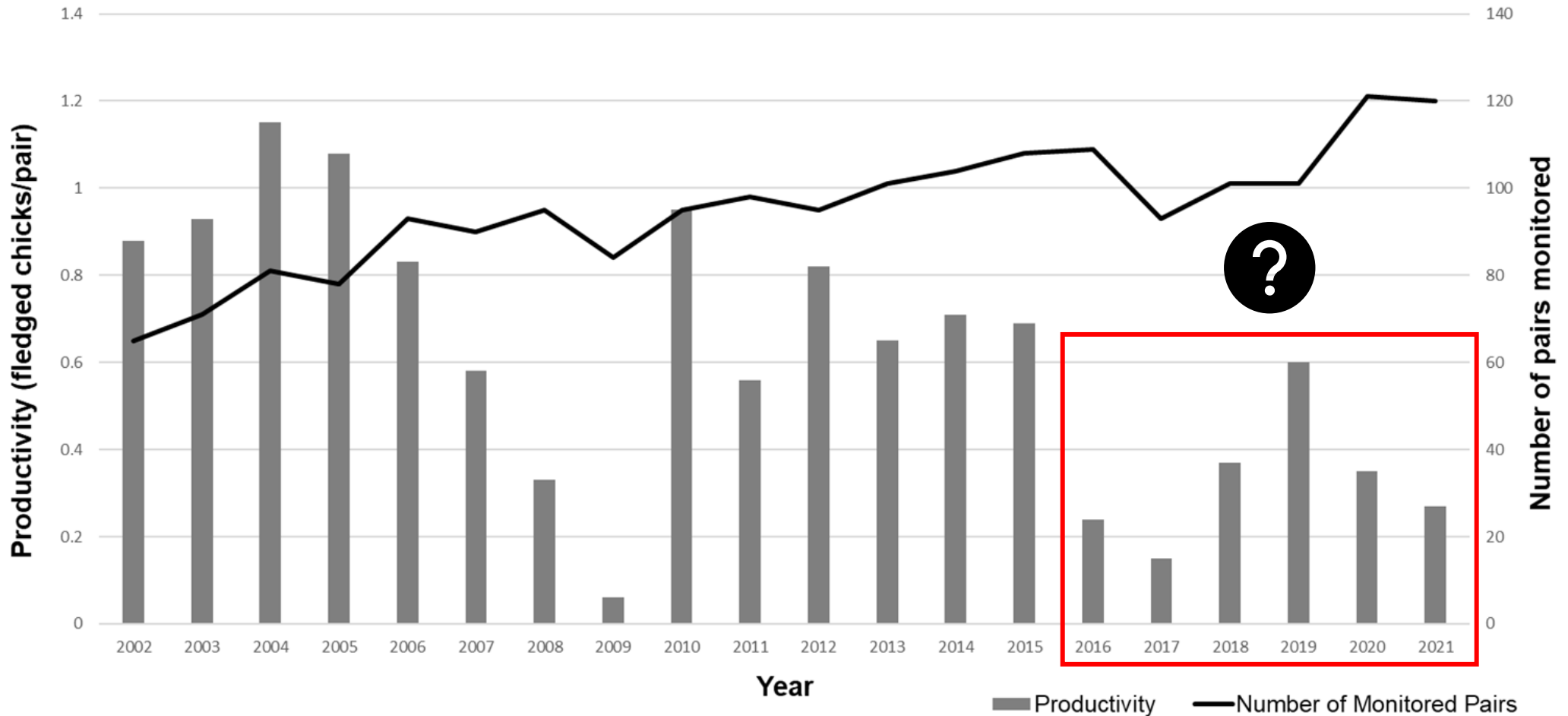


Low productivity on Metompkin Island motivated chick survival study

Background



American Oystercatcher Productivity and Monitoring on Metompkin Island, 2002-2021





2019 camera study provided insight into nest, but not chick survival

Background

AFSI 2020; Call et al. *in review*



- Nest success threatened by avian predators, ghost crabs
- Apparent hatch success > 70%
- Productivity decline appears to be driven by low chick survival
- Cameras did not capture mortality events for mobile chicks



Used brood surveys and radio-tracking to monitor chicks in 2021, 2022

Background

Methods

Brood surveys



Radio-marked chicks

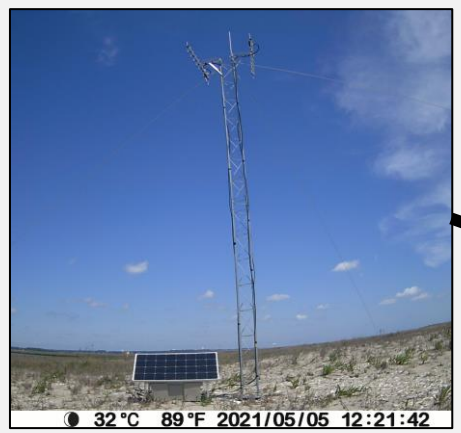




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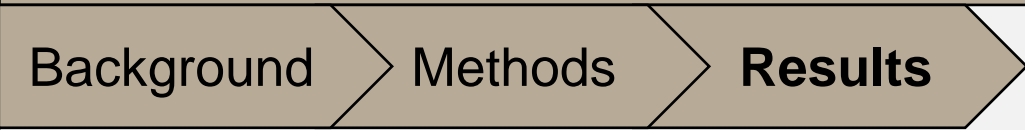
Background

Methods





Fate of radio-marked chicks in 2021 and 2022



	Fledge	Mortality
2021 (<i>N</i> = 15)	7	8
2022 (<i>N</i> = 19)	3	16
Total (<i>N</i> = 34)	10	24
Percentage of Total	29%	71%

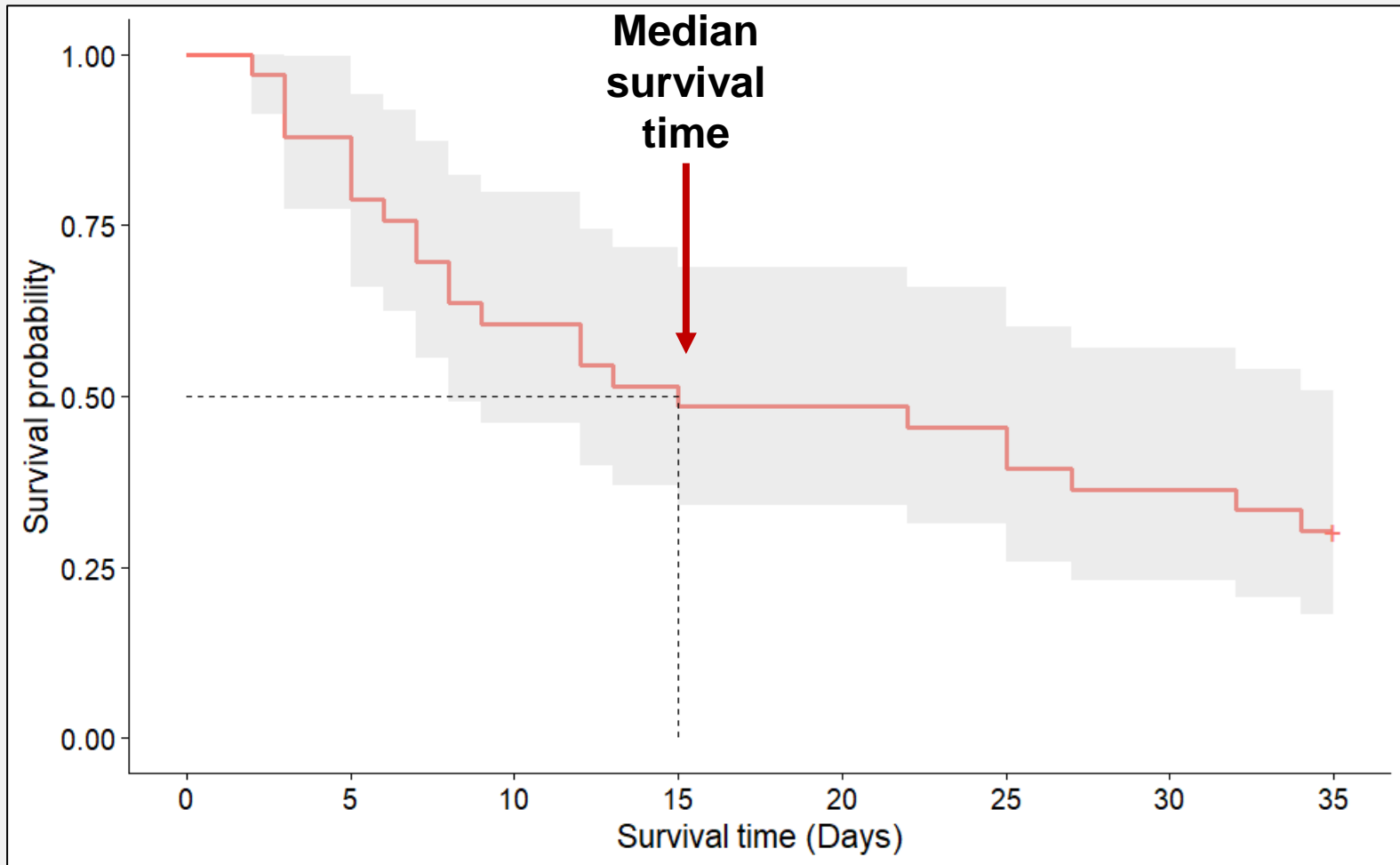


Cumulative survival probability of radio-tagged chicks

Background

Methods

Results



- Chicks most vulnerable in their first 15 days (**median survival time = 15 days**)

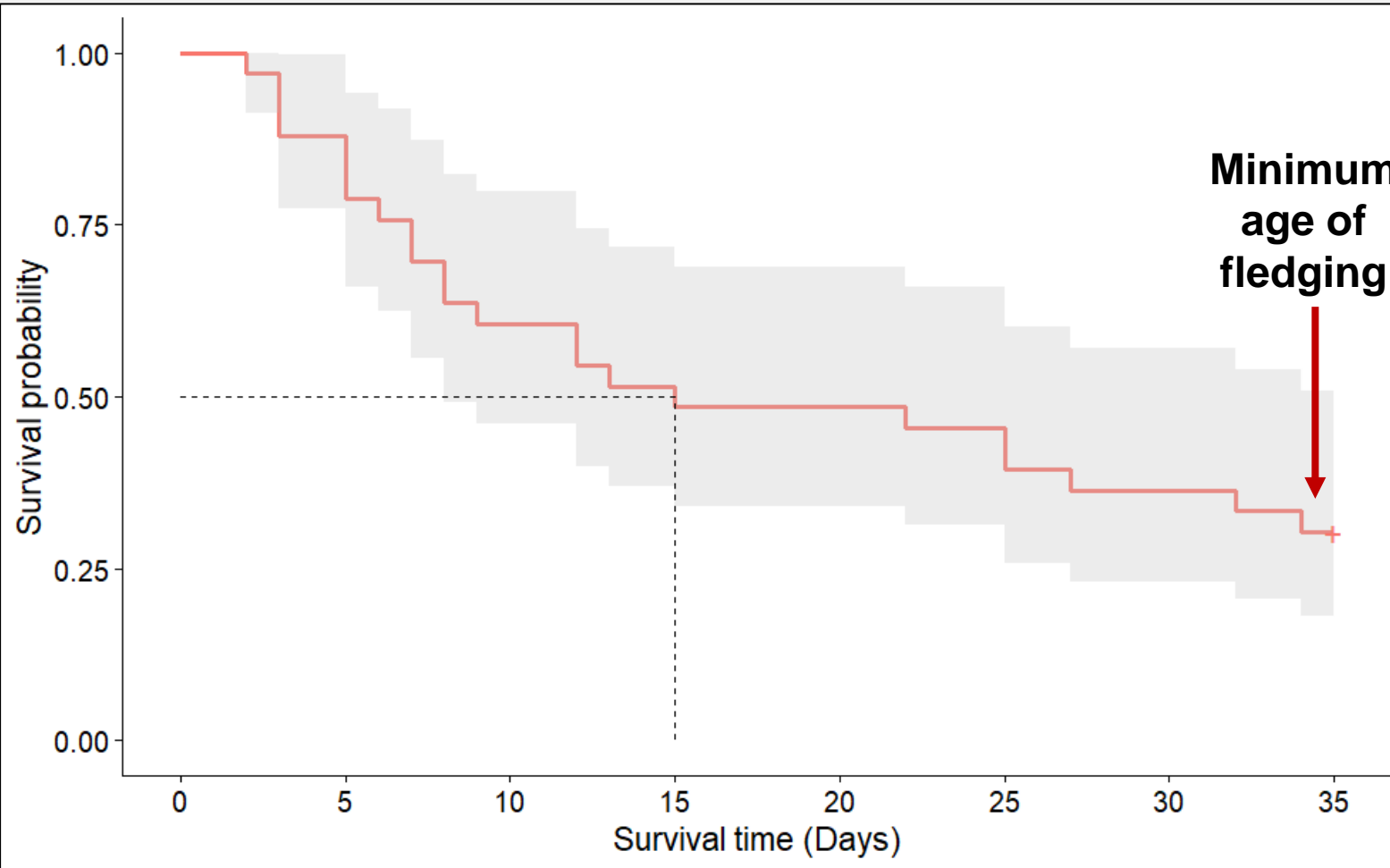


Cumulative survival probability of radio-tagged chicks

Background

Methods

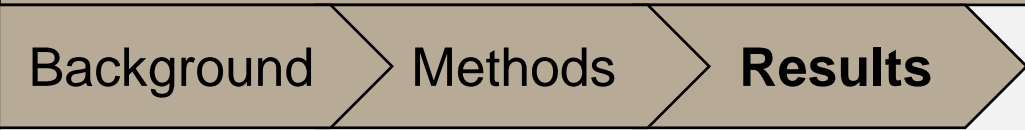
Results



- Chicks most vulnerable in their first 15 days (**median survival time = 15 days**)
- Cumulative probability of surviving to fledging (i.e., 35 days) was **30.3 ± 8.0%**
- Survival to 35 days was lower than in North Carolina (43.8%; Schulte *et al.* 2015)



Sources of chick mortality



Unknown Cause



- Tag signal lost, chick never relocated

Avian Predation



- Tag relocated w/ plucked chick feathers and/or wings
- Tag relocated w/PEFA feathers
- Tag relocated >100m from known brood territory
- Tag relocated near a known raptor perch
- Tag moves significantly in short time interval

Ghost Crab Predation



- Tag and chick remains relocated in or near ghost crab burrow

Trauma or Illness







- Chick relocated alive, but weak.
- No visible signs of injury or blood
- Chick's head and neck curled



Sources of chick mortality







	Unknown Cause 	Avian Predation 	Ghost Crab Predation 	Trauma or Illness 
2021 (N = 8)	4	1	3	0
2022 (N = 16)	9	4	2	1
Total (N = 24)	13	5	5	1
Percentage of Dead Chicks	54%	21%	21%	4%



Sources of chick mortality



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**** Additional observed sources of untagged chick mortality:**


 Intraspecific mortality
 (N = 1)


 Exposure
 (N = 1)



Sources of chick mortality

Background

Methods

Results

Conclusions

- Predation seems to still be a threat to chick survival
- No signs of **mammalian predators** -- management efforts appear to be successful in reducing that!
- Seems to be an active predator community on Metompkin Island (particularly avian predators)
- Further questions about the importance of ghost crabs as a predator...
 - Predation vs. scavenging?
 - Unclear population trends?



What factors are driving ghost crab activity at a shorebird breeding site?

Background

Pongnon et al. (*in prep*)



Project Goals:

-  Develop a method for quantifying and monitoring ghost crab activity at a shorebird breeding site.
-  Assess the biotic and abiotic factors affecting the level of ghost crab activity at a site

Counted ghost crab burrows as an index of ghost crab activity in 2022

Background

Methods

Pongnon et al. (*in prep*)



Counted the number of ghost crab burrows within 2 m of all PIPL ($n = 15$) and AMOY ($n = 44$) nests in our study site and at random points ($n = 38$)

Repeat measurements at each point.

For nests: at each visit

For random points: once per week

Modeled the effects of several variables on burrow presence and abundance:

- 📍 Habitat type
- 👤 Shell cover (none, sparse, heavy)
- 🌡️ Mean daily air temperature
- 📅 Date
- 🐛 Point type (random, PIPL nest, AMOY nest)

What factors best predict ghost crab burrow abundance?

Pongnon et al. (*in prep*)






Background

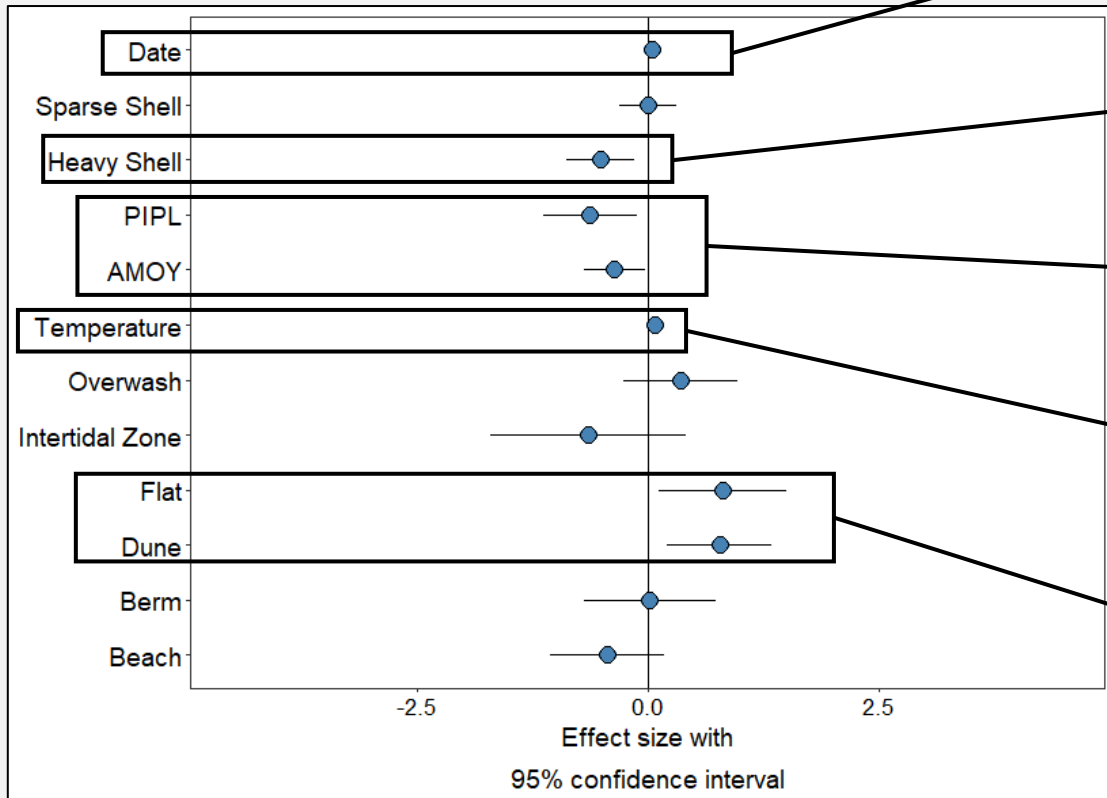
Methods


Results


Burrow abundance is...


The top model included:


-  Date
-  Habitat Type
-  Mean daily air temp.
-  Point Type
-  Shell cover





↑  Greater later in the shorebird breeding season.


↑ 


↓  Lower in areas with heavy shell cover.

↑ 

↓  Lower at nests, relative to the random points



↑  Greater when mean daily air temperature increases.

↑ 

Greater in the *dunes* and *backdune flats*, relative to the *backbarrier*

Linking ghost crab activity to shorebird conservation and management

Background

Methods

Results

Conclusions

Pongnon et al. (*in prep*)

- Model predicts lower burrow abundance as nests relative to random points
 - Crabs do not appear to be selecting nest locations...and may be avoiding.
- Ghost crab activity is greatest later in the shorebird breeding season, when air temperature was warmer
 - Makes sense ecologically
 - Ghost crabs more active when chicks more likely to be present in 2021 and 2022



Acknowledgements

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