

Quantifying Effects of Predation on Plover Productivity and Evaluating Effectiveness of Predator Management



Jason Bruggeman, PRRIP EDO—TAC Meeting, May 8, 2024

Science Plan Extension Big Questions

- **EBQ #8:** How much of an effect does predation have on plover productivity?
- **EBQ #9:** How effective is Program management at mitigating losses of plover productivity due to predation?

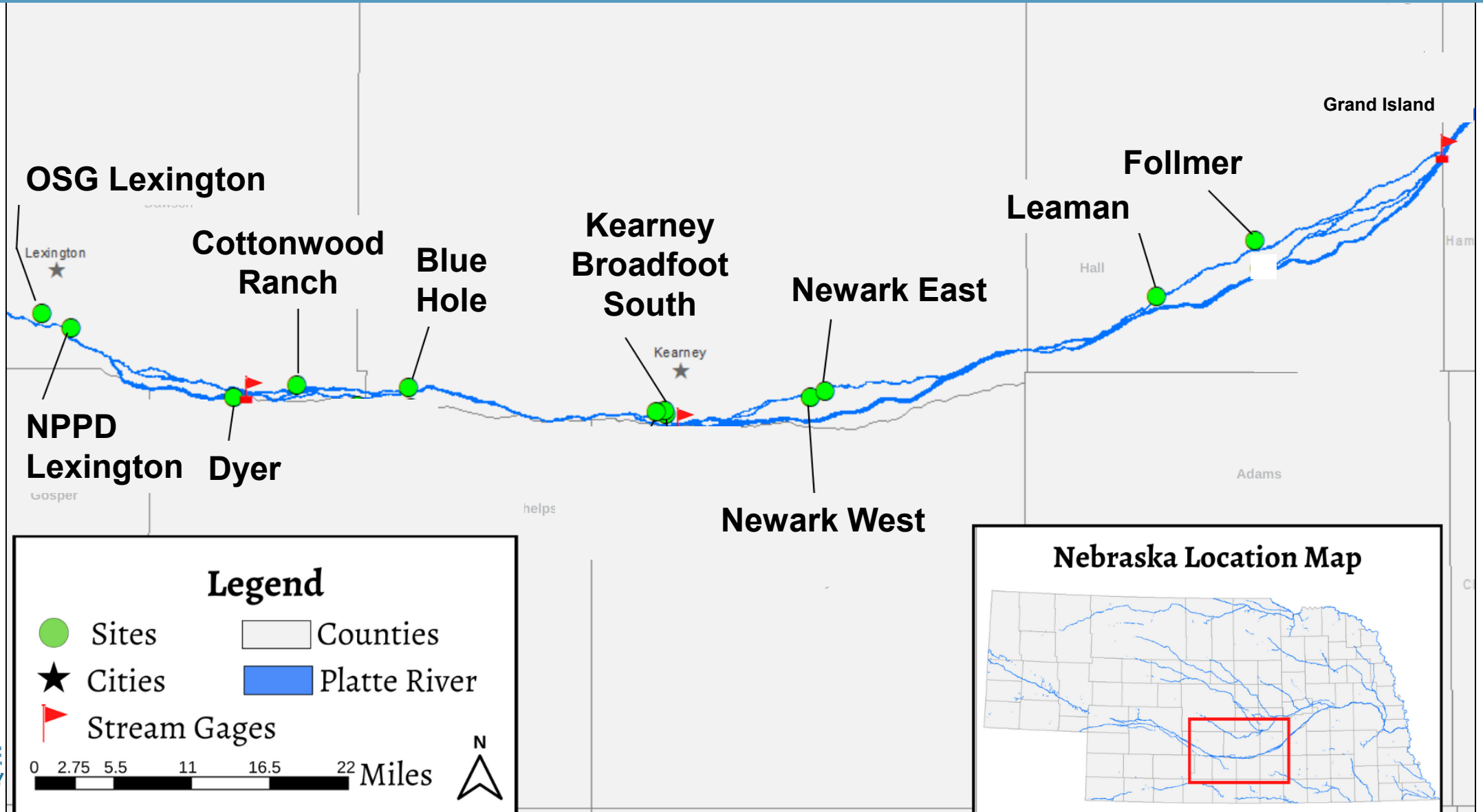


PRRIP Predator Management

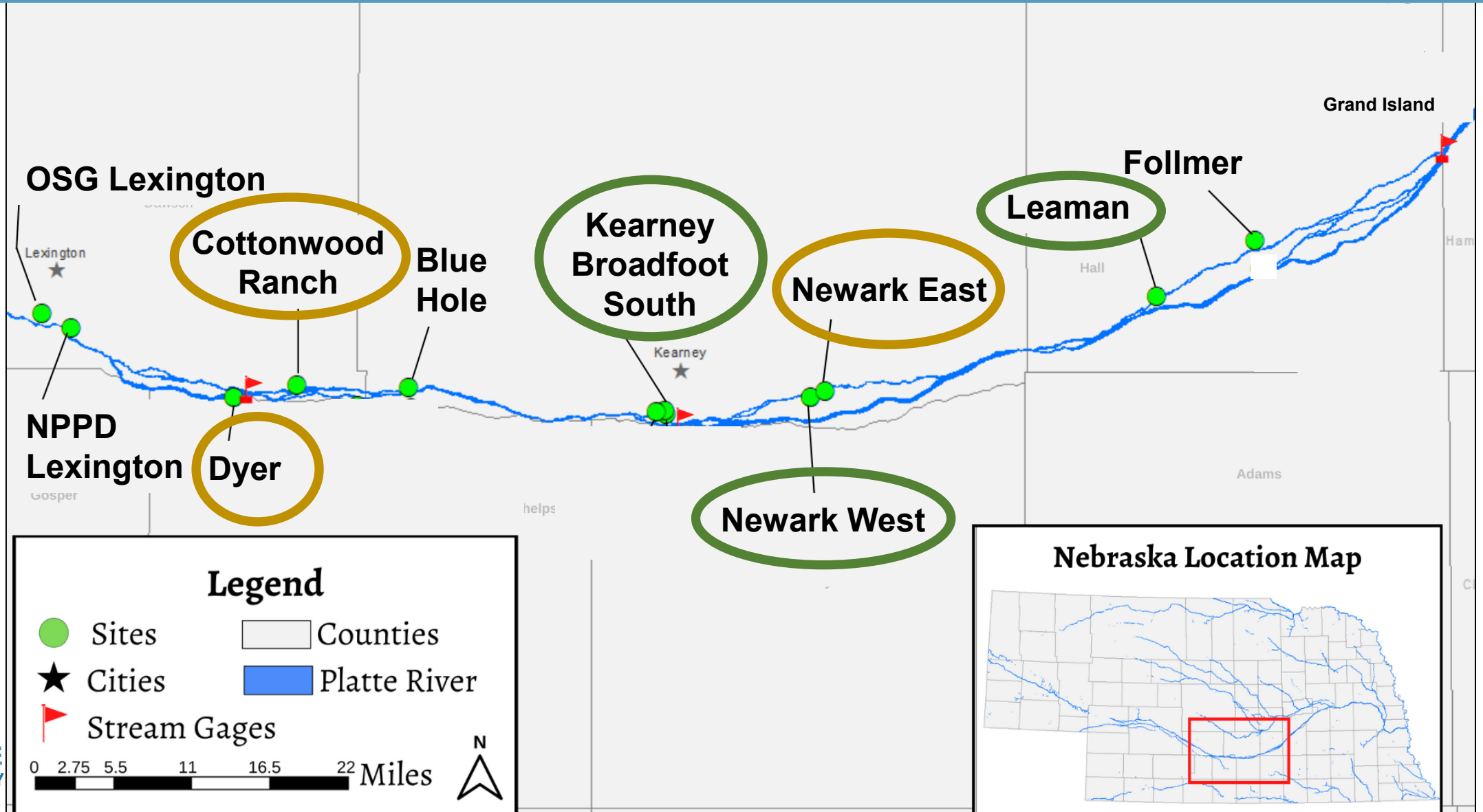
- 10 off-channel sand and water (OCSW) sites—
basic predator management
 - Electrified fence—entrance
 - Fence panel wings
 - Tree removal
 - Avian spikes
 - Trapping



OCSW Study Areas



OCSW Study Areas



Predator Monitoring and Management

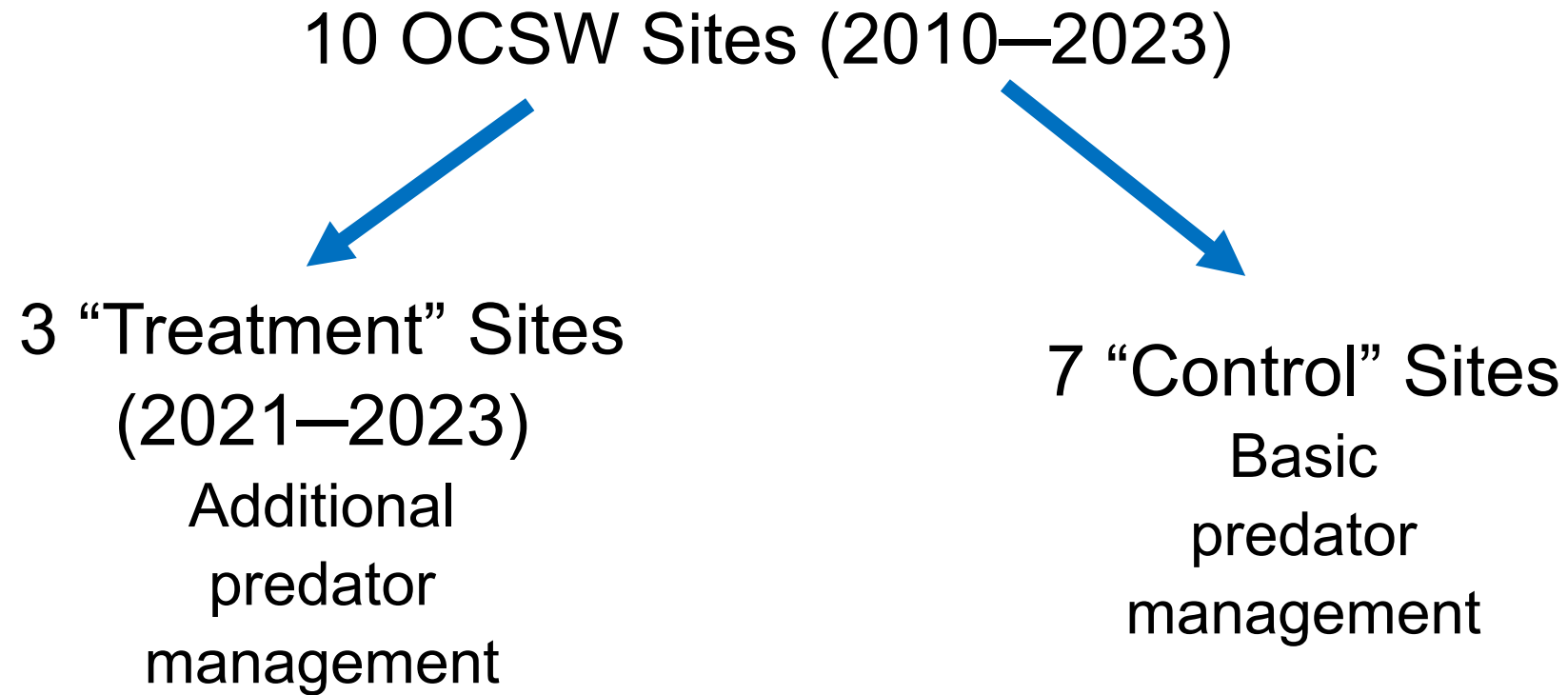
- Predator monitoring at six OCSW sites
 - Remote camera monitoring
 - Predator track surveys
- Three sites—additional predator management
 - Predator exclusion fencing
 - Deterrent lighting



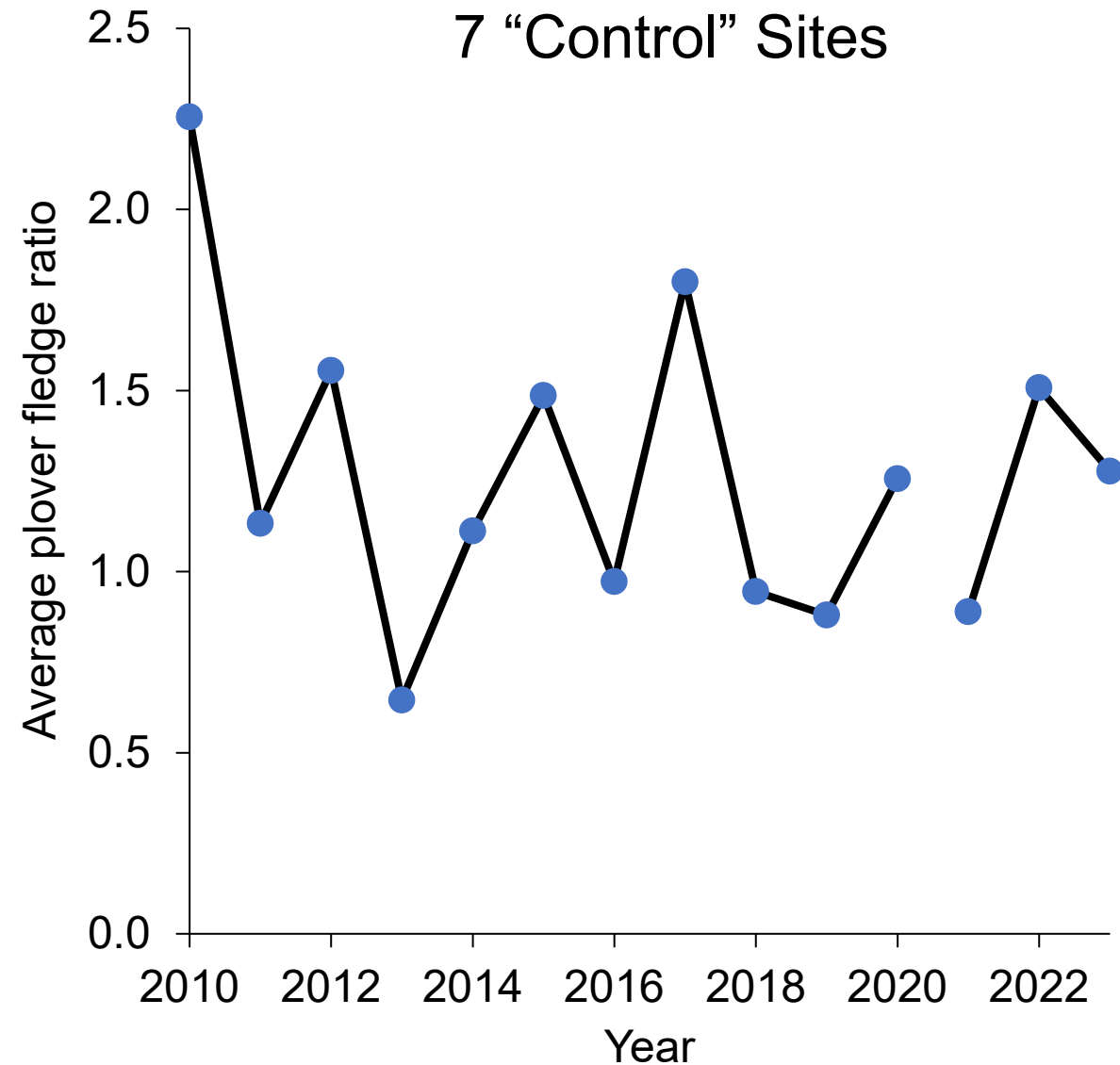
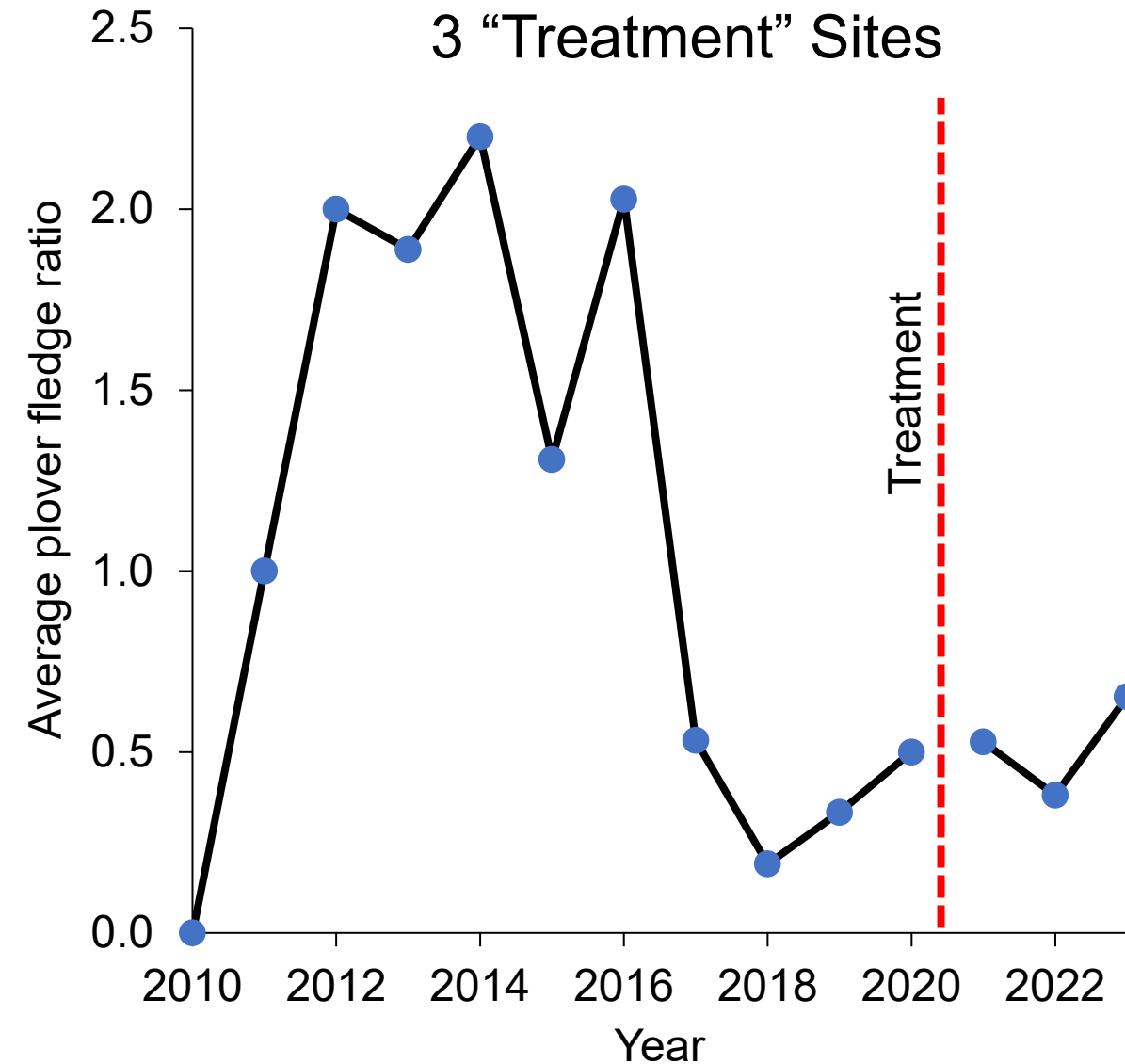
Predator Management Methods



“Experimental Design”



Fledge Ratios at Treatment and Control Sites



BACI Design

- Before-After-Control-Impact (BACI) approach useful:
 - To evaluate impacts from natural disturbances and management actions
 - Where management cannot be implemented in random locations
 - When there are limitations for replication

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Treatment

Fledge ratio
before

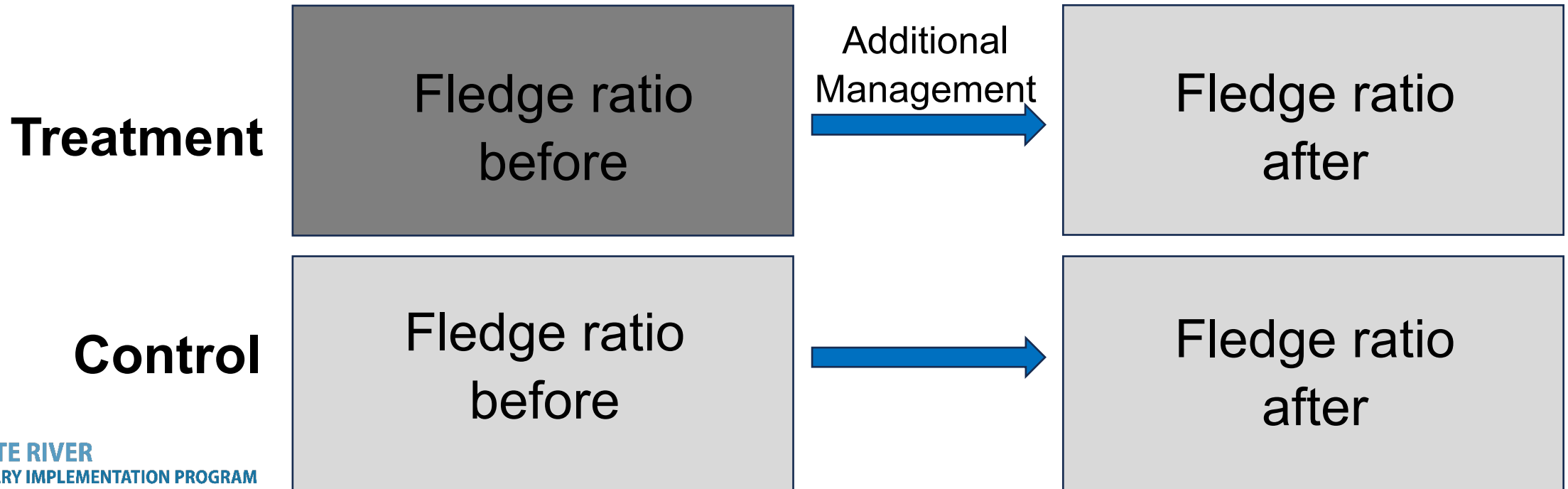
Control

Fledge ratio
before



BACI Design

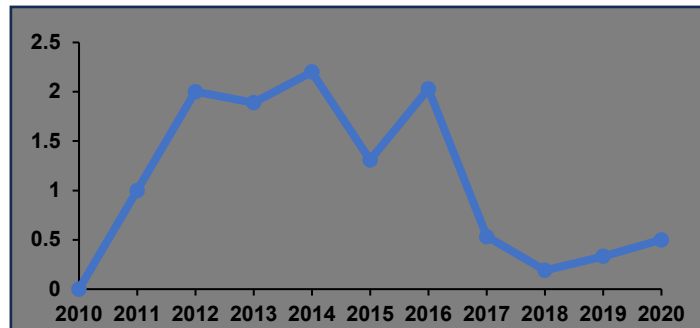
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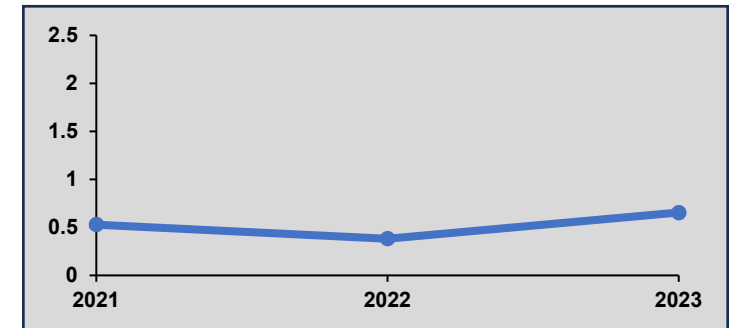
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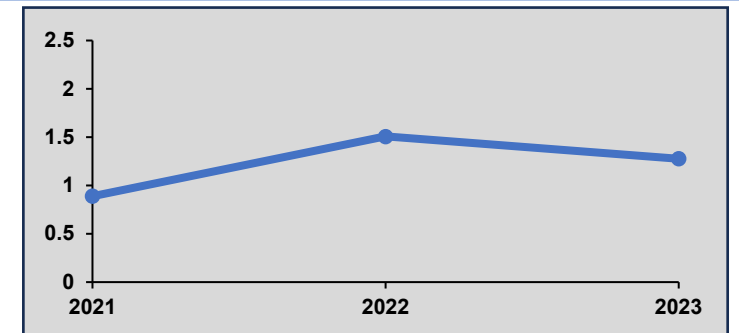
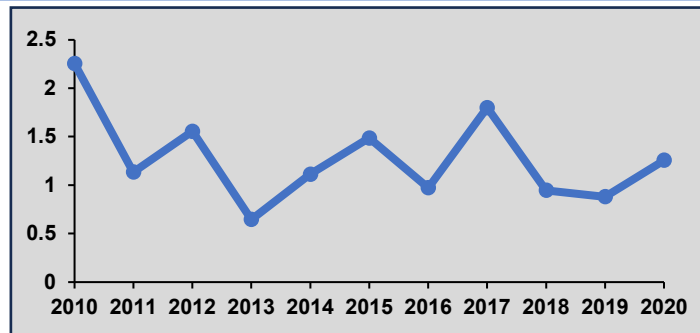
Treatment



Additional
Management



Control



BACIPS Design

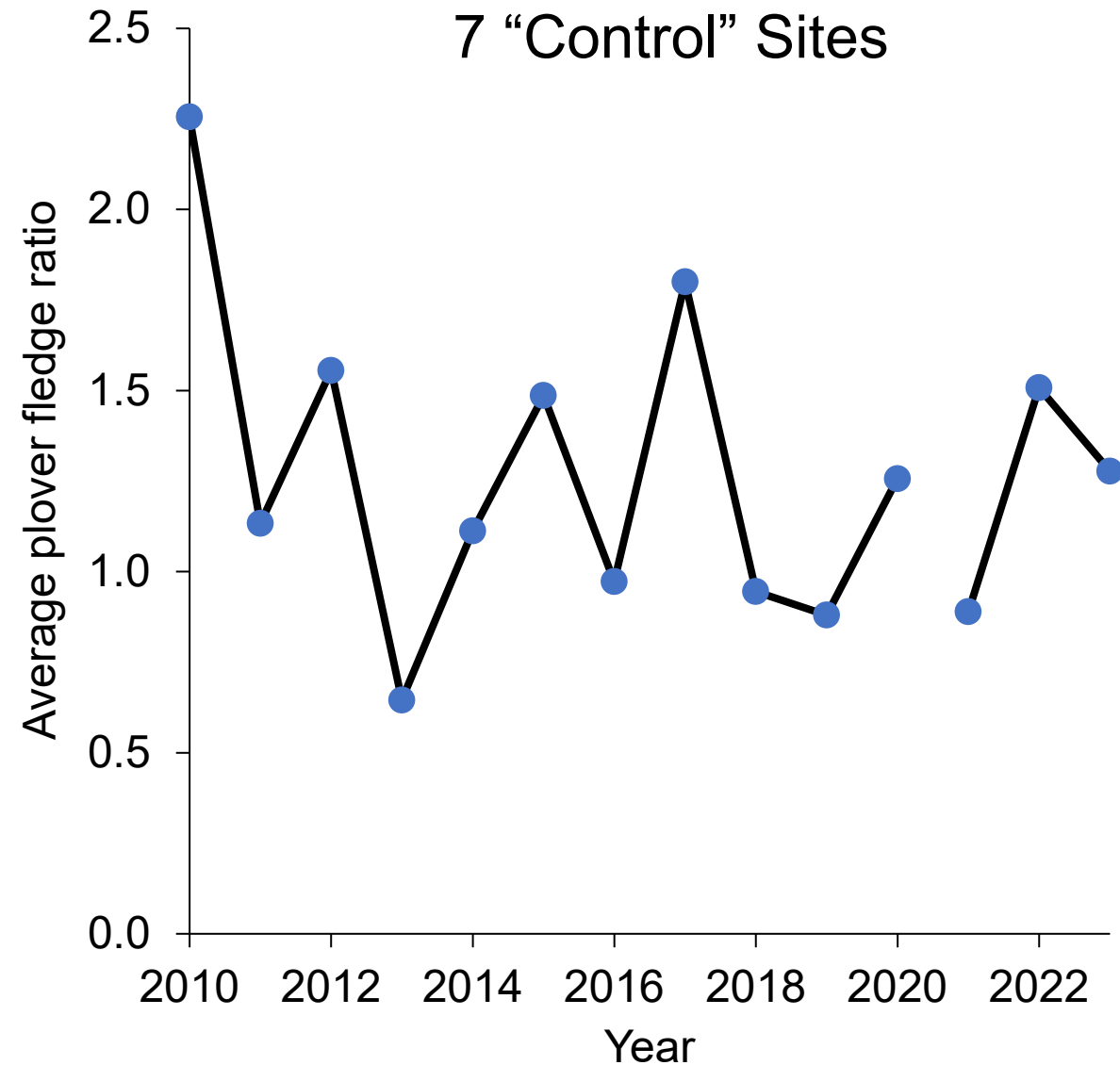
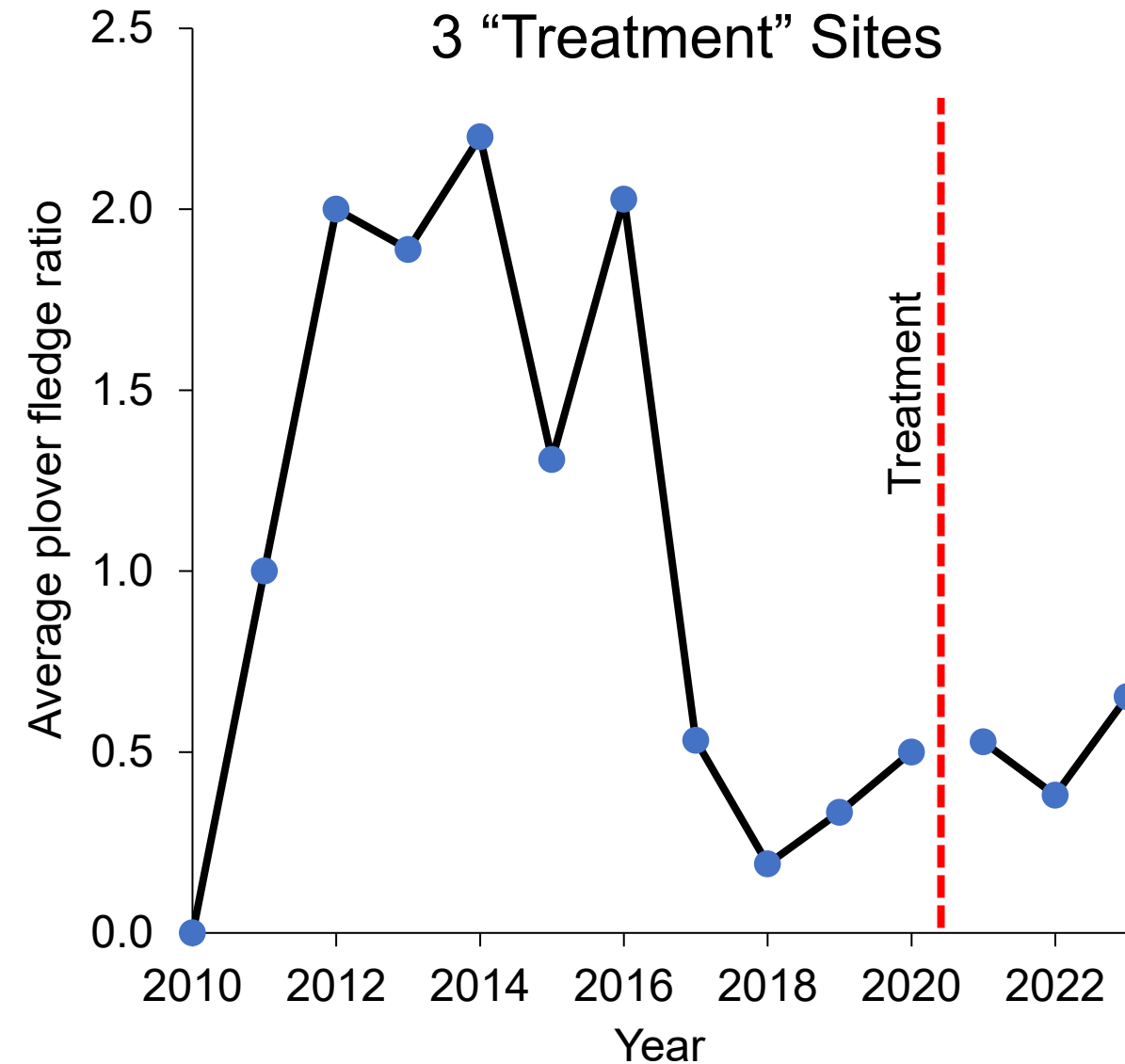
- Before-After-Control-Impact Paired Series (BACIPS) design
- Uses paired data from before and after treatment to:
 - Distinguish treatment impacts from background time effects shared by all sites
 - Distinguish treatment impacts from differences between treatment and control sites
 - Control for spatial differences between treatment and control sites
 - Separate possible signal from noise

Evaluating management effectiveness for improving fledge ratios

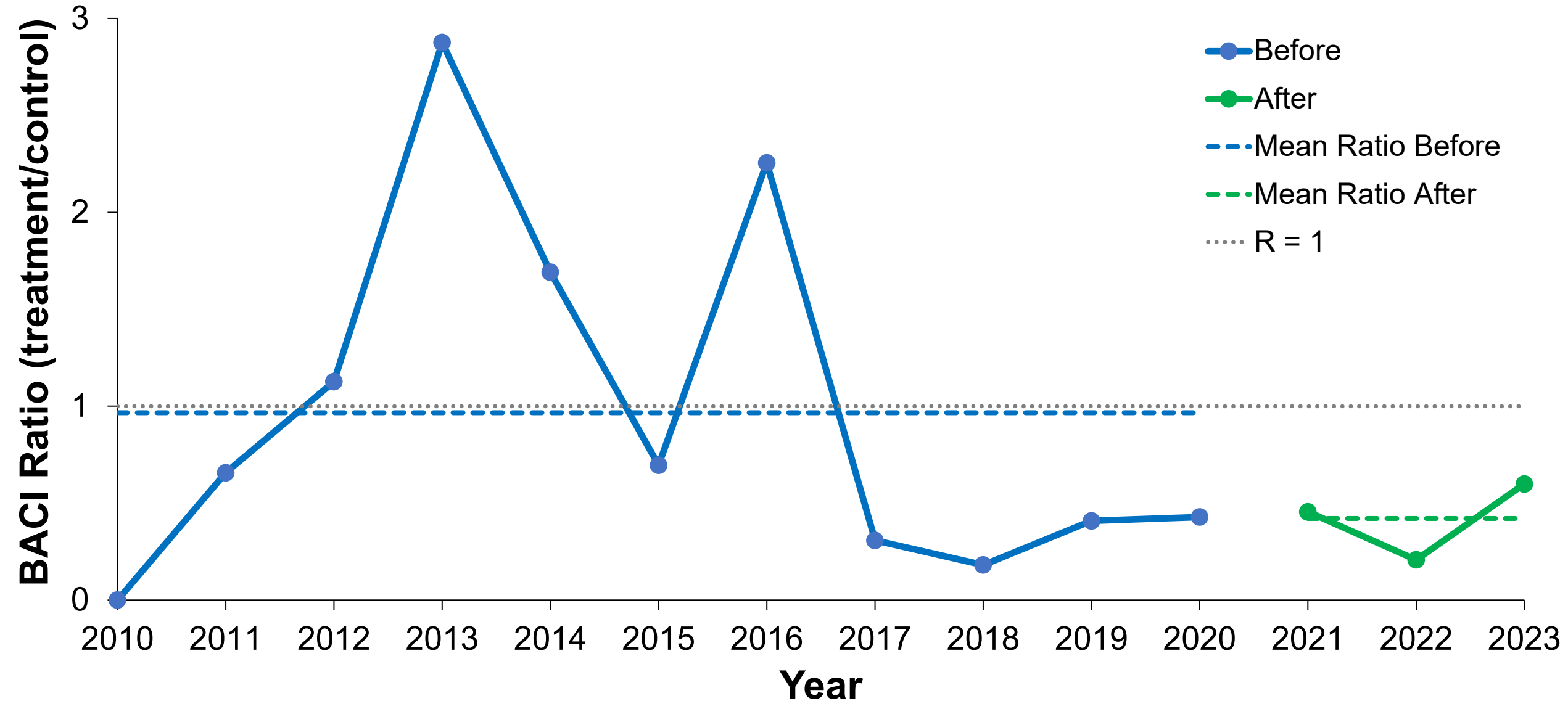
- Separately analyzed plover and tern data
- Used three approaches
 - Classic BACI model
 - Mean differences
 - BACI ratio



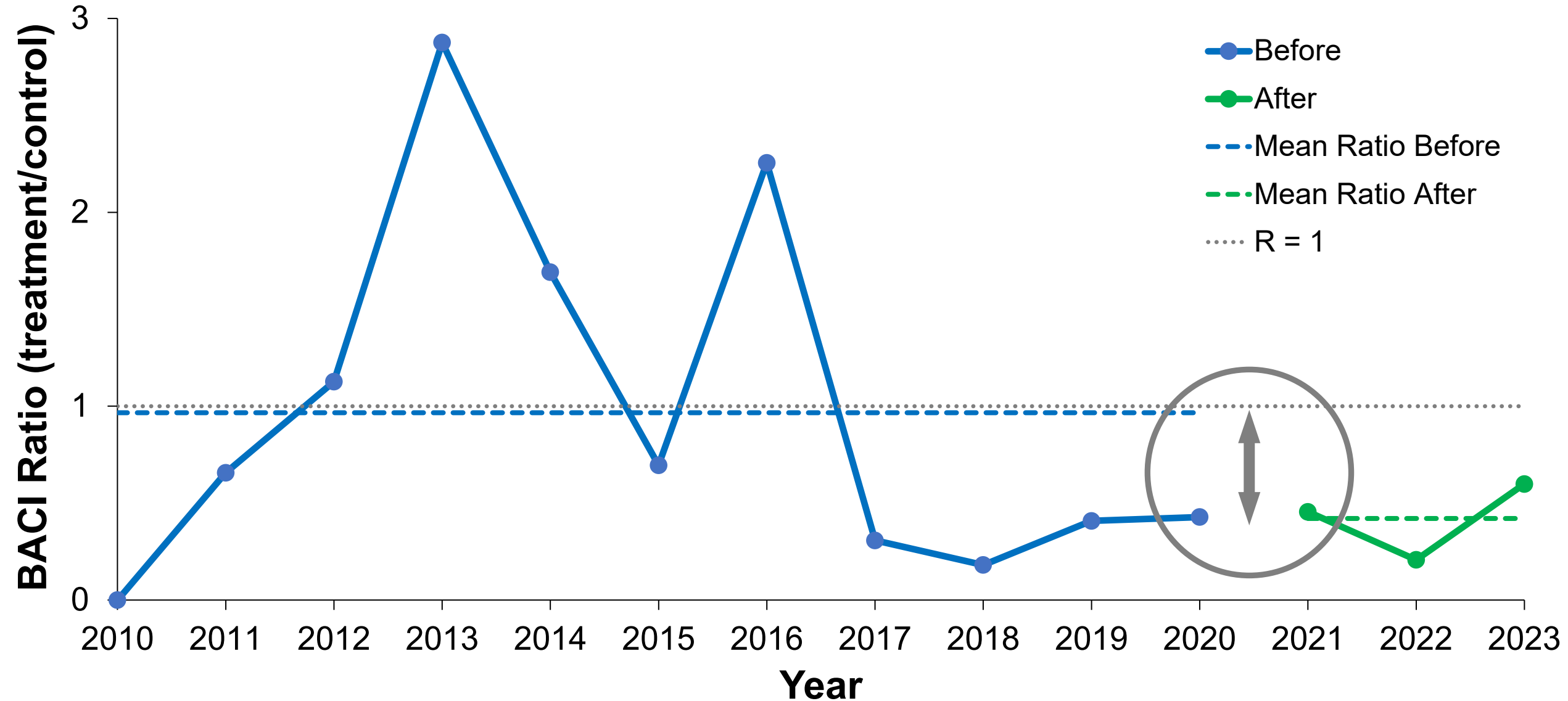
Fledge Ratios at Treatment and Control Sites



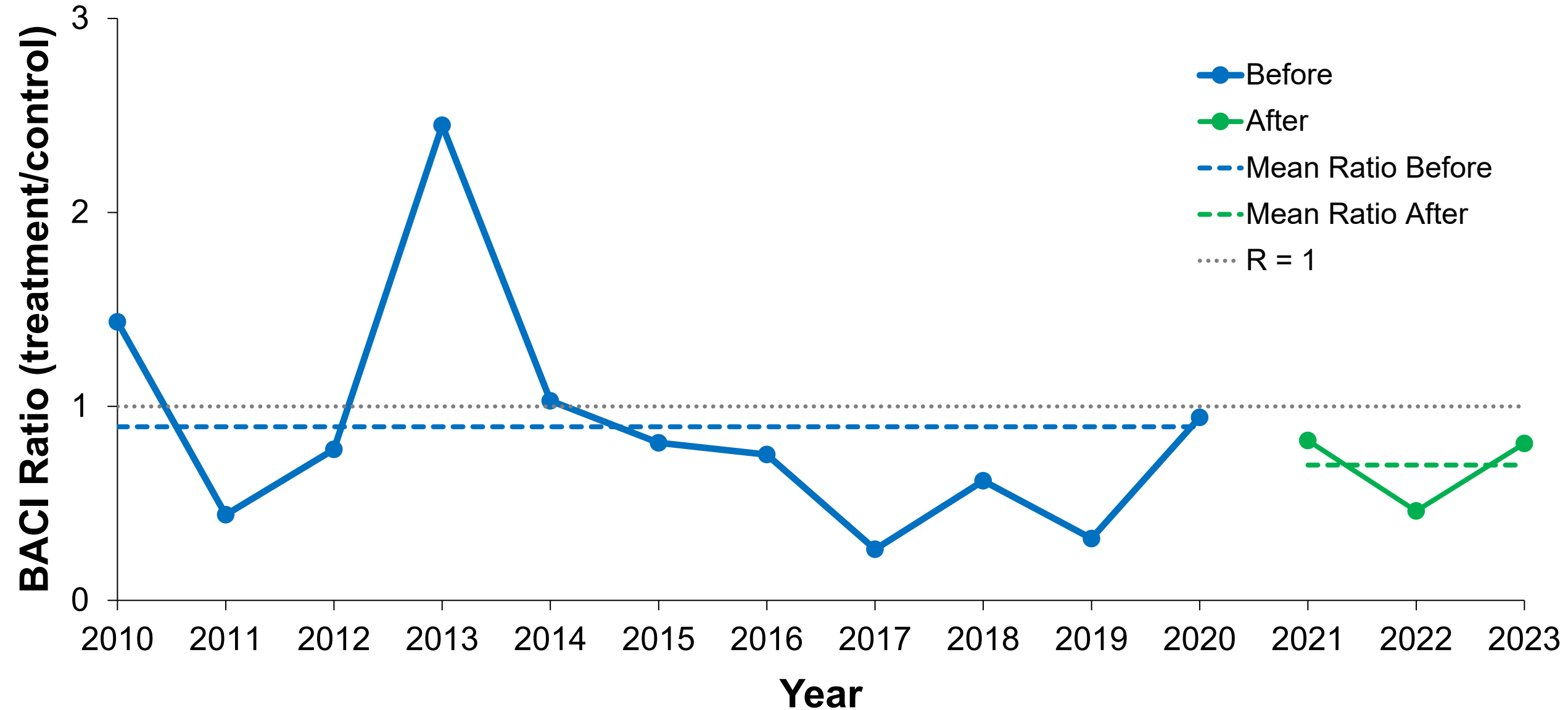
BACI Ratio—Plovers



BACI Ratio—Plovers



BACI Ratio—Terns



Limitations of Fledge Ratio Analyses

- Fledge ratio influenced by number of fledglings and number of nests
 - May be affected differently by predation
- Combines losses from all sources
 - Predation, weather, abandonment,...
- Ability to assess changes in fledge ratios due to predator management limited with only three years of data and three sites



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Next Step—Data Analysis 2

- Quantifying role of predation on daily nest and brood survival with a BACI paired series design
 - Establish TAC working group for input



Data Analysis 2—Next Steps

May

**Nest and
brood data
preparation**

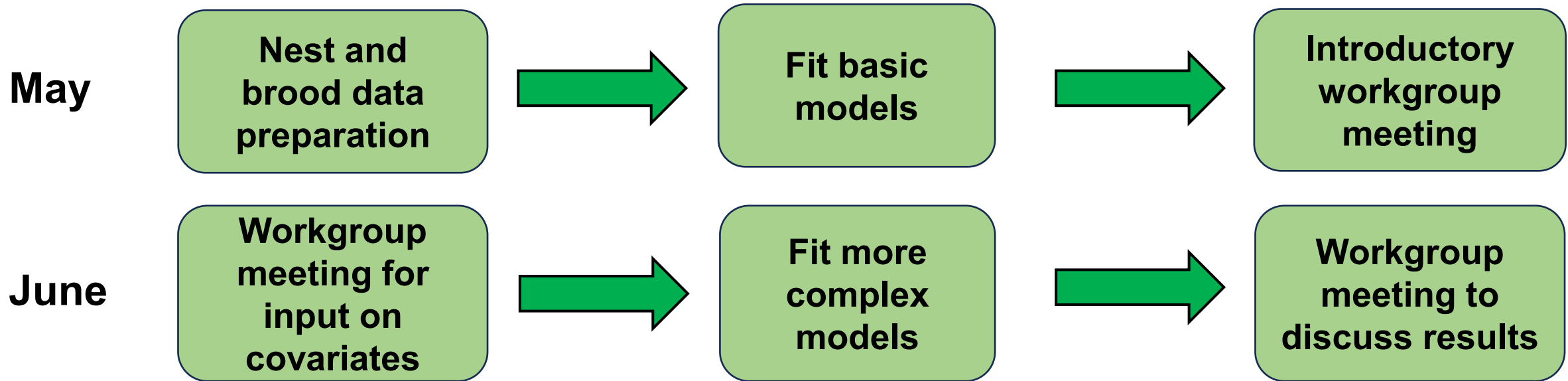


**Fit basic
models**

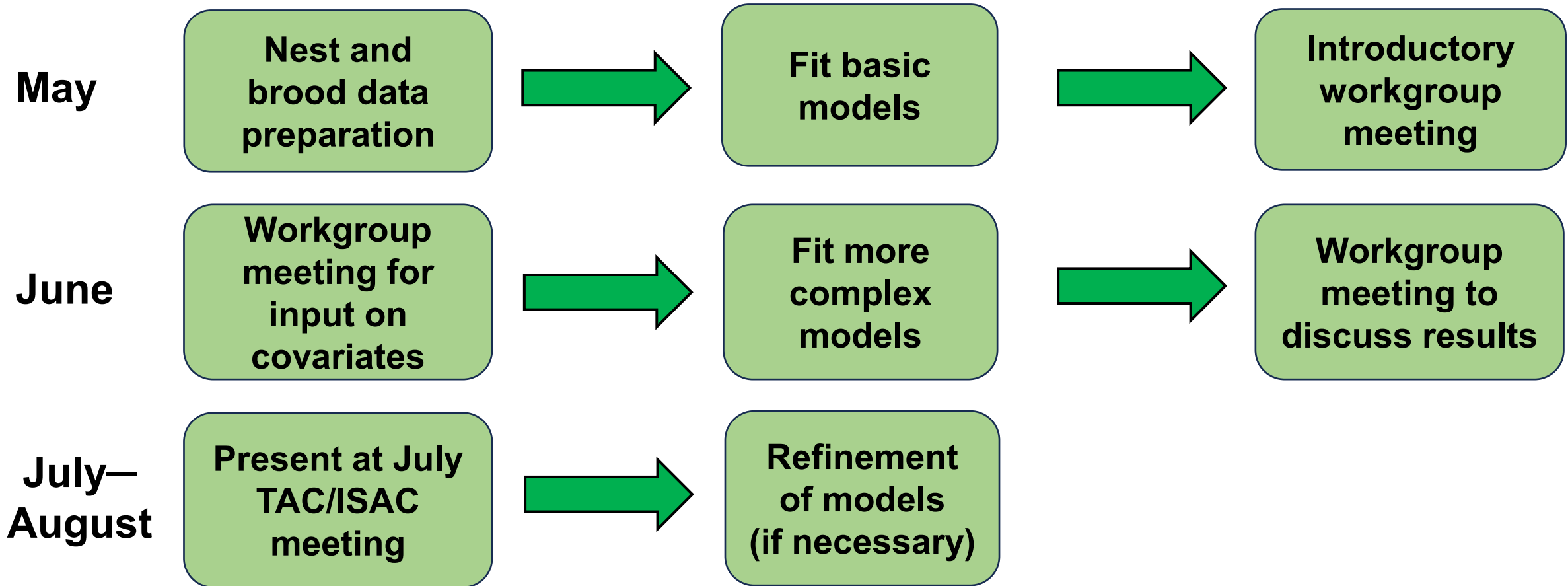


**Introductory
workgroup
meeting**

Data Analysis 2—Next Steps



Data Analysis 2—Next Steps



Data Analysis 2—Next Steps

