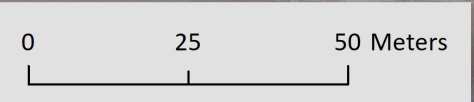
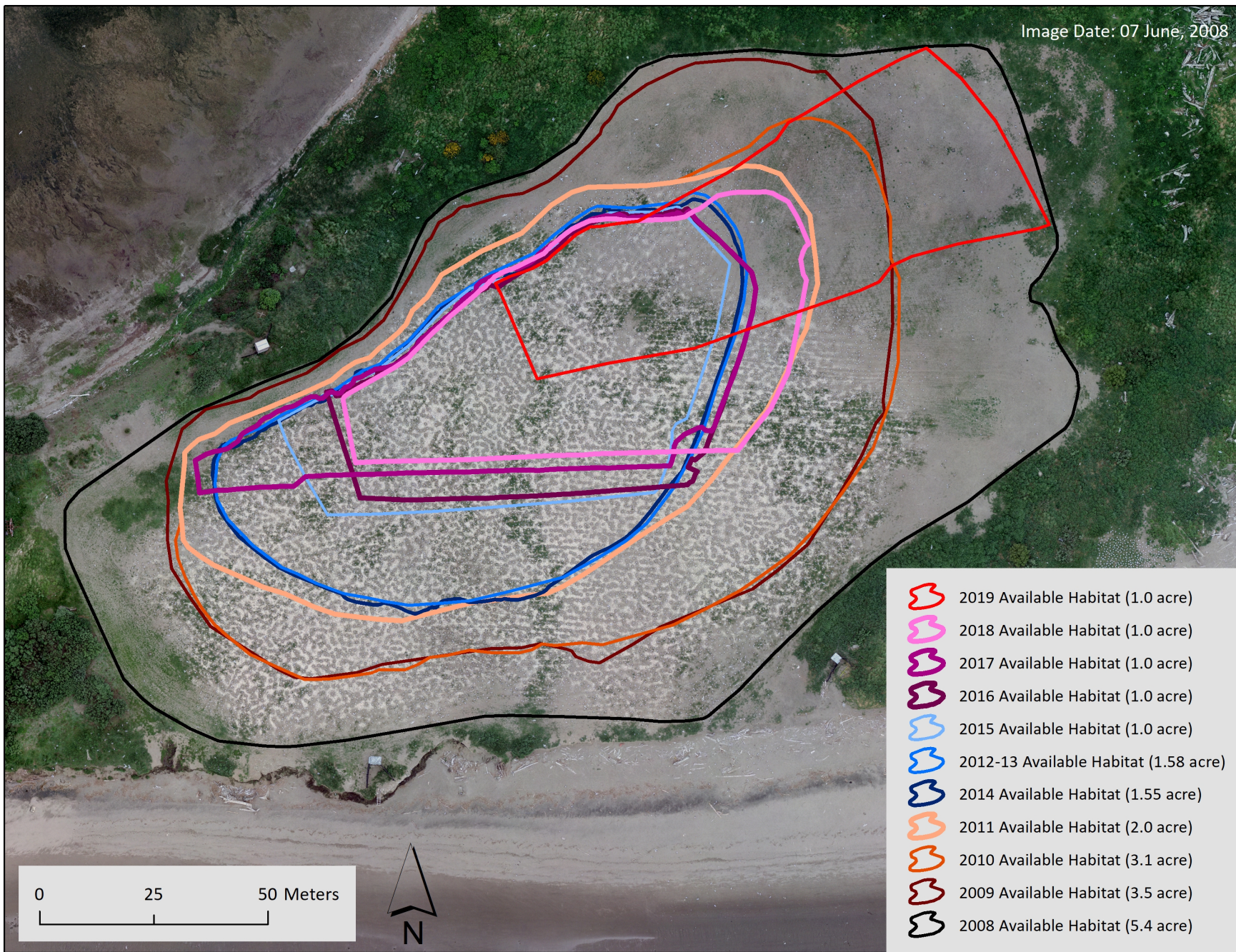


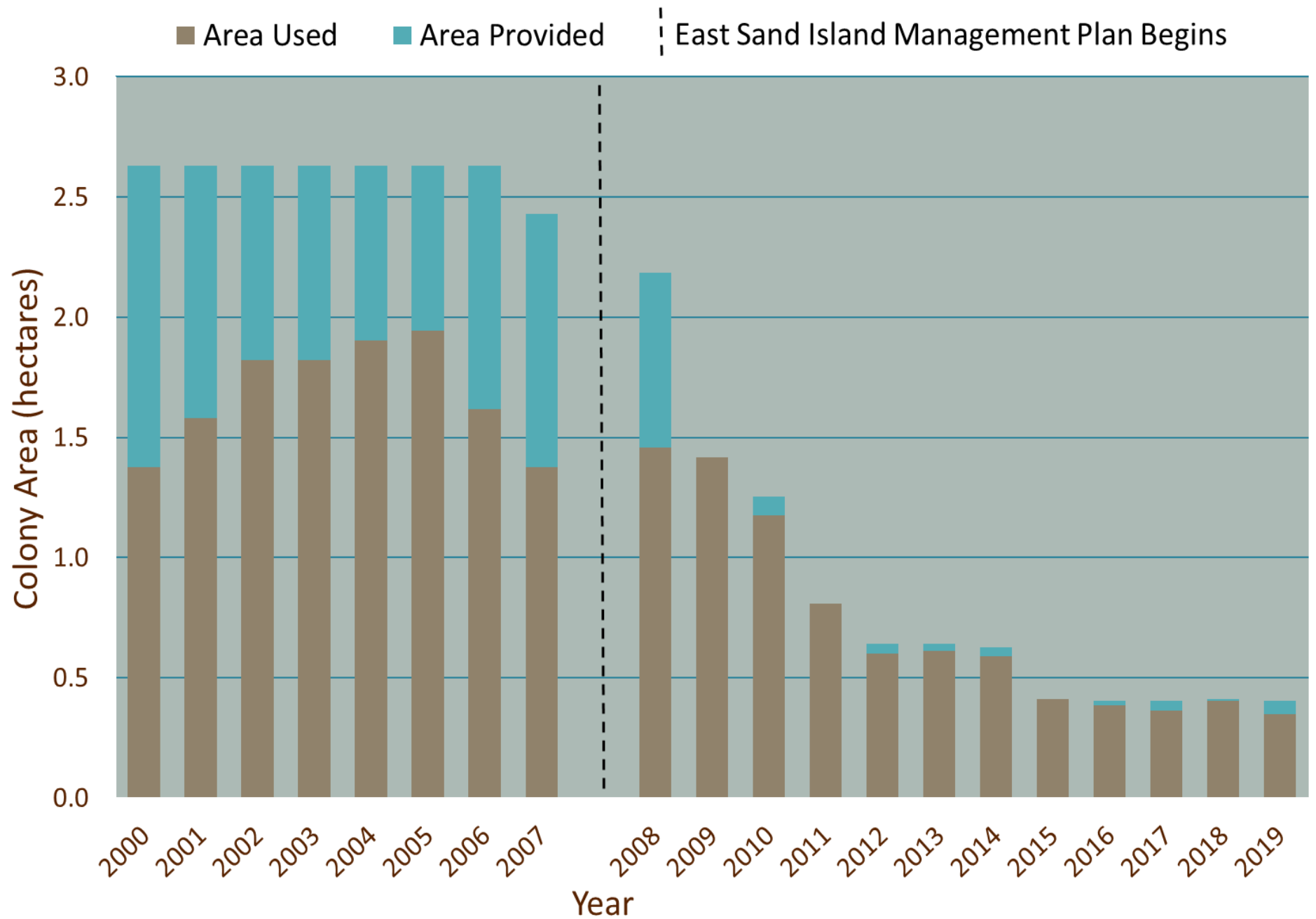
CHAPTER 1: Caspian Tern Management in the Columbia River Estuary

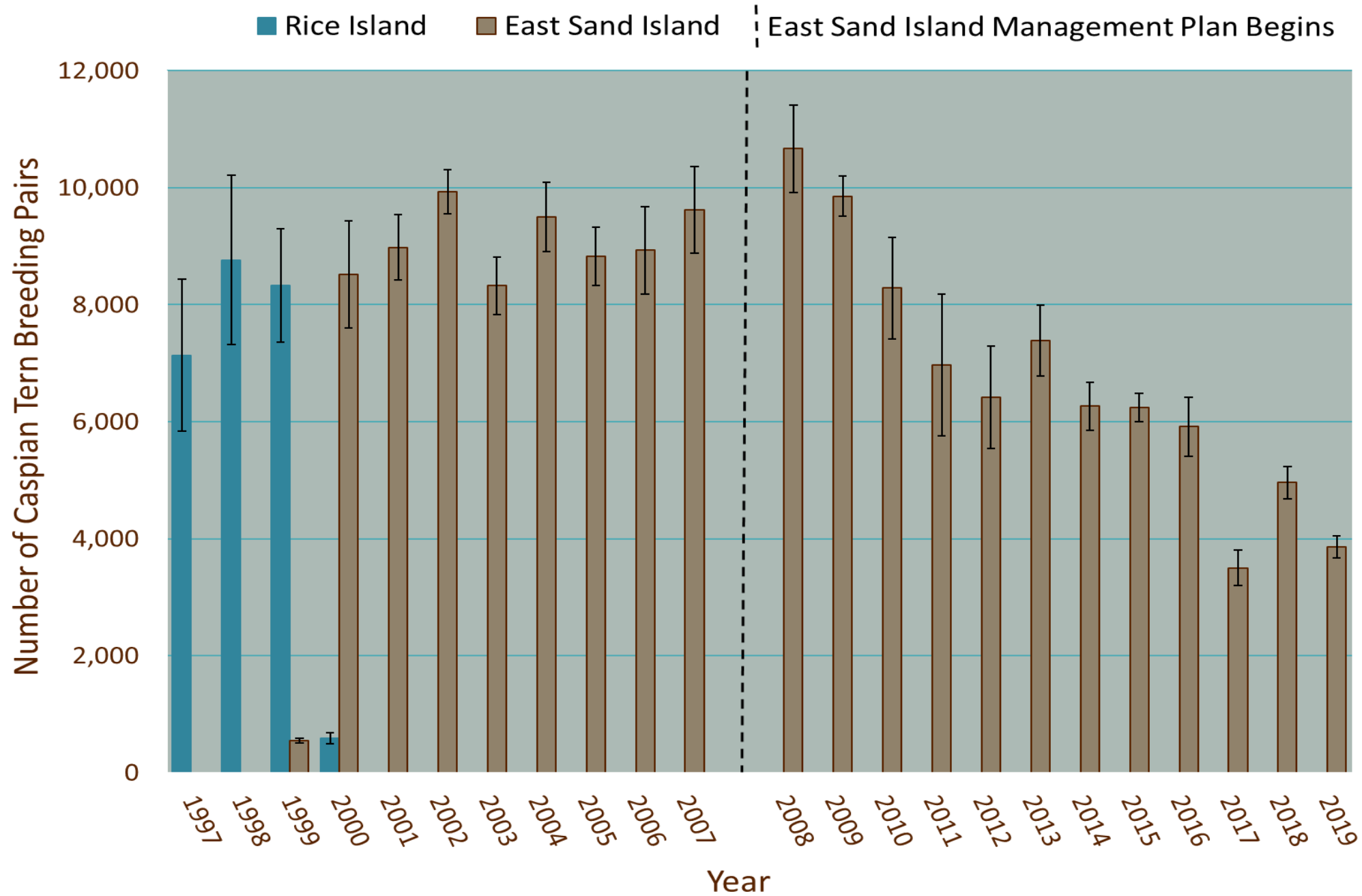
Authors: Daniel D. Roby¹, Timothy J. Lawes¹,
Donald E. Lyons¹, Ken Collis², Allen F. Evans²,
Kirsten S. Bixler¹, Stefanie Collar¹, Olivia A. Bailey¹,
Yasuko Suzuki¹, Quinn Payton², and Peter J. Loschl¹

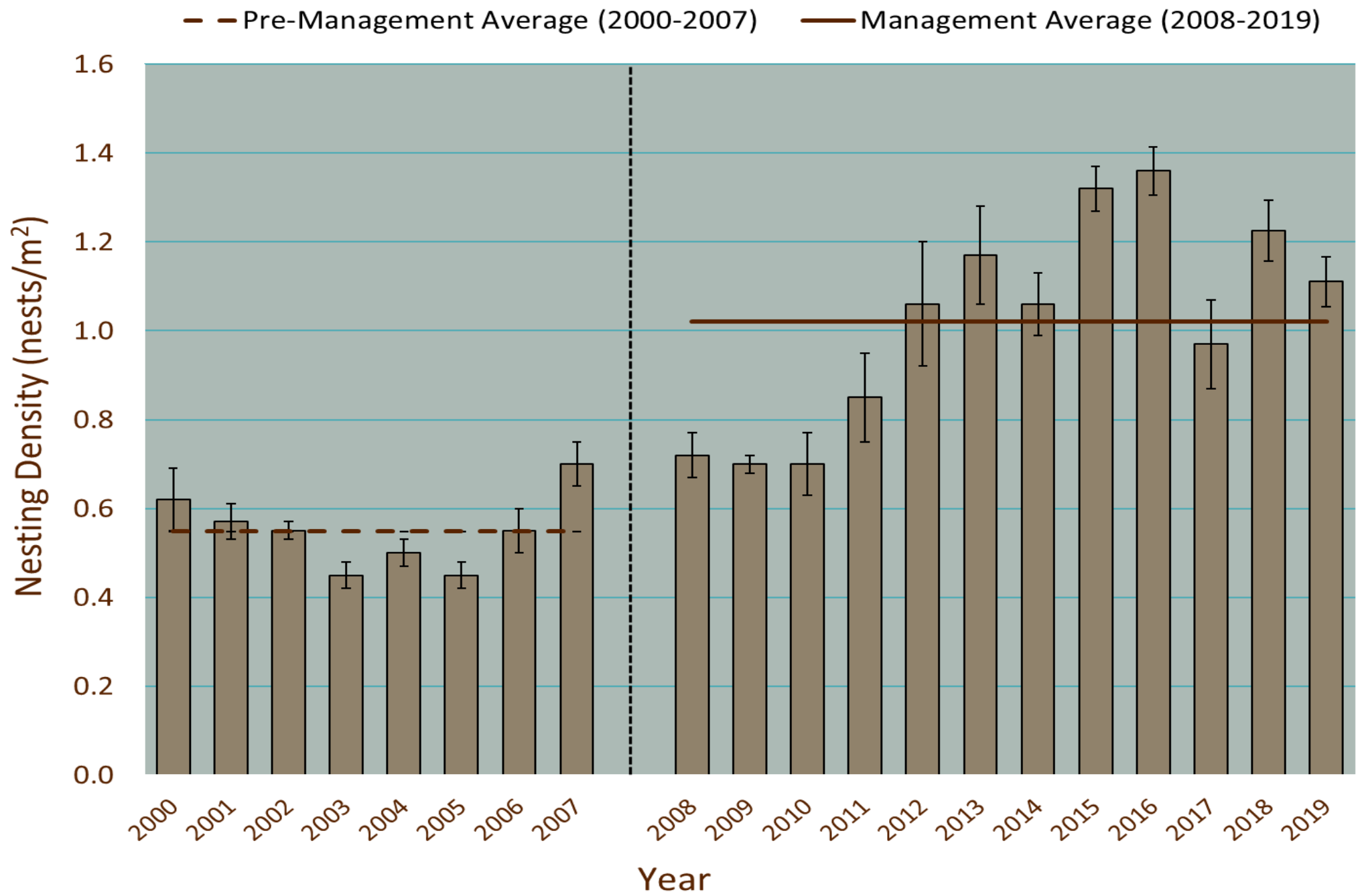


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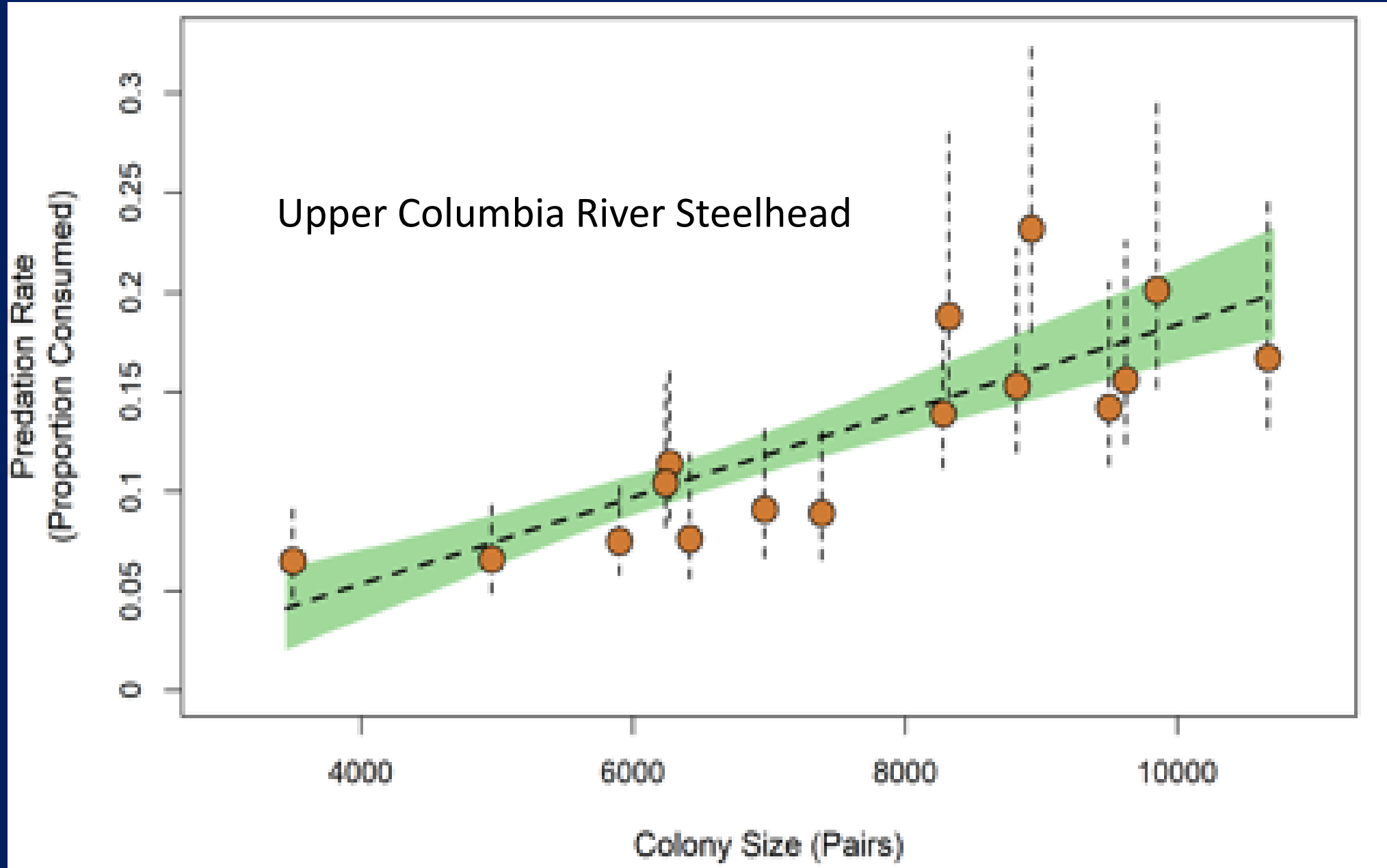








Tern Predation Rates vs. Tern Colony Size on East Sand Island



Take-homes (Management Effectiveness)

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- Area of tern nesting habitat on East Sand Island stipulated by the *Caspian Tern Management Plan* (1 acre) was achieved by 2015 and sustained for the next 4 breeding seasons

Take-homes (Management Effectiveness)

- Area of tern nesting habitat on East Sand Island stipulated by the *Estuary Tern Management Plan* (1 acre) was achieved by 2015 and sustained for the next 4 breeding seasons
- Target size for the Caspian tern colony on East Sand Island stipulated in the *Estuary Tern Management Plan* (3,125–4,375 breeding pairs) achieved in 2 of 5 years on 1 acre of designated nesting habitat

Take-homes (Management Effectiveness)

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- Target size for the Caspian tern colony on East Sand Island stipulated in the *Estuary Tern Management Plan* (3,125–4,375 breeding pairs) achieved in 2 of 5 years on 1 acre of designated nesting habitat
- Reduction in size of East Sand Island Caspian tern colony resulted in a reduction in consumption of juvenile salmonids by approximately 42%
 - ~ 5.0 million smolts/year down to ~ 2.9 million smolts/year

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- Reduction in East Sand Island colony size resulted in reductions in predation rates on ESA-listed steelhead smolts by 50% to 76%, depending on DPS
- Average annual predation rates on steelhead DPSs by Caspian terns at East Sand Island declined from approximately 19% during the pre-management period to 7% during 2016–2018, an average reduction of about 63%

Take-homes (Adaptive Management)

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- In order to fully achieve the objectives of the *Estuary Tern Management Plan* we recommend:

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 - Further reduction in area of tern nesting habitat on East Sand Island from 1 acre to 2/3 acre to ensure colony size does not exceed 3,125–4,375 breeding pairs

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 - Management of designated tern colony site on East Sand Island to reduce risk of permanent colony abandonment by (1) shifting colony away from shoreline, (2) enhancing sandy nest substrate on-colony, and (3) controlling gull predation on tern nests

Take-homes (Adaptive Management)

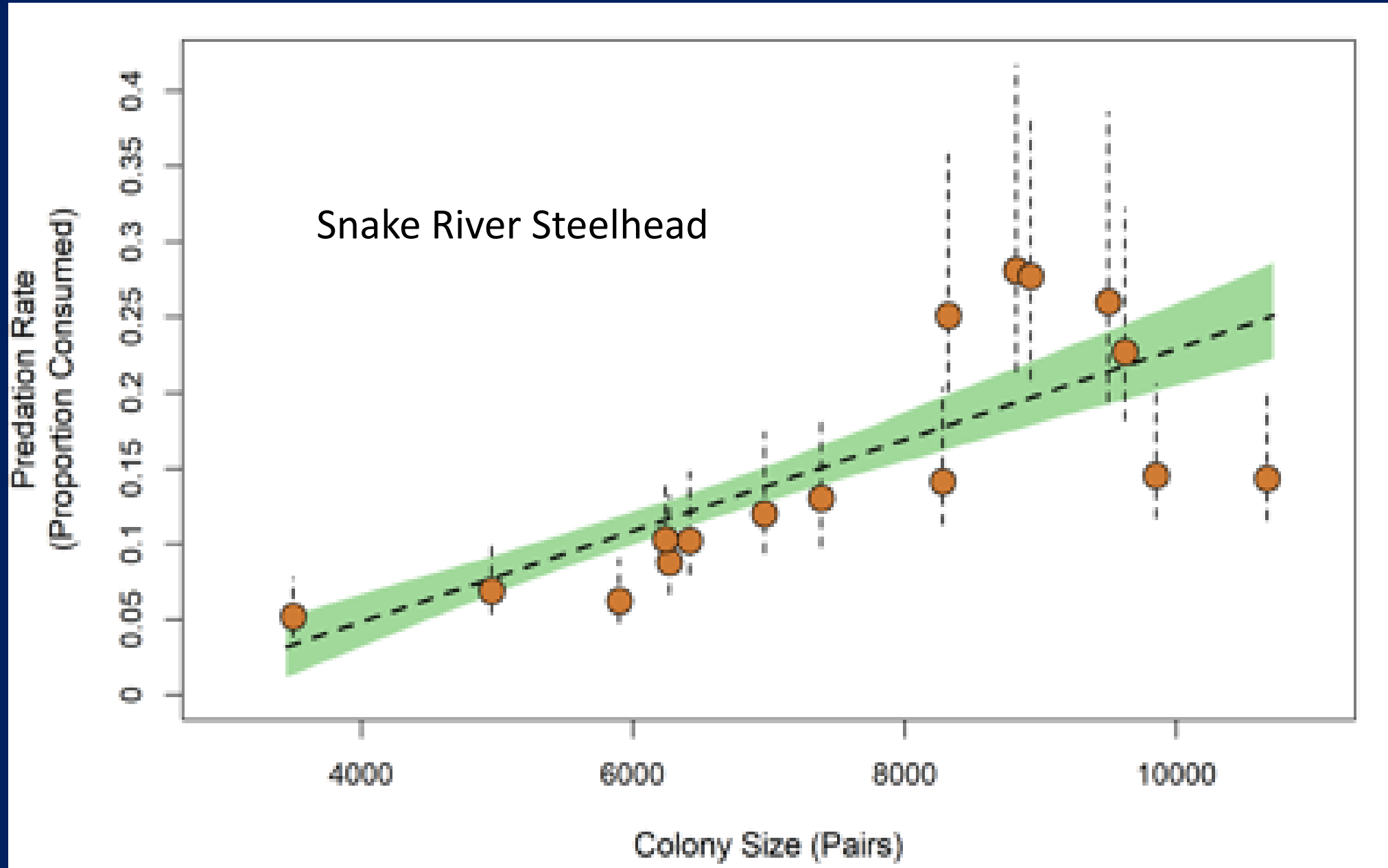
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 - Restoration of a large Caspian tern nesting colony (ca. 1,000 breeding pairs) at or near a former colony site in coastal Washington, while avoiding hatchery release sites

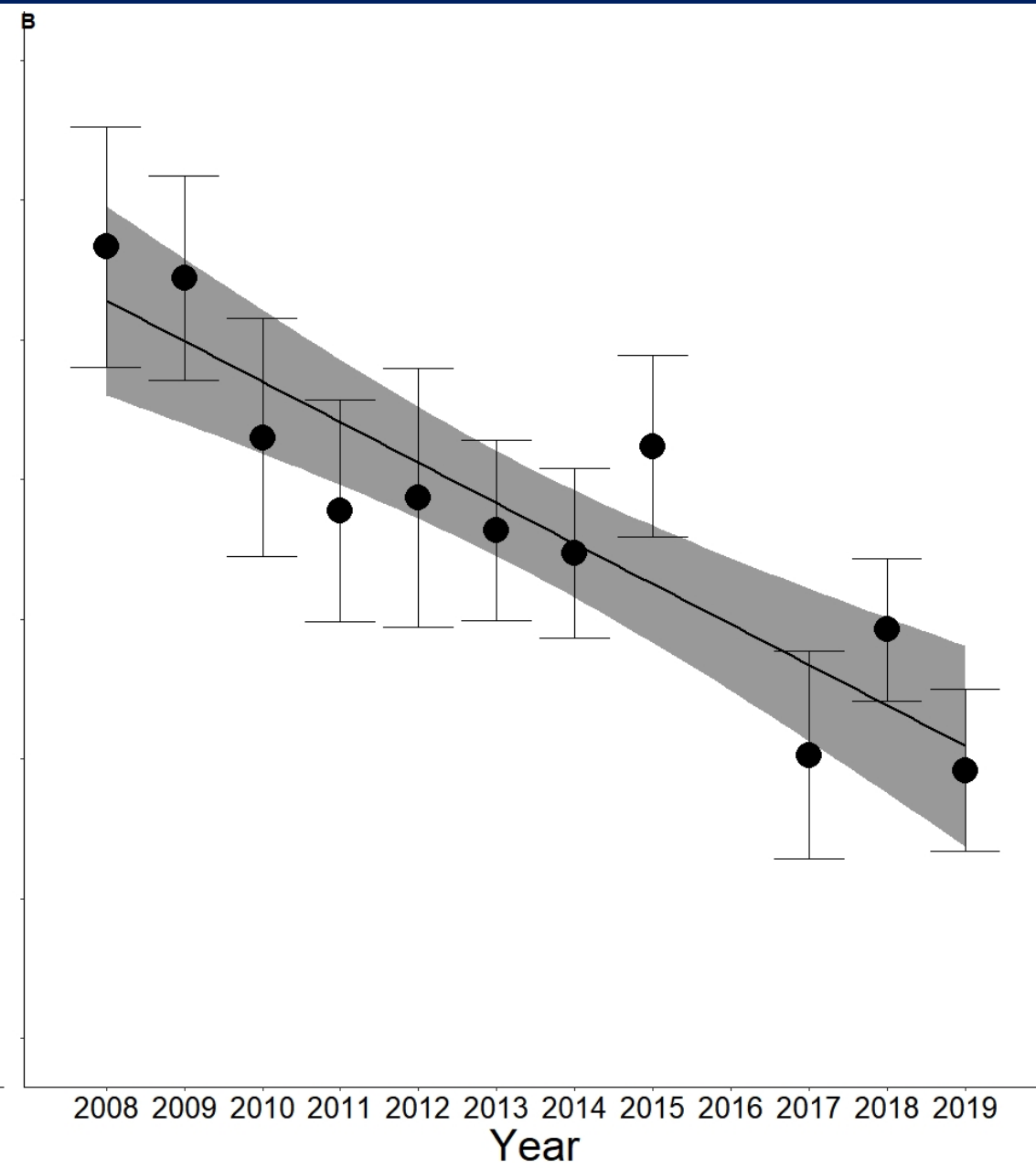
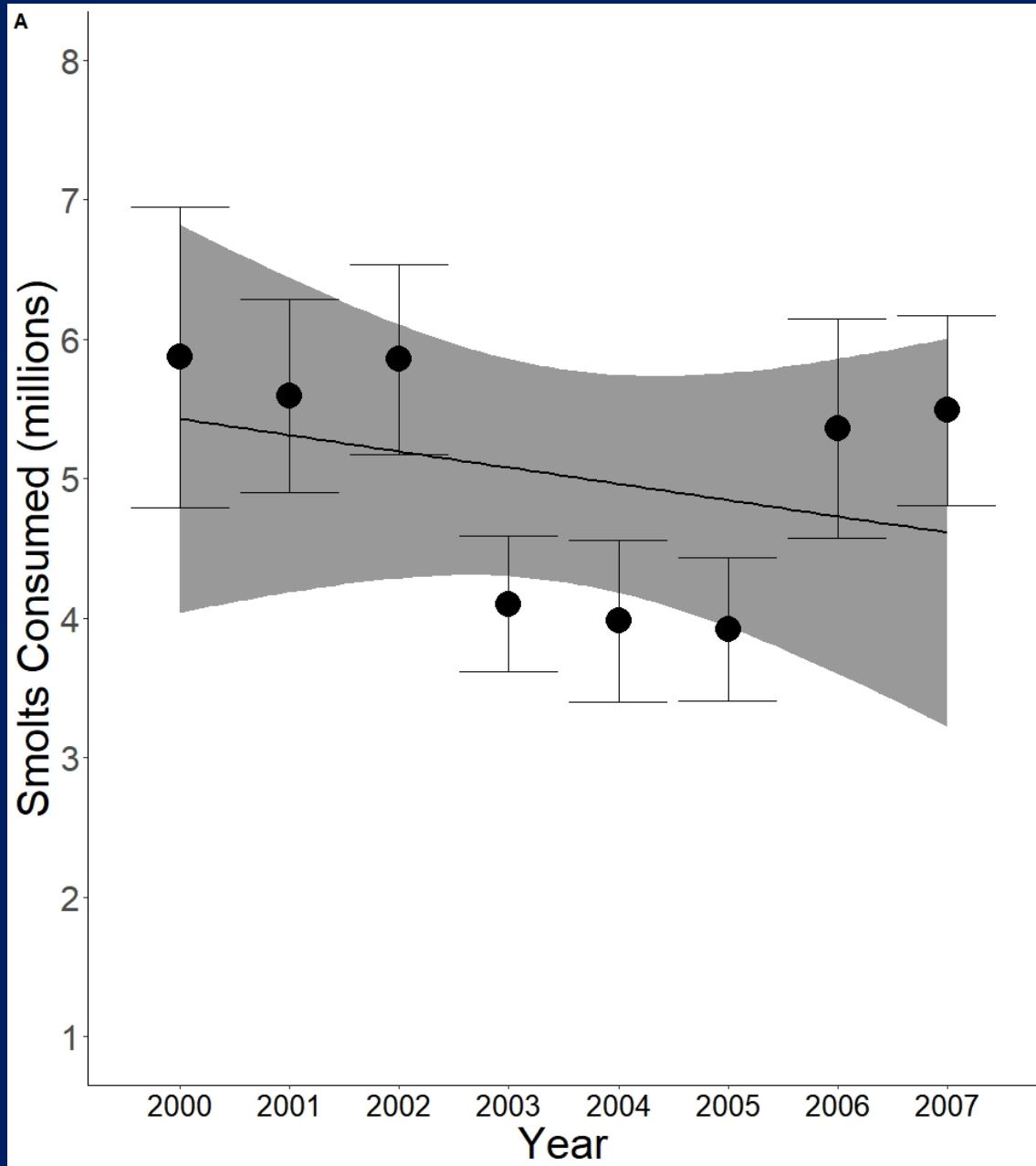
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 - Continued close monitoring of the Pacific Flyway population of Caspian terns for early detection of major declines

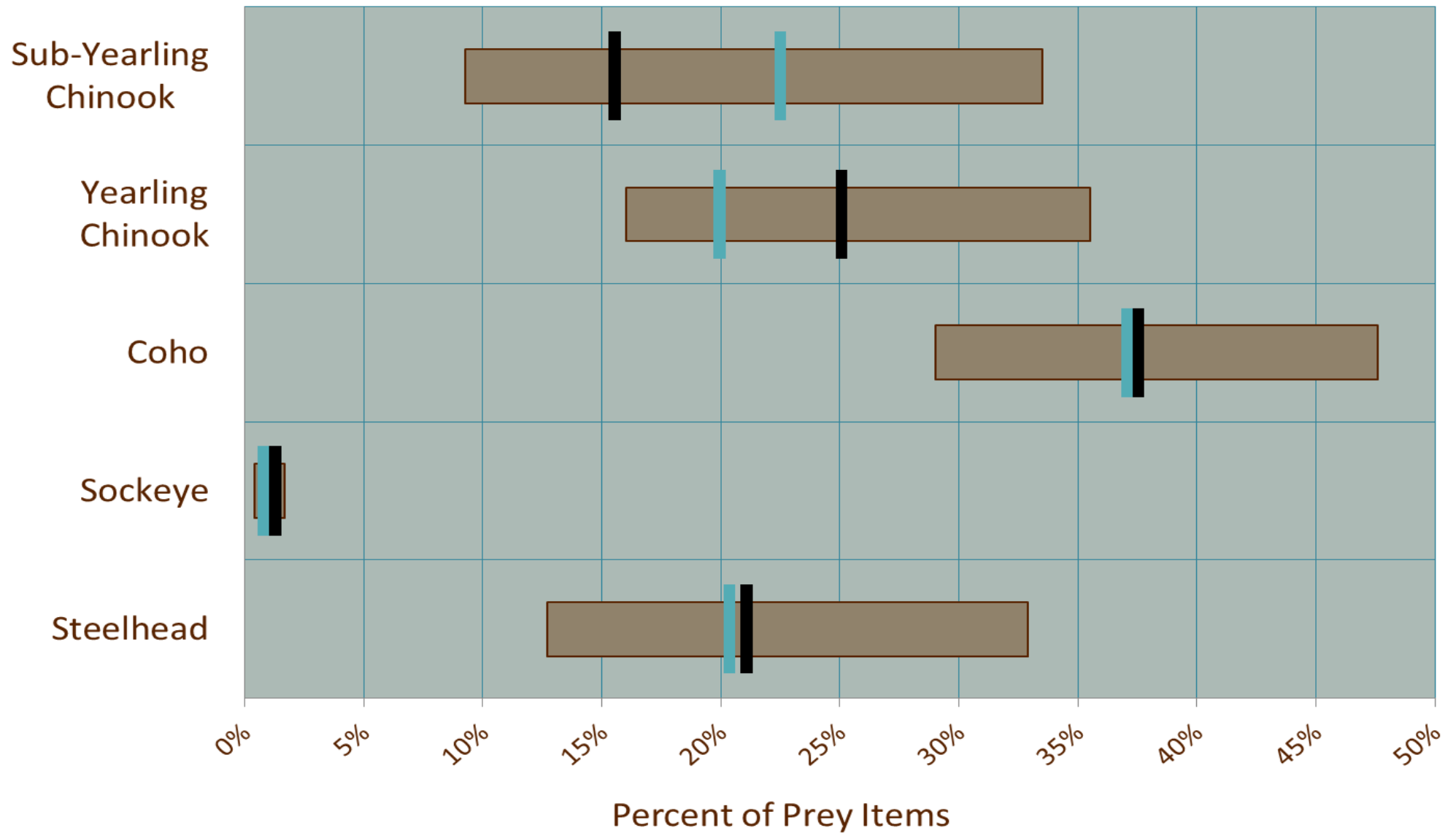
Back-up Slides

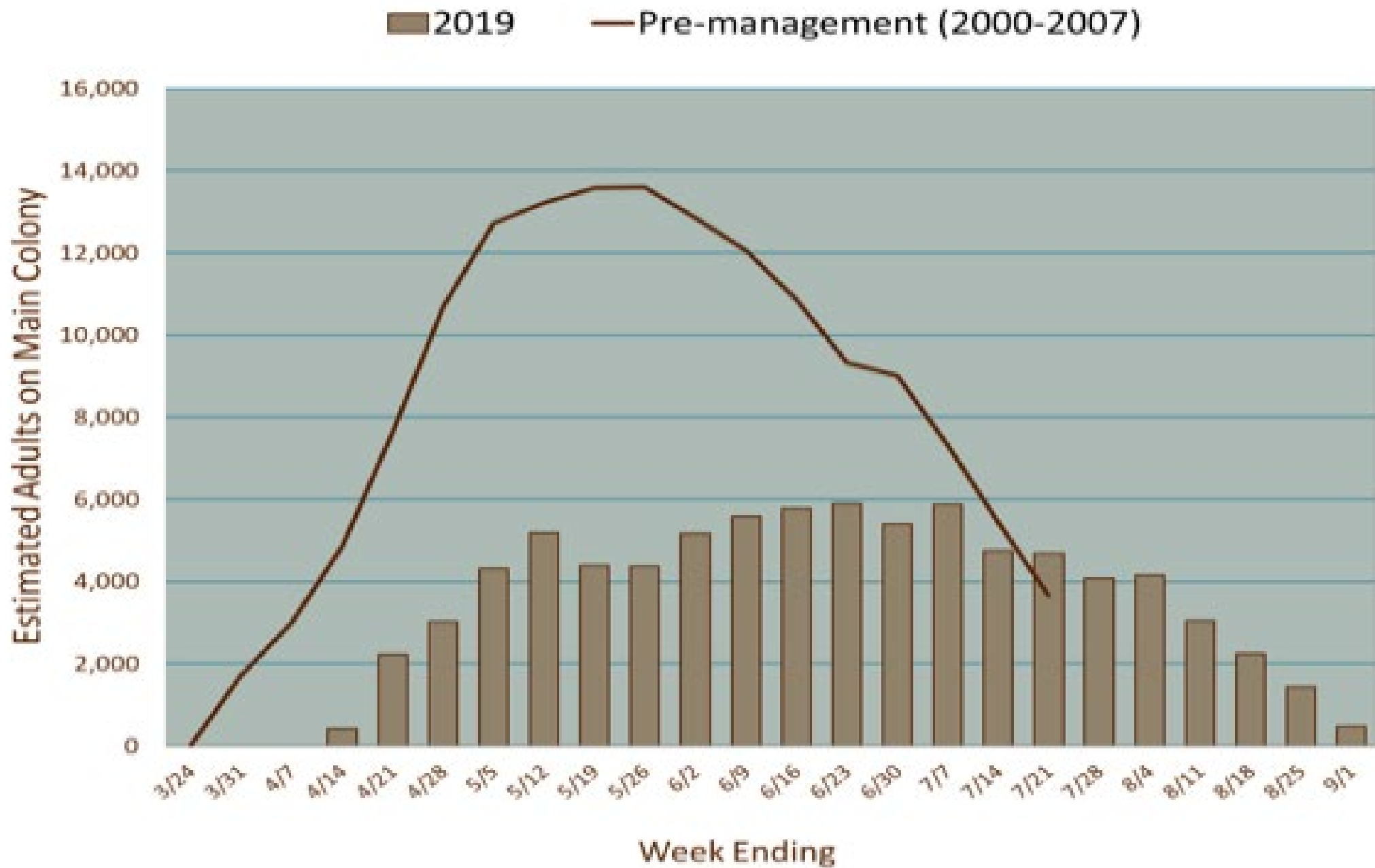
Tern Predation Rates vs. Tern Colony Size on East Sand Island





■ Range (1999-2019) ■ Average (1999-2007) ■ Average (2008-2019)





■ East Sand Island (1999-2019)

