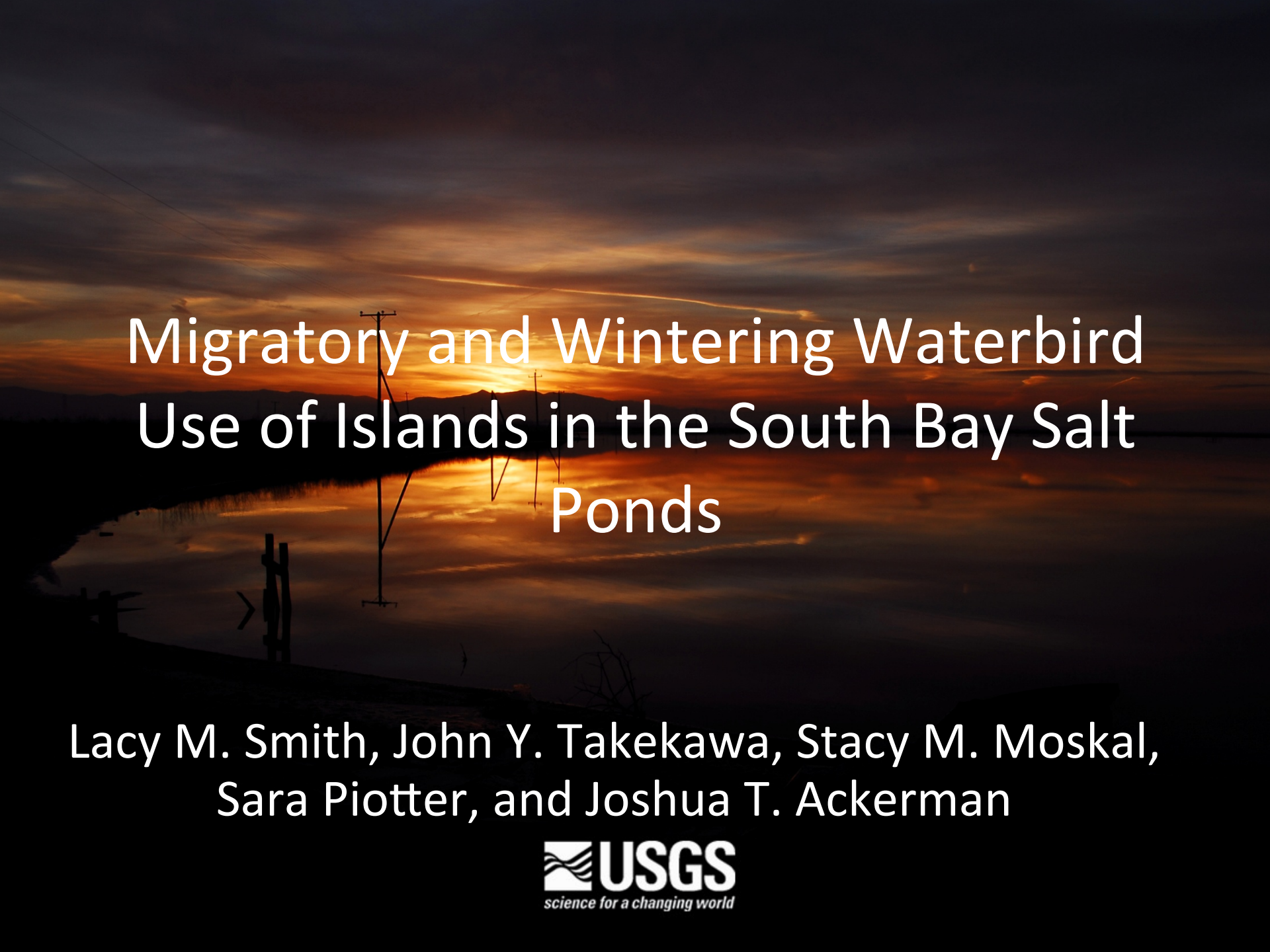

Migratory and Wintering Waterbird Use of Islands in the South Bay Salt Ponds

Lacy M. Smith, John Y. Takekawa, Stacy M. Moskal, Sara Piotter, and Joshua T. Ackerman

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Importance of Restoration Monitoring

1. The salt pond restoration project plans to restore 50-90% of former salt ponds to tidal marsh.
2. Thousands of waterbirds use these ponds every year and will have less habitat as ponds become marsh.

3. Ponds not slated for tidal marsh restoration will be actively managed to support an increased density of waterbirds.

4. The restoration project team is developing methods to increase waterbird density, including the construction of islands.

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Constructing Islands to Increase Density

1. Migratory and wintering waterbirds use islands for roosting and for foraging around island perimeter.

2. Islands are a pond element that can be manipulated or created to increase bird density.

3. Extensive island development project in RSF2.

4. We evaluated other pre-existing islands across the south bay ponds.

Colwell et al. 2010

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Research Questions

1. Is there a higher density of waterbirds in ponds with islands?

2. Is there a higher density of waterbirds in ponds that have more island area?

3. Is there a higher density of waterbirds in ponds that have a higher island perimeter to area ratio?

4. What factors explain the density of waterbirds on islands?

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Salt Pond Waterbird Counts

- Ponds counted monthly

  Oct 2010 – Sept 2012
- Species, abundance, spatial location, behavior
- Mapped island areas in ArcMap
  - 52 islands within 20 ponds
  - 1-6 islands per pond
  - RSF2 excluded

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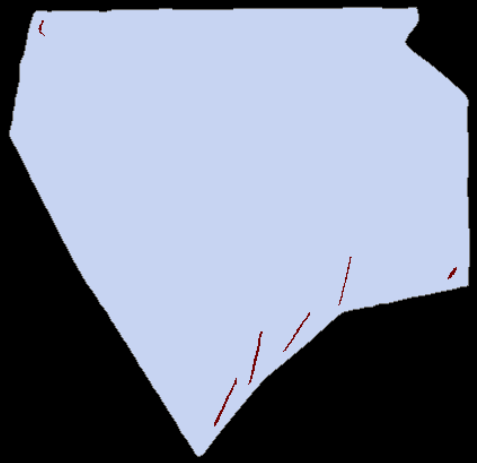
Analysis

- Waterbirds analyzed within the following guilds:
  - Dabbling Ducks
  - Diving Ducks
  - Gulls
  - Small Shorebirds
  - Medium Shorebirds
- Winter Season: Nov – Feb
- Spring Season: Mar - May



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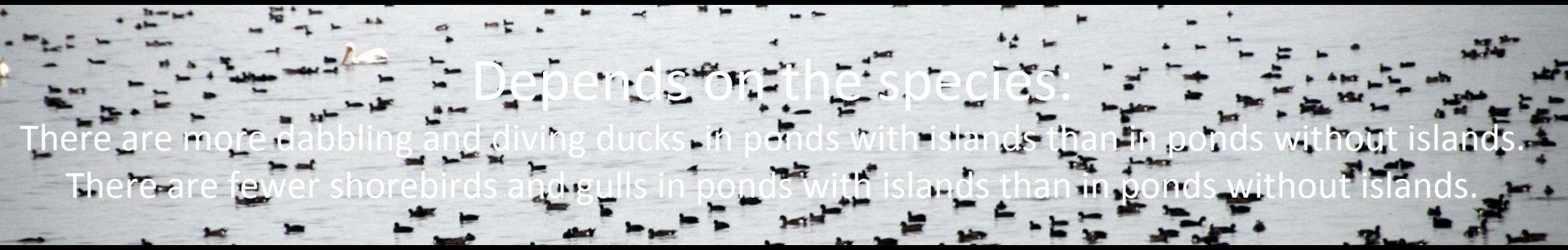
Research Questions

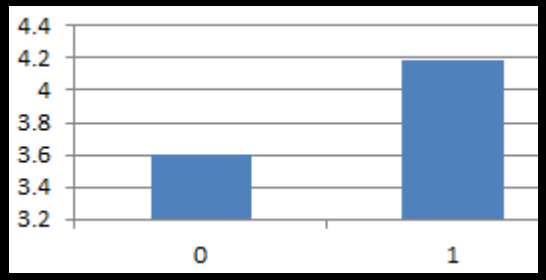
1. Is there a higher density of waterbirds in ponds with islands?

2. Is there a higher density of waterbirds in ponds that have more island area?

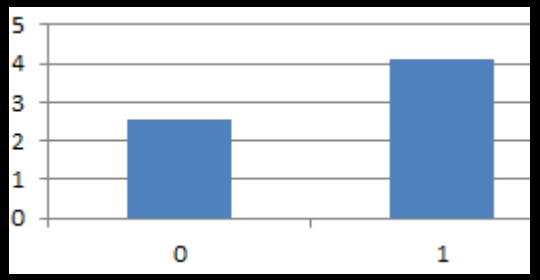


3. Is there a higher density of waterbirds in ponds that have a higher island perimeter to area ratio?

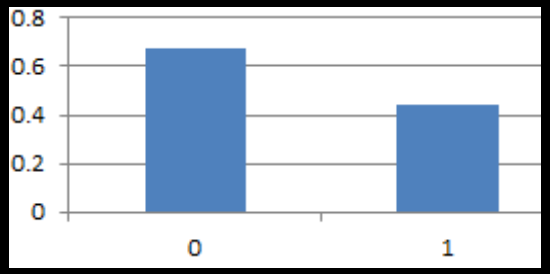
Mean Birds in Ponds with and without Islands Winter, Density



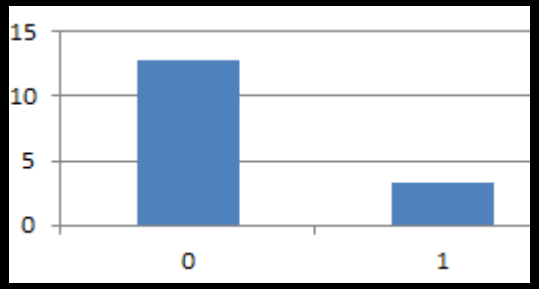
Dabbling Ducks



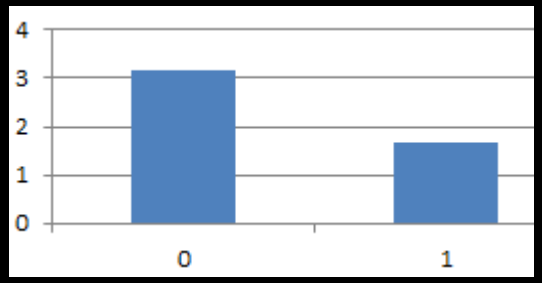
Diving Ducks



Gulls



Small Shorebirds



Medium Shorebirds

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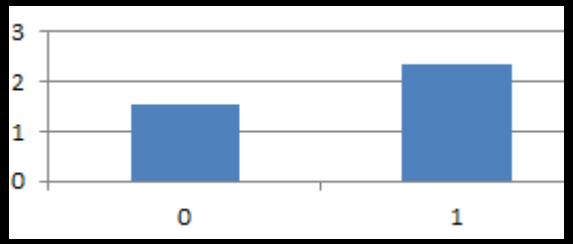
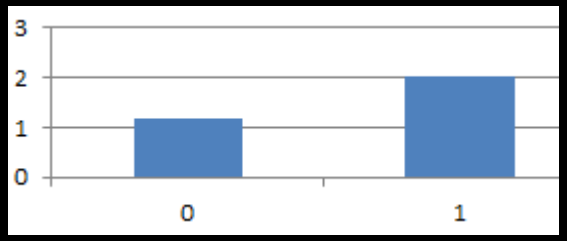
Mean Birds in Ponds with and without Islands Spring, Density



Dabbling Ducks



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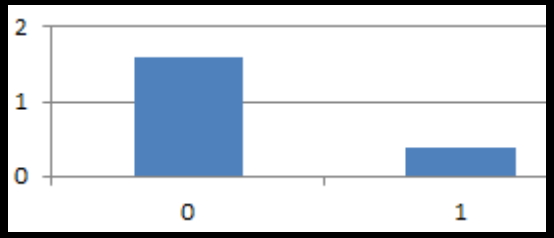
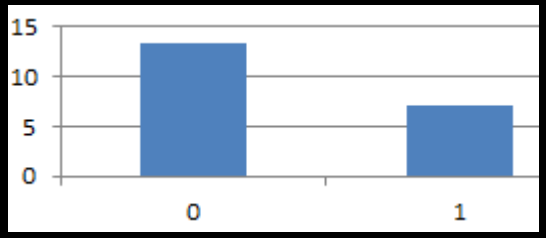
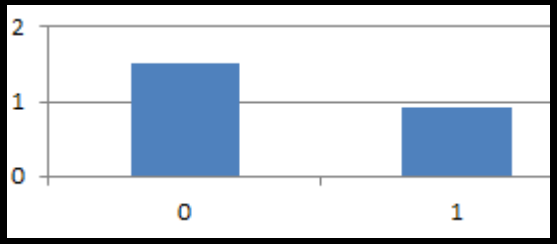


Gulls



Small Shorebirds



Medium Shorebirds

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Research Questions

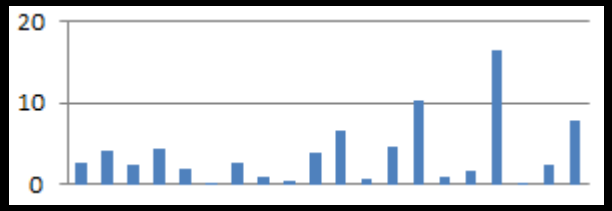
2. Is there a higher density of waterbirds in ponds that have more island area?

For Some

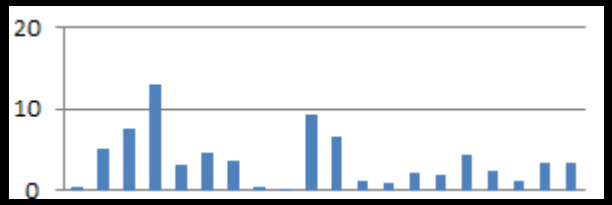
Dabbling ducks had a significantly higher density in winter.
Diving ducks had a significantly lower density in winter.

All other guilds had no significant difference in density in both seasons .

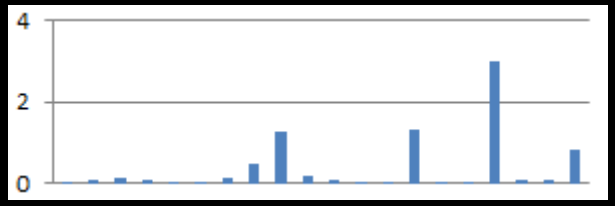
Mean Birds in Ponds of Increasing Island Area
Winter, Density



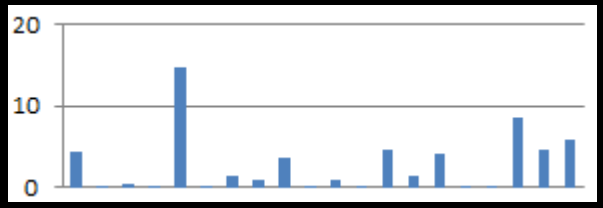
Dabbling Ducks



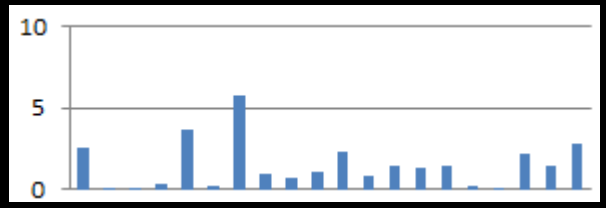
Diving Ducks



Gulls



Small Shorebirds



Medium Shorebirds

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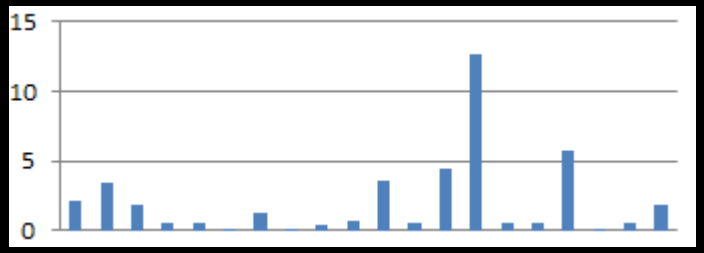
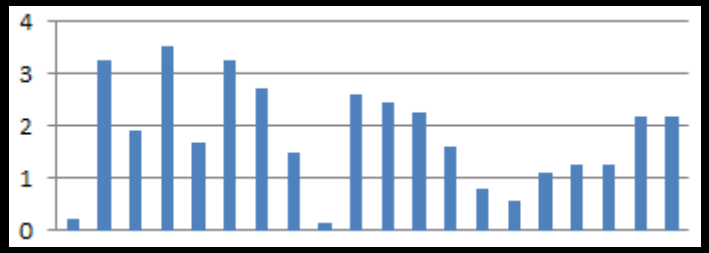
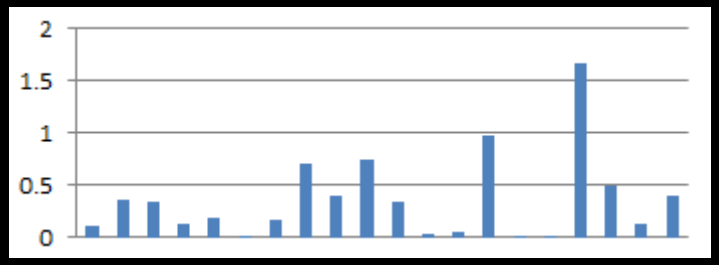
Mean Birds in Ponds of Increasing Island Area Spring, Density



Dabbling Ducks



Diving Ducks



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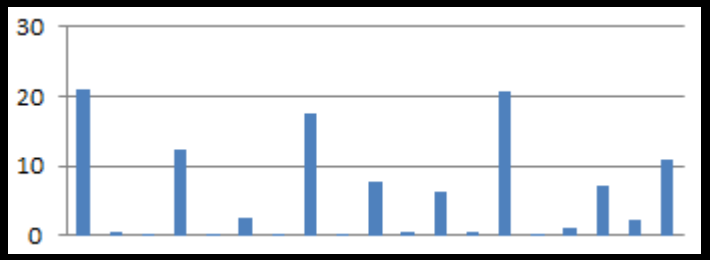
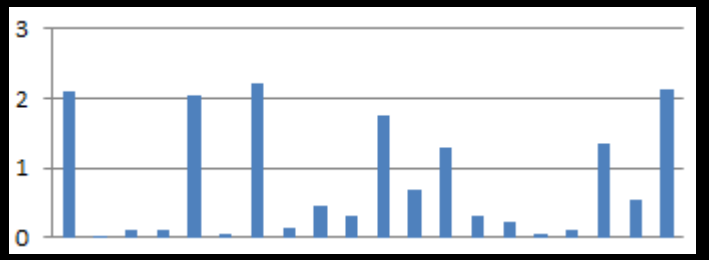


Small Shorebirds



Medium Shorebirds

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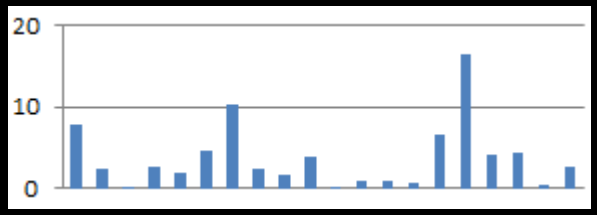
Research Questions

3. Is there a higher density of waterbirds in ponds that have a higher island perimeter to area ratio?

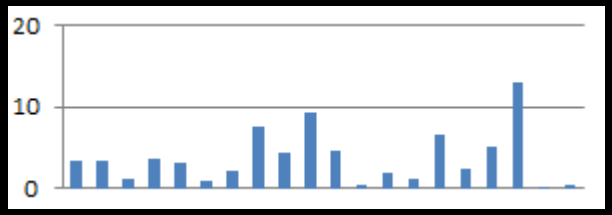
No

All guilds had no significant difference in density.

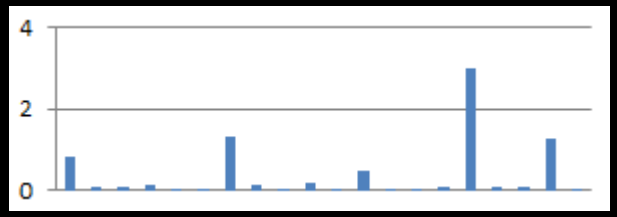
Mean Birds in Ponds of Increasing Perimeter to Area Ratio – Winter, Density



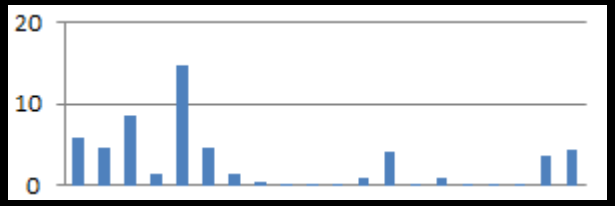
Dabbling Ducks



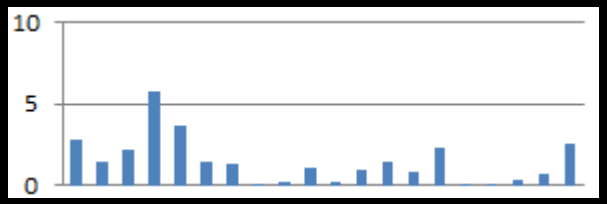
Diving Ducks



Gulls



Small Shorebirds



Medium Shorebirds

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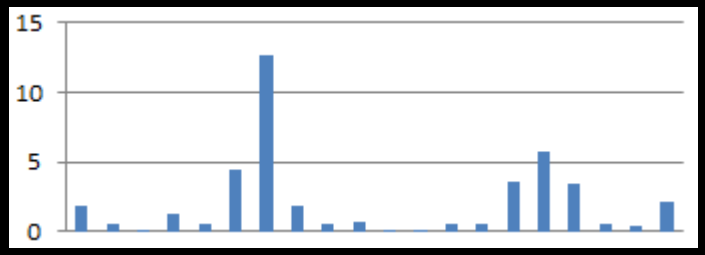
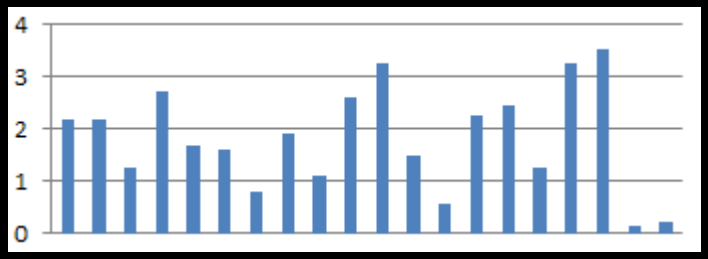
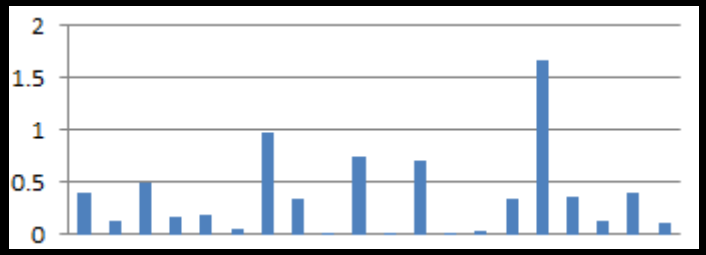
Mean Birds in Ponds of increasing Perimeter to Area Ratio – Spring, Density



Dabbling Ducks



Diving Ducks



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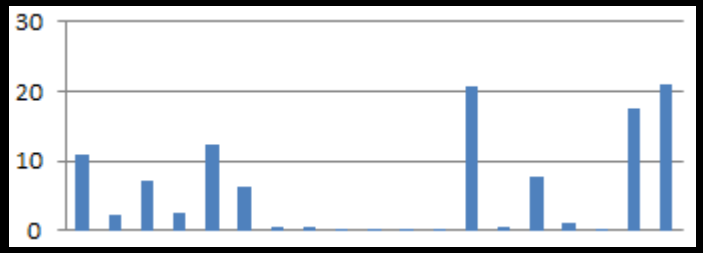
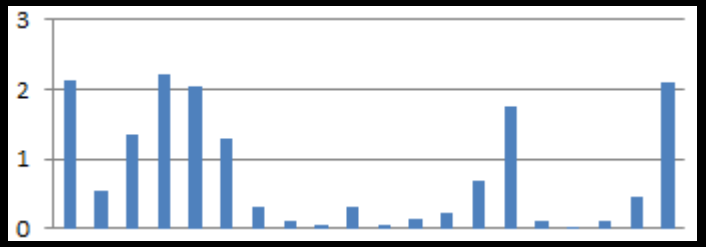


Small Shorebirds



Medium Shorebirds

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What factors explain the density of waterbirds on islands?

- Waterbird density on specific islands
- Island characteristics
  - Perimeter to area ratio
  - Size
  - Shape
  - Distance to bay
  - Distance to levee
  - Elevation, Slope, Aspect

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Conclusions

1. Ducks have a higher density in ponds with islands.

2. Shorebirds have a lower density in ponds with islands.

3. In general islands may be a valuable attribute of managed ponds.

4. If we can figure out the island features that are best for birds we can increase bird density within ponds.

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Acknowledgments

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Collaborators: SFBBO, PRBO, Moss Landing Marine Labs, San Jose State University & San Francisco State University

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Thank You