Effects of management on avian populations in the South Bay salt ponds: density changes from 2003-2010

L. Arriana Brand[1], John Takekawa[1], Jill Bluso-Demers[2], Joel Shinn[1], Nicole Athearn[3], Caitlin Robinson-Nilsen[2], and Cheryl Strong[4]

USGS science for a changing world

SAN FRANCISCO BAY BIRD OBSERVATORY

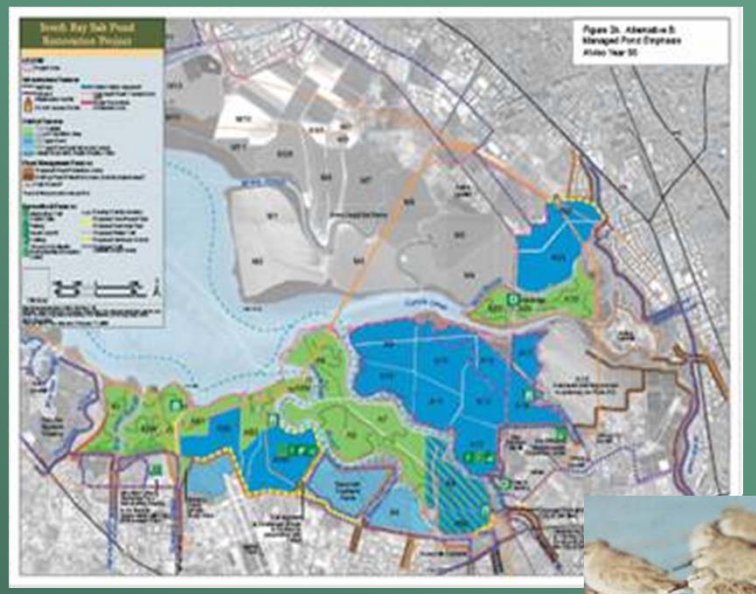
U.S. FISH & WILDLIFE SERVICE

[1] U. S. Geological Survey
[2] San Francisco Bay Bird Observatory
[3] U. S. Fish and Wildlife Service, Arcata
[4] U. S. Fish and Wildlife Service, Newark

South Bay Salt Pond Restoration Project

50-90% of salt ponds to be converted to marsh

Tidal Marsh

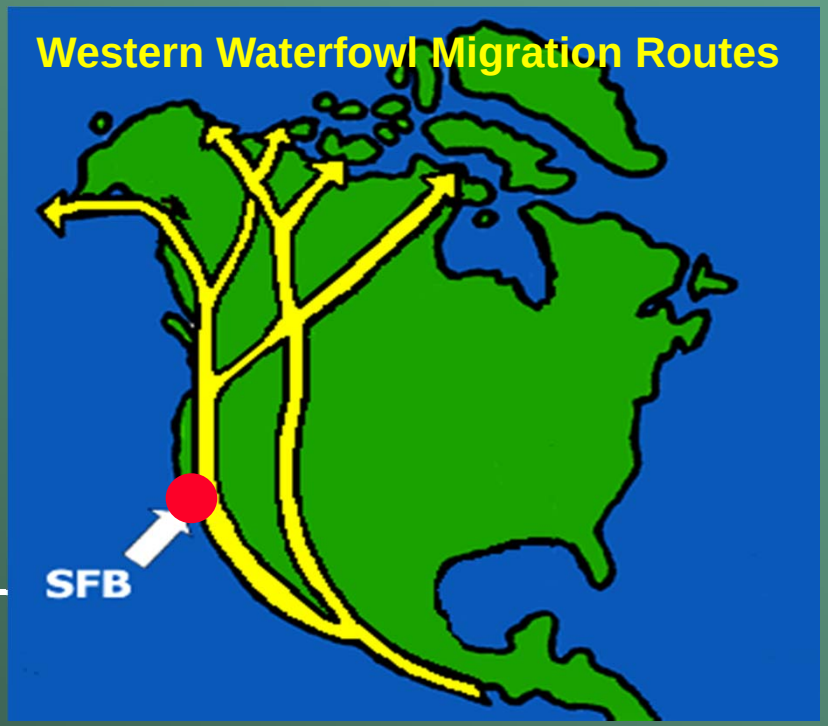


Managed Pond

USGS

Critical region for migratory birds

- *Pacific flyway - 20% of North American waterfowl in the Central Valley & SF Bay*
- *Western Hemispheric Shorebird Reserve Network*

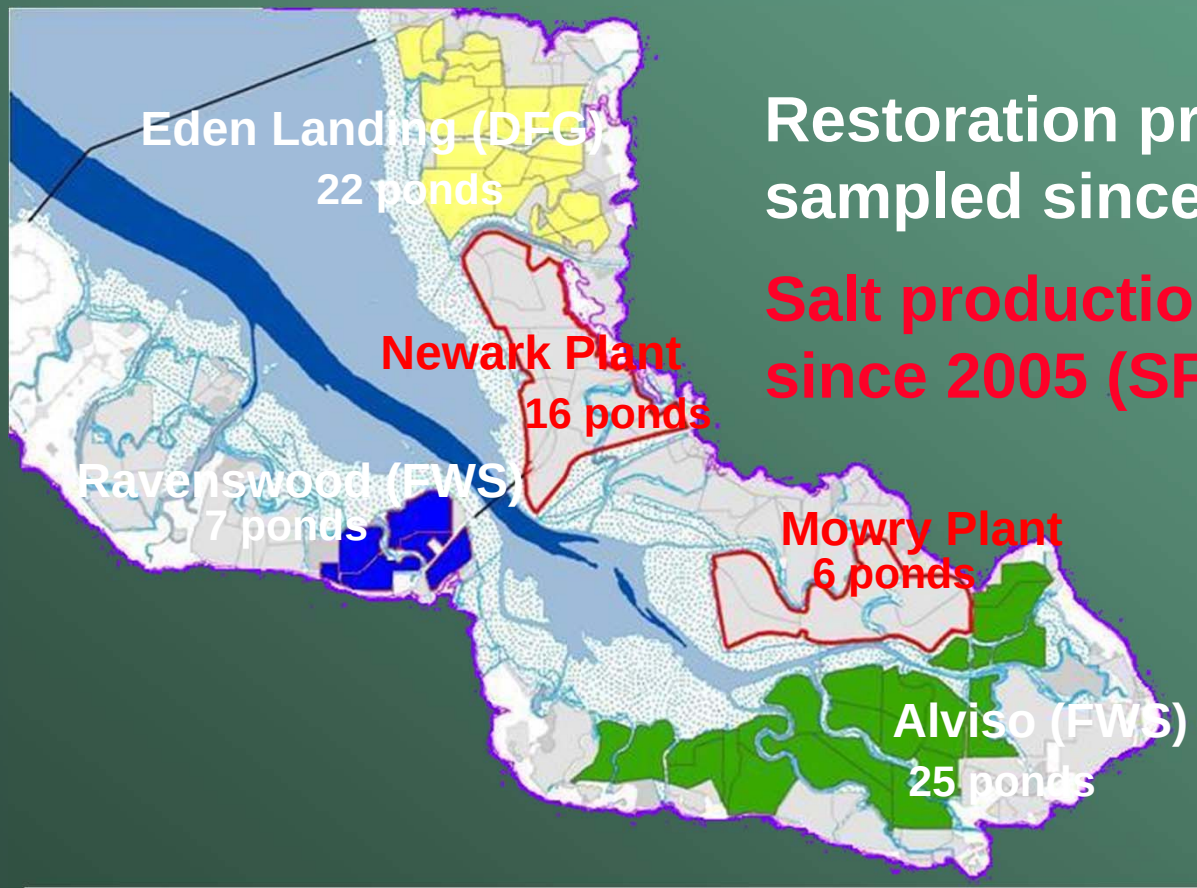


Central challenge:

How to maintain waterbird populations in a reduced area?

USGS

South Bay Salt Ponds



Restoration project ponds sampled since 2002 (USGS)

Salt production ponds sampled since 2005 (SFBBO)

USGS

Questions

- Do production ponds support similar avian densities to restored ponds?
- How have avian densities changed over time in production vs. restored ponds?
- What factors may be influencing these patterns?

USGS

Methods

Data collection

- Monthly counts at HT
- 250-m grid overlay

Data analysis

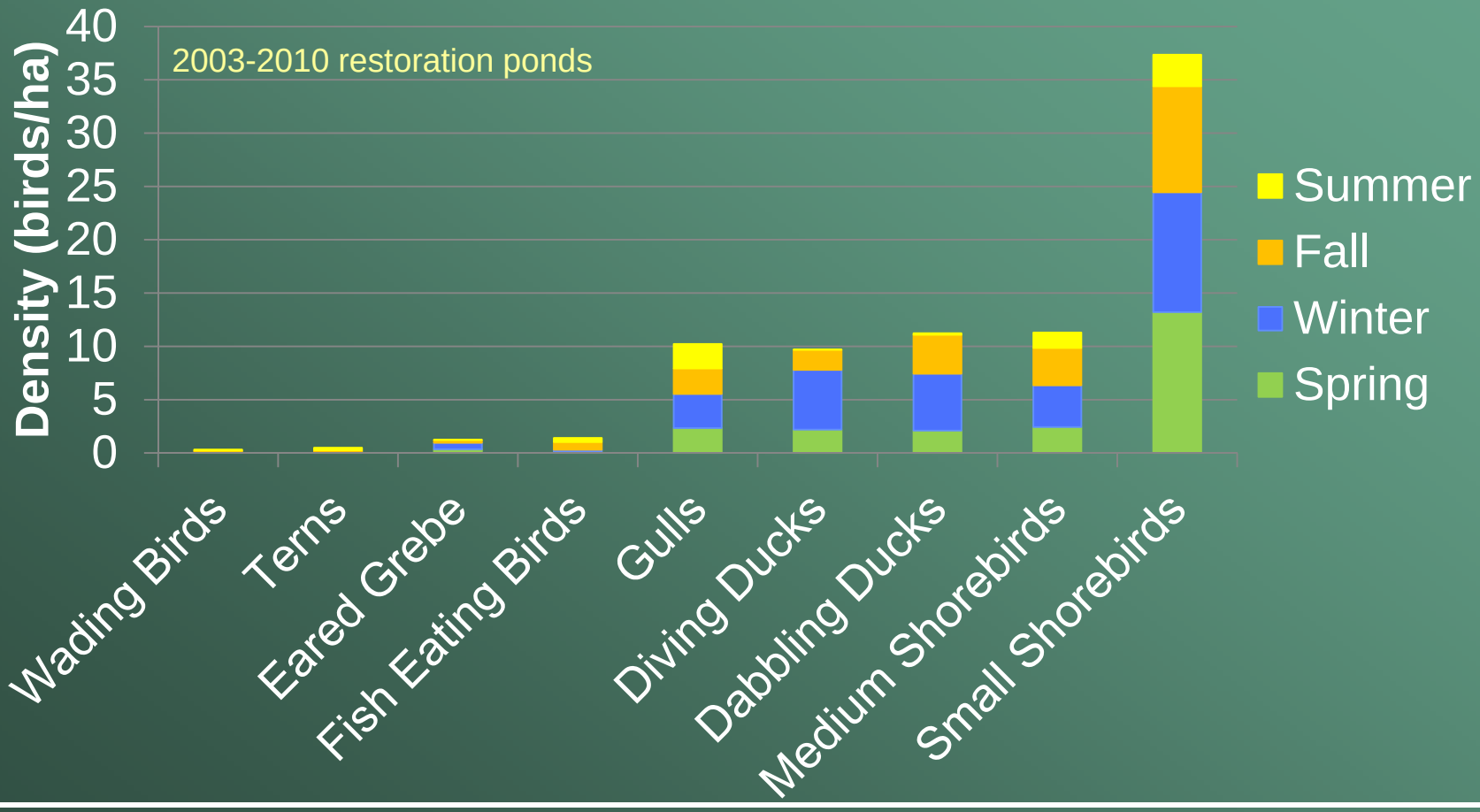
- Aggregate to pond scale
- Generalized LS regression for clustered data with pond random effect
- Monthly sequence as time series variable

USGS

Avian Guilds

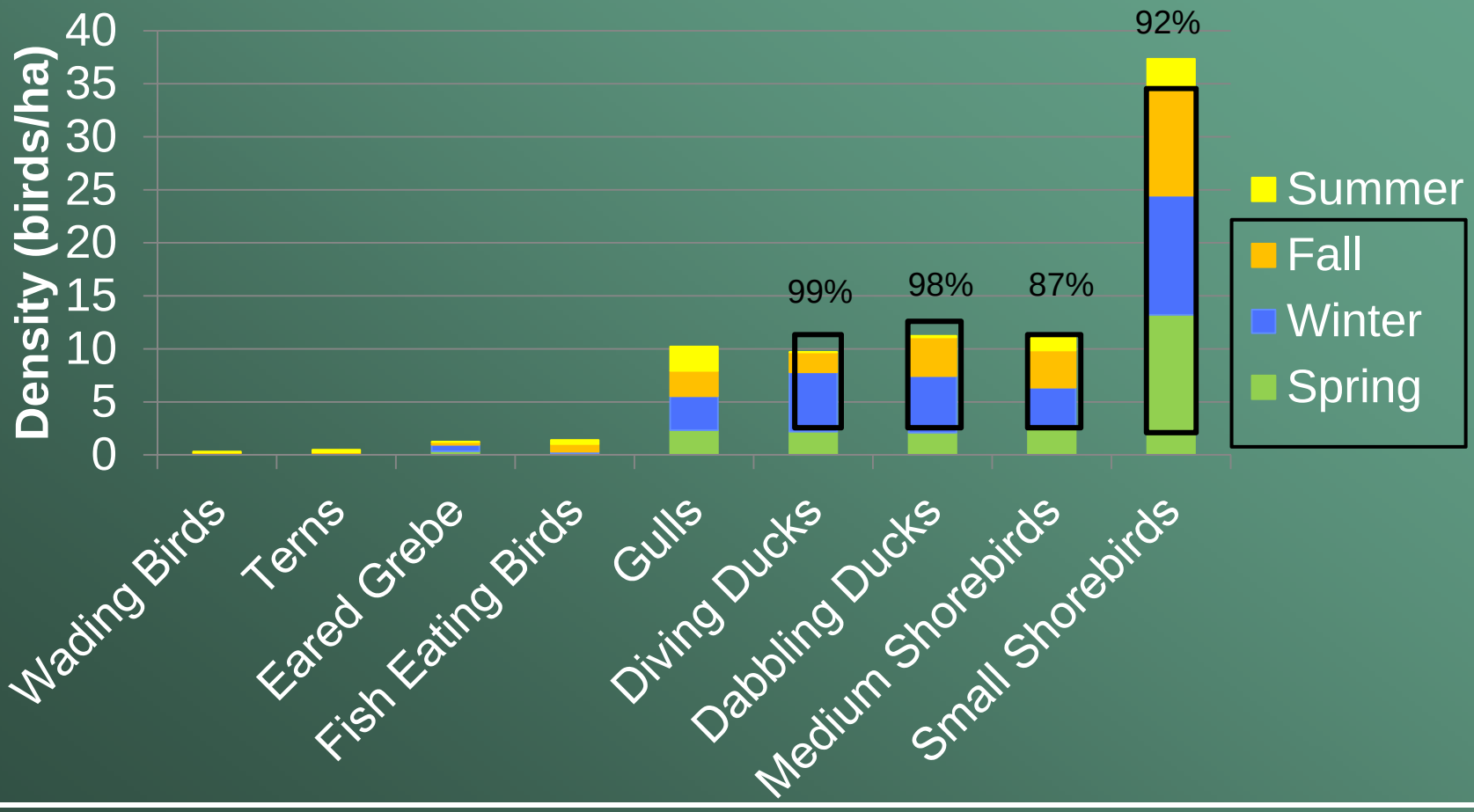
Drawing adapted from Warnock 2004

Avian guilds by season



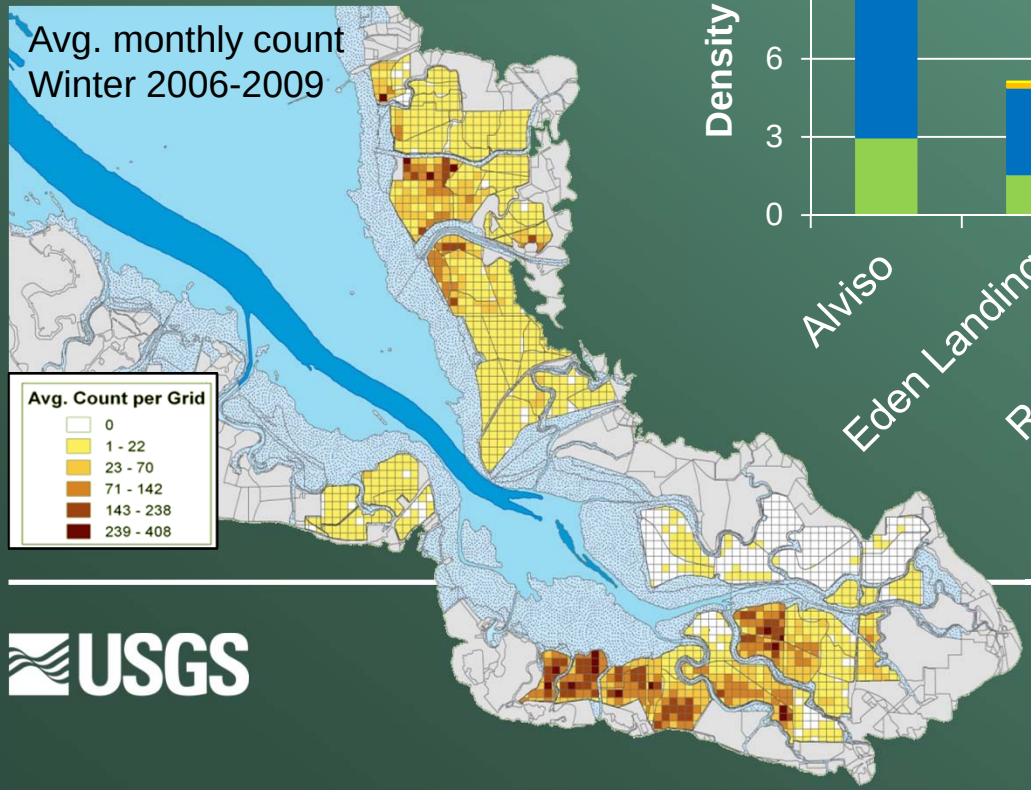
USGS

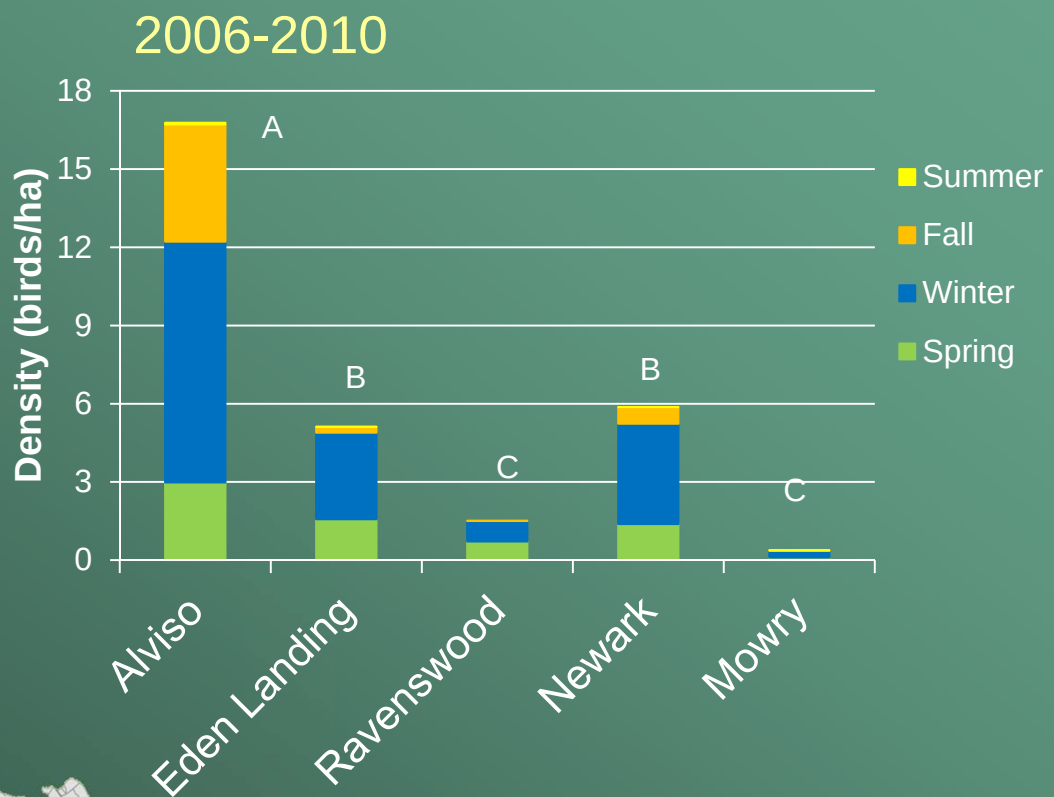
Avian guilds by season



USGS

Diving duck – restored vs. production

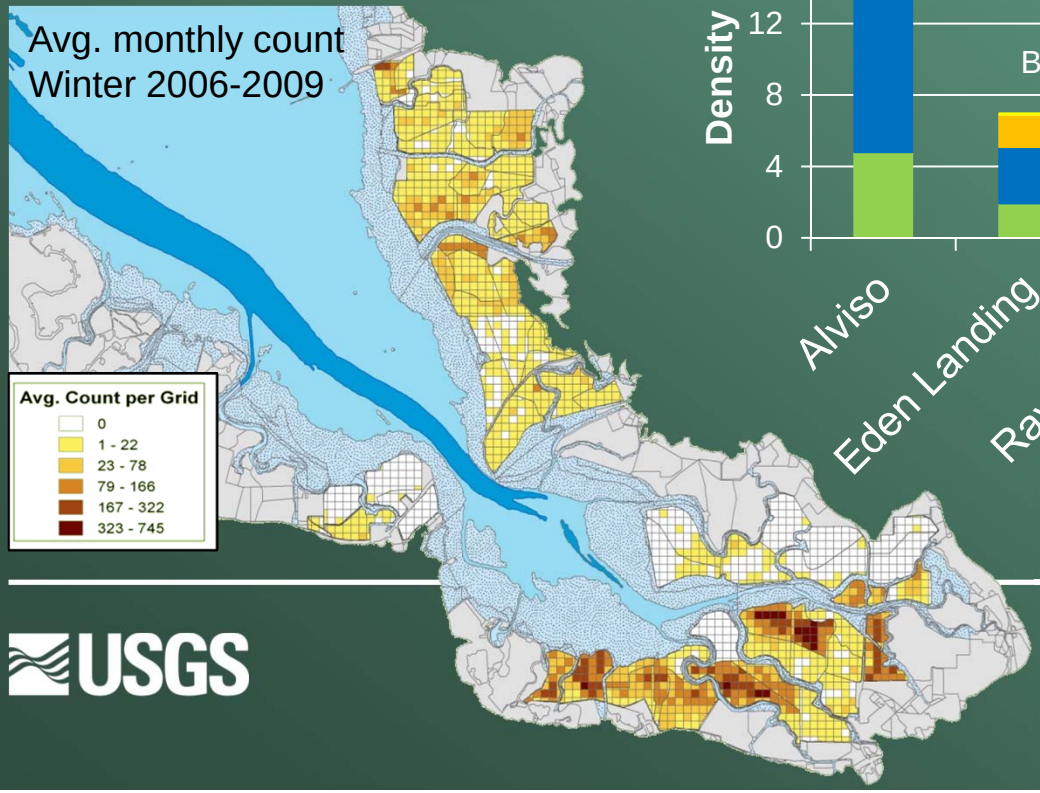


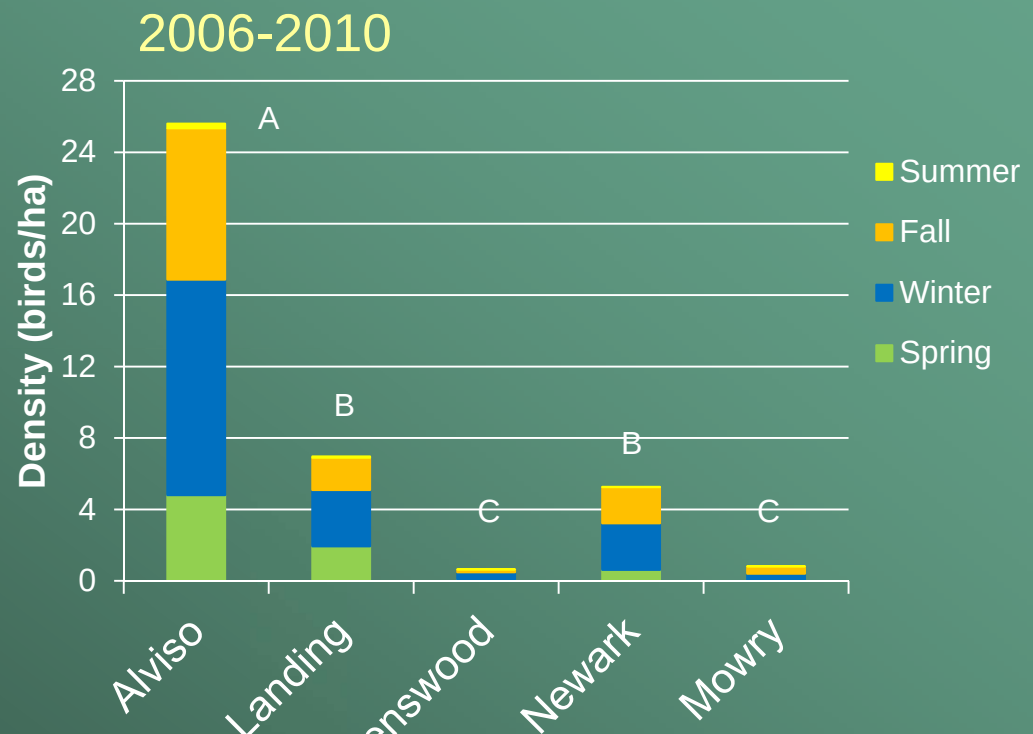


USGS

Preliminary results from Athearn et al. (in review)

Dabbling duck– restored vs. production

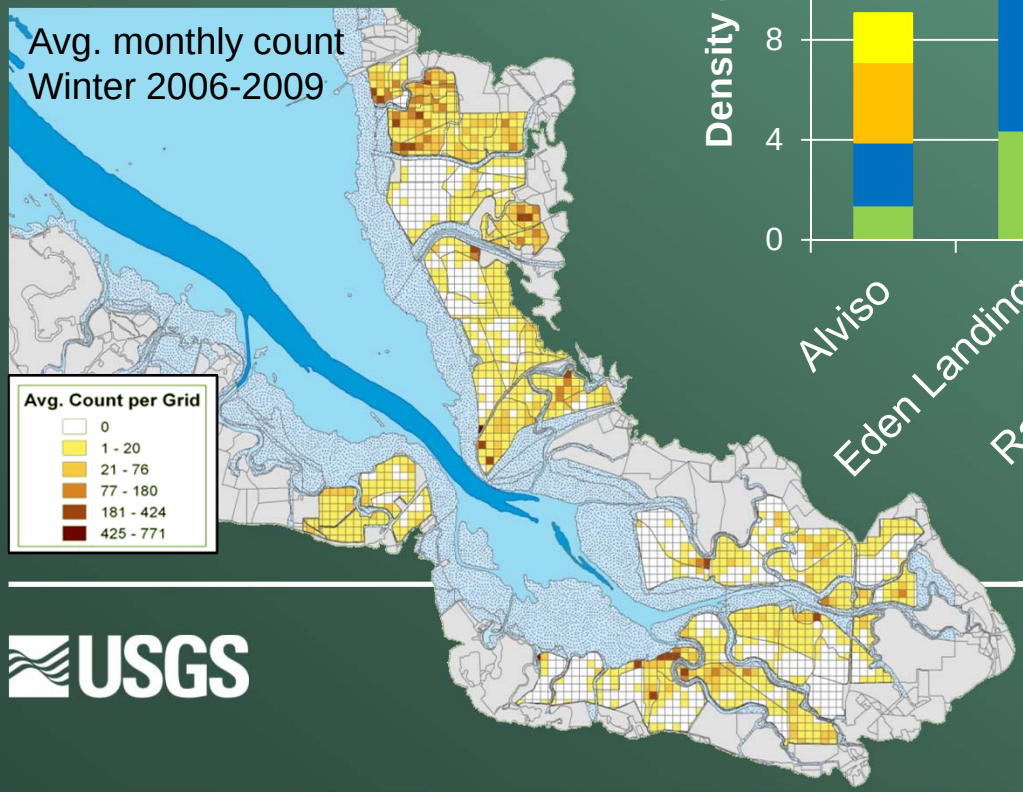


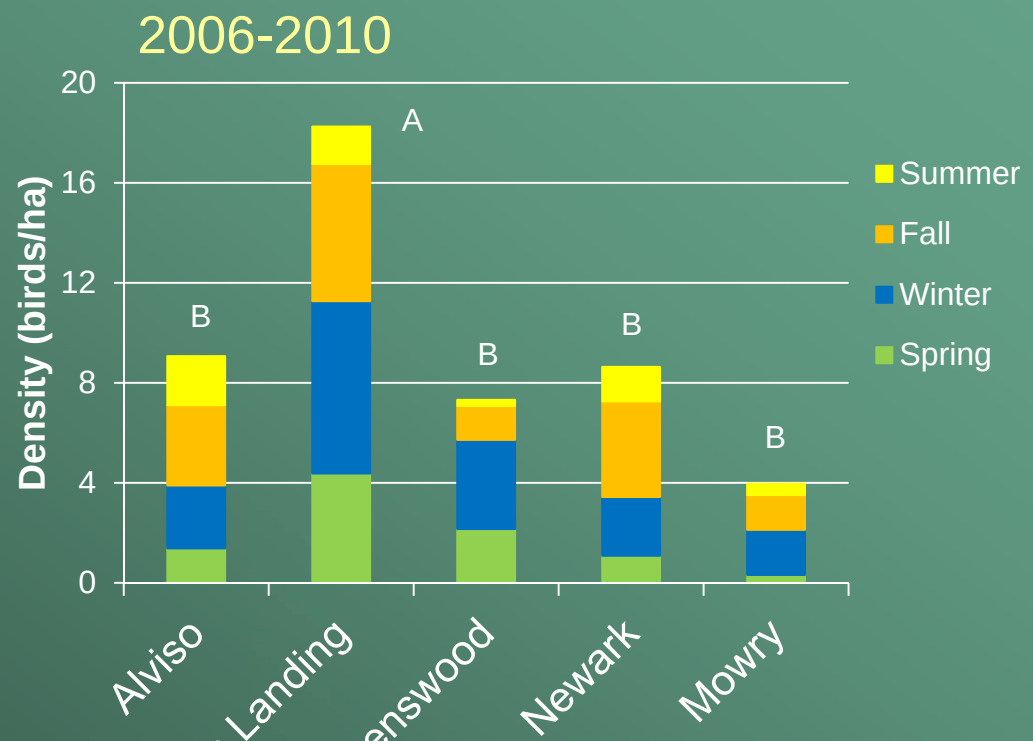


USGS

Preliminary results from Athearn et al. (in review)

Med. shorebird – restored vs. production

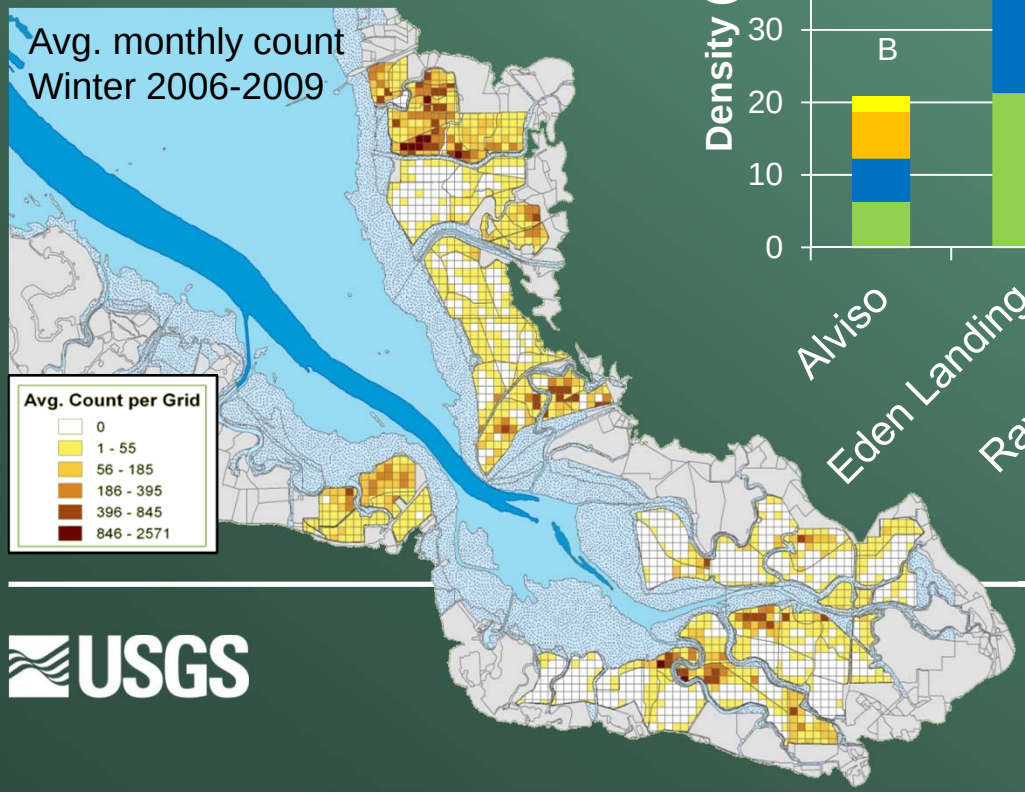


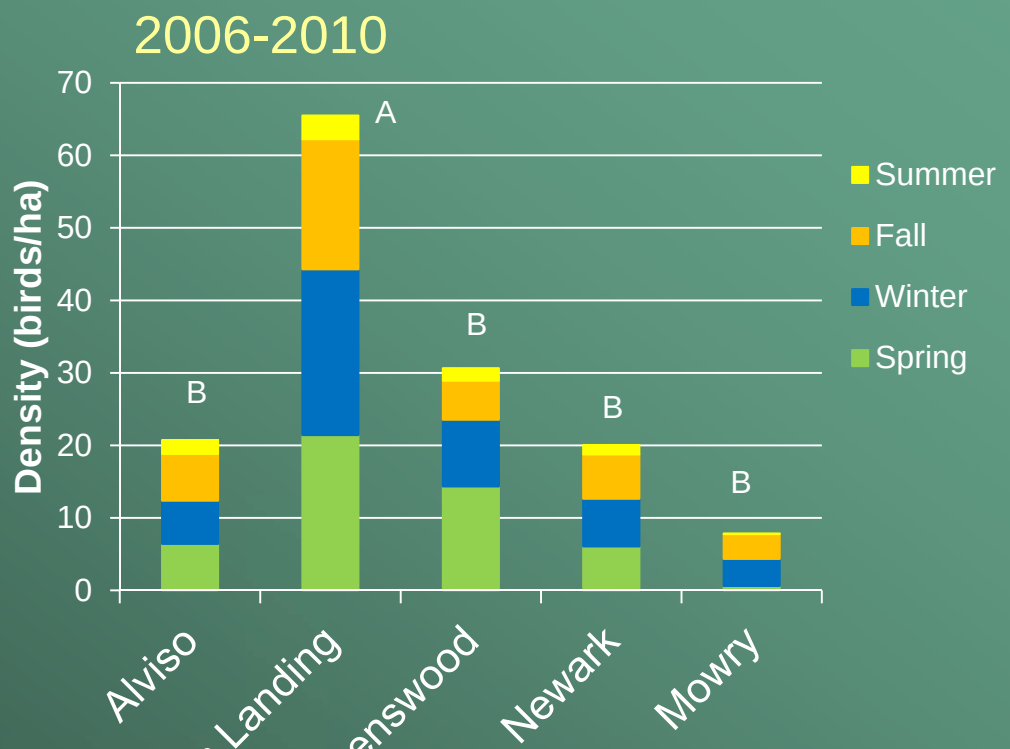


USGS

Preliminary results from Athearn et al. (in review)

Sm. shorebird – restored vs. production

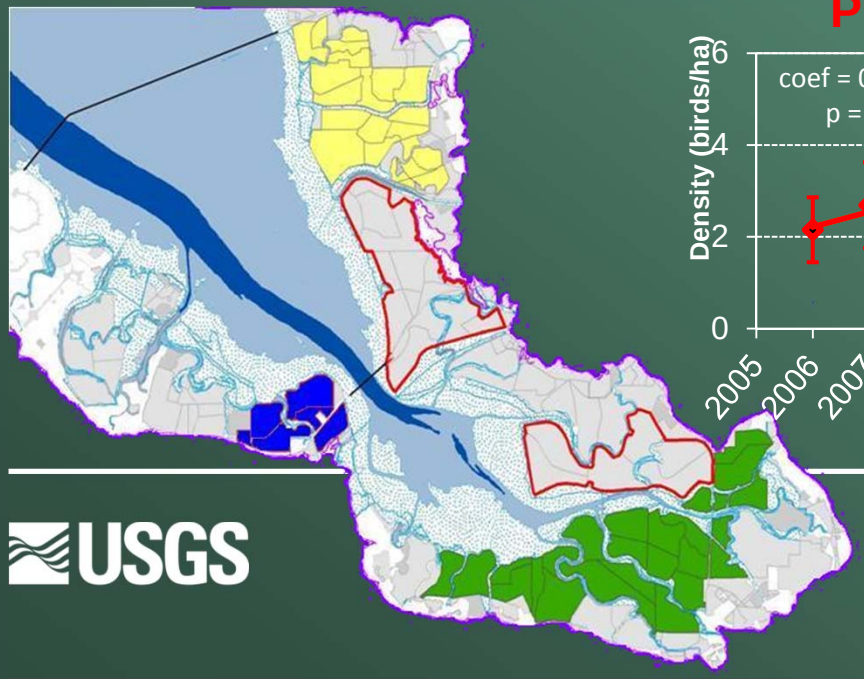


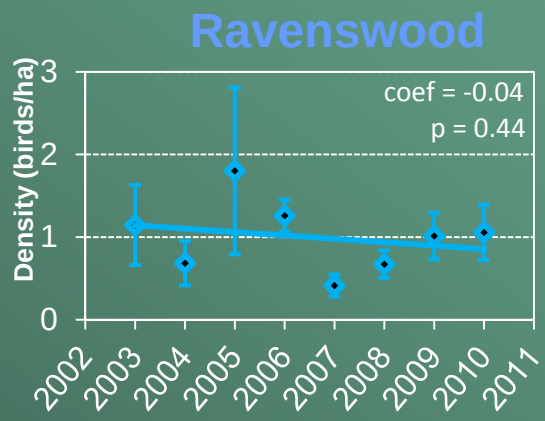


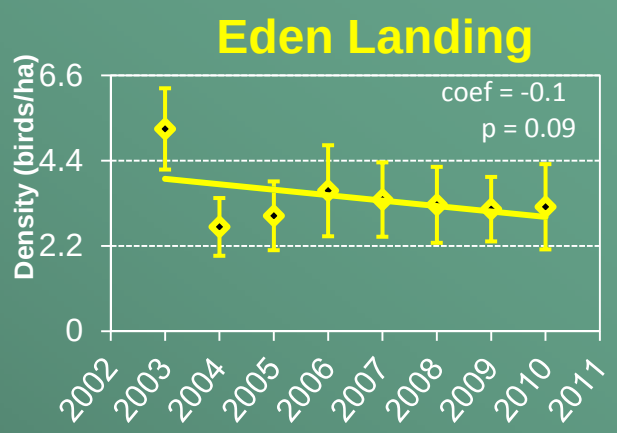
USGS

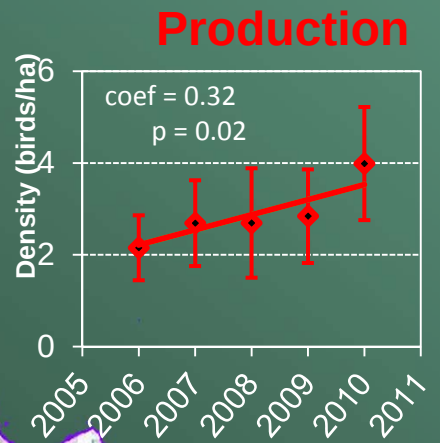
Preliminary results from Athearn et al. (in review)

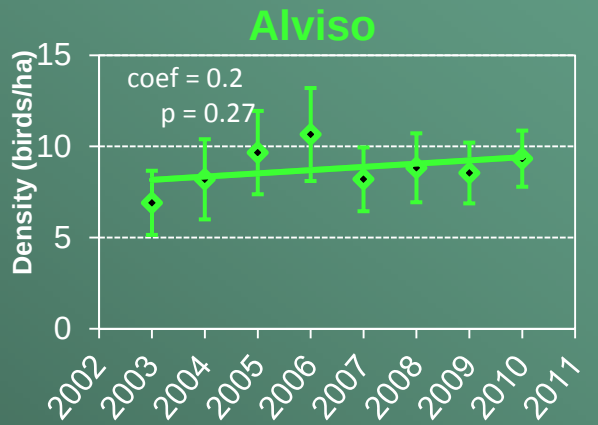
Diving duck trends 2003-2010







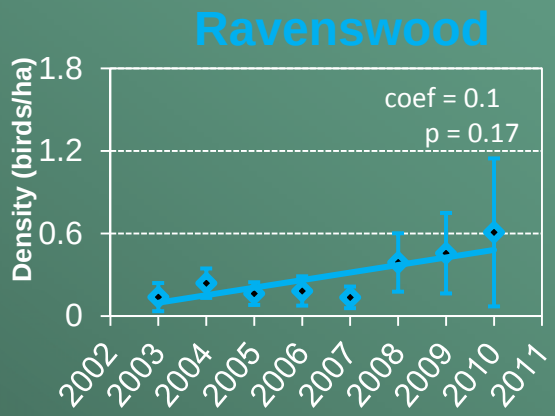


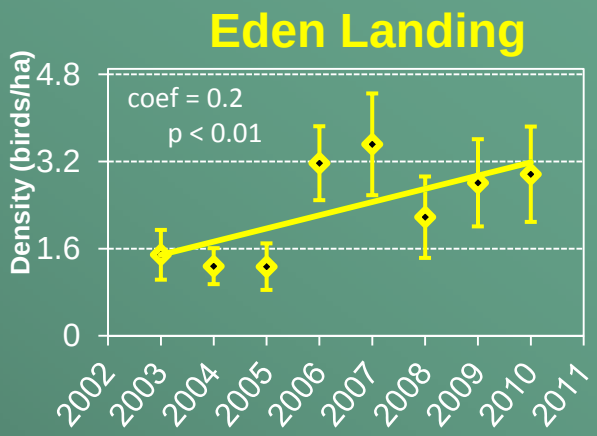


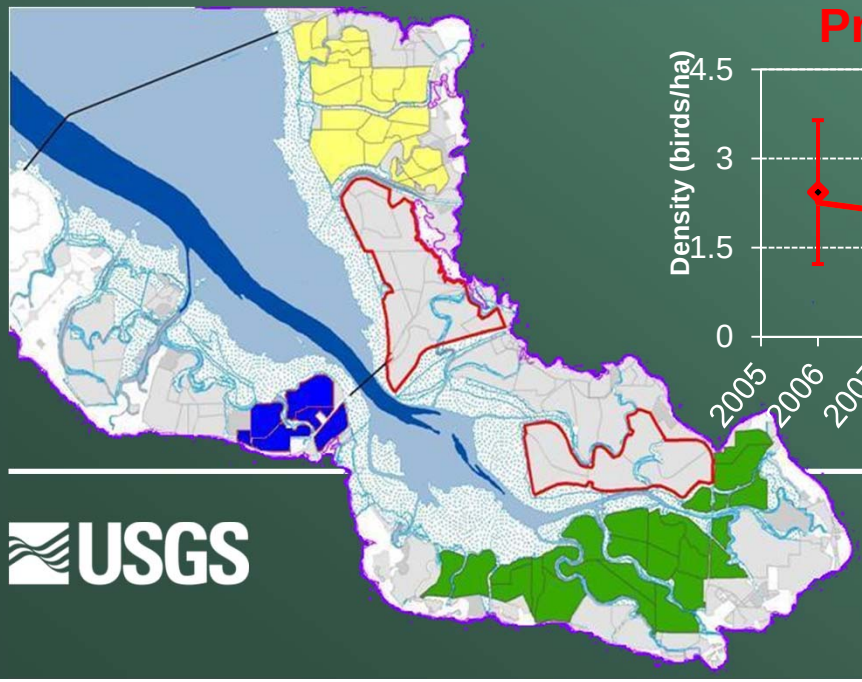
USGS

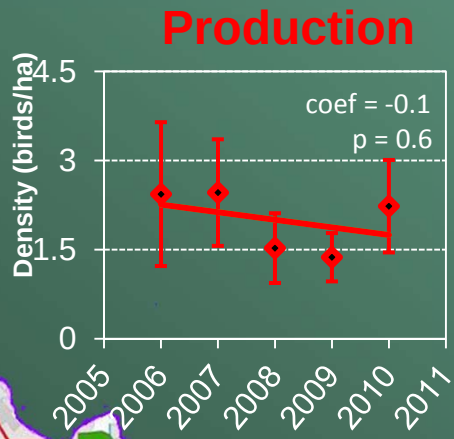
Preliminary results from Brand et al. (in prep)

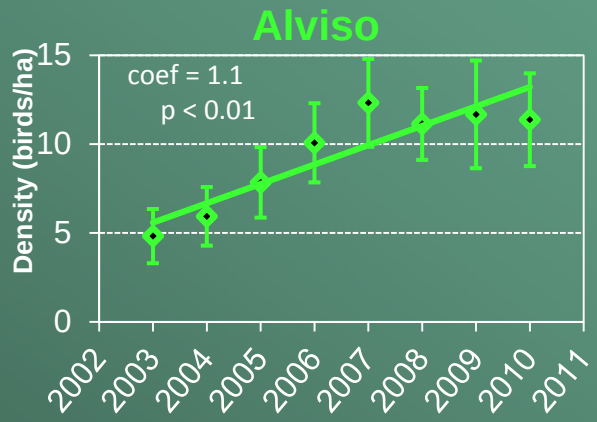
Dabbling duck trends 2003-2010







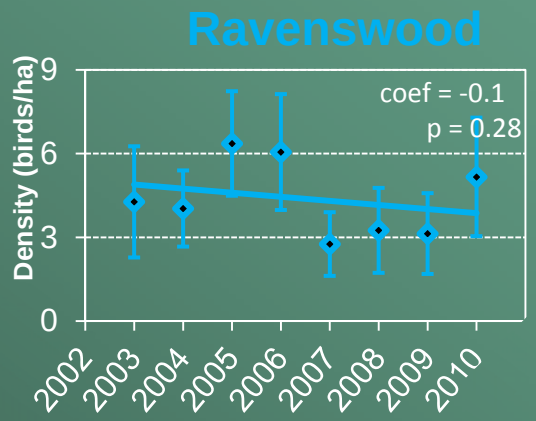


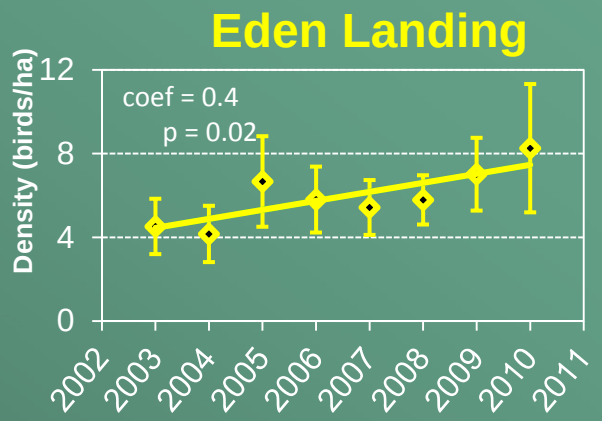


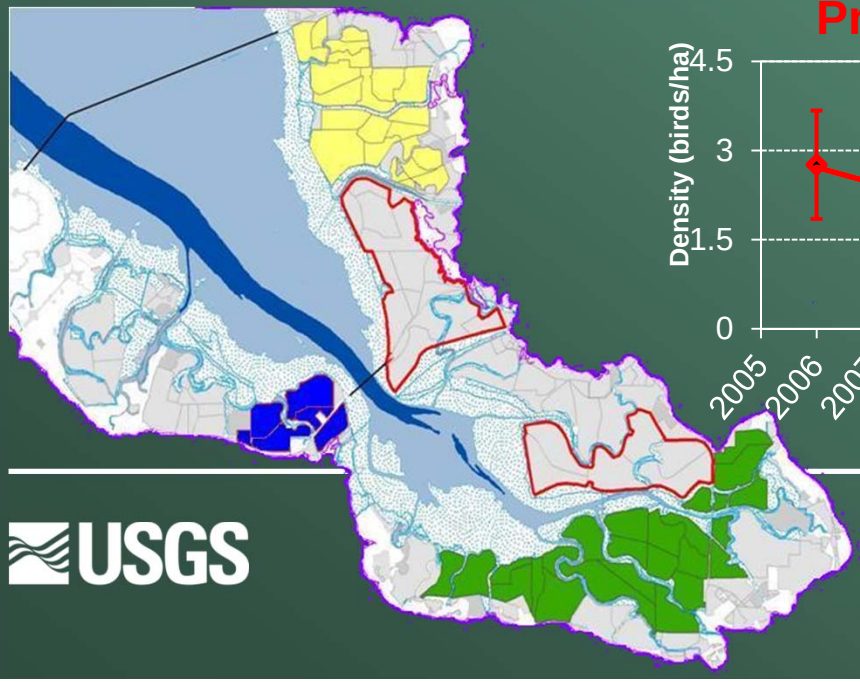
USGS

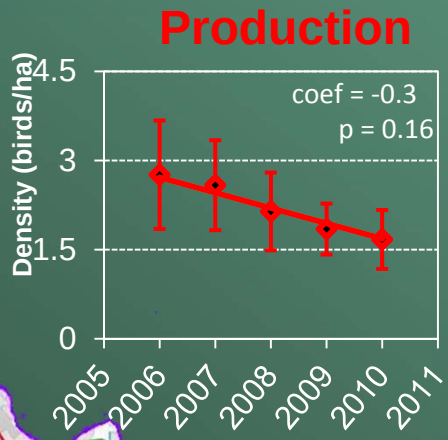
Preliminary results from Brand et al. (in prep)

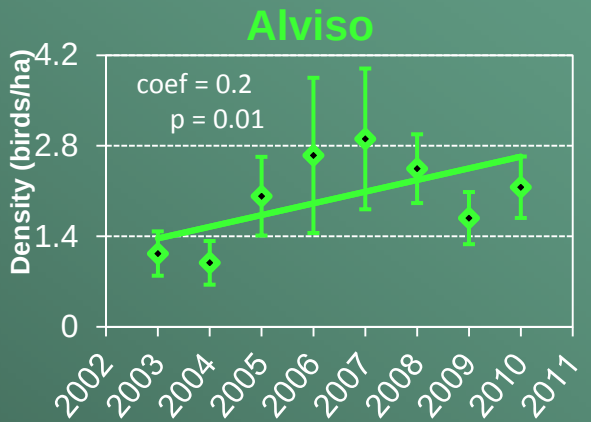
Medium shorebird trends 2003-2010







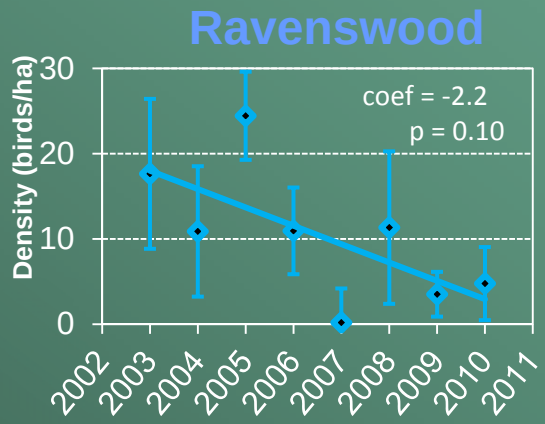


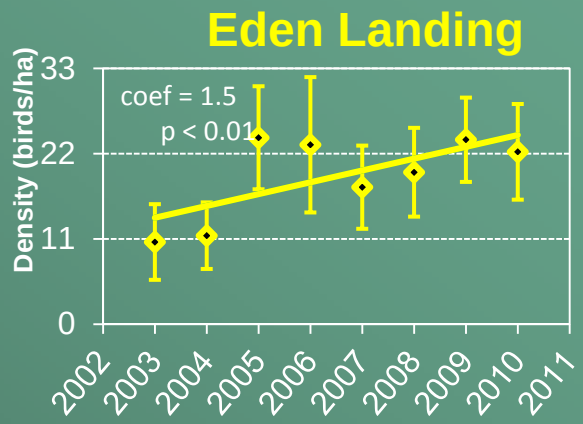


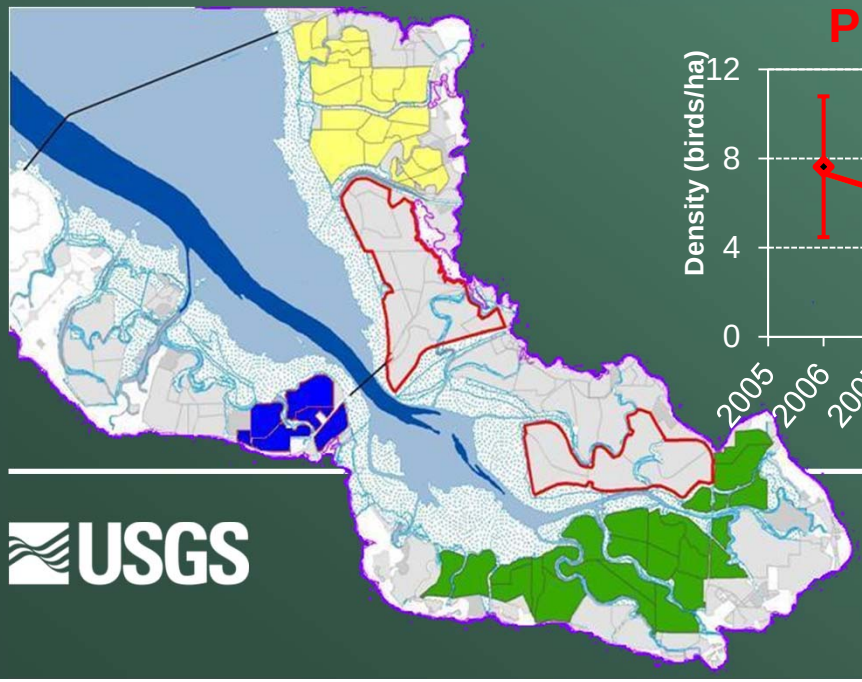
USGS

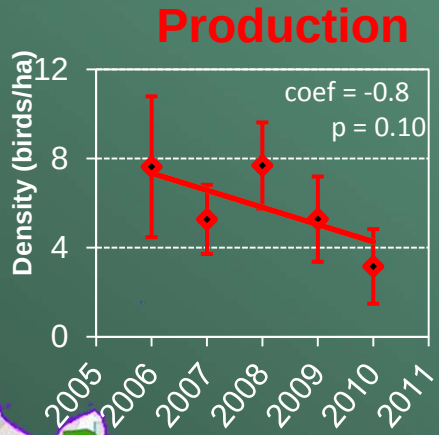
Preliminary results from Brand et al. (in prep)

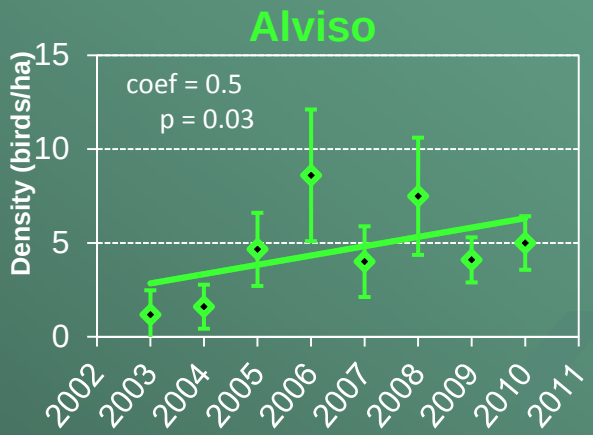
Small shorebird trends 2003-2010











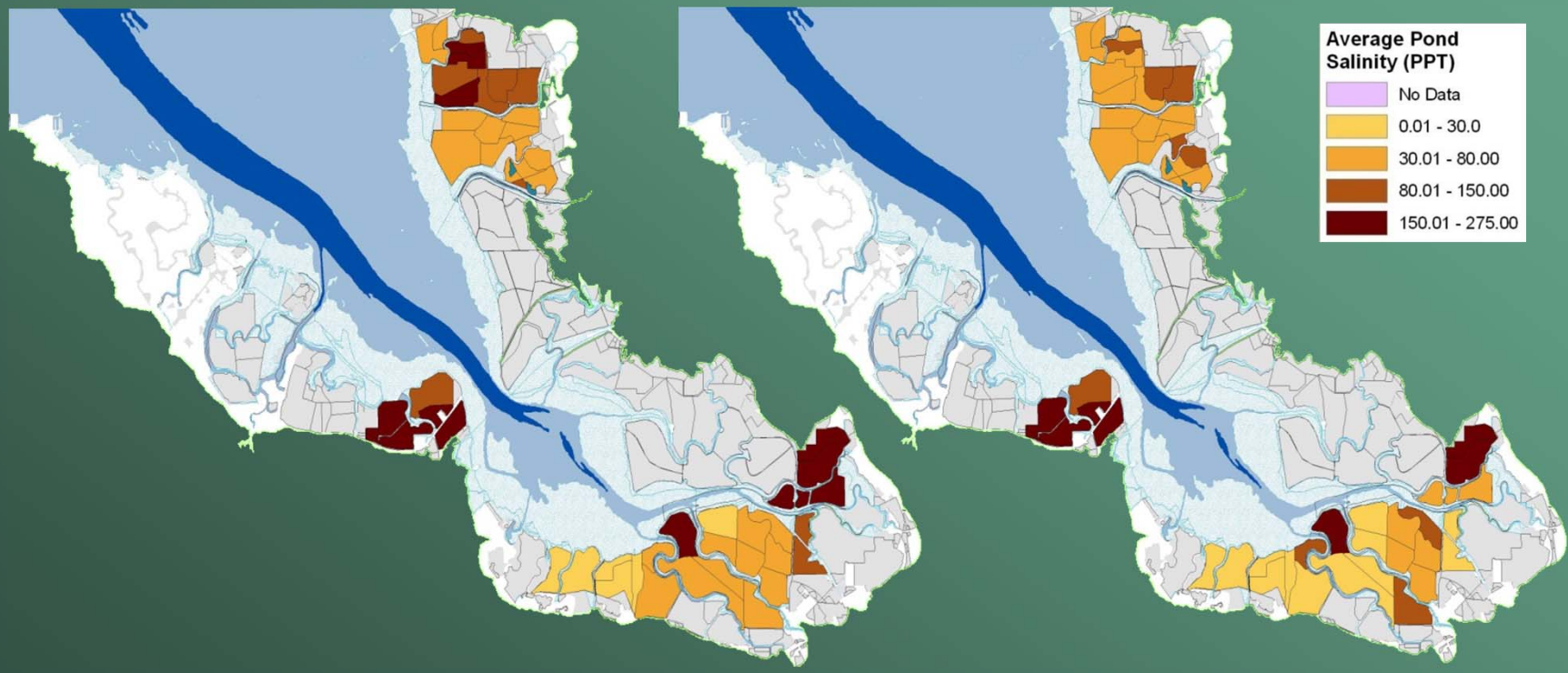
USGS

Preliminary results from Brand et al. (in prep)

Changing Pond Salinities

Salinity (2003-2004)

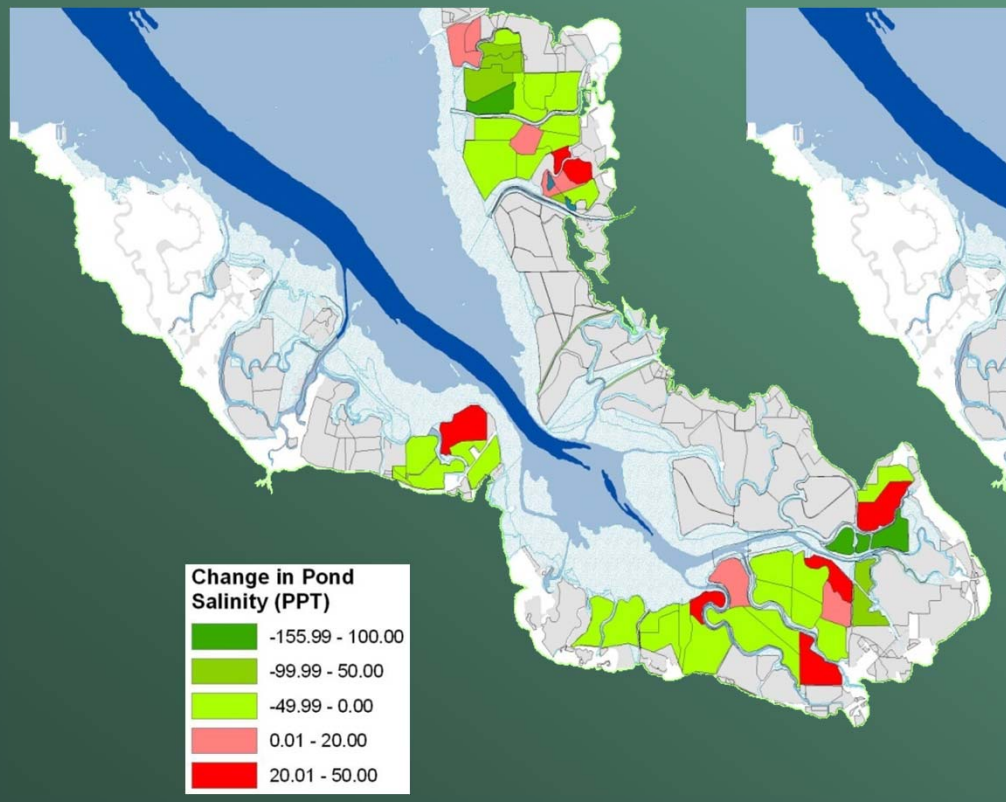
Salinity (2005-2008)



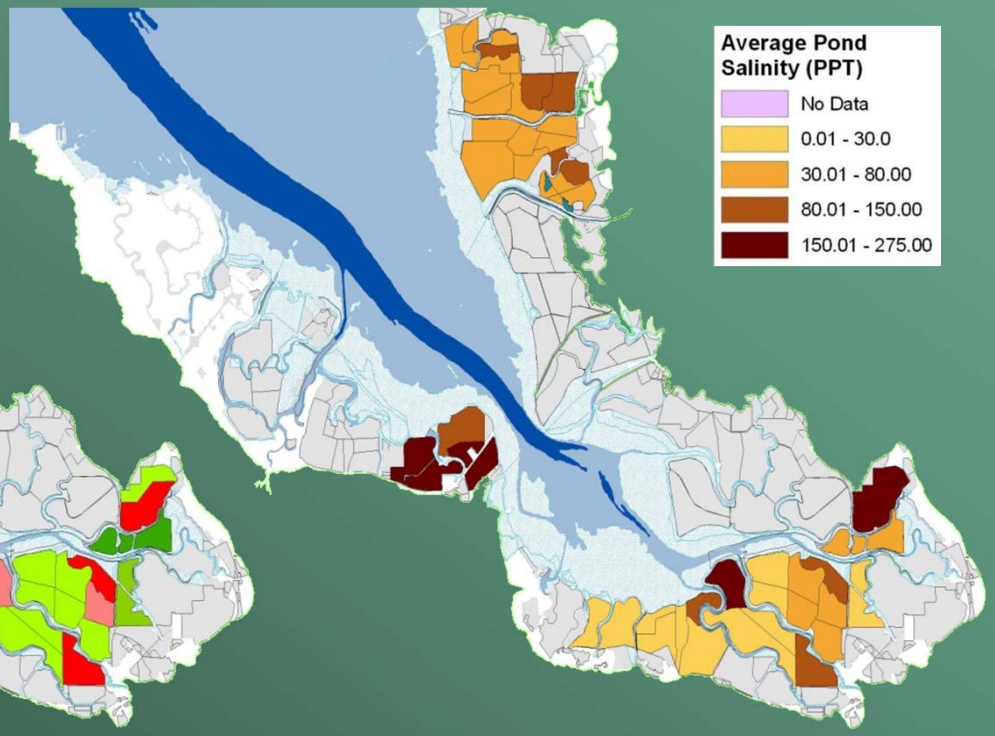
USGS

Changing Pond Salinities

Salinity Change

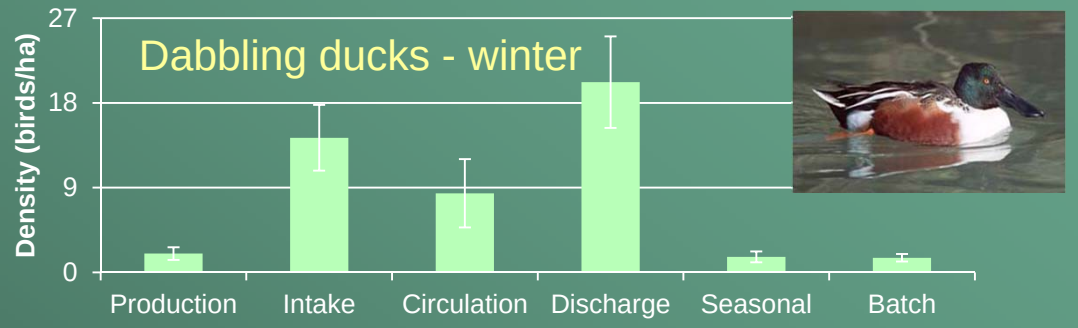


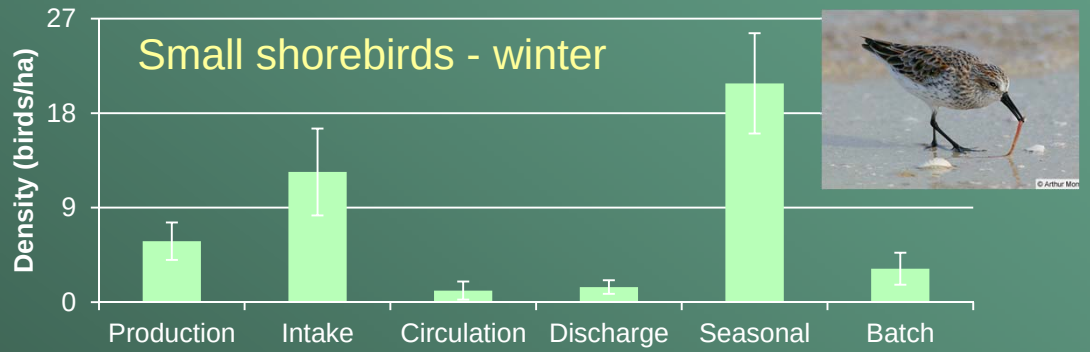
Salinity (2005-2008)

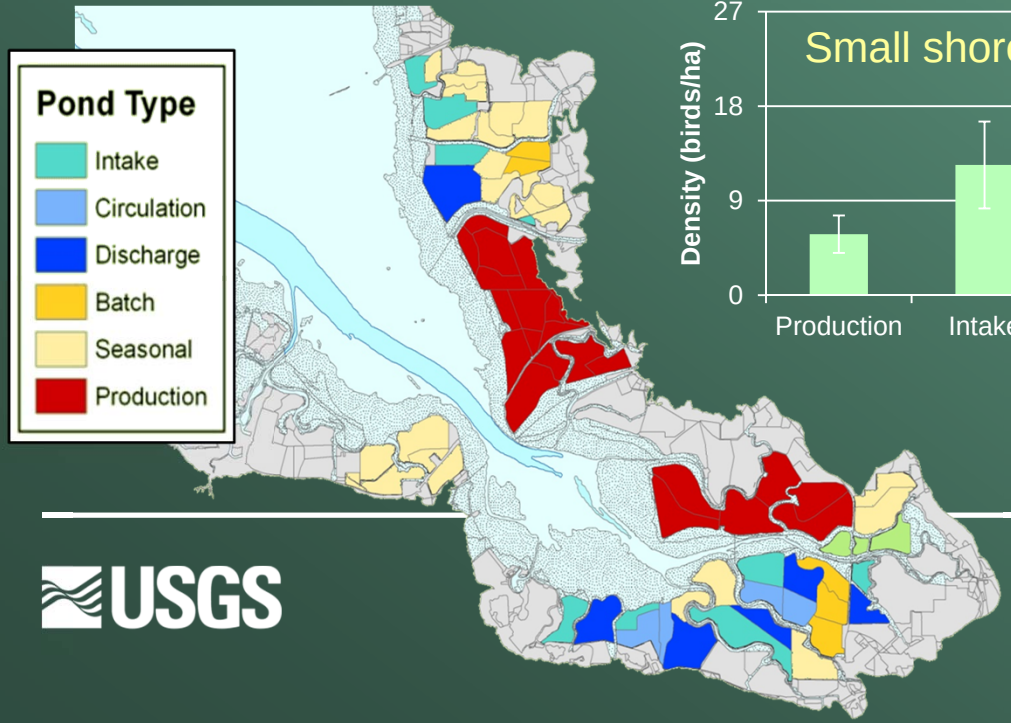


USGS

Pond management types







USGS

Preliminary results from Brand et al. (in prep)

Conclusions

- Production ponds contain lower densities compared with ducks in Alviso and shorebirds in Eden Landing
- Density trends vary by pond complex
- Dabbling ducks, med. and small shorebirds densities have increased in restoration ponds

USGS

Future studies

- Need to quantify what factors influence bird density patterns in order to best manage reduced salt pond habitat for birds:
  - Water depth
  - Salinity
  - Dissolved oxygen
  - Prey resources
  - Proximity to islands and levees
  - Landscape context

USGS

Contact:
arriana_brand@usgs.gov