Tidal Marsh Birds: Indicators of Habitat Quality of the Wetland/Upland Transition Zone

Nadav Nur, Julian Wood, Megan Elrod, Leia Giambastiani, and Isaiah Thalmayer, Point Blue Conservation Science, Donna Ball, Save The Bay, David Thomson, San Francisco Bay Bird Observatory 22 October 2019, State of the Estuary Conference

Point Blue



SAN FRANCISCO BAY BIRD OBSERVATORY

Many species dependent on Tidal Marsh habitat Endangered, Threatened, and Species of Special Concern Some are endemic to the SF Estuary





Photo: Peter LaTourrette

Saltmarsh Common Yellowthroat Saltmarsh Harvest Mouse

Tidal Marsh Song Sparrow

Principal Threats to Tidal Marsh Wildlife

• Habitat Loss, Degradation





Principal Threats to Tidal Marsh Wildlife

• Habitat Loss, Degradation





Principal Threats to Tidal Marsh Wildlife

- Habitat Loss, Degradation
- Sea-level Rise
- Extreme storms (winter, breeding season)
- Other climate change (Temperature, Precipitation)
- Non-native predators
- Invasive Species
- Loss of transition zone







Importance of Healthy Transition Zone

- Refugia or cover from extreme tides
- Shoreline stabilization
- Habitat for other spp. (pollinators, etc.)
- Yet currently little natural transition zone in the SF Estuary;
- 95% of natural transition zone lost or altered
- mostly levees, often with little vegetation.

A 'complete marsh' system requires healthy upland and transition zone



WHAT WECAN DO











Habitat Restoration

Restoration of tidal marsh: breaching levees

- Salt ponds (e.g., South Bay Salt Ponds)
- Agricultural land, duck clubs



Restoration of the upland/marsh transition zone

• Planting, seeding







Indicator Species to Guide Restoration

What habitat characteristics and landscape features best support robust wildlife populations? We have addressed this question with regard to:

- Tidal marsh habitat
- Transition zone habitat

Thus, we use wildlife to assess habitat quality, in and adjacent to tidal marsh.

What should restored marshes and adjacent transition zones look like to best provide for wildlife?

• What features?

How can we measure success of restoration (and learn what works and what doesn't)?



What have we learned to guide Tidal Marsh restoration?

Vegetation structure, height important

- Dense vegetation, + (Black Rail)
- Tall vegetation, + (Saltmarsh Yellowthroat)

Marsh size and shape important Large, + (Black Rail) Compact (spherical) marshes, + (Ridgway's Rail)

Reduce access to predators

Adjacent Landuse important Natural Uplands, +, Agriculture - (Song Sparrow)









What have we learned regarding Tidal Marsh restoration?

Time course





Similar results for Common Yellowthroat and Ridgway's Rail. Takes 30-40 years or more to see full response.

Thus, 30+ years to attain quality habitat for this and other species



Information Needed to Inform Transition Zone Restoration

- Many recent and current projects restoring transition zone ("Tzone") throughout SF Estuary.
- Design of new Tzone underway at to-be-restored tidal marshes.
- What should these look like to maximize benefit to wildlife?
- No monitoring programs in place to answer this question.



Primary study questions:

Do tidal marsh-dependent birds in the marsh respond to transition zone characteristics?

- If so, which features?
- What is the significance of width and slope of the Tzone?
- Which vegetation characteristics? Specific plant species?

What recommendations can we make based on the above?





Students and Teachers Restoring A Watershed (STRAW)





SAN FRANCISCO BAY BIRD OBSERVATORY



After





Surveys conducted at 16 Sites/46 Plots

Vegetation and Habitat in Transition Zone – Spring/Summer Secretive Marsh Bird Surveys in Tidal Marsh– Ridgway's Rail Tidal Marsh Bird (all Species) in Tidal Marsh - Spring

Do Tidal Marsh Birds in the Marsh Respond to Transition Zone Features? If So, Which Features?

Tidal Marsh Birds - Bird Response Variables

Ridgway's Rail Short-term Trend in Abundance (last 5 years) Song Sparrow Short-term Trend in Abundance (last 5 years)

Rail Trend correlates with mean 5-yr abundance for Rail Song Sparrow Trend correlates with mean 5-yr abundance Song Sparrow

Steven Tucke

Tidal Marsh Song Sparrows: Respond to Dense Vegetation in the Tzone Non-linear response evident

Controlling for tidal marsh age and amount of development, effect of dense veg, P < 0.05.

Ridgway's Rail: Respond to Maximum Veg Height, Width, in Tzone. Non-linear, positive response to Max Height

Trends more positive as height of vegetation increases. Controlling for development, amount of midmarsh, and width (pos).

Tops out at 90-100 cm?

Ridgway's Rail: Respond to Width, Maximum Height, in Tzone Linear Response to Increasing Width

Controlling for development, amount of midmarsh and maximum veg height (pos).

Relationship appears linear

Ridgway's Rail: Respond to Grass cover, Maximum Veg Height in Tzone. Linear, positive response to Grass cover.

Controlling for development, amount of midmarsh and maximum veg height.

Relationship appears linear

Tidal Marsh Birds – Other variables

Tzone slope not correlated with Ridgway's Rail or Song Sparrow Response

 benefit to restore steep slopes because no negative impact seen on tidal-marsh birds

Did not see response to Grindelia per se.

 However height and dense vegetation over 30 cm important, which Grindelia and other species can provide.

No response seen to any specific plant species

Several plant species can provide needed cover

Follow up to these Results

Quandary: Wider Transition zones had more grass cover. Rail population trends were more positive where transition zones were wider/more grass. But which is it? Or is it both? The observational study can only go so far.

A controlled study is called for. Forthcoming study: Evaluating the importance of Grasses compare plots with two different planting designs:

Follow up

At two sites, STRAW program

Comparing efficacy and cost effectiveness of 2 restoration planting designs, with regard to

- providing high quality wildlife habitat
- limiting weed encroachment

Follow up

At each of two sites, compare plots with:

1. all grasses (graminoids)

 Frankenia, Grindelia
Saltgrass
wildrye rhizominous forb combination rhizominous plant combinations ARCA or other woody
shrubs

2. mixed graminoid/shrub/rhizomatous forbs)

xx	x x xx	x	x x x	x xx	x xx	X XX XX
x xx	XX XX	XX X XX	XX XX XX	XX XX XX	XX X XX	XX X XX

Stay tuned for update: State of the Estuary Conference 2021!

Summary: Value and Challenges of Indicator species

- Importance of considering more than a single species
- Song Sparrow and Ridgway's Rails proved to be good indicators species. Complementary.
- But how representative are they?
- Song Sparrow trends + correlate with marsh bird species richness. Where Song Sparrows more abundant, more marsh bird species.
- Challenge: can one or a few species represent a guild?

Implications and Conclusions

- Insights into designing/implementing/prioritizing Tzones:
 - Restore dense vegetation >30 cm
 - Vegetation structure important; not specific species
 - Restore wider transition zones
 - Horizontal levees may provide particular benefits
 - Restoring steep levees may benefit marsh birds
- Restore using controlled design to facilitate comparison
 - Limitations to the observational approach.
- Integration of studies needed: from low marsh to high marsh to upland – complete marsh system. At multiple spatial scales.

For transition zone monitoring protocols, framework, go to: www.pointblue.org/tbirds

Acknowledgments Funding Provided By:

- National Fish and Wildlife Foundation
- Barbour Foundation
- Richard Grand Foundation

For more info, Visit: www.pointblue.org/tbirds

nnur@pointblue.org jwood@pointblue.org melrod@pointblue.org

Thank you to our many data collectors and contributors -Invasive Spartina Project -USFWS -CDFW -Avocet Research Assoc. -Staff and Interns from Save The Bay, SFBBO, Point Blue

Thank You!

End of slides

Photos to use?

Point Blue Conservation science for a healthy planet.

- 160 passionate & dedicated scientists
- Mission: we work to advance the conservation of birds, other wildlife, and ecosystems through science, partnerships, and outreach
- Founded in 1965 as Point Reyes Bird Observatory

SCIENCE is at the core of everything we do

Jon Dachenhaus, Megan Elrod, Elliott Casper on the Napa River, CA

Humpback whale by Sophie Webb. Black-backed Woodpecker and Long-billed Dowitchers by Tom Grey. Adélie Penguin by Viola Toni

Tidal Marsh Variables Analyzed

Age of tidal marsh Tidal range Size and shape of marsh Proximity to urban, to the Bay Amount of following: at the site and within 1000 m • Subtidal, mudflat

- low marsh, mid marsh, high marsh
- development
- Forest, shrub, grass, crops

Tidal Marsh Bird Trends reflect In-Marsh Variables and Land-use Adjacent to Marsh

Song Sparrow: Population Trends correlate with development (neg), and age of tidal marsh (pos).

Ridgway's Rail: Population Trends correlate with development (neg), and amount of "mid-marsh" (pos).

These variables included in our analyses of how tidal marsh birds respond to transition zone features.

Summary of Results

Tidal marsh bird species in the marsh:

Show response to Tzone features. Population trends more positive, abundance higher with:

- -Taller vegetation
- -More dense vegetation (over 30 cm)
- -Wider Tzone
- -More grass cover.
- Veg structure important -- not specific plant species.

The two tidal marsh species show somewhat different response, but they are compatible.

Wide transition zones with taller, more dense vegetation (with grass?) provides important functions for tidal marsh birds (refugia, cover, foraging).

