



Avian Abundance Estimation for Full Life-cycle Conservation Planning

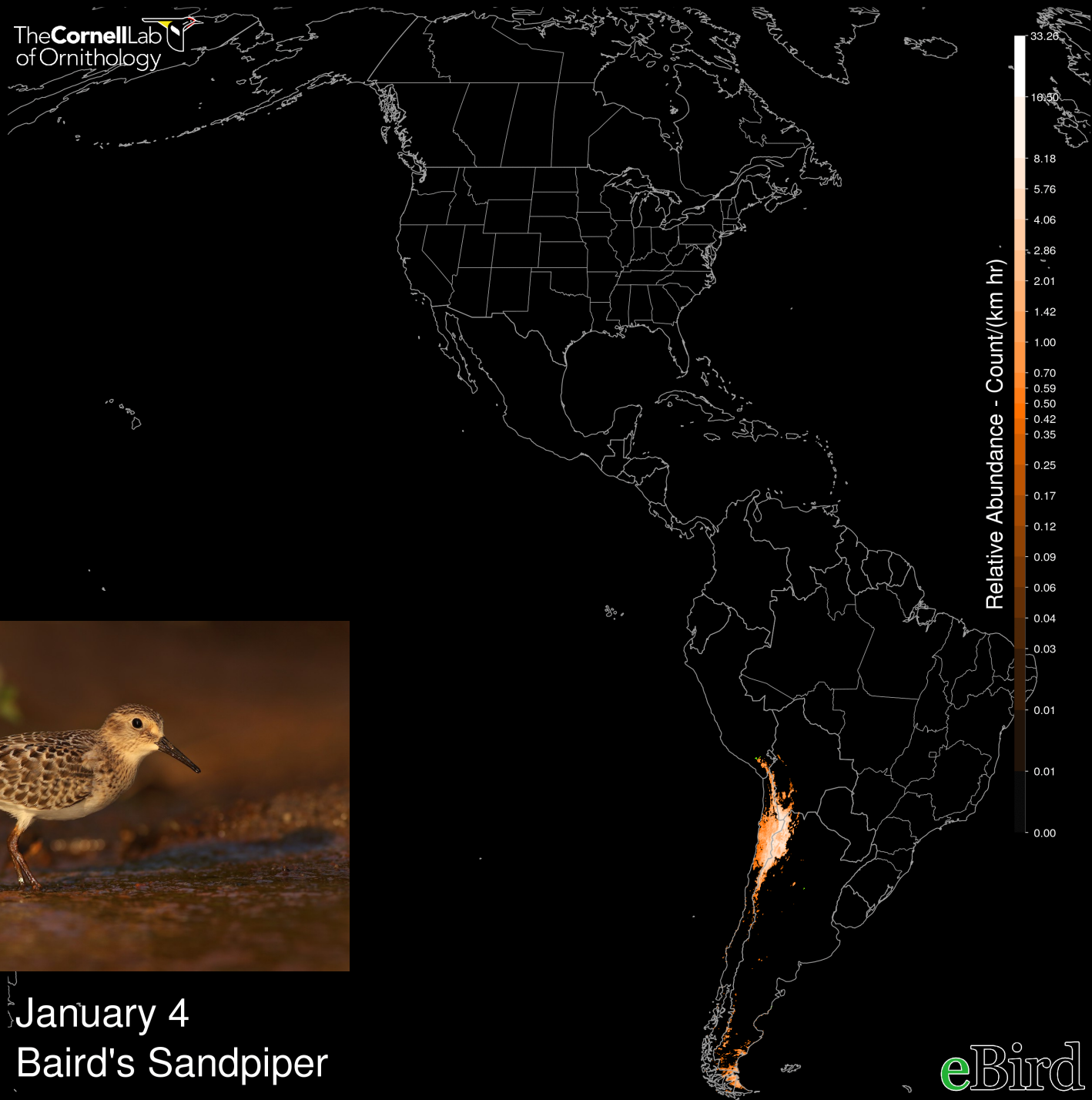
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LEON LEVY FOUNDATION
The Legacy Of Leon Levy





January 4
Baird's Sandpiper

Abundance Estimation

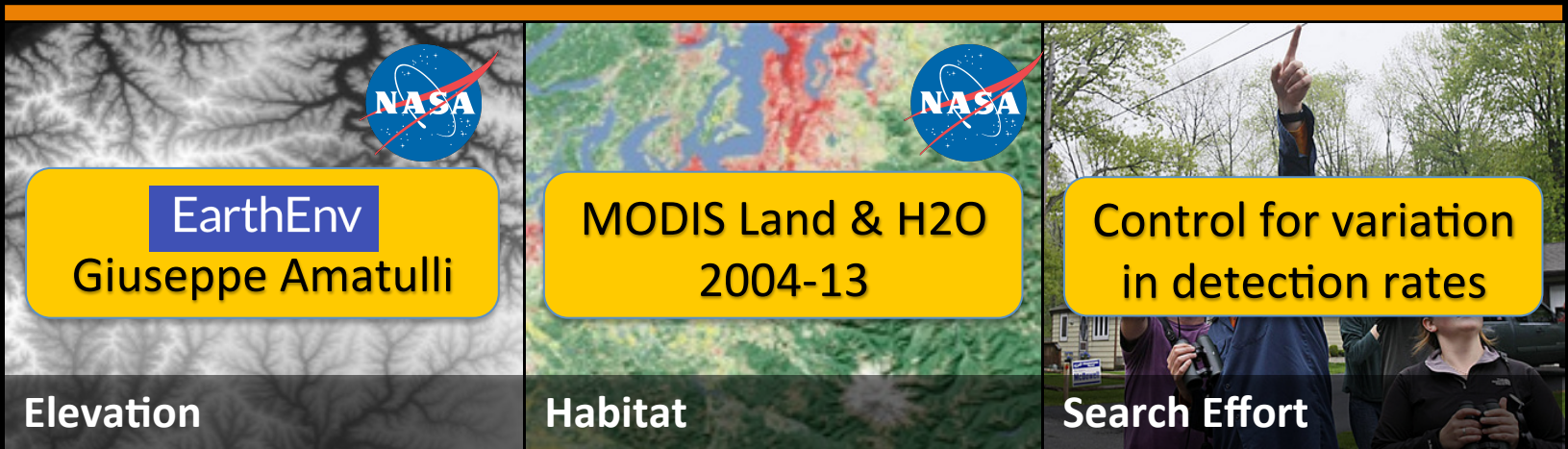


12M Checklists
2004-16
Western
Hemisphere

Statistical Learning



Johnston et al. 2015
Fink et al. 2014



Data Products

- 200 Species
- Western Hemisphere
- 8.4km x 8.4km x 1 wk
- Abundance & Occurrence
- Habitat Use
- Uncertainty & Quality

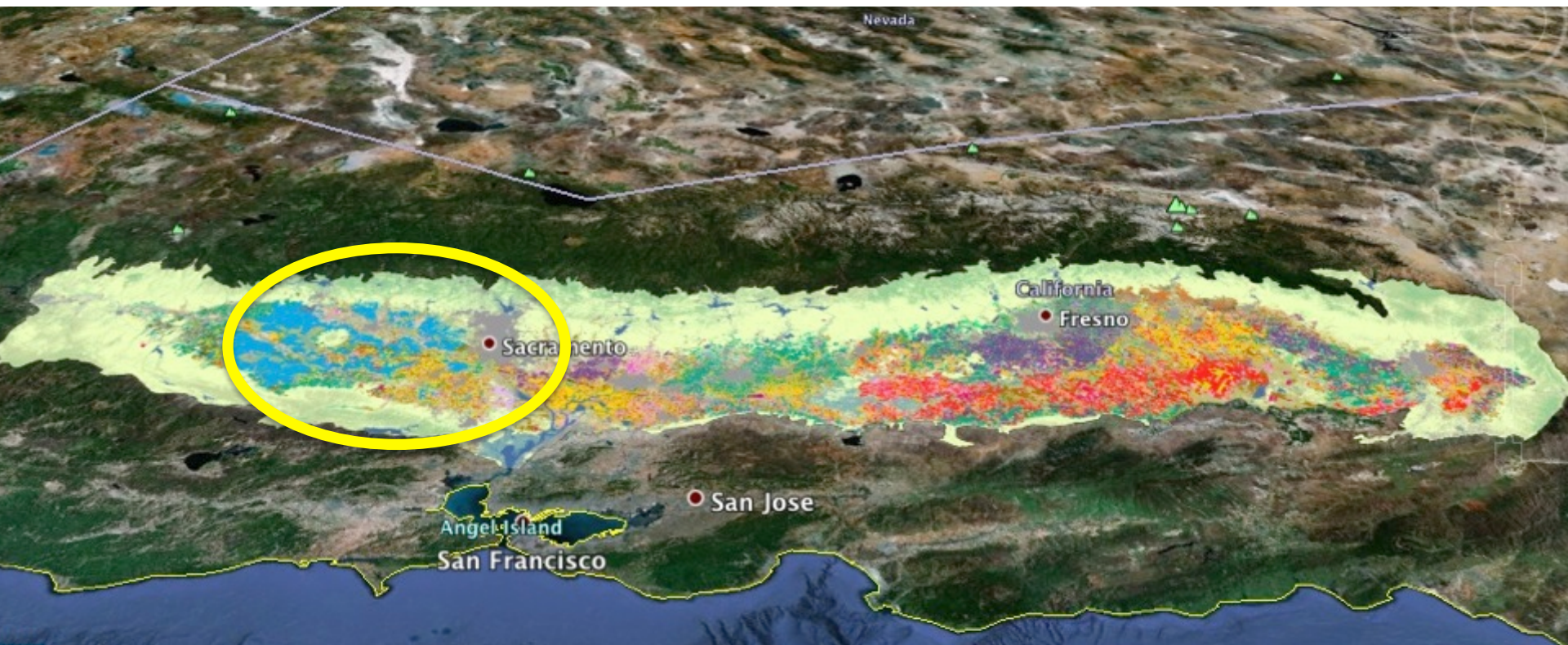


Dunlin
January 4



Relative Abundance - Count/(km hr)

232.19
83.77
50.32
30.22
18.15
10.90
6.55
3.93
2.36
1.83
1.42
1.10
0.85
0.51
0.31
0.18
0.11
0.07
0.04
0.02
0.01
0.00
0.00



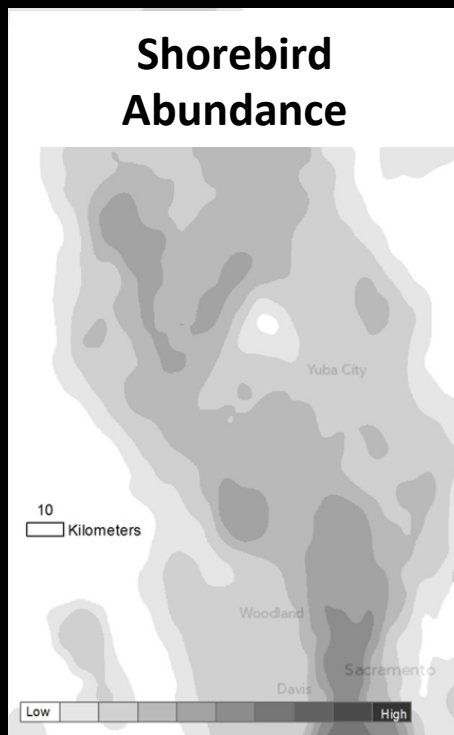
BirdReturns: Dynamic Land Conservation



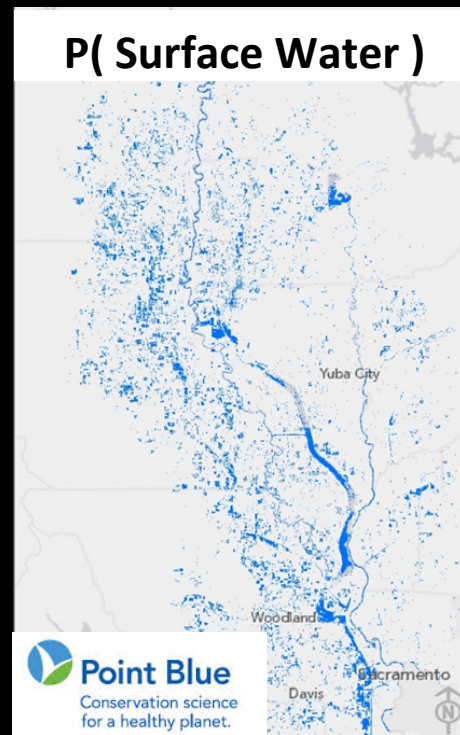
1. Program Design

- When to hold auctions? What species would benefit?
- Select species for shorebird abundance Index

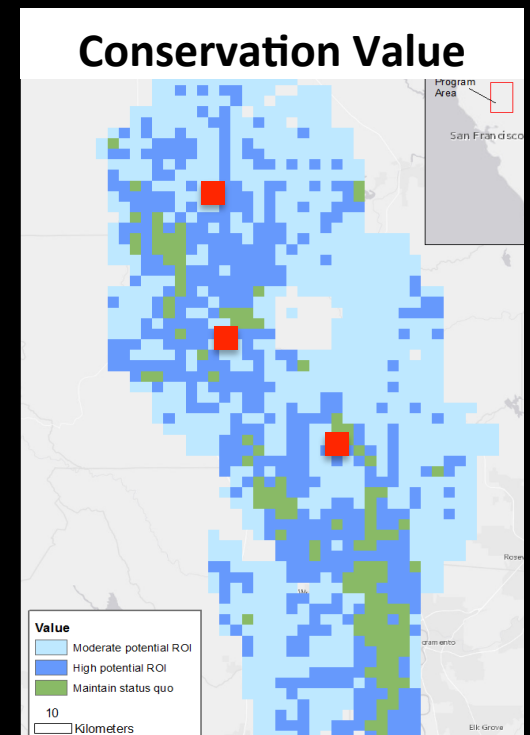
2. Determine conservation value



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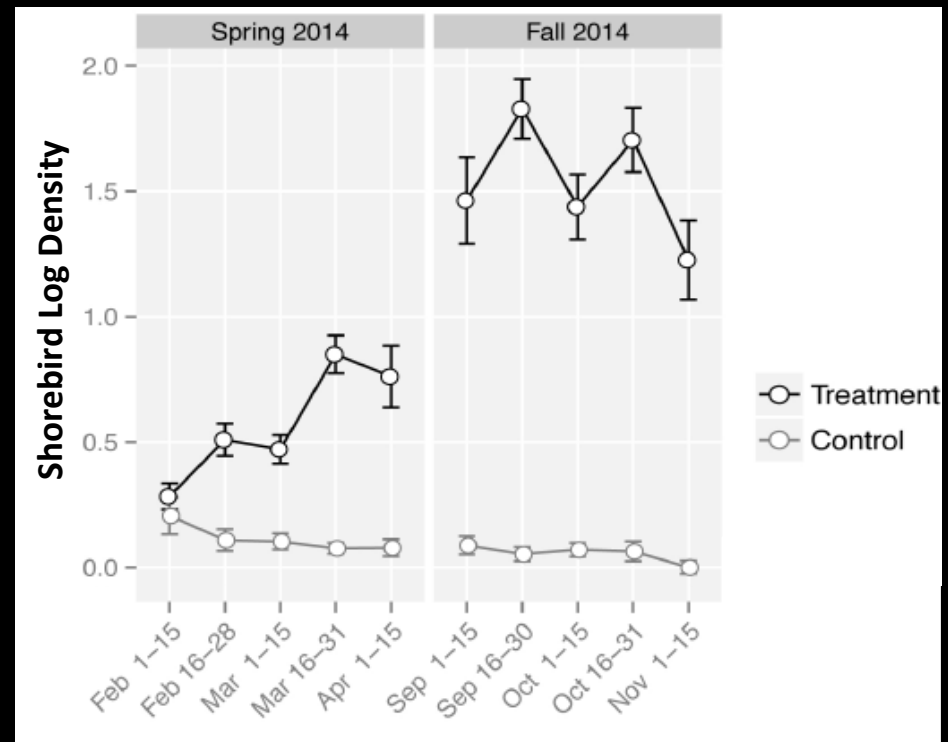


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Bird Returns Impact

Season	Acres
Spring 2014	11,000
Fall 2014	6,100
Winter 2014-2015	5,000
Spring 2015	6,000
Fall 2015	7,200
Spring 2016	6,300
Fall 2016	5,765
Spring 2017	3,900



- > 46K Acres habitat created
- > 175 Farmers
- Drought - Flood

- 6K point counts
- > 50 species of waterbirds
- > 250K shorebirds



Abundance

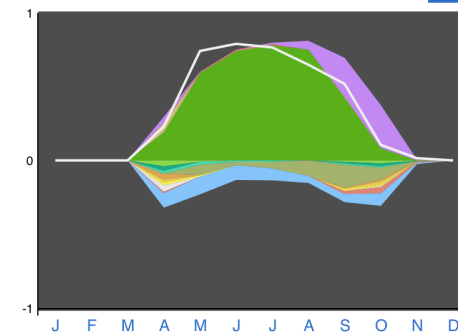
Habitat

Habitat Legend

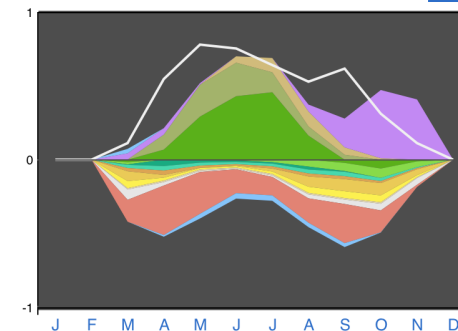
show/hide

Water	Wooden Grassland
Urban Built	Woodland
Cropland	Mixed Forest
Bare	Evergreen Needleleaf
Open Shrubland	Evergreen Broadleaf
Closed Shrubland	Deciduous Needleleaf
Grassland	Deciduous Broadleaf

Area 1



Area 2



References

Fink et al. 2014. Crowdsourcing meets ecology: hemisphere-wide spatiotemporal species distribution models. AI Magazine 35:19–30.

Johnston et al. 2015, Abundance models improve spatial and temporal prioritization of conservation resources. Ecological Applications, 25: 1749–1756. doi:10.1890/14-1826.1

North American Bird Conservation Initiative. 2016. The State of North America's Birds 2016. Environment and Climate Change Canada: Ottawa, Ontario. 8 pages. www.stateofthebirds.org

North American Bird Conservation Initiative. 2017. The State of the Birds 2017. (in press) www.stateofthebirds.org

Reiter, Matthew E., et al. "Spatio-temporal patterns of open surface water in the Central Valley of California 2000-2011: drought, land cover, and waterbirds." JAWRA Journal of the American Water Resources Association 51.6 (2015): 1722-1738.

Reynolds, Mark, et al. "Dynamic Conservation for Migratory Species", submitted Science Advances