

# SALTON SEA ECOLOGY

## GENERAL AVIAN USE TRENDS

*Dan Orr – Senior Analyst*



Sonny Bono Salton Sea NWR (Obsidian Butte)  
- September 21, 2014

## Salton Sea Environmental Changes

- Water level and salinity
- Changing habitats
- Changing prey availability

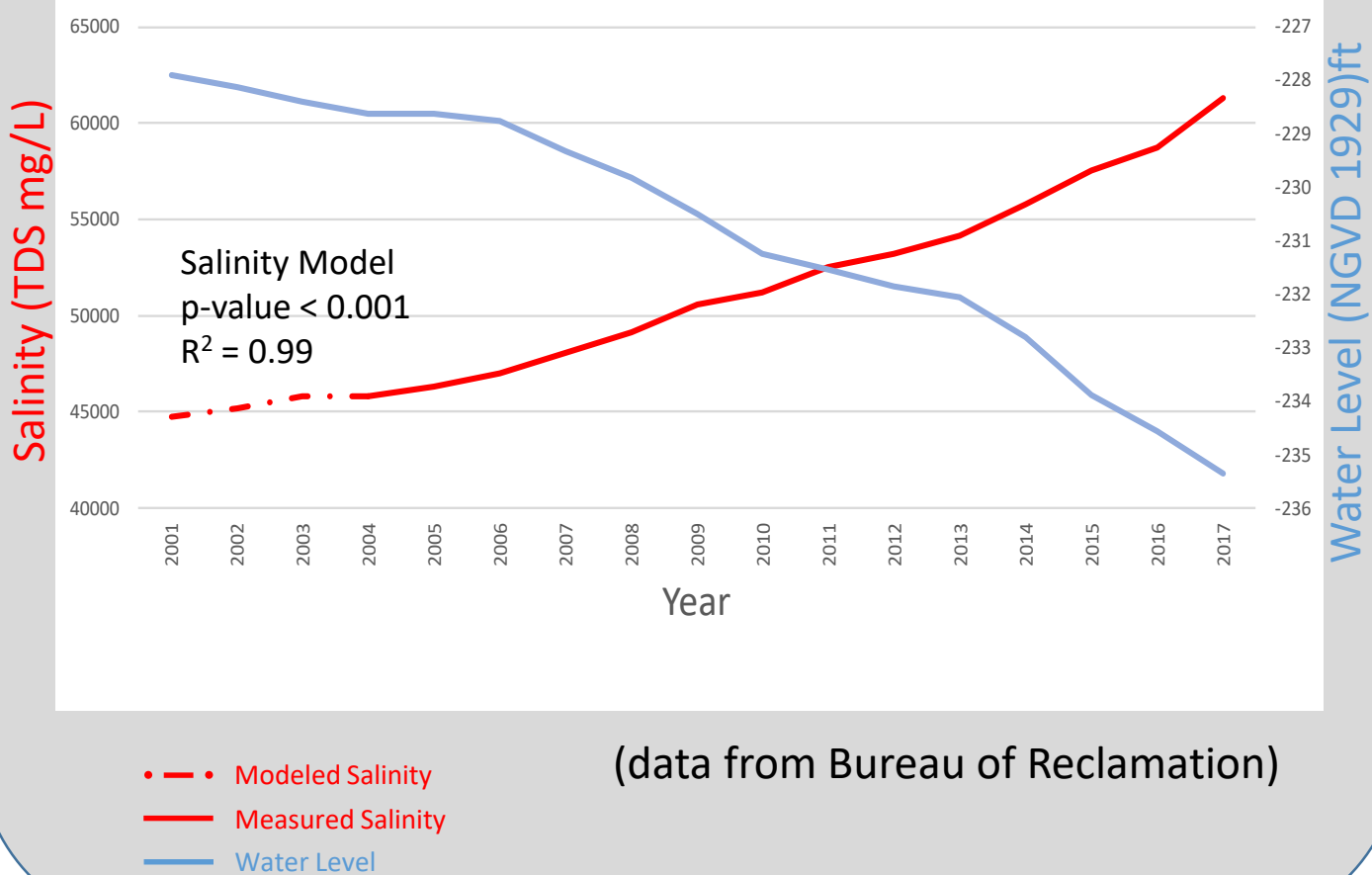


## Audubon California Salton Sea Waterbird Survey

- Overview
- Trends



Salton Sea Salinity and Water Level  
2001 – 2017



## Steady decreases in water level

- Can change habitat availability
- Rising Salinity
  - Impact habitat
  - Impact available food

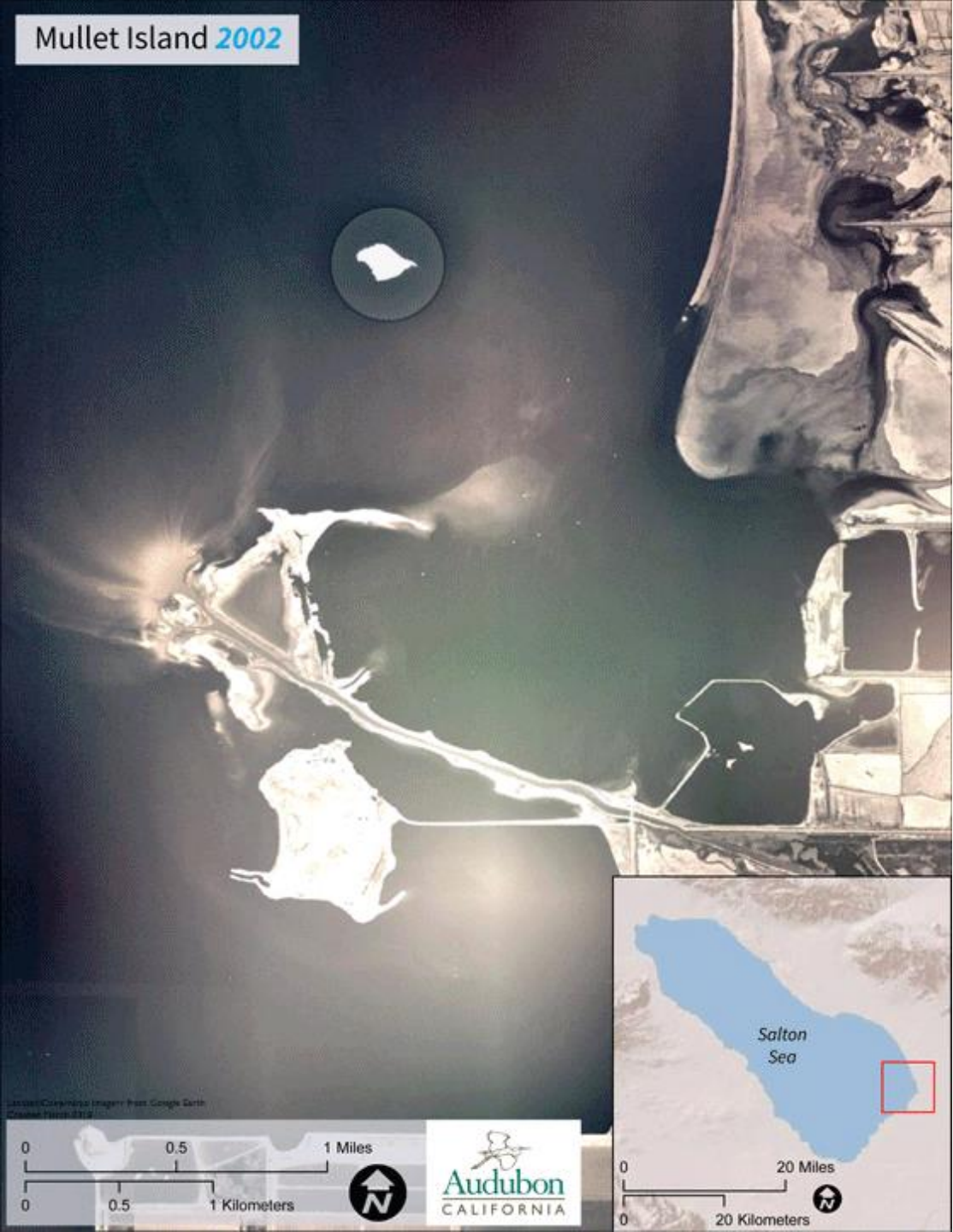
*Salton Sea Environmental Changes*  
*Habitat and prey availability*

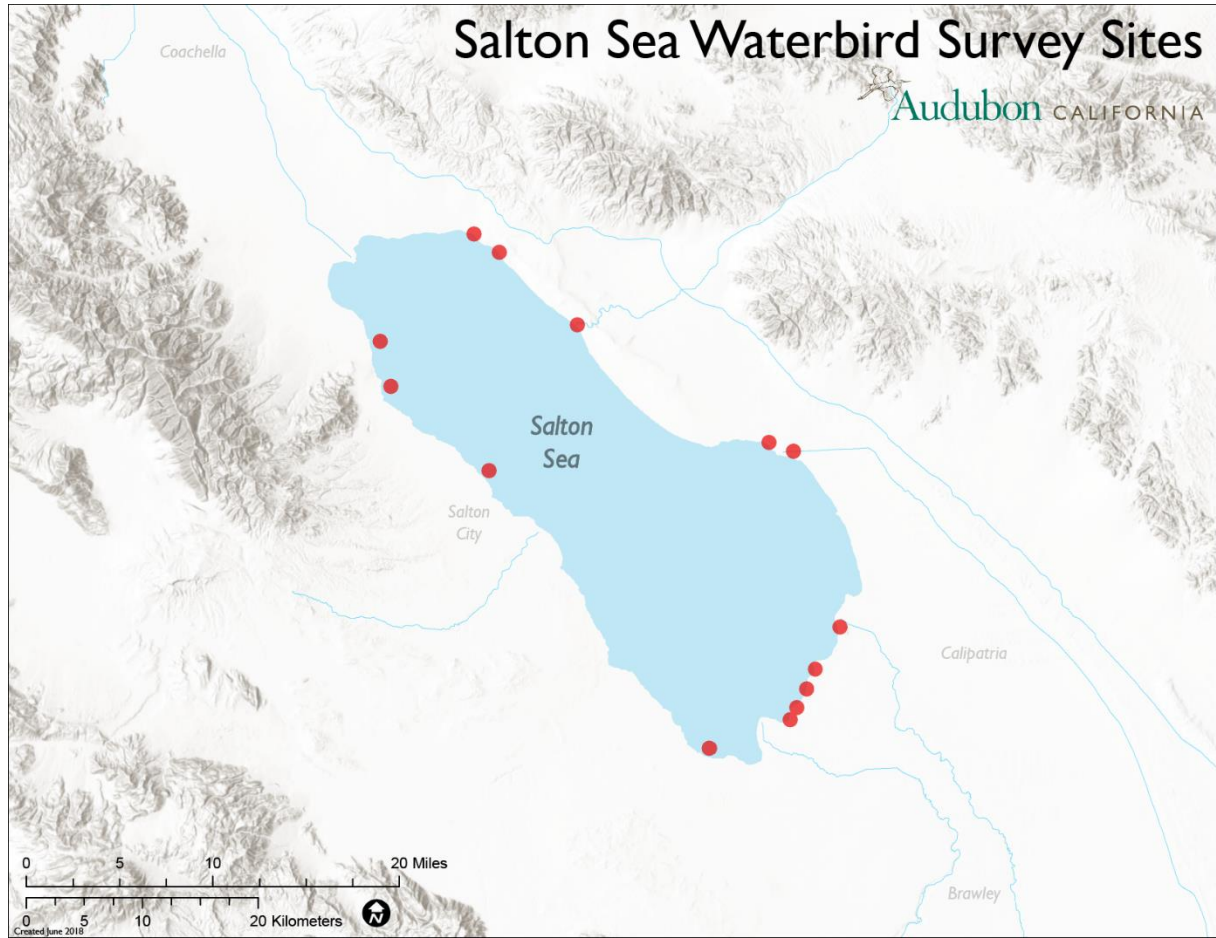
# For Birds

Changes in water level impact habitats

Changes in Salinity impact prey species

- e.g. Fish





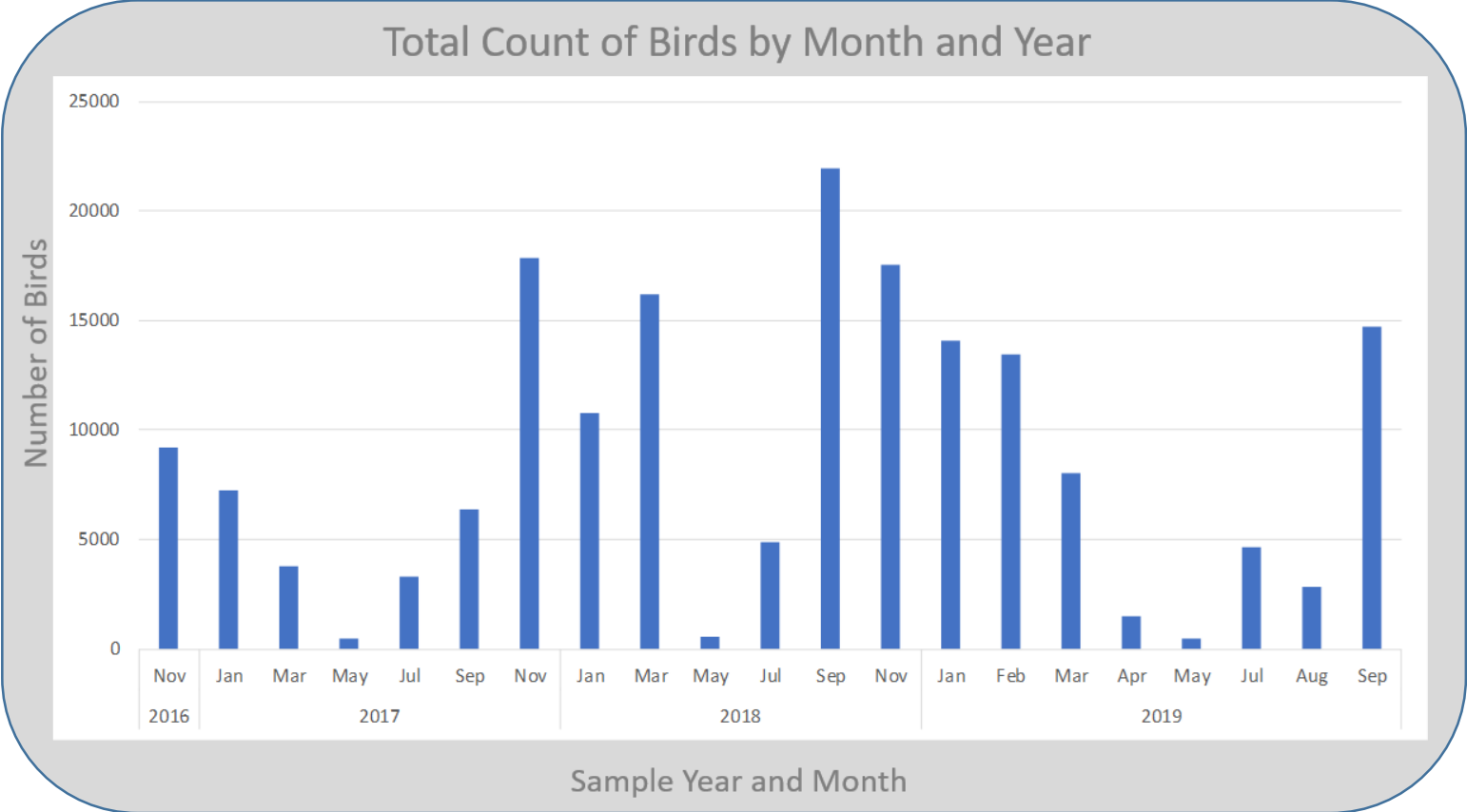
## Salton Sea Waterbird Surveys

- Nov 2016 – Sept 2019
- 14 Sites
- 1 km<sup>2</sup> survey boxes
- Surveyed every 2 months
- 20 minute counts/box





# Total number of birds over the survey period



# Is this a shift in functional groups?

- Habitat changes
- Prey availability



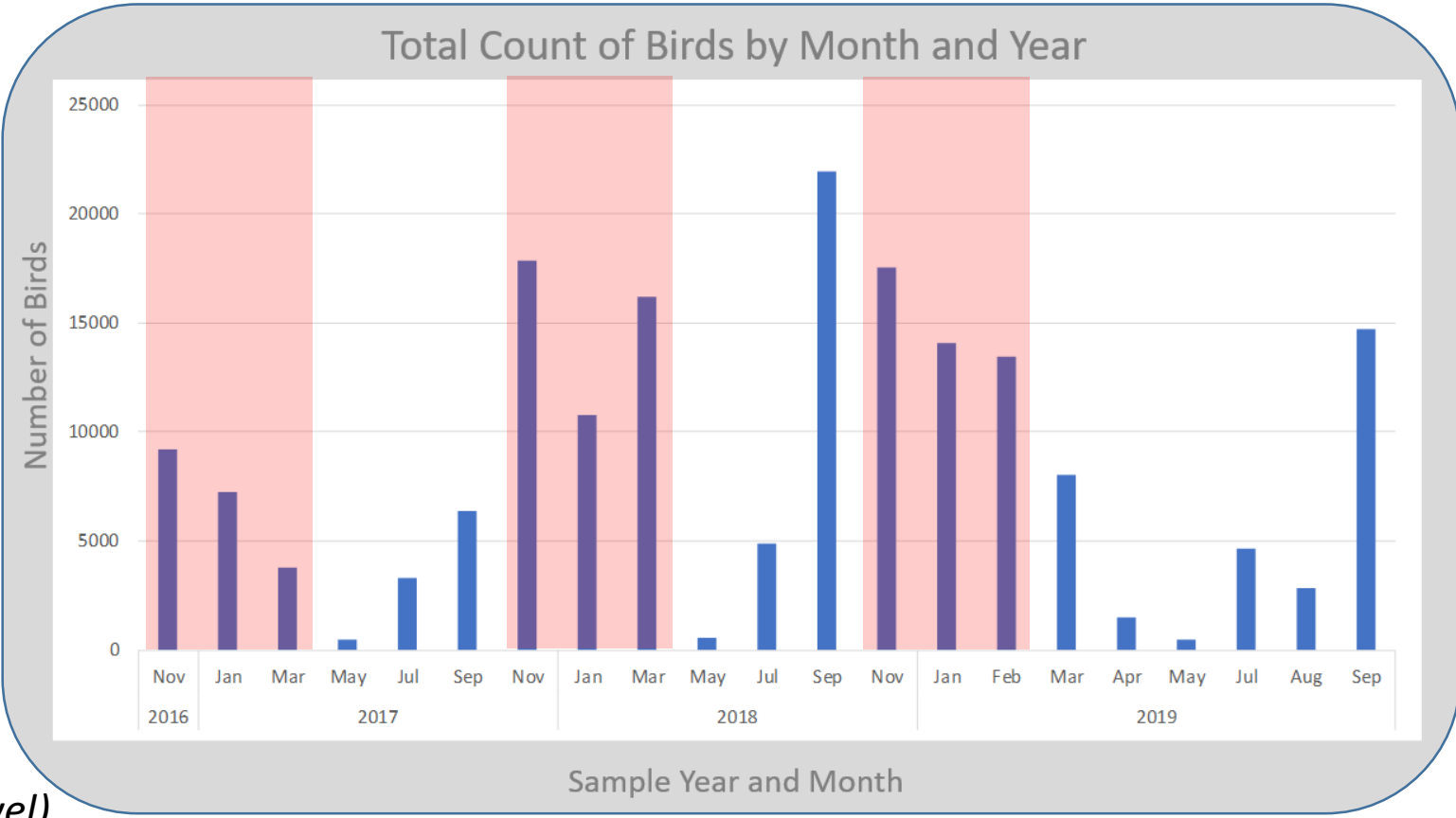
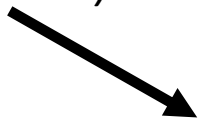
Robin L.



CDFW

Few fish eating birds  
(Higher Trophic Level)

Many shorebirds  
(Lower Trophic Level)



# Decrease in birds feeding higher on the food chain

- *Statistically significant*



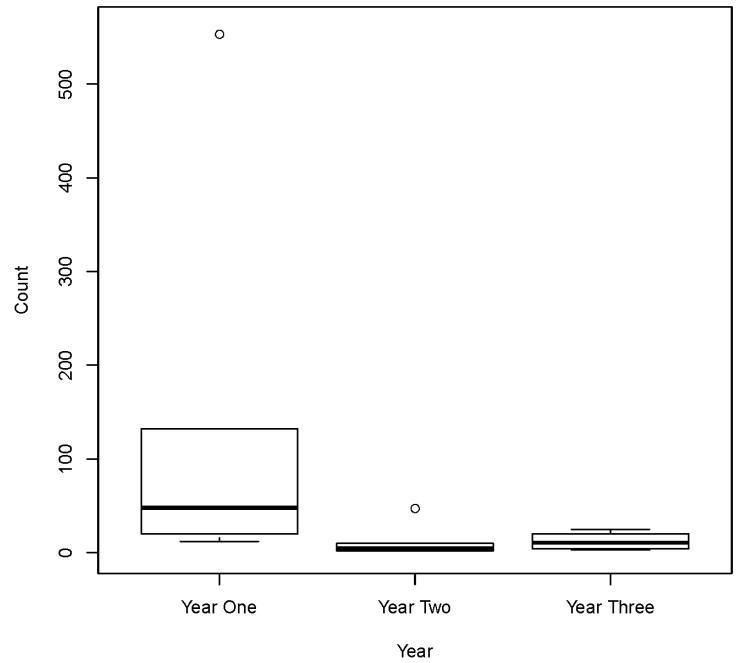
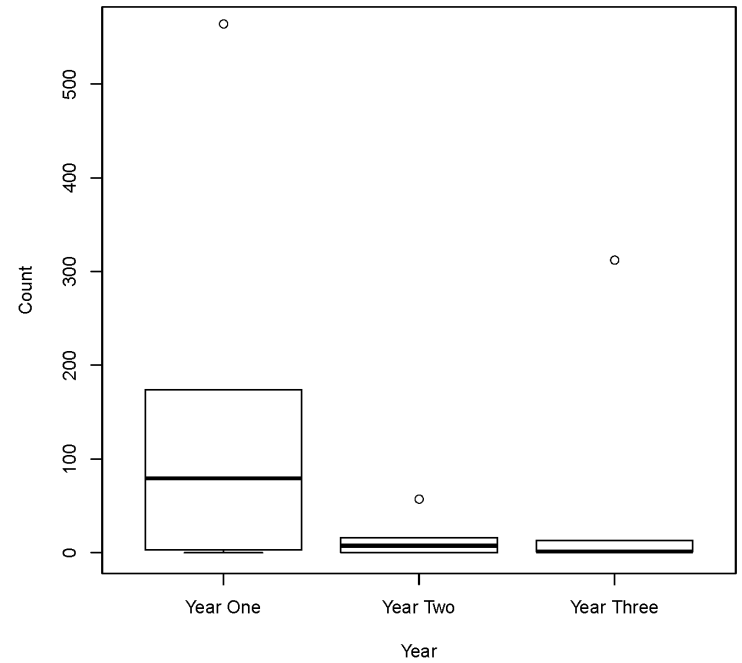
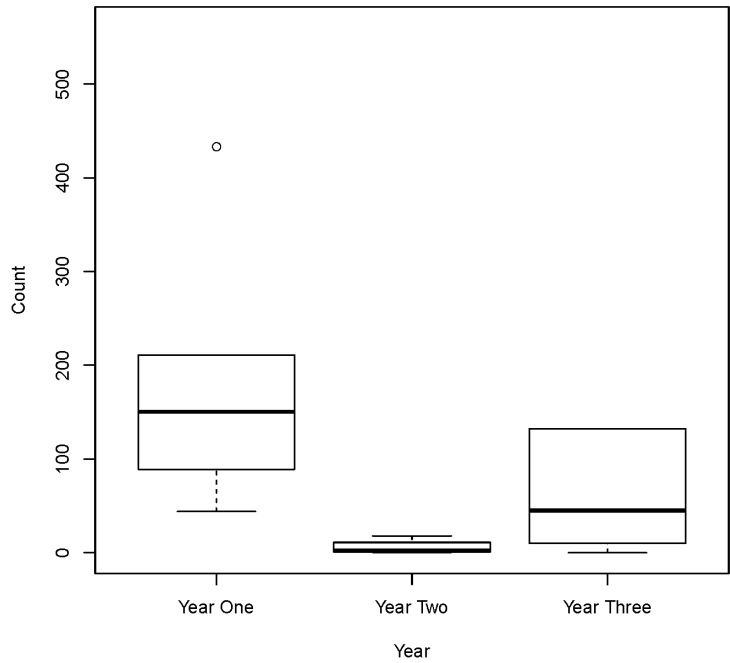
Salton Sea Eared Grebe



Salton Sea American White Pelican



Salton Sea Double-crested Cormorant





Corroborated by longer term trends from CDFW aerial surveys



Georgia Wilson / Great Backyard Bird Count;



Photo: Matt Filosa/Audubon Photography Awards

Piscivorous Birds by Season and Year  
Winter 2008 - Spring 2018

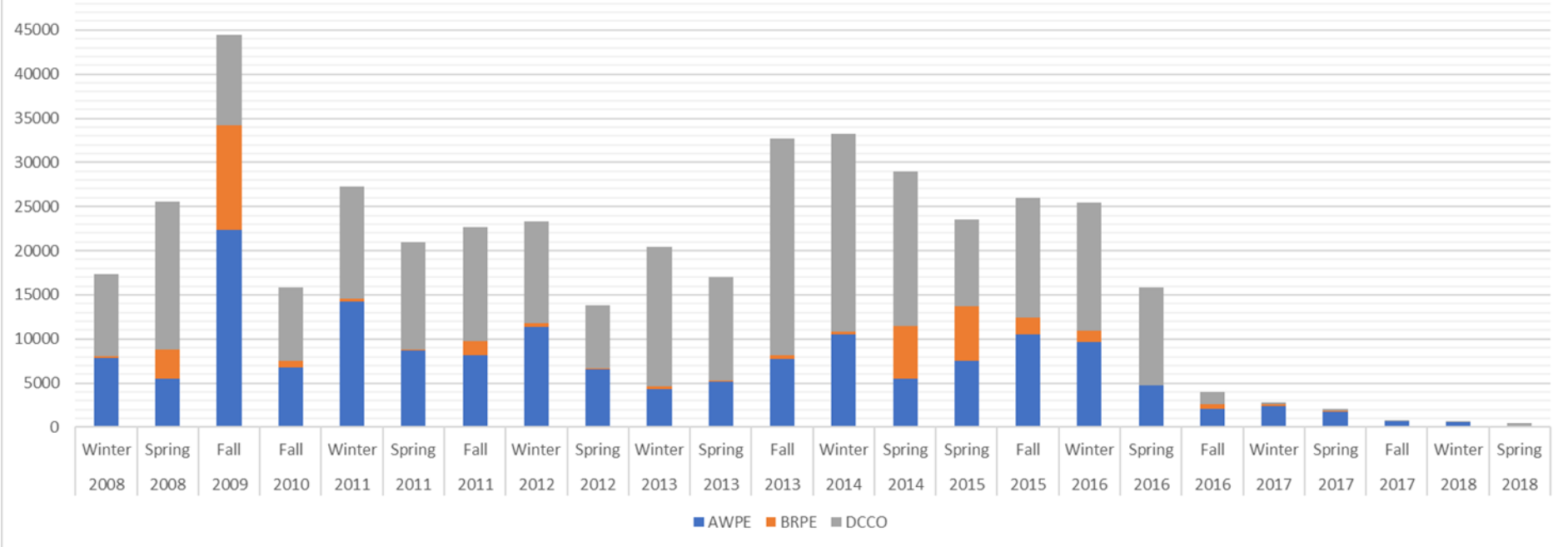


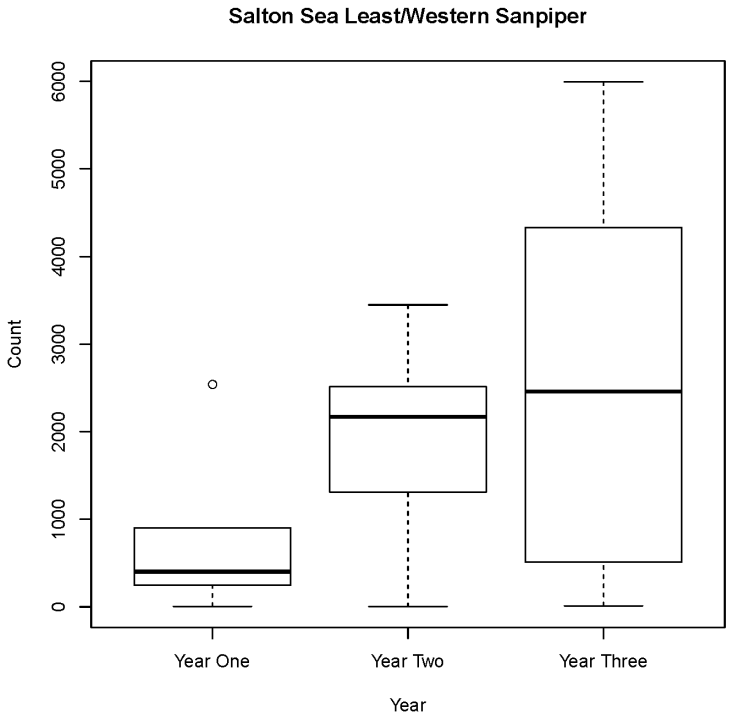
Figure courtesy of California Department of Fish and Wildlife

Birds feeding lower on the food chain

- *Appear to be stable or increasing based on three years of data*



Least/Western Sandpiper



American Avocet



Ruddy Duck



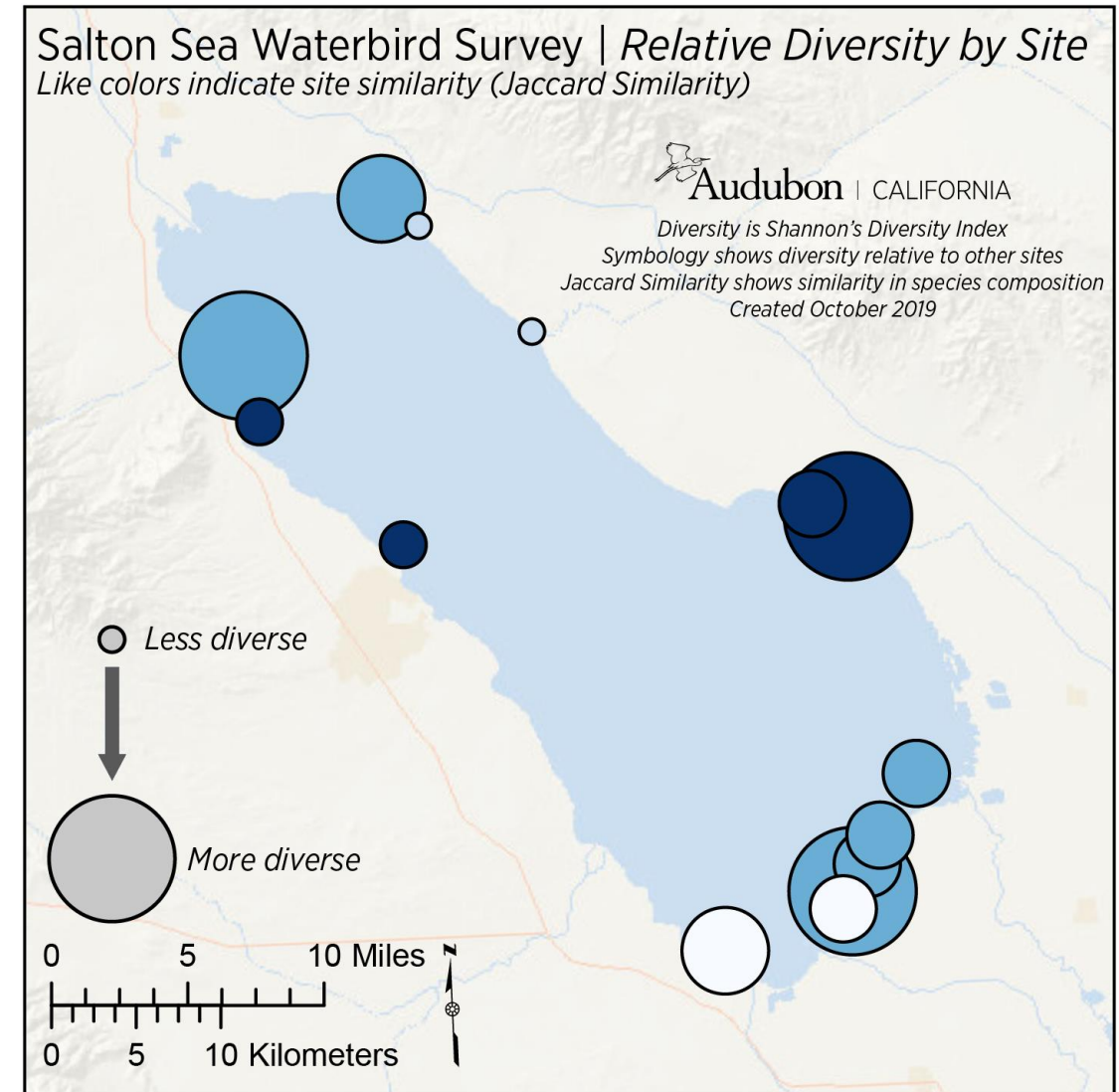
Northern Shoveler

## Salton Sea Avian Diversity Varies Spatially

- Shannon Diversity Index
  - Number of species
  - Relative numbers represented

## Map Shows

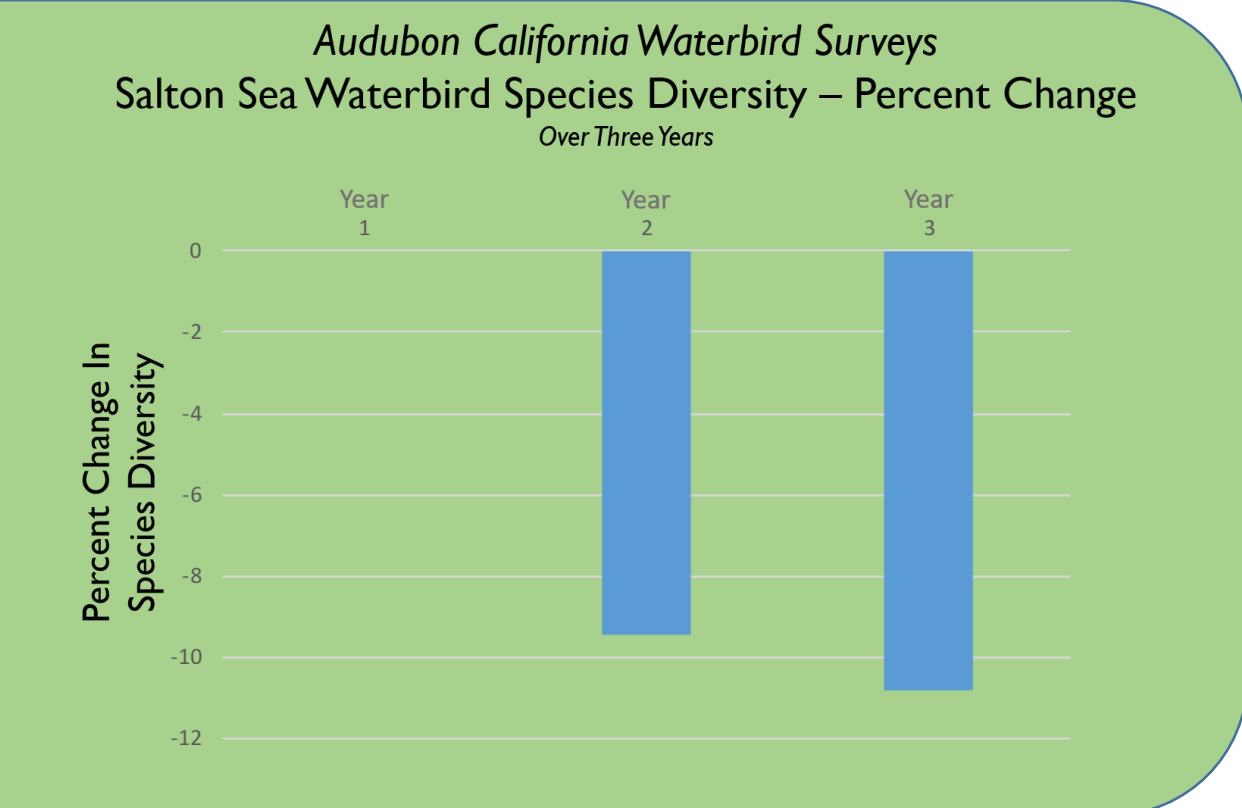
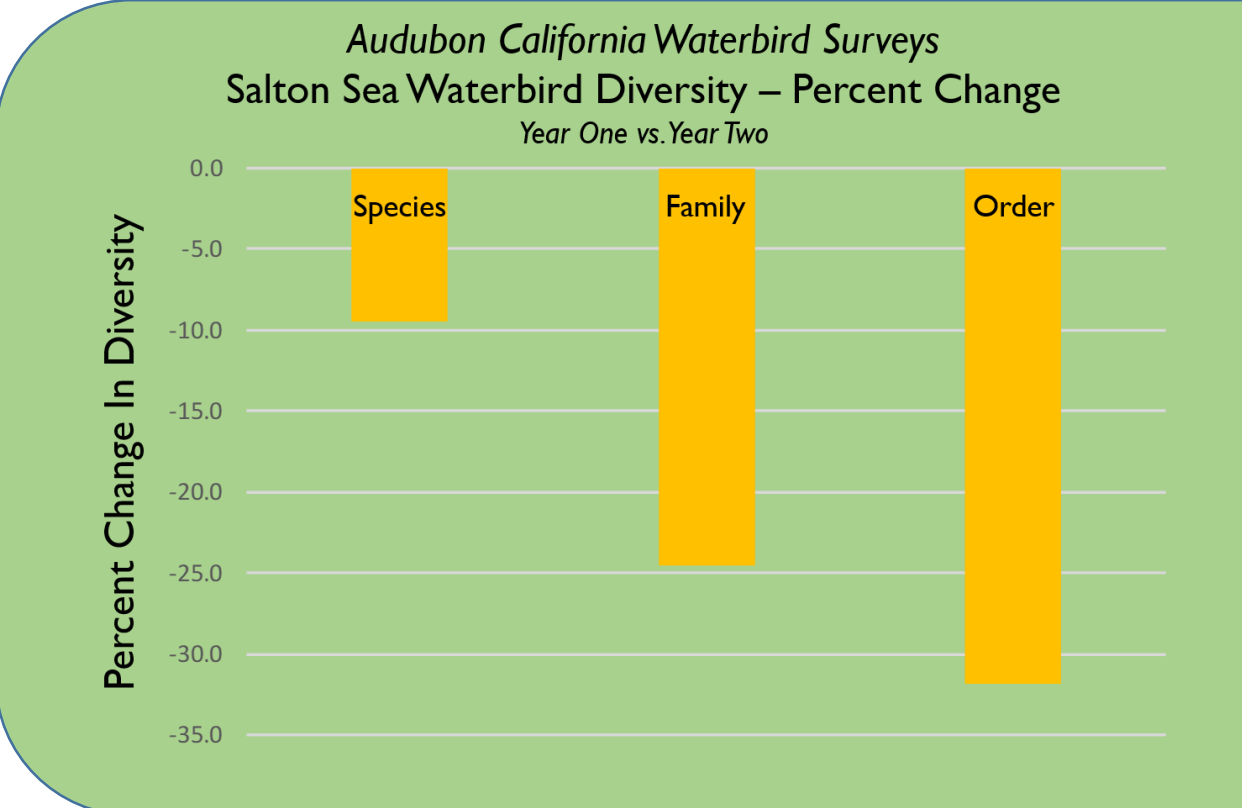
- Relative diversity by Site (*size of circle*)
- Site similarity (*color of circle*)
- Similar Species Composition



# Changing Avian Diversity at the Salton Sea

Two years of data indicate potential changes in functional diversity

Preliminary analysis of the third year of data indicate that trend may be continuing



# Salton Sea Broader Importance

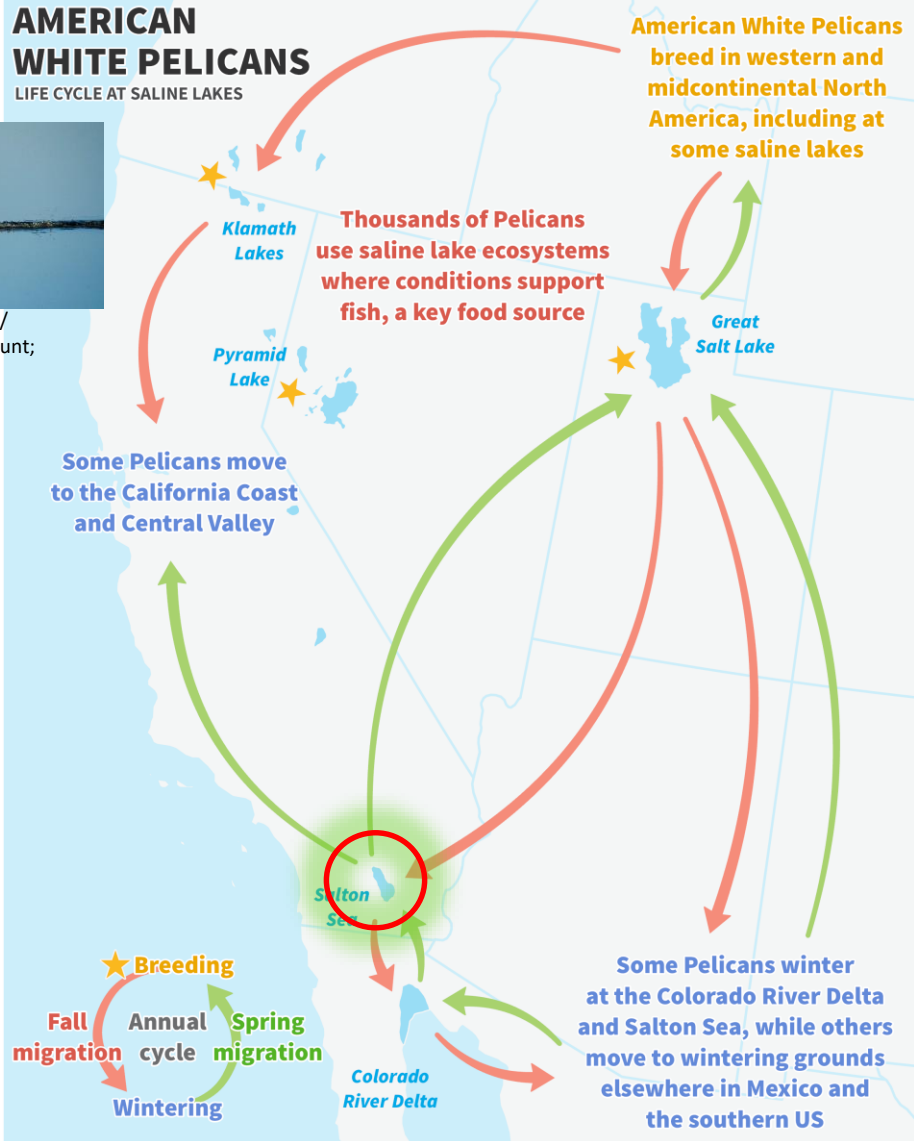
## Saline Lakes System

### AMERICAN WHITE PELICANS

LIFE CYCLE AT SALINE LAKES



Photo: Georgia Wilson / Great Backyard Bird Count;

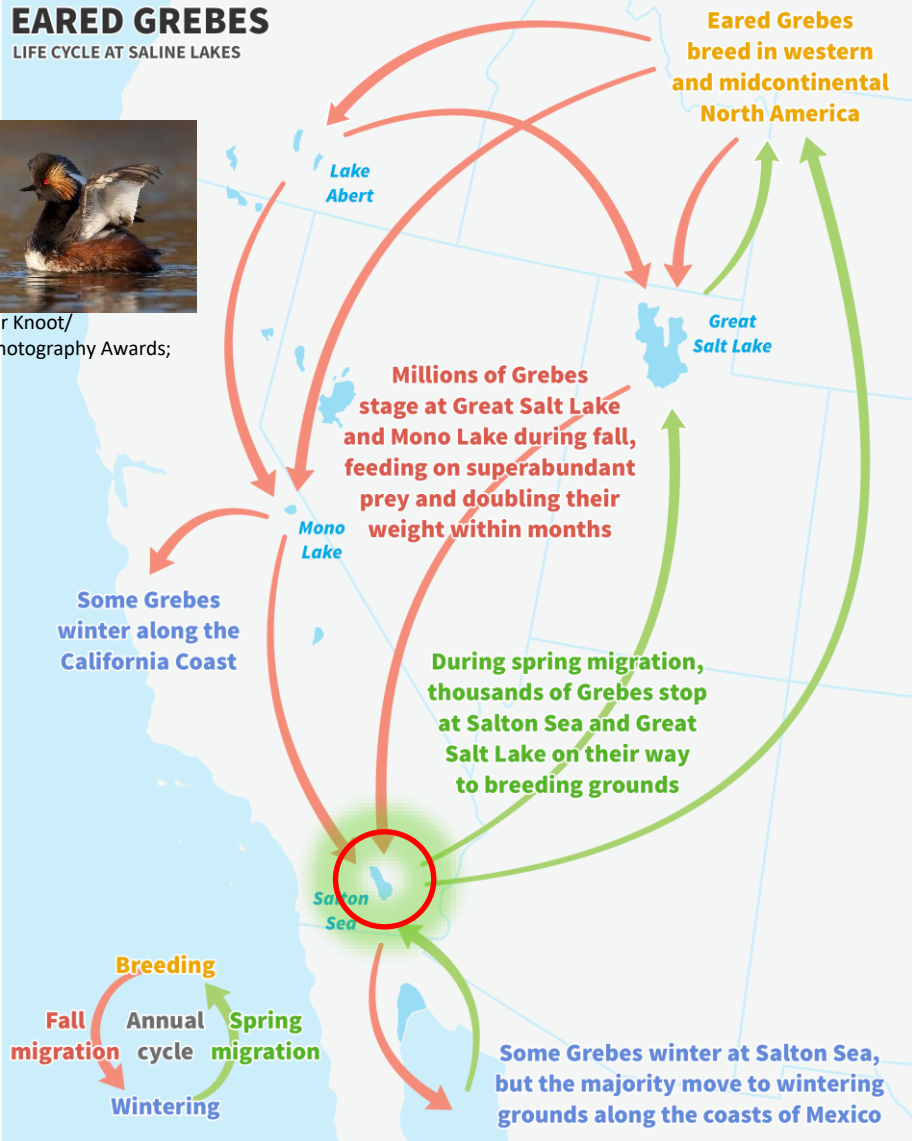


### EARED GREBES

LIFE CYCLE AT SALINE LAKES



Photo: Peter Knoot / Audubon Photography Awards;



Migration Figures: Lotem Taylor, National Audubon Society

## Status

Objective of 3.6 million (IWJV) at fall staging areas

- Great Salt Lake host substantial numbers
  - 2013-16:  $\geq$  4.9 million at GSL
  - 2017: 2.6 million – is decline consistent?

## Limitations

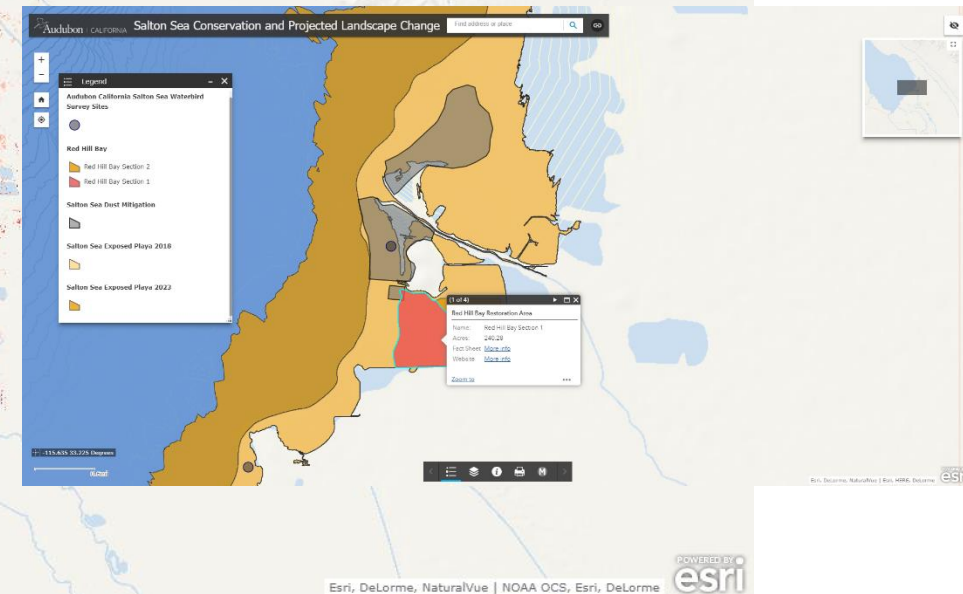
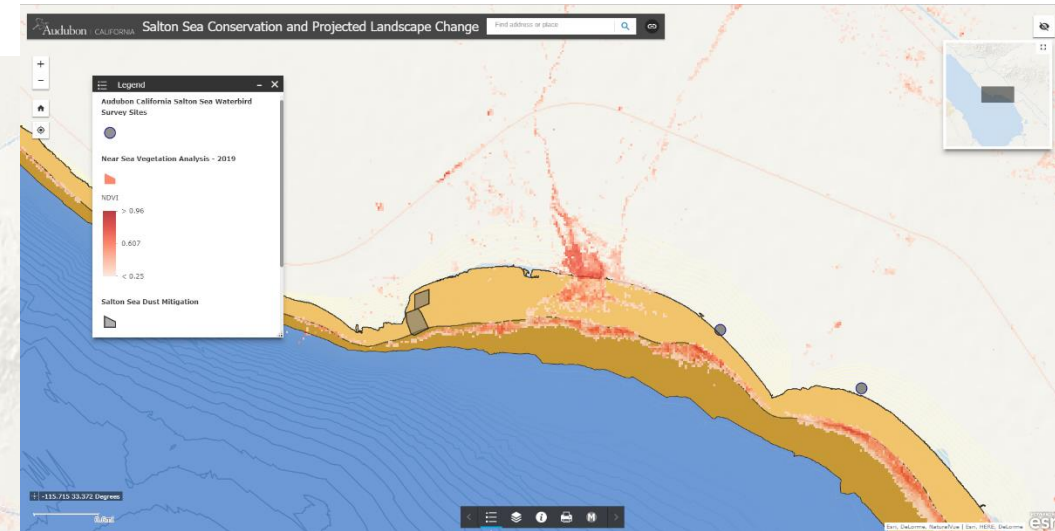
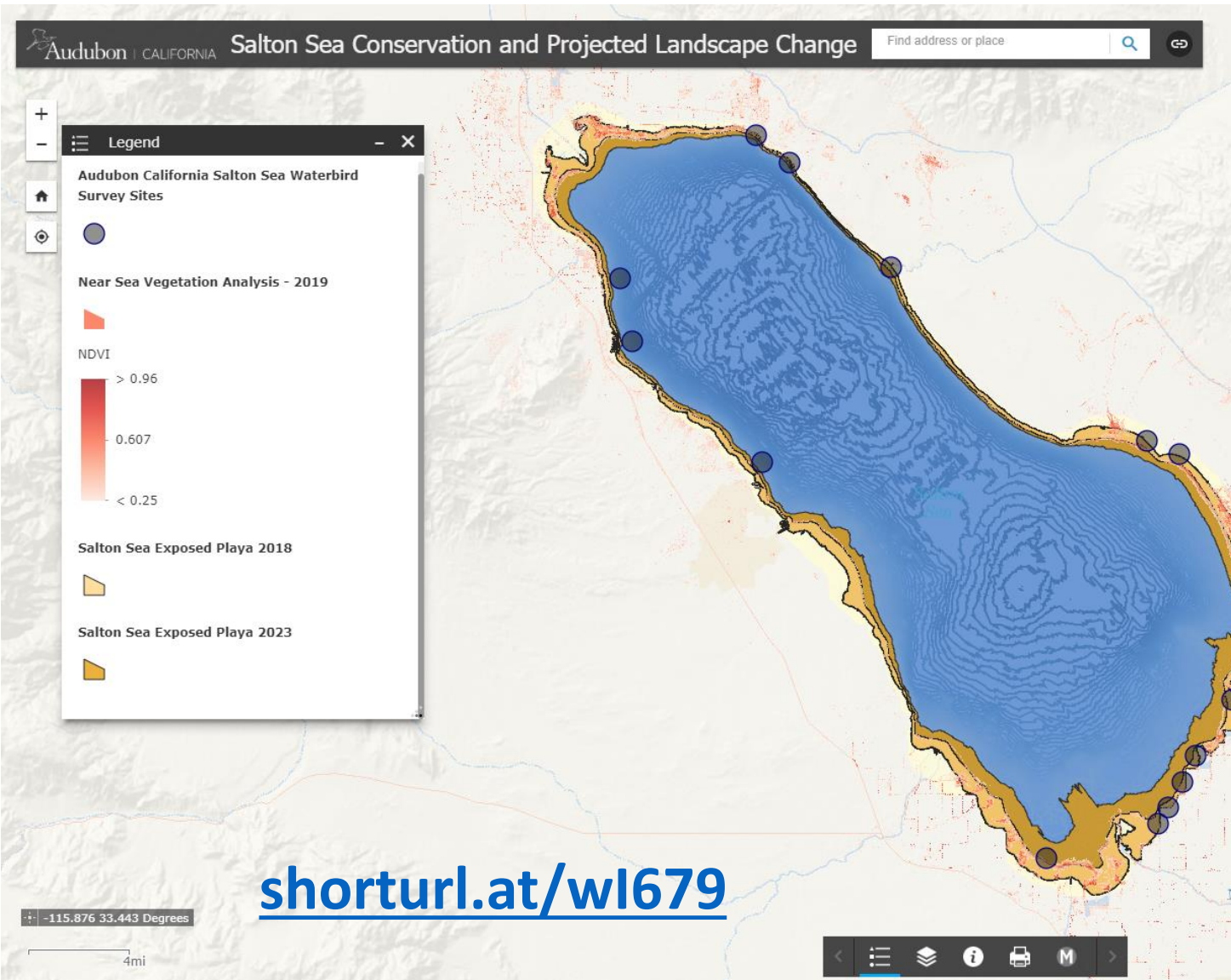
Vary across places, seasons, years

- Declining river and some saline lake inflows
- Food at staging and wintering areas
- Breeding habitat
- Disease
- Mass mortality events



# Salton Sea Conservation and Landscape Change

## Tracking Changes and Conservation

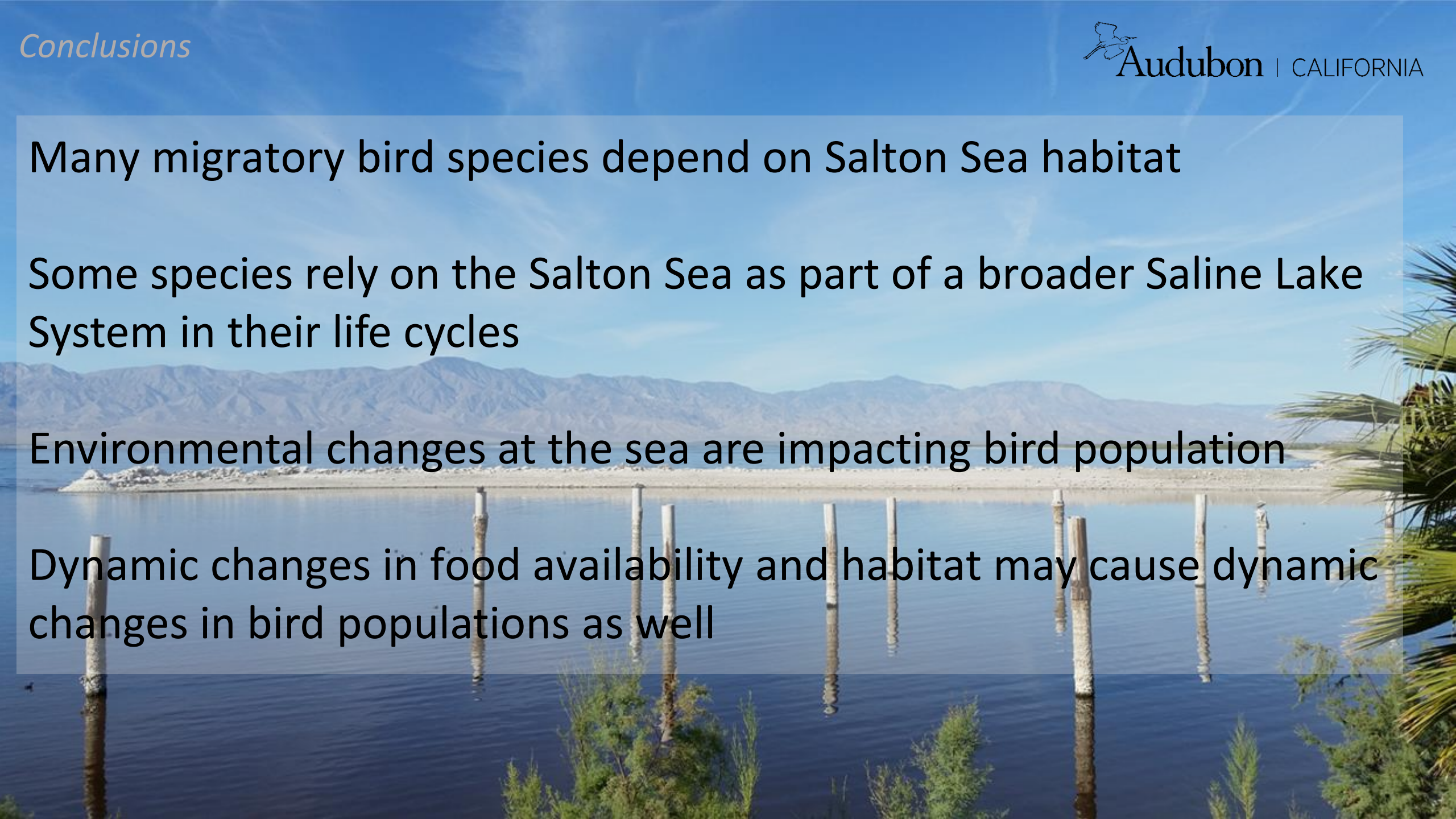


Many migratory bird species depend on Salton Sea habitat

Some species rely on the Salton Sea as part of a broader Saline Lake System in their life cycles

Environmental changes at the sea are impacting bird population

Dynamic changes in food availability and habitat may cause dynamic changes in bird populations as well





More information this work:

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