

Observations of shoreline habitats and bird species richness  
Associations in the central and north portion of Salton Sea, 2014-2019

**Talking points**

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Net-gain/Net-loss of Shoreline Habitat

Bird Diversity Hotspots

Comments about Prey Resources

Examples from Bird Surveys Results

Examples of Key Species Abundances

Preliminary Conclusions



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**Robert McKernan and Chet McGaugh**  
**Oasis Bird Observatory**





Figure 1. Oasis Bird Observatory Salton Sea survey locations

Locations of weekly surveys- Eastside: A = north North Shore, B = North Shore, C = State Recreation Area, D = Salt Creek. Westside: E = 81st Ave., F = 83rd Ave./84th Ave., G = 84.5th Ave./85th Ave.

Location of monthly surveys – Eastside: H = Hayes Road, Westside: I = Desert Shores.

Observers: RM = Robert McKernan, CM = Chet McGaugh.



Date	Time of day	Observer	Location	Cumulative days & hours
July -Dec 2014	AM PM	RM, CM RM, CM	Eastside A, B, C, D Westside E, F, G	26 days ~286 hrs
Jan-Dec 2015	AM PM	RM, CM RM, CM	Eastside A, B, C, D Westside E, F, G	52 days ~ 572 hrs
Jan – Dec 2016	AM PM	RM, CM RM, CM	Eastside A, B, C, D Westside E, F, G	52 days ~ 572 hrs
Jan – Dec 2017	AM PM	RM, CM RM, CM	Eastside A, B, C, D Westside E, F, G	52 days ~ 572 hrs
Jan – Dec 2018	AM PM	RM, CM RM, CM	Eastside A, B, C, D Westside E, F, G	26 days ~286 hrs
Jan – August 2019	AM PM	RM, CM RM, CM	Eastside A, B, C, D Westside E, F, G	26 days ~286 hrs
<b>total effort</b>				<b>234 days ~ 2577 hrs</b>

- We estimated all waterbird species and numbers at each site, which includes shoreline habitats and an open water viewshed of approximately  $\pm 1$  km right-angles from the shore. Surveys are conducted during mornings (AM from civil Dawn) and afternoons (PM after solar noon). We survey sites for 60 to 120 min depending on the relative abundance of waterbirds to ensure accurate identifications and abundance estimates. Monthly relevé estimates of shoreline habitats are completed.

Table 1. Date span, locations, observers, and effort.

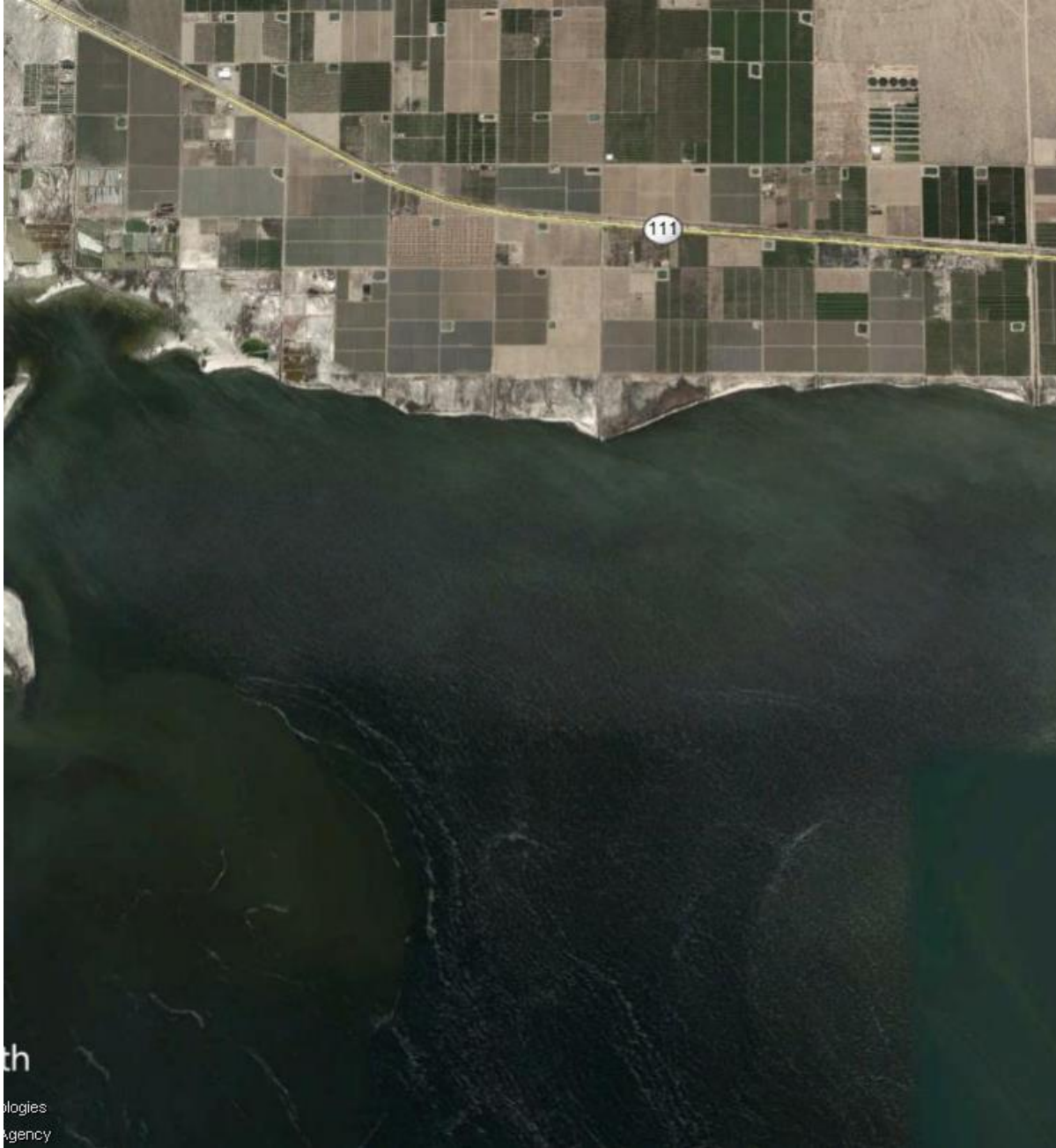


Net gain / Net loss of shoreline habitats at Salton Sea

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Aug. 2005, northeast shoreline of Salton Sea



Sept. 2018, northeast shoreline of Salton Sea



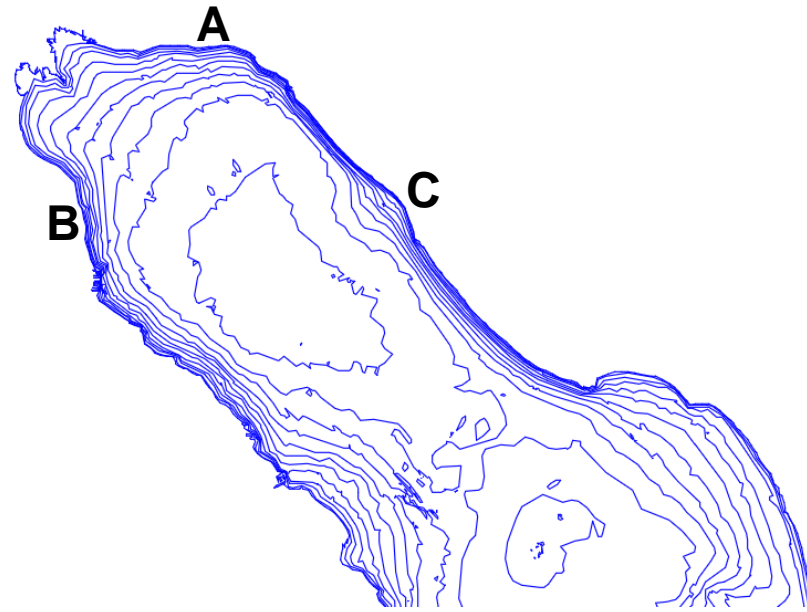


Northeast shoreline: east of Arthur St. and Cleveland St., inflow drains. 15 August 2018





# Effects of water levels receding and topographic variation for waterbird habitats at NESS



Bathymetric Contours  
(5 foot) - Salton Sea  
sounding points taken  
by Bureau of Reclamation  
Project 2007



Northeast shoreline, 2019 = A



82<sup>nd</sup> Ave. shoreline, 2018 = B



Salt Creek shoreline, 2019 = C



# 76<sup>th</sup> Ave inflow drain



November 2010



April 2017





29 March 2019,  
76<sup>th</sup> Ave. drain

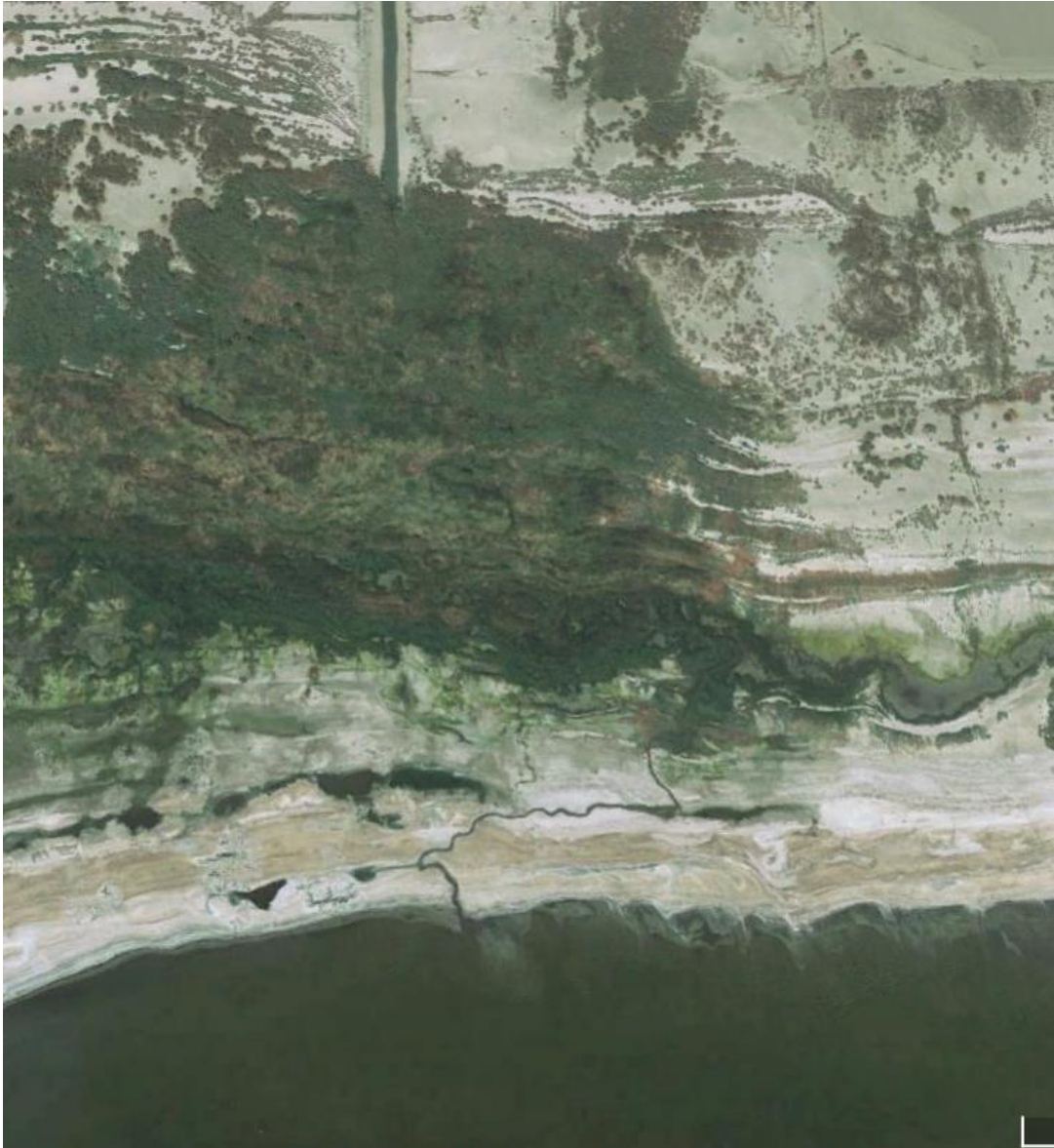




# Colfax Street inflow drain



June 2009



September 2018



Feb. 2008, Hayes St. drain



Sept 2018, Hayes St. drain



Nov 2018, nearshore at Hayes St. drain



17 October  
2018, Salt  
Creek inflow







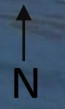
6 March  
2019 - Salt  
Creek inflow



Levee portion compromised



Approximately 375 acres



Flood plain inundation along the westside of Whitewater River levee. This fluvial environment was presumed created by flood waters (February-March 2019) compromising a portion of the west levee of Whitewater River, photo 29 March 2019. Robert McKernan





29 March 2019





# Avian diversity and abundance Hotspots at the central and north portion of Salton Sea, 2014-2019







- **Table 2. Waterbird Hotspots Identified at the central and north portion of Salton Sea.**
- **The names, number of waterbird taxa, and habitat characteristics for each area**
- **the resultant hotspots are listed in the order from most diverse to least diverse.**

Name of Hotspots	Number of waterbird taxa	Habitat characteristics
<b>Northwest shoreline and ±1km offshore</b> Avenues 76 <sup>th</sup> 78 <sup>th</sup> 81 <sup>st</sup> 82 <sup>nd</sup> 83 <sup>rd</sup> 84 <sup>th</sup> 85 <sup>th</sup>	104	Permanent inflows: 7-10 seasonal brackish pools and some permanent pools, extensive mudflats, extensive wetlands, 100m to 300 m exposed playa.
<b>Northeast shoreline and ±1km offshore.</b> Street: Grant, Colfax, Hayes, Garfield, Arthur, Cleveland, Palm Island Dr., 72 <sup>nd</sup> Ave.	103	Permanent inflows: 8-12 seasonal brackish pools and some permanent pools, extensive mudflats, extensive wetlands, 100m to 400 m exposed playa.
<b>Salt Creek and ±1km offshore.</b>	102	Seasonal inflow: 2-4 seasonal brackish pools, extensive barnacle beaches and some mudflats, 100m – 800m exposed playa.
<b>North Shore and ±1km offshore.</b>	88	Small harbor, presently isolated from the sea, urban run-off, extensive mudflats and rocky shoreline, some barnacle beach, 100-300m exposed playa.
<b>State Parks Recreation Area (SRA) and ±1km offshore.</b>	84	Small harbor, possibly seasonal surface inflow, presently isolated from the sea, urban run-off, rocky shoreline, barnacle beach.
<b>Desert Shores and ±1km offshore.</b>	63	Rocky beach, barnacle beach, a series of small canals without outlets to the sea.



Observations of  
prey resources in  
our study area







Water boatman abundance observed in late fall 2016 through 2019

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The status of  
Barnacles in birds'  
diets (January thru  
April) at Salton Sea





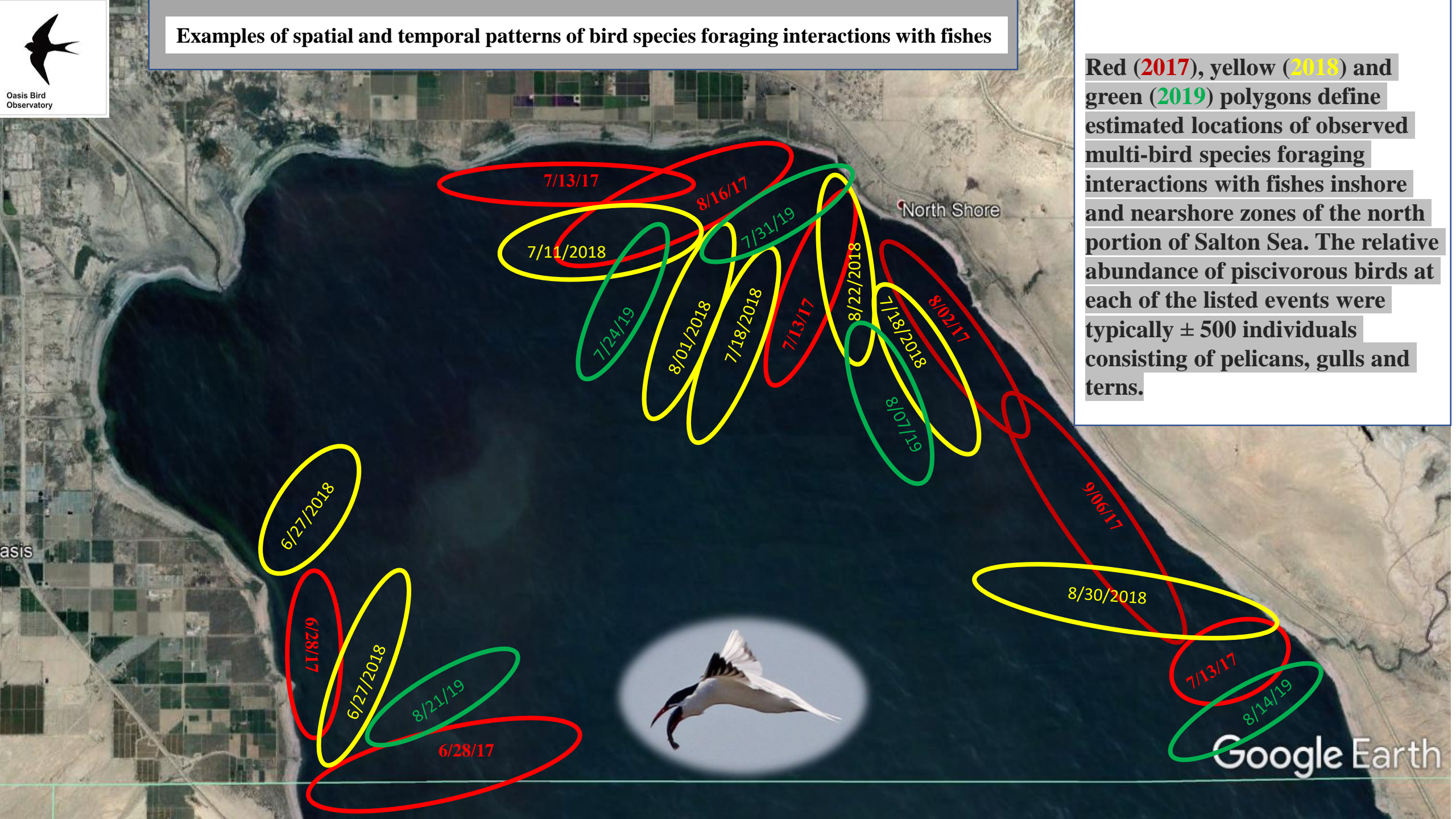
One of numerous piscivorous foraging assemblages, North Shore, 24 July 20019





# Examples of spatial and temporal patterns of bird species foraging interactions with fishes

Red (2017), yellow (2018) and green (2019) polygons define estimated locations of observed multi-bird species foraging interactions with fishes inshore and nearshore zones of the north portion of Salton Sea. The relative abundance of piscivorous birds at each of the listed events were typically  $\pm 500$  individuals consisting of pelicans, gulls and terns.



6/27/2018

6/28/17

6/27/2018

8/21/19

6/28/17

7/13/17

7/11/2018

7/24/19

8/01/2018

7/18/2018

7/13/17

8/16/17

7/31/19

8/22/2018

7/18/2018

8/07/19

8/02/17

8/30/2018

9/06/17

7/13/17















8/14/19

North Shore





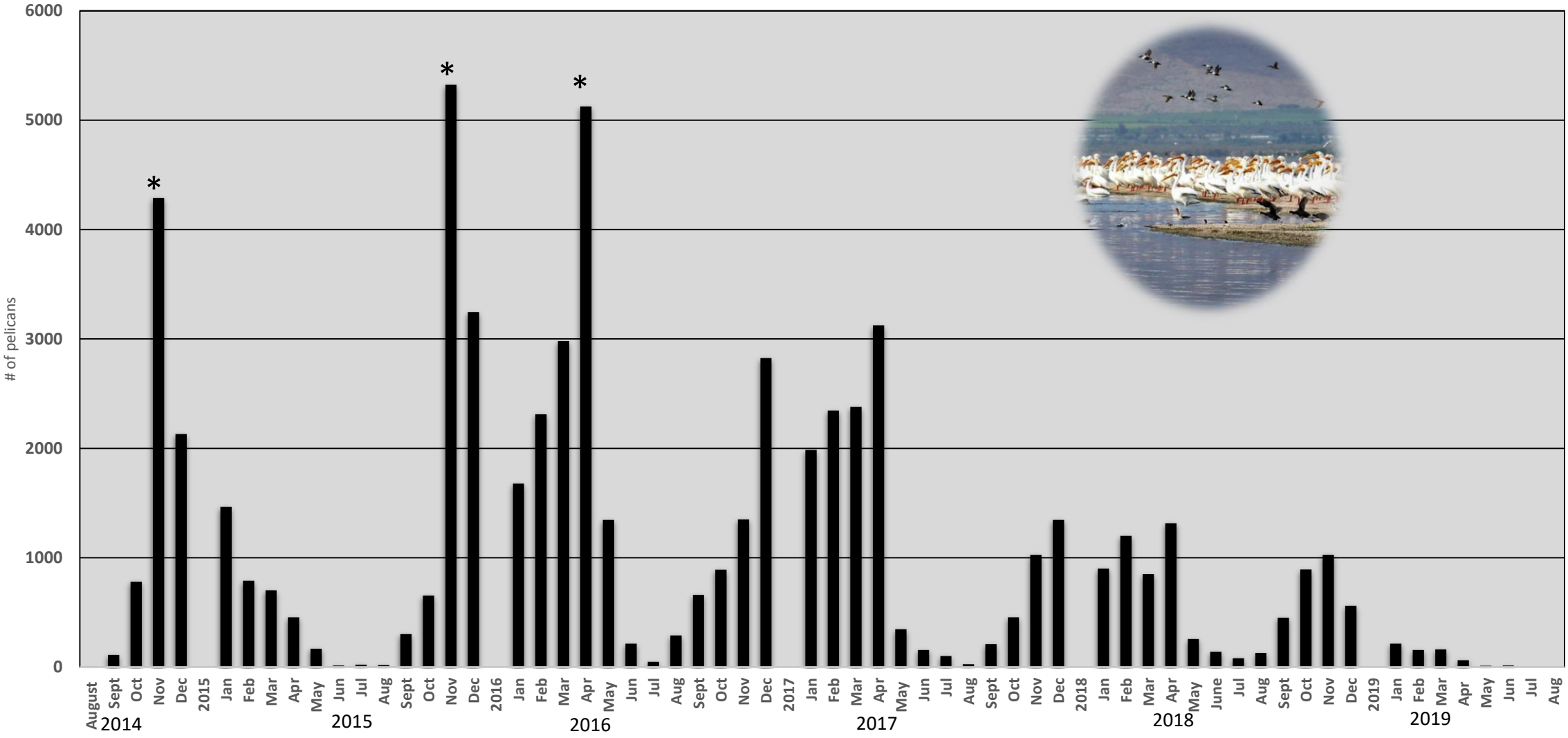
 reflect historic #'s,  reflect possible declining use of the NESS

Species	Previous studies	Historic data	OBO Surveys 2014-2019	Possible trends
American White Pelican	Patten et al 2003	late 1980's through the 1990's 	2014 through spring 2017  Fall 2017 through spring 2019 	OBO continues to document large migratory numbers of pelicans presumably passing through the Salton Sink during late 2017 through 2019
Brown Pelican	Patten et al 2003	During the 1990's 	2014 through 2017  2017 through 2019 	OBO survey estimates of post-breeding numbers appear to be declining during late fall and winter for 2017 through 2019
Eared Grebe	Jehl and McKernan 2002	during the 1980's and 1990's	2014 through 2019 ?  ? (temporal pattern consistent with 1980's & 1990's)	Without aerial or boat surveys Eared Grebe use of the Salton Sea is ambiguous. OBO aerial surveys 2019 and 2020 winter/early spring.
Western/Clark's Grebe	Shuford et al. 2000	survey numbers recorded in 1999 	2014-2016 nearshore numbers  late 2017 and 2019 recorded peak numbers on only a few days  ?	OBO nearshore observations between late 2017 and 2019 recorded peak numbers on only a few days perhaps reflecting only brief stopovers at Salton Sea
Shorebirds *Red Knot	Shuford et al. 2000	surveys in 1999 	2014 through 2019 appears to be corresponding estimates of 1999 	Red Knot were staging during spring (2016-2019) in higher peak numbers than have been previously documented
Snowy Plover	Page et al. 1986	important wintering site for Snowy Plover 	Continues to be an important wintering and nesting location 	OBO 2018 surveys of nesting populations indicated nest were placed close to the shoreline (mean 22.5m), perhaps a respond to the receding sea levels.





## American White Pelican relative abundance based on weekly shoreline surveys for the central and north portion of Salton Sea, 2014 through August 2019

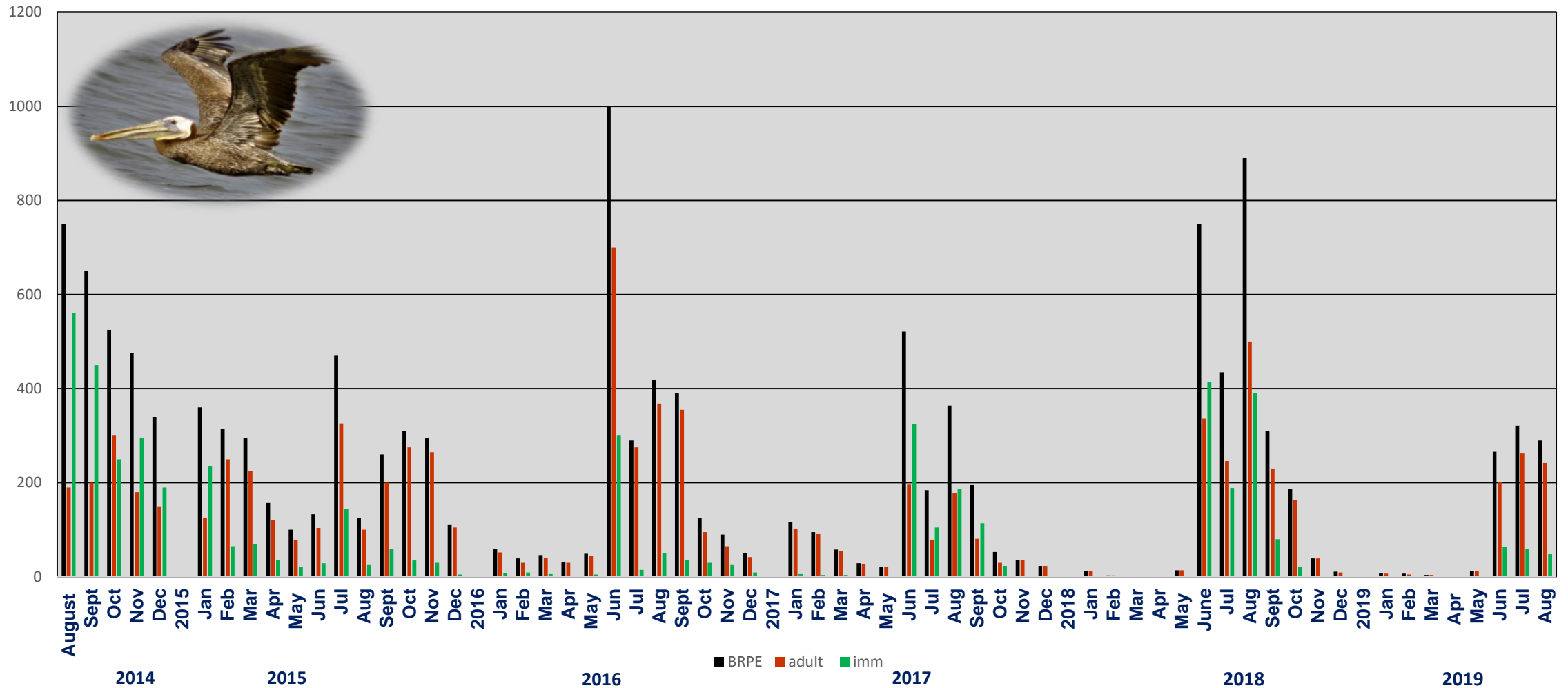


\* LACMNH air- boat surveys



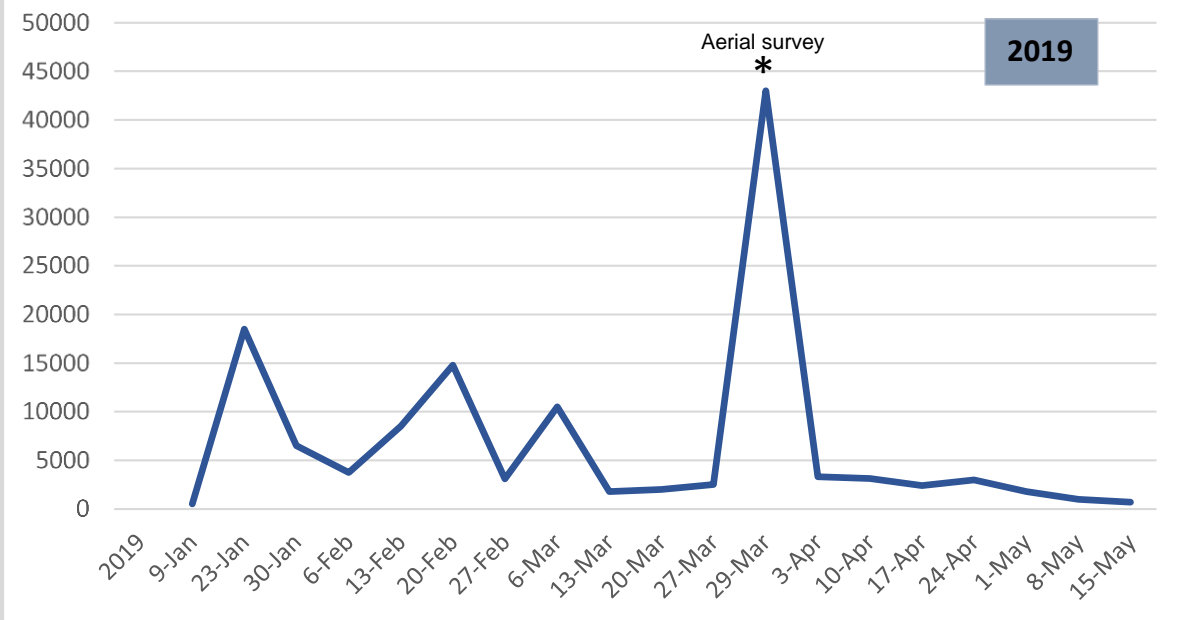
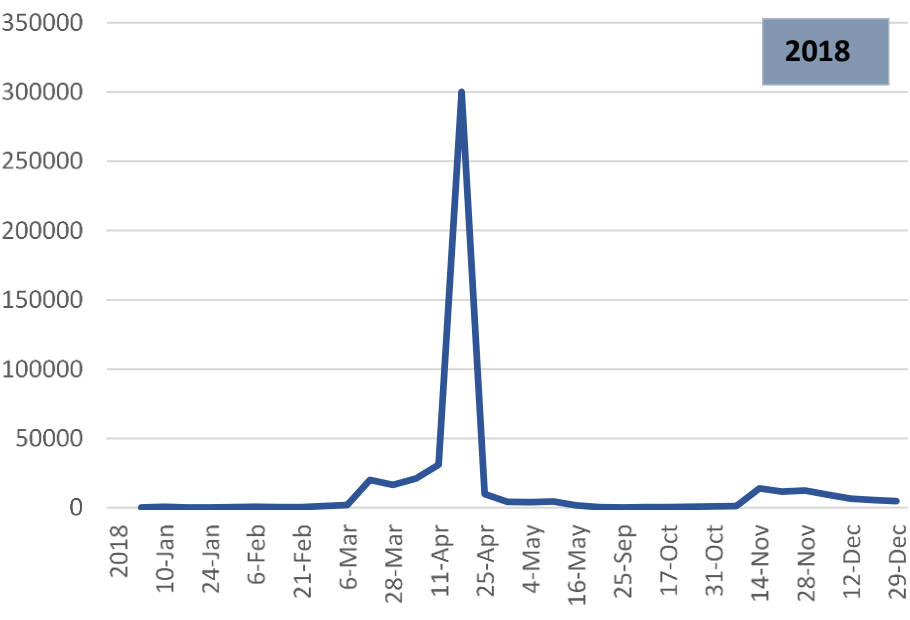
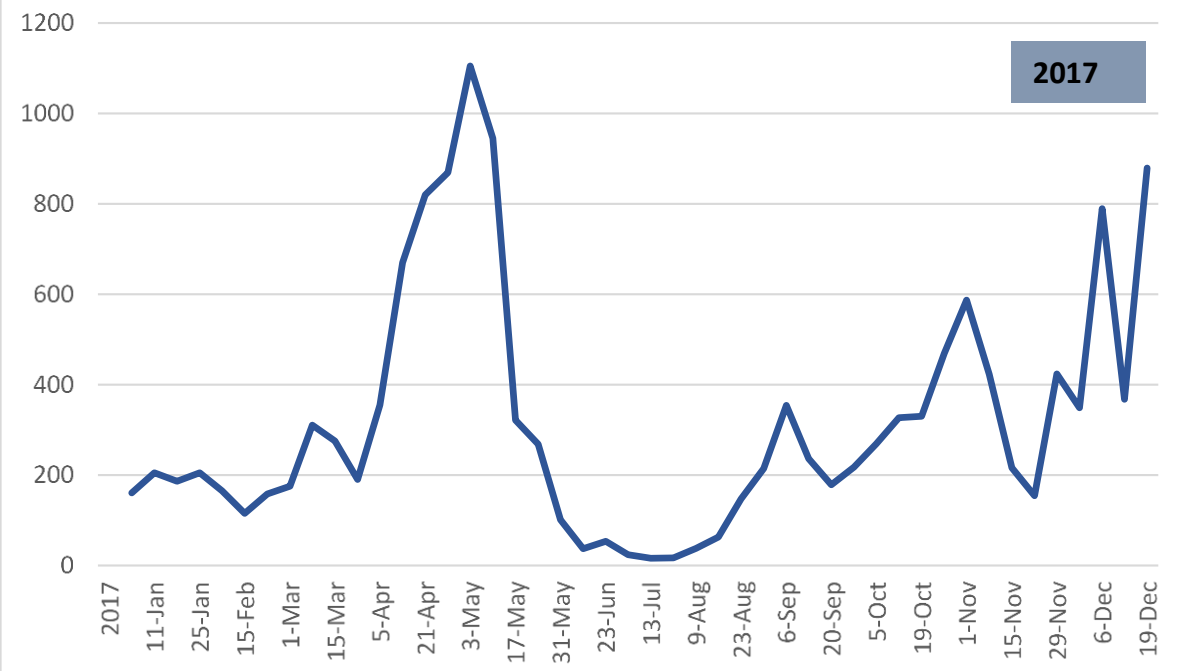
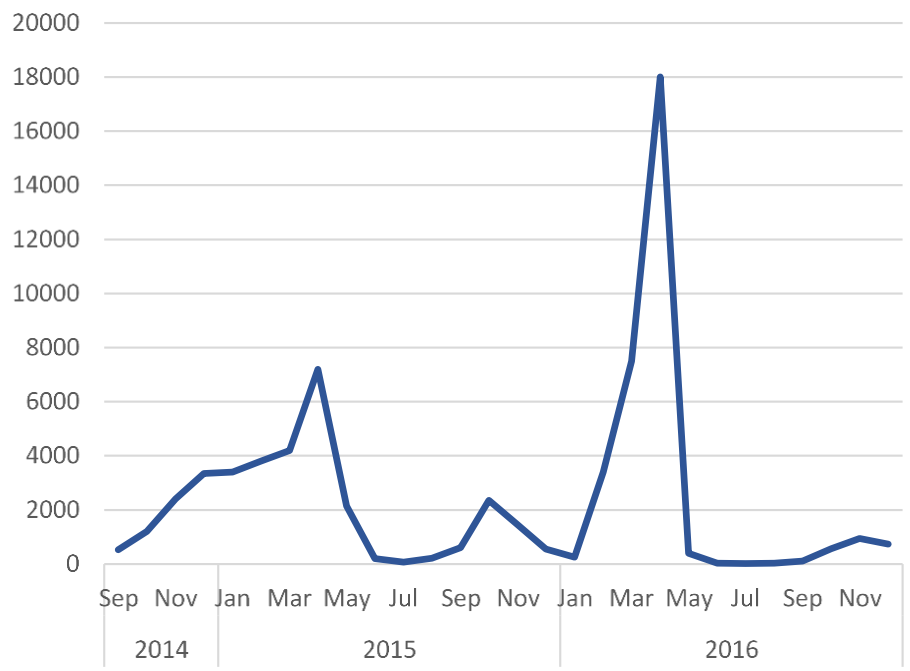


## Brown Pelican relative abundance based on weekly shoreline surveys for the central and north portion of Salton Sea, 2014 through August 2019





# Eared Grebe relative abundance results from shoreline counts along the central and north portion of Salton Sea, 2014-2019

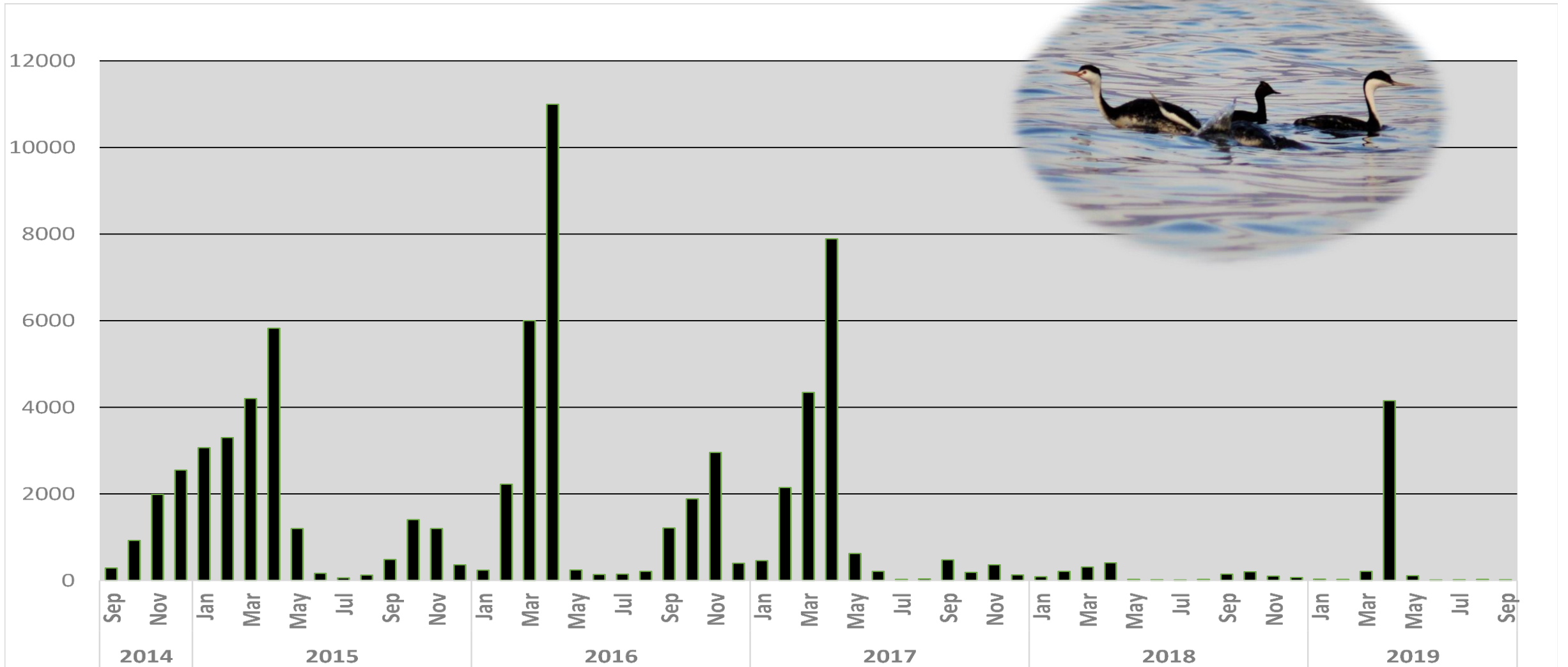






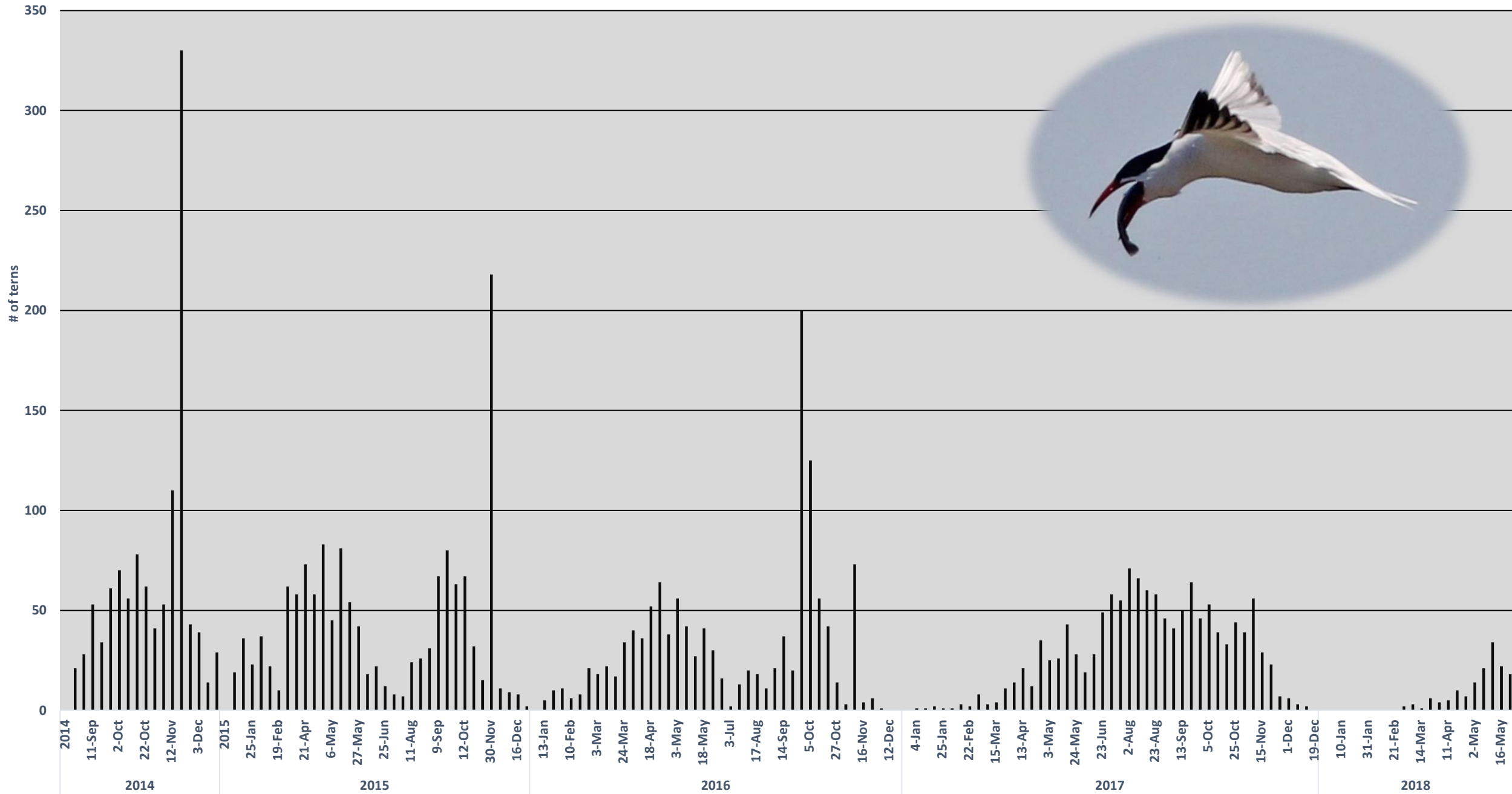
Oasis Bird  
Observatory

## Western Grebe/Clark's Grebe relative abundances for the middle and north end Salton Sea, 2014 through September 2019



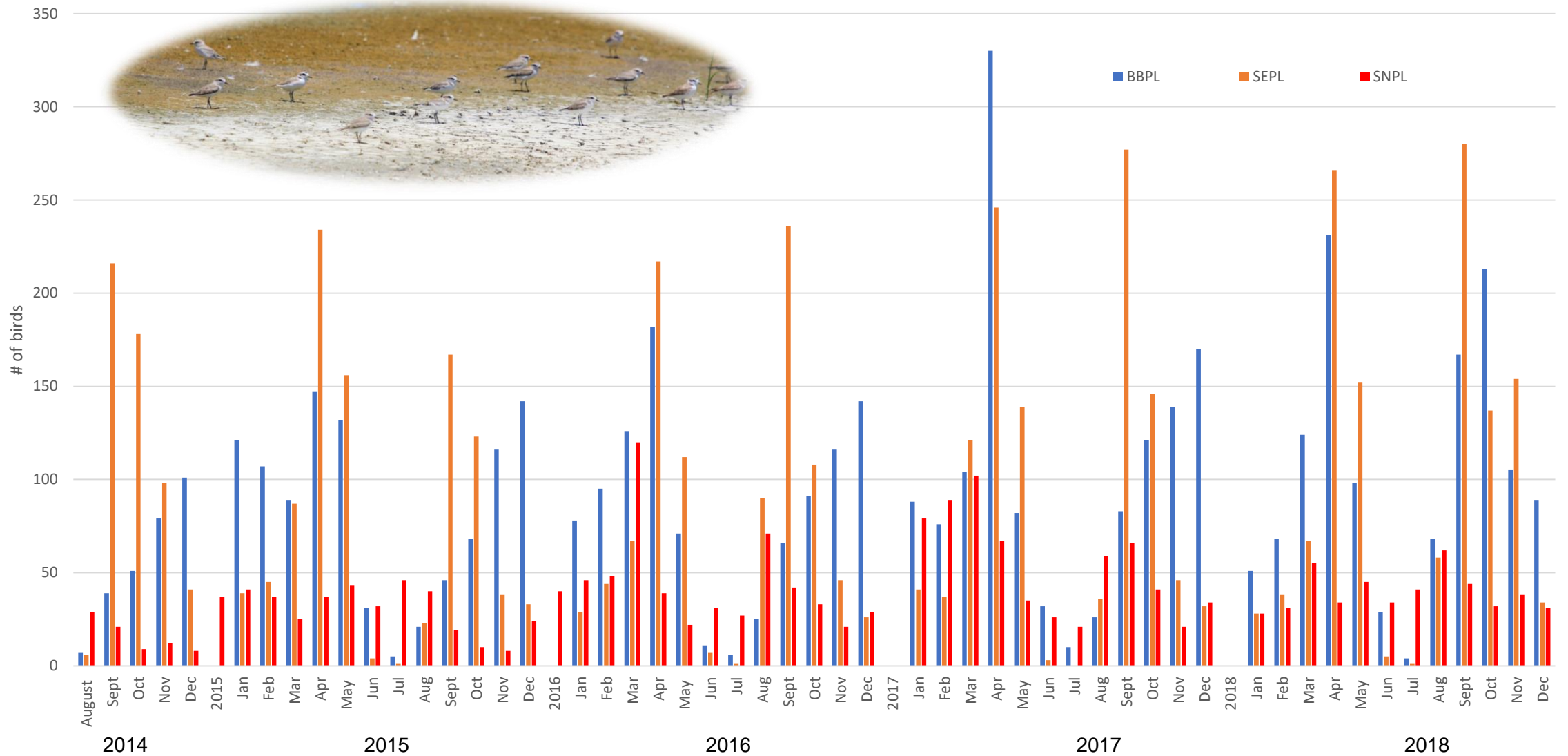


Caspian Tern relative abundance in the central and north portions of Salton Sea, 2014 through spring 2018





Phenology of Black-bellied Plover, Semipalmated Plover, Snowy Plover monthly peak relative abundances in the central and north portions of Salton Sea, 2014 through 2018

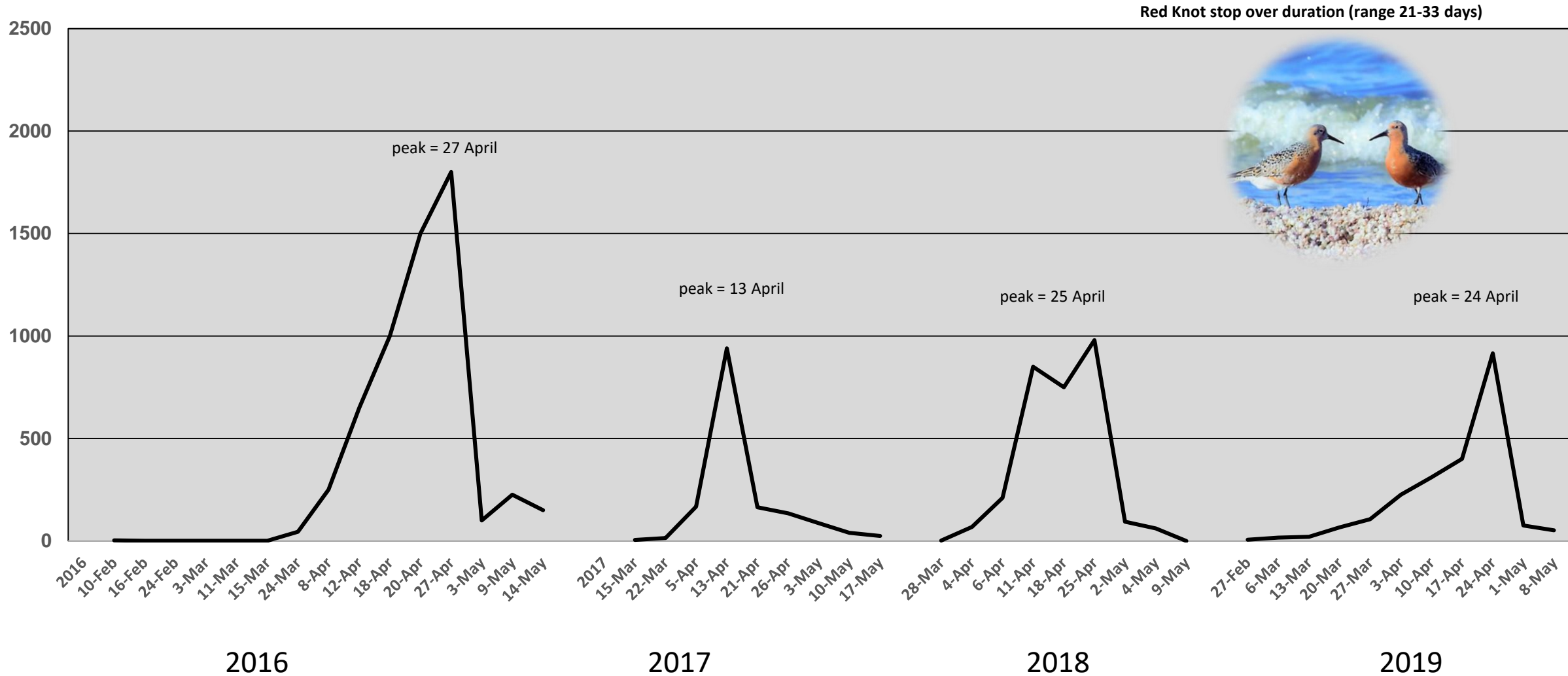


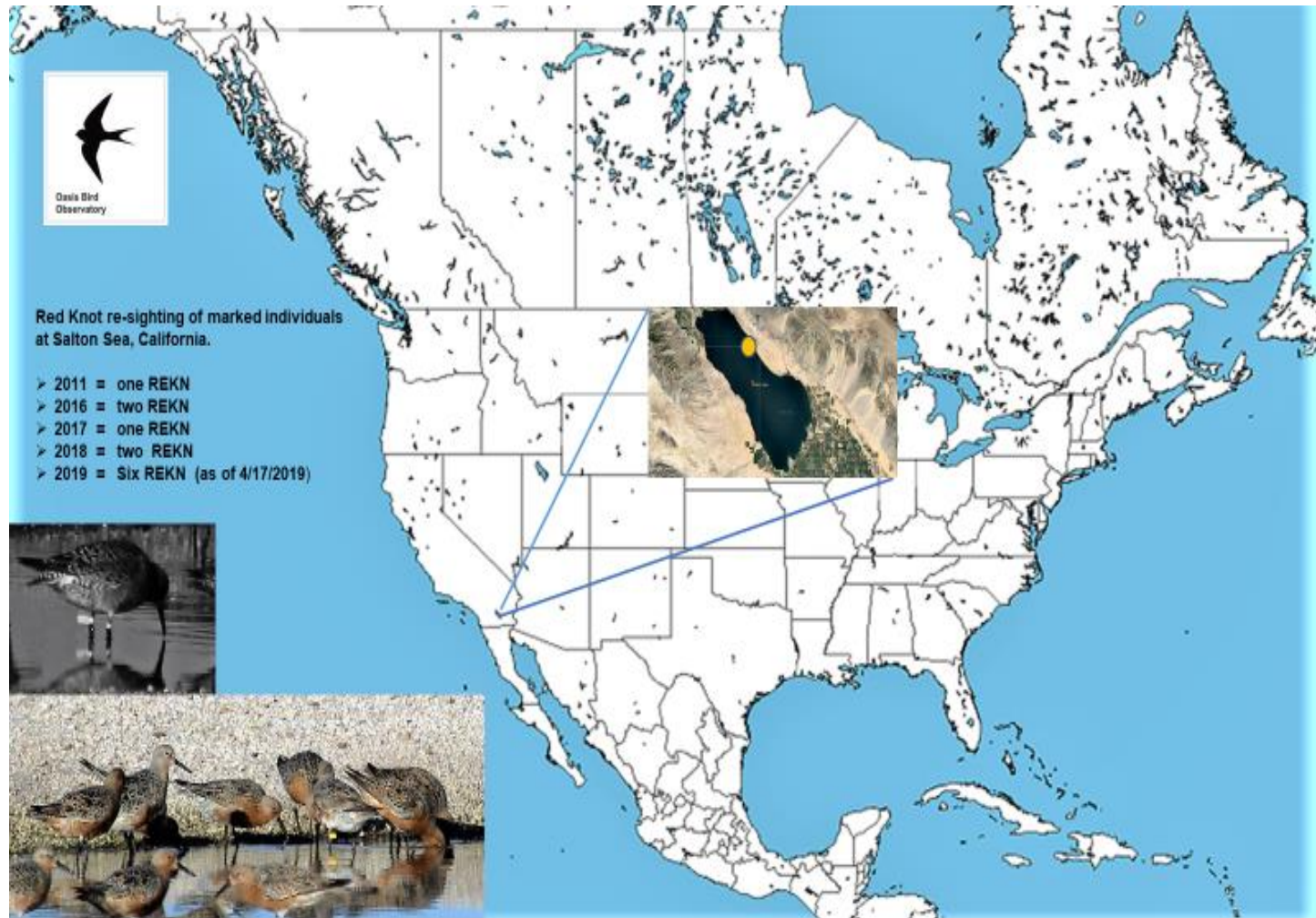




Oasis Bird  
Observatory

## Red Knot relative abundance along the barnacle beaches at Salton Sea 2016 through 2019







# Preliminary Conclusions

- Consider an adapted management strategies for inflow drain water resources at Salton Sea
- The northwest ( $\pm 750$  hectares), northeast ( $\pm 850$  Hectares) and Salt Creek ( $\pm 200$  Hectares) are critical Hotspots for bird diversity.
- A critical elements to further understand bird ecology during the Salton Sea transition would be to perform bird dietary studies and aquatic invertebrate sampling.
- Determine if drain water inflows buffer salinity and thereby perhaps improving conditions for invertebrate species and the fishery at the north end of Salton Sea.
- Continue to assess the Salton Sea status as a globally significant migratory stopover and overwintering location in western North America for birds.
- Monitoring bird populations and habitats at the Salton Sea during the sea's transformation is a vital part of best-practices in conservation management of the Salton Sea in a regional context.
- Frequency of bird surveys are an important consideration when assessing spatiotemporal patterns and habitat use.



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### **Aerial Surveys**

LightHawk- *Conservation Flying*

