

Double-crested Cormorant Declines on San Francisco Bay Bridges

Meredith Elliott, Point Blue Conservation Science, melliott@pointblue.org

Mark Rauzon, Laney College, mjrauz@aol.com

Eric Lichtwardt, LSA Associates, Eric.Lichtwardt@lsa-assoc.com

The double-crested cormorant (*Phalacrocorax auritus*) is a seabird known to occupy urban structures as nesting habitat. The old east span of the San Francisco-Oakland Bay Bridge (SFOBB) and the Richmond-San Rafael Bridge (RSRB) have hosted the two largest colonies of this species in the region. However, boat counts of these colonies in 2015 showed precipitous declines on both bridges; less than half of each colony remained from 2014. The old east span of the SFOBB is currently being dismantled, and despite social attraction techniques employed to attract cormorants to nesting platforms on the new SFOBB east span, the cormorants have not used these structures yet. The RSRB has maintenance projects that have blocked off where the cormorants have nested in the past. So it begs the question: where will the double-crested cormorants nest in the future? We are undergoing a region-wide study of double-crested cormorant colonies by censusing aerial photographs (2004-2014). These results will provide a regional status assessment for this species, as well as inform us on how this species moves and uses different areas in the Bay. Double-crested cormorants are known to move to other colonies within their west coast range, as evidenced by a banded double-crested cormorant on the SFOBB; this bird was hatched at East Sand Island in Oregon, a large double-crested cormorant colony which is soon to be reduced by the U.S. Army Corps of Engineers in an attempt to protect endangered salmonids in the Columbia River Estuary.

Keywords: double-crested cormorant, regional population, decline, bridges

Poster Topic: Biological Species: Birds

Avian Predator Community and Foraging Behavior during Winter Tides in San Francisco Bay Saltmarshes

Kyle A. Spragens, USGS San Francisco Bay Estuary Field Station, kspragens@usgs.gov
Karen M. Thorne, USGS San Francisco Bay Estuary Field Station, kthorne@usgs.gov

Inundation from seasonal and diurnal tides can present predictable periods of increased risk for tidal marsh wildlife to avian predator species which are commonly found in and around San Francisco Bay saltmarshes. While tidal inundation is a normal phenomenon and part of the predator-prey interaction found in this habitat type, higher winter tides and storm surges present an event driven increase in predation risk which is difficult to assess through typical survival study methodologies. We attempted to expand on Evens and Page's (1986) observations which suggested increased predation on saltmarsh-dependent vertebrates occurred during high winter tides. Direct measures of mortality for marsh vertebrates is complicated by low recapture and detection probabilities and a general lack of knowledge on fine-scale movement between and connectivity of adjacent habitat parcels, especially for species of concern. Alternatively, in 2010 and 2011 we conducted paired low and high tide surveys between September and February to assess the number and activity of avian predator species in relationship to site, season, time of day and tide height at four tidal marshes in San Francisco Bay estuary. Commonly observed avian predator species observed included; White-tailed Kite, Great Egret, Northern Harrier, Great-Blue Heron and Red-tailed Hawk. We found that species diversity varied across sites, and that prominent species seemed to be influenced by adjacent land type bordering saltmarsh. During a January 2010 El Nino storm surge event, where the marshes were inundated above predicted tides, certain marshes recorded 50% capture efficiency by avian predators during marsh plain flooding. Our results suggest that while predation events were opportunist, the particular avian predator species and marsh site also influence predation risk during marsh flooding events, especially during storm surges.

Keywords: avian, predation, saltmarshes, storm surges, tides,

Poster Topic: Biological Species: Birds

Controlling Physical and Chemical Characteristics of Habitat Islands in the San Francisco Bay Estuary

Austin Payne, Ducks Unlimited, apayne@ducks.org
Renee Spent, Ducks Unlimited, rspent@ducks.org

Islands in San Francisco Bay provide important nesting, resting, roosting, and foraging habitat for a myriad of waterbirds. However, creating islands that can provide persistent high quality habitat without continuous maintenance is challenging. Test islands utilizing 5 different surface treatments were constructed in 2013 at Eden Landing and the results were analyzed. Based on these results, 4 nesting islands were surfaced with a combination of (a) lime treatment (b) oyster shells and (c) pea gravel. Bird usage, vegetation establishment, cracking, and erosion are being observed. Preliminary results indicate that surfacing new and existing islands utilizing this surface treatment method provides benefit for nesting waterbirds at a reasonable cost.

Keywords: Islands, nesting, waterbirds, desiccation cracking, bay mud, saltponds

Poster Topic: Biological Species: Birds

Assessment of Habitat Displacement of Waterbirds in Central San Francisco Bay: Lessons from the 34th America's Cup Races

Tanya Graham, US Geological Survey, tgraham@usgs.gov

Susan De La Cruz, US Geological Survey, sdelacruz@usgs.gov

Lacy Smith, US Geological Survey, lmsmith@usgs.gov

John Takekawa, US Geological Survey, john_takekawa@usgs.gov

In 2012 and 2013, San Francisco Bay (SFB) hosted the 34th America's Cup sailing races, an event which drew >1,000 spectator boats on the busiest race days. Many of the races coincided temporally and spatially with nesting and fall arrival of migratory waterbirds. Thus, the races provided a unique opportunity to quantify effects of high-density water traffic on waterbirds and identify best management practices to minimize future impacts. Our objective was to examine guild and species-specific responses to watercraft density. We divided the event area into 1-km² grids and conducted bird and boat counts from five fixed survey locations. We used generalized linear mixed models and model selection to assess the influence of habitat characteristics, boat abundance, event status, and weekday/weekend on the abundance of bird guilds (cormorants, grebes, gulls, seabirds). We conducted 177 ground surveys over 26 days, spanning event/non-event weekdays/weekends covering an average of 24.19±2.33 km² per survey. Mean waterbird density was 2.72±3.27 birds/km², and was higher on event (2.46±2.86 birds/km²) compared to non-event (3.23±3.72 birds/km²) weekends, with gulls displaying the greatest densities (4.84±3.04 birds/km²). Mean boat density was 5.59±8.30 boats/km² (event weekends = 10.92±11.39 boats/km²; non-event weekends = 3.69±1.61 boats/km²). Motorboats (581%) and sailboats (256%) were more dense on event weekends than non-event weekends. Model results suggested that for every 100 additional boats, abundance decreased by 61% for cormorants, and 81% for grebes, while gull abundance increased by 195%. Boats were not a factor for other seabirds. Habitat characteristics affecting abundance included Beaufort sea state, distance to Alcatraz Island, and depth. Our results suggest some migratory bird species are displaced from Central SFB habitat by increased abundances of watercraft associated with large-scale events, such as America's Cup. Managers can use these results to consider impacts to waterbirds when planning for future events and water transit changes

Keywords: Disturbance, habitat displacement, vessel traffic, cormorants, gulls, grebes, seabirds

Poster Topic: Biological Species: Birds

Shorebird Response to Varying Salinity and Water Depth in an Experimental Design in Salt Pond Management

Lacy M. Smith, U.S. Geological Survey, lmsmith@usgs.gov
Susan E. W. De La Cruz, U.S. Geological Survey, sdelacruz@usgs.gov
Stacy M. Moskal, U.S. Geological Survey, smoskal@usgs.gov
John Krause, CA Department of Fish and Wildlife, John.Krause@wildlife.ca.gov
Renee Spent, Ducks Unlimited, rspent@ducks.org
John Y. Takekawa, U.S. Geological Survey, john_takekawa@usgs.gov

San Francisco Bay Estuary supports thousands of shorebirds during fall and spring migration and over winter. These shorebirds rely on foraging opportunities in the bay mud flats and former salt production ponds. The South Bay Salt Pond Restoration Project plans to restore 50-90% of salt ponds to tidal marsh and the resulting sediment demand for restoration may reduce the extent of remaining mud flat. Ponds E12 and E13 in the Eden Landing Ecological Reserve were enhanced to provide varying levels of salinity and water depth for increased shorebird foraging and roosting opportunities. Each pond was divided into three cells and foraging mounds were constructed to provide variation in topography. Our objectives were to understand shorebird use and invertebrate colonization immediately post-construction. We surveyed shorebirds across the cells and within survey plots on foraging mounds during the first winter (Jan-April) post-construction. We measured water quality and collected benthic macro-invertebrate cores and sweep samples on the mounds. Small shorebirds, predominantly Western Sandpiper and Dunlin, were the most abundant shorebirds, with over 5,000 observed across all cells each month. Small shorebird abundance on foraging mounds ranged from zero to several hundred; however only 10% were observed foraging. We found aquatic invertebrates in our sweep samples and primarily ostracods in our sediment cores; however, we expect additional colonization to occur over time. Our research highlights immediate shorebird use of managed ponds manipulated to provide suitable water depths for roosting and foraging opportunities. Our on-going studies at these experimental ponds will increase our understanding of shorebird spatial distribution in relation to water salinity, depth, and invertebrate composition, and will provide managers with key information to optimize ponds for wintering and migrating shorebirds.

Keywords: waterbirds, salt ponds, habitat, invertebrates

Poster Topic: Biological Species: Birds