

Case Study Name: Farallon Seabird Nest Site Enhancement Project

Lead Agency/Organization and Partners: PRBO Conservation Science is implementing this project in partnership with the US Fish and Wildlife Service Farallon National Wildlife Refuge, with funding from the *Cosco Busan* Oil Spill Restoration Plan.

Project Description: Researchers installed artificial nesting boxes on Southeast Farallon Island (SEFI) in the early 1970's to provide cavity nesting seabirds additional nesting habitat and to assist monitoring efforts and reduce disturbance to natural habitat. This project will redesign wooden nest boxes – to mitigate for climate change impacts on this artificial habitat - for the Cassin's Auklet and Rhinoceros Auklet populations on Southeast Farallon Island (SEFI), part of the Farallon National Wildlife Refuge located 30 miles west of the Golden Gate. The Cassin's Auklet, a California Species of Special Concern, is a small, krill-eating seabird that nests in burrows and rock crevices on seabird colony islands. Highly sensitive to climate variability, Cassin's Auklets are indicators of environmental change in coastal California¹. PRBO Conservation Science has monitored the population of breeding auklets on SEFI continuously since 1970 and has documented a decline in the population of over 70% in the past four decades². Rhinoceros Auklets, a species extirpated from the island for over a century have returned to breed in record numbers.

Unprecedented heat events during the 2008 breeding season led to the over-heating of many Cassin's Auklets in boxes, and the death of some. With a trend in warming temperatures and an expected increase in the frequency of extreme heat events, it will be necessary to modify artificial nesting boxes to maintain temperatures safe for auklet use. The goal of this project is to provide permanent artificial habitat for the auklets using materials and methods that keep the artificial habitat at temperatures closer to natural burrows.

Approach to Vulnerability Assessment: *How was vulnerability assessed in the planning process or during implementation? What data and decision support tools were used to evaluate vulnerability? Who was involved in the assessment and how were they engaged? Did participants prioritize risk? How much time did the assessment take?*

During the unique 2008 event, immediate action was taken by PRBO and FWS to respond for Cassin's Auklets – developing short term solutions to implement that day and over the next few weeks. Analysis of long term climate data revealed an increasing temperature trend over the past 40 years, and an increase in the frequency of extreme temperature events. Assessments of the impacts of short term solutions were conducted between 2009-2011. These assessments will guide efforts for new box design.

¹ <http://www.prbo.org/cms/650>

² http://www.prbo.org/cms/docs/marine/SEFI_seabirds/PRBO_TechnicalBrief_2010_CAAU_PVA_FINAL.pdf

Adaptation Actions: *What actions were chosen to mitigate climate change risks? What criteria were used to select these actions?*

In 2008, PRBO researchers installed shade structures in all occupied nest boxes as a temporary means of preventing heat stress and started a pilot study to determine temperature differences in un-shaded boxes, shaded boxes and natural burrows. Simple wood shades effectively reduced temperatures of treated nest boxes – sometimes by well over 25% - relative to controls. Treated boxes had higher temperatures than natural burrow habitat, but were generally cooler than ambient temperature. A related study by a graduate student researcher is examining differences in incubation behavior by auklets in the three nest types³.

The next stage of this project will evaluate potential materials for the new artificial habitat and possible alternate means of installing them (*e.g.*, buried or partially buried, shaded, *etc.*). Once these alternatives have been tested in the field, a final design will be selected and new nesting boxes will be installed.

Implementation: *Was a written plan completed? What is the status of implementation for the selected actions? Describe specific actions that have been completed or are in the process of implementation.*

A draft plan for the project was developed as part of the draft restoration plan for *Cosco Busan*⁴. New designs will be developed in 2014, with initial testing in 2015, and full implementation 2016-2017.

Monitoring and Management: *What type of post-project monitoring will be conducted? Does this project include an adaptive management component?*

New designs will be tested over three years to insure successful use by seabirds, and that goals to mitigate anticipated climate change impacts are met. All these goals will be met before full implementation of selected final design. Continued annual monitoring of the new designs will allow regular assessments of how the new habitat functions in future climate conditions.

Lessons Learned: *What part of the process worked well and what would you do differently?*

Over this process, there has been a gradual, stepwise progression of response that has been very effective. While temporary shades have been effective early designs of them using thick

³ <http://losfarallones.blogspot.com/2013/04/v-behaviorurldefaultvmlo.html>

⁴ <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=36952&inline=true>

foam instead of wood were problematic. While they provided adequate shade protection, gulls often ripped them apart and they were not durable. Wood shades are much more durable and very effective, but need heavy weights piled on them to prevent high winds from dislodging them. What has worked well includes: implementing an immediate response to a crisis, putting short-term mitigation measures into place, assessing those measures, and continuing implementing short-term successful mitigation measures while planning for more long-term action. Now we will design, test, and monitor the longer term solutions,.

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PLEASE include photos and any relevant maps that might help illustrate the case study.
SUGGESTED LENGTH is 2 – 4 pages including photos and maps.



Photo: Ron LeValley

Cassin's Auklet
Ptychoramphus aleuticus



Shaded Cassin's Auklet nest box



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