

Seabird Monitoring at the Cape Perpetua Marine Reserve / Protected Area

A Citizen Science Project



Audubon volunteers monitoring seabird nests at the Mile 179 colonies (Photo: Amelia O'Connor).

**Report prepared by Amelia J. O'Connor¹, Joe Liebezeit², Shawn Stephensen¹,
Paul Engelmeyer², Rob Suryan³ and Amanda Gladics³**

¹U.S. Fish and Wildlife Service, Oregon Coast National Wildlife Refuge Complex, 2127 S.E. Marine Science Drive, Newport, Oregon 97365

²Audubon Society of Portland, 5151 NW Cornell Rd, Portland, OR 97210

³Oregon State University, Hatfield Marine Science Center, 2030 S.E. Marine Science Drive, Newport, Oregon 97365

November 2014



Background

Oregon currently has five Marine Reserve / Marine Protected Areas (MR/MPA). These areas prohibit extractive uses, such as commercial fishing, in order to support stable populations of marine life and protect key nearshore habitats. In MRs all extractive uses are prohibited while MPAs are areas protected for a specific conservation purpose, allowing for some, but not all, uses.

The Cape Perpetua MR / MPA is the largest in Oregon and moved from the “designation” to “implementation” stage in January of 2014. With this transition, we enter a critical time to monitor the effectiveness of this marine reserve for both human benefit and ecological health.



Pelagic Cormorant nest with pigeon guillemot crevice nest in the background at the Sea Lion Caves (Photo: Amelia O'Connor).

The Cape Perpetua MR/MPA is unique in that it includes a “Seabird Protection Area” which specifically protects forage fish species including Pacific Herring, Pacific sardines, anchovies, smelt, and Pacific sand lance. These small fish are a critical link in the ocean ecosystem providing a primary food source for many top predators like salmon, marine mammals, and seabirds. Scientific studies show that when seabird populations are not doing well, the decline of forage fish prey is often a primary cause.¹ Seabird populations are also

¹ Cury, P. M. et al. 2011. Global Seabird Response to Forage Fish Depletion – One-Third for the Birds. *Science* 334 : 1703-1706.



Rhinoceros Auklet with sand lance (Photo: A. Redding)

influenced by a number of other factors including pollution, invasive predators, and human disturbance.²

Oregon Department of Fish and Wildlife (ODFW), the lead agency tasked with managing the marine reserves, is focusing ecological monitoring on benthic habitats and fish communities. Complementing these efforts, the Audubon Society of Portland, the U.S. Fish and Wildlife Service, Oregon State University are partnering to learn more about seabird use in Oregon’s largest MR/MPA at Cape Perpetua. Globally, research on seabird reproductive and foraging ecology has informed MR/MPA site identification and assessment and provided vital information on the subsequent changes in the marine community following MR/MPA establishment.³

The “science goal” of this project is to establish a baseline of information on nearshore, fish-eating seabird populations in the Cape Perpetua MR/MPA that can be used to compare to nearby seabird colonies. We aim to accomplish this by:

² Croxall, J.P., et al. 2012. Seabird conservation status, threats, and priority actions: a global assessment. *Bird Conservation International* 22: 1–34.

³ Pichegru, L., D. Gremillet, R.J.M. Crawford, and P.G. Ryan. 2010. Marine no-take zone rapidly benefits endangered penguin. *Biology Letters* 6:498-501;
Thaxter, C.B, et al. 2012. Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biol Conserv* 156: 53-61 doi <http://dx.doi.org/10.1016/j.biocon.2011.12.009>

- 1) Determining breeding success of the most abundant seabird species⁴ at multiple colonies in the MR/MPA and compare with other Oregon colonies including at Yaquina Head. The focal species include Brandt's, Pelagic, and Double-crested Cormorants.
- 2) Determine abundance of crevice nesting species, Pigeon Guillemot and Rhinoceros Auklets, at Sea Lion Caves in the MR/MPA.
- 3) Record avian predator abundance and disturbances at monitored colonies.



Volunteer Mary Scully monitoring cormorant nests at Heceta Head (Photo: Amelia O'Connor).

The “outreach goal” of this project is to promote wider recognition of Oregon’s marine reserves and forage fish conservation through local community participation and associated outreach and education. We have the unique opportunity to reach more than 150,000 visitors that go to Sea Lion Caves (a local business) and Heceta Head Lighthouse annually.

This report provides a summary of our findings for the initial year of this project.

Study Area & Methods

The marine reserve at Cape Perpetua is the largest of Oregon’s five MR/MPAs (Figure 1). From 22 May to 22 August we monitored six cormorant plots on four different nearshore



Peregrine Falcon eating a Pigeon Guillemot at Sea Lion Caves (Photo: Joe Liebezeit)

and two on-shore (headland) colonies within the southeastern Cape Perpetua MPA (Figure 2). Each plot is a subset of 9-14 nests within a given colony. Sites were selected based on proximity to colonies within the reserve, visibility of the colony, and tourist and visitor use in order to promote outreach. Plots and nests were selected based on visibility from land, specifically nests that were lower elevation and that were less likely to be blocked by other nests or roosting birds. Plots were located (from North to South) at Heceta Head, Mile 179 Pullout, the Sea Lion Caves, and Cox Rock (Figure 2, Appendix). These plots were compared with data collected by the Seabird Oceanography Lab at Yaquina Head, just north of Newport Oregon. In addition, Pigeon Guillemots and Rhinoceros Auklets were counted at the Sea Lion Caves from 22 May to 22 August.

Nineteen hard working “citizen scientist” volunteers performed much of the monitoring under the supervision of a U.S. Fish and Wildlife Service (USFWS) intern. An initial training on project goals and field methods was provided by the Audubon Society of Portland. Volunteers monitored sites twice a week during the three month field season comprising a total of 30 days of observation (178 volunteer hours). All plots were monitored twice a week with the exception of Cox Rock, which was monitored once a week and only by the USFWS Intern. In addition, at Sea Lion Caves, auklets and guillemots were counted twice a week before or after the adjacent cormorant plot was

⁴ We focused on seabird species that feed on fish relatively close to shore.

monitored. These counts lasted no more than 15 minutes. Monitoring was conducted with binoculars (10x42), and spotting scopes (Swarovski and Leupold, 25-60X).⁵

Analyses included calculating breeding productivity which is defined as the average number of fledglings produced per nest. We defined a fledgling as a Brandt's or Pelagic Cormorant chick that is present 30 days after first observation and a Double-crested Cormorant chick after 25 days (same criteria used at the Yaquina study area). Fledgling age reflects the observed timing chicks fully developed wings and is comparable to methods used in other studies⁶. Basic summary statistics, including average clutch size and chicks per nest for cormorants, frequency of predators and average and maximum guillemot and auklet cave counts are also reported. Summary statistics and graphs were created using the R Project for Statistical Computing (R core team 2014).

Results & Discussion

We monitored a total of 65 cormorant nests where we observed a total of 92 eggs, 104 chicks, and 55 fledglings (See Table 1 for species breakdown). Brandt's cormorants had the lowest breeding productivity with 0.49 ± 0.12 ($M \pm SE$ ⁷) fledglings per nest. This productivity was comparable to that of Brandt's cormorants at Yaquina Head (0.33 ± 0.09 , Table 1). Between Cape Perpetua Brandt's colonies there was considerable variability in breeding productivity ranging from 1.3 ± 0.3 ($M \pm SE$) at Mile 179 South colony to failure (zero productivity) at both Blast Rock and Cox Rock (Figure 3). Pelagic and Double-crested Cormorants had relatively

higher breeding productivity, 1.89 ± 0.35 ($M \pm SE$) and 1.45 ± 0.51 ($M \pm SE$) fledglings per nest, respectively (Table 1). Pelagic cormorants breeding productivity was slightly higher at the Cape Perpetua colony (1.89 ± 0.35) than that observed at Yaquina Head (0.79 ± 0.22 ; Figure 4). The Double-crested Cormorant colony on Blast Rock was abandoned however the neighboring Parrot Rock colony had relatively high breeding productivity (Figure 5) and may have included second nesting attempts from birds that abandoned Blast Rock.



Pigeon Guillemot pair at Sea Lion Caves (Photo: Amelia O'Connor).

Predators were observed at all sites although slightly higher numbers of bald eagles and turkey vultures were seen at Mile 179 and brown pelicans at Heceta Head (Figure 6). Only one predator disturbance was observed during monitoring which occurred at Cox Rock on 13 June. This disturbance was caused by a subadult bald eagle and there were no resulting cormorant mortalities. Although this was the only disturbance recorded during monitoring many disturbances were reported outside of monitoring times. Up to three subadult eagles were reported flushing cormorants and landing on Cox Rock on multiple occasions. Monitoring visits following these events saw losses in monitored nests and may explain the colony abandonments documented at both the Cox and Blast Rock colonies.

In the Sea Lion Caves a maximum count of 163 Pigeon Guillemot adults and 25 Rhinoceros Auklet adults were observed on 1 July 2014 and 19 June 2014, respectively (Table 2). Counts varied significantly throughout the breeding

⁵ For detailed information on field methodology contact Joe Liebezeit for the sampling protocols

⁶ Elliott, M.L., Bradley, R.W., Robinette, D.P., and J. Jahncke. 2014. Changes in forage fish community indicated by the diet of the Brandt's cormorant (*Phalacrocorax penicillatus*) in the central California Current, *Journal of Marine Systems*. doi: 10.1016/j.jmarsys.2014.07.015; Wires, L.R., F.J. Cuthbert, D.R. Trexel and A.R. Joshi. 2001. Status of the Double-crested Cormorant (*Phalacrocorax auritus*) in North America. Final Report to USFWS.

⁷ Mean \pm Standard Error

period with no apparent temporal pattern. On average 118.35 ± 5.66 ($M \pm SE$) guillemot and 10.87 ± 1.21 ($M \pm SE$) auklet adults were counted (Table 2). Chicks were observed late in the breeding period and had a maximum count of four guillemot and one auklet chick (Table 2). A total of eight Pigeon Guillemots and no Rhinoceros Auklets were observed with fish in the cave (Table 2).

During monitoring volunteers engaged with a minimum of 234 visitors about Oregon's marine reserves, importance of forage fish, as well as the goals of this project. Visitors ranged

from local Oregonians to those who traveled cross-county or internationally to see the Cape Perpetua area.

Next Steps

This project will continue in the summer of 2015 with the potential addition of Black Oystercatcher monitoring within the MPA. The data summarized in this report will contribute to a long term baseline dataset to indicate Cape Perpetua ecosystem health.

Acknowledgements

This project was made possible by a collaboration of organizations and people. Funding and project concept was provided by the Audubon Society of Portland. The U.S. Fish and Wildlife Service provided gear and the involvement of a full time intern, Amelia O'Connor. We thank Norb Leupold at Leupold Optics for donating two spotting scopes for the Project. Also, special thanks to landowners, Luthera Mlott for providing access to monitor Cox Rock and Boomer Wright for providing access to the Sea Lion Caves, and both for being a pleasure to work with.

There were 19 superstar volunteers that monitored throughout the season rain or shine for this project: Anne Caples, Mary Scully, Shelley Taylor, Nikki Thomas, Adele Dawson, Meagan Campbell, Tara Dubois, Cassidy Dubois, Abbey Dubois, Karen Johnson, Ashley Clayton, Sandra Davidson, Brad Smith, Lisa Wallace, Luke Ferrenburg, Christie DeMoll, Sheila Schaffer, Ken Minchella, and Roberta Swift. Thank you for your invaluable monitoring efforts!

Oregon State University's Seabird Oceanography Lab supplied access to Yaquina Head cormorant monitoring data and assisted with summarizing the data. Jess Porquez, Lucila Fernandez, and Ian Throckman collected data at Yaquina Head and Ian Throckman summarized the data.



Tara Dubois and family monitoring seabirds at the Mile 179 pullout (Photo: Amelia O'Connor).

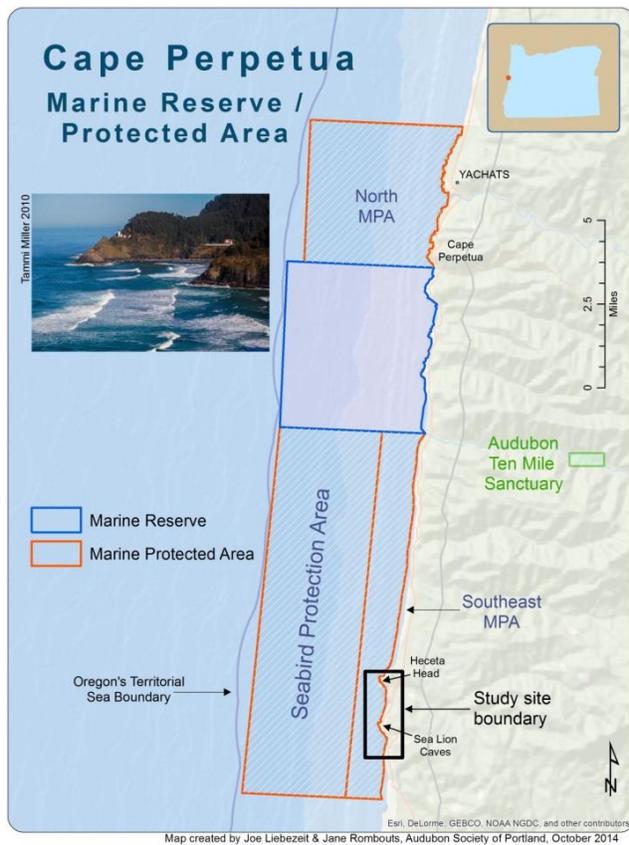


Figure 1. Cape Perpetua Marine Reserve/Marine Protected Area boundaries and study site area.

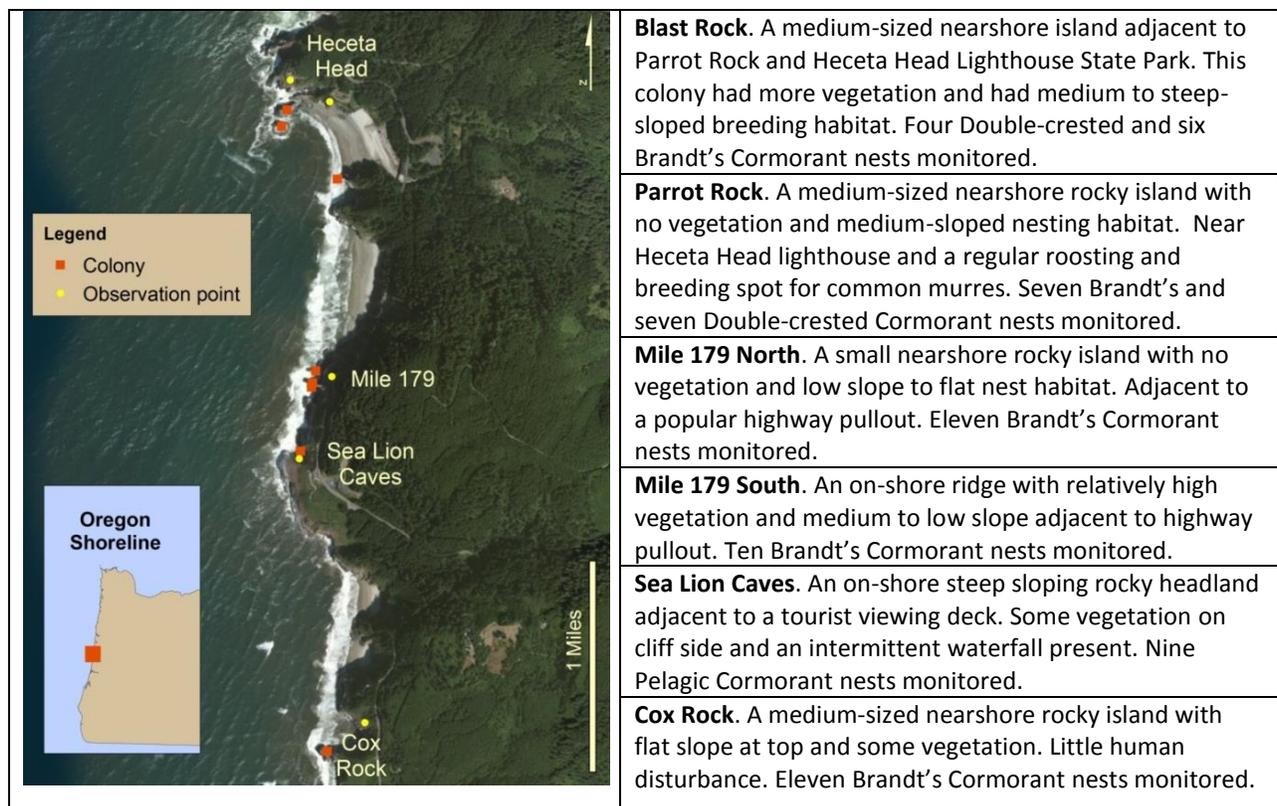


Figure 2. Colonies monitored at Cape Perpetua MR/MPA and plot descriptions from North to South.

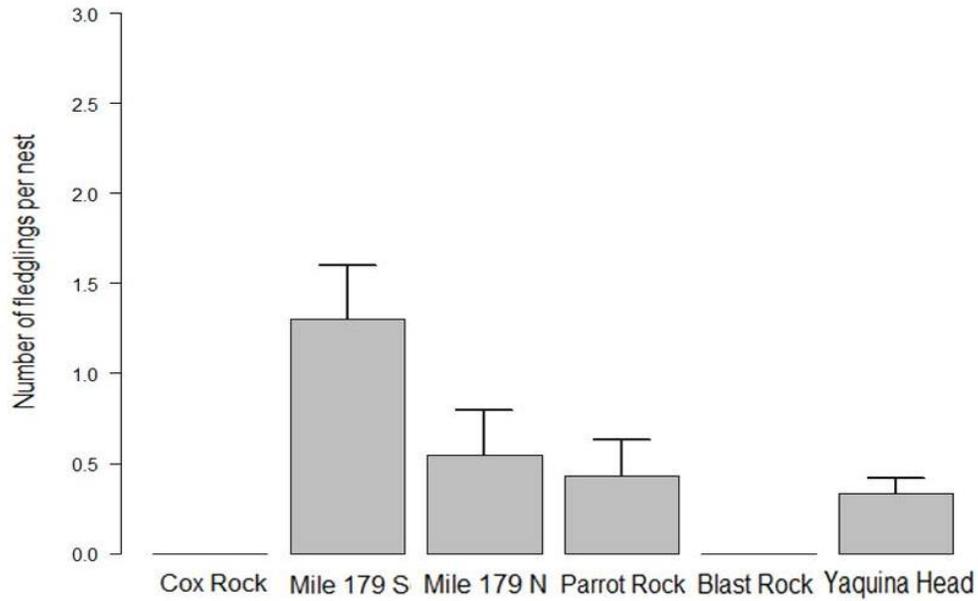


Figure 3. Breeding productivity (M+SE) of Brandt's cormorants by monitored colony in order from south to north, including Yaquina Head colony for comparison. See Figure 2 for plot descriptions and sample sizes.

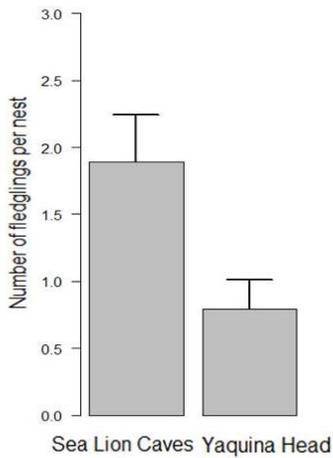


Figure 4. Breeding productivity (M+SE) of pelagic cormorants including Yaquina Head colony for comparison.

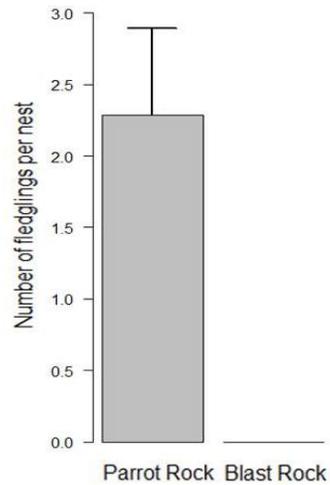


Figure 5. Breeding productivity (M+SE) of double-crested cormorants by monitored colony in order from south to north.

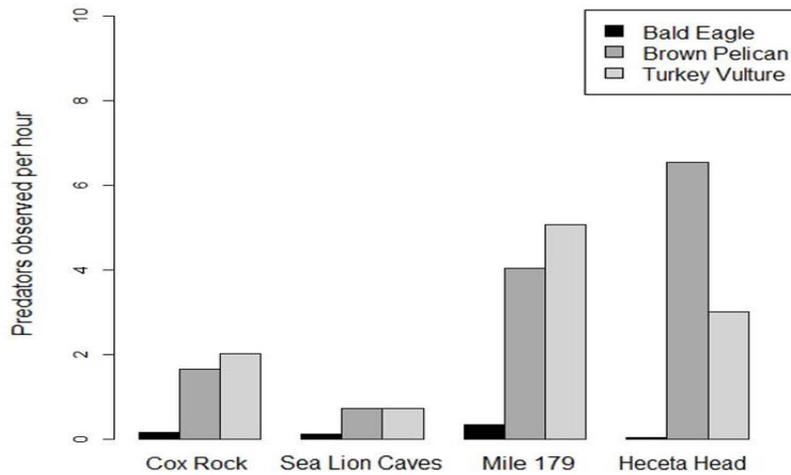


Figure 6. Mean predators per hour observed at monitoring sites in order from south to north. Heceta Head site includes both Parrot and Blast Rock plots.

Table 1. Summary statistics for monitored Cape Perpetua and Yaquina Head cormorant nests by species.

Species / site	No. nests	No. eggs/chicks	Mean clutch size	Nest hatch success	Chicks per nest (M±SE)	Fledglings per nest ¹ (M±SE)	Prop. of nests with fledglings	Mean days to Fledge
Brandt's Cape Perp.	45	82/69	2.73	90%	1.53±0.15	0.49±0.12	0.31	35
Brandt's Yaquina	61		1.91	96%	1.85±0.14	0.33±0.09	0.21	NA
Pelagic Cape Perp.	9	5/18	1.25	100%	2.00±0.37	1.89±0.35	0.89	38
Pelagic Yaquina	33		1.86	57%	2.33±0.23	0.79±0.22	0.36	NA
Double-Cr. Cape Perp.	11	5/17	1.67	33%	1.55±0.55	1.45±0.51	0.45	24

¹ Brandt's and Pelagic Cormorants assumed fledged at 30d, Double-crested at 25d.

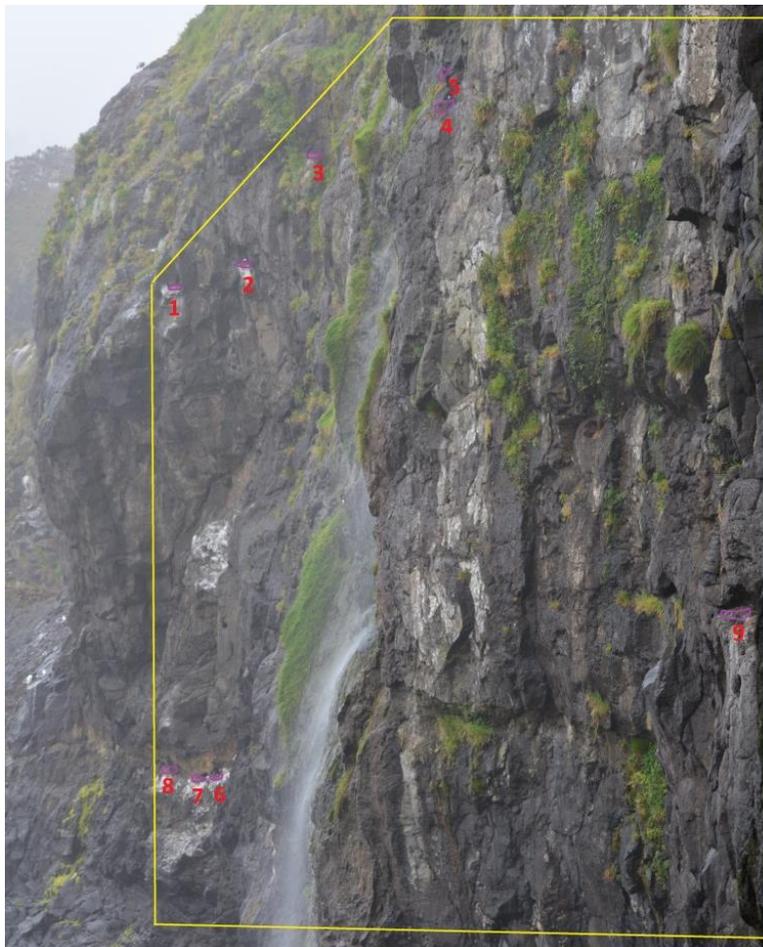
Table 2. Summary statistics for Sea Lion Cave pigeon guillemot and rhinoceros auklet counts. All counts may be largely underestimated due to limited visibility in the cave.

Species	Adults (M±SE)	Adult max count	Date adult max count	Chick max count	Date chick max count	Total adults with fish
Pigeon Guillemot	118.35±5.66	163	7/1/2014	4	8/22/2014	8
Rhinoceros Auklet	10.87±1.21	25	6/19/2014	1	8/6 & 7/9	0

Appendix. Cape Perpetua colonies and plot boundaries in order from south to north. Plots outlined in yellow and nests circled.



Cox Rock



Sea Lion Caves



Mile 179 South



Mile 179 North



Parrot Rock



Blast Rock