Yaquina Head Seabird Colony Monitoring
2012 Season Summary

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Project Overview

Yaquina Head Outstanding Natural Area (YHONA) is home to some of Oregons's largest and most publically visible seabird colonies, including over 60,000 Common Murres (*Uria aalge*). The seabird colonies surrounding Yaquina Head present a unique opportunity for research and monitoring given their close proximity to viewing platforms and intensive oceanographic studies of surrounding waters. Additionally, this is one of the most rapidly growing and productive murre colonies on the Oregon coast. YHONA seabird studies are a joint project among Oregon State University, U.S. Fish and Wildlife Service, and the Bureau of Land Management. Summer 2012 was the 6th consecutive year of study by these collaborators. Combined with similar studies conducted by Julia Parrish (University of Washington) at YHONA from 1998 to 2002,

we are now developing a much needed time series investigation for the Oregon Coast (currently at 11 years). Unfortunately, no reproduction and diet data (other than stable isotope samples) were collected at YHONA from 2002-2006, a timeframe containing highly anomalous ocean conditions. 2012 was a mixed year in regards to environmental conditions. Following the El Niño influenced 2010, La Niña influenced 2011, 2012 had a wet, late spring transition but warm sea surface temperatures and relatively light/variable winds during June and July. Therefore, these continue to be interesting years to capture seabird responses to environmental variability on the central Oregon coast.

In general, we are interested in how seabird breeding chronology, reproductive success, diet, and foraging activities are affected by changing ocean conditions. Furthermore, we wish to quantify the effects of bald eagles and other sources of predation on or disturbance to seabirds during the breeding season. At YHONA, we monitored 12 plots on Colony Rock and Flattop Rock (Fig. 1) throughout the breeding season (April-August). Within these plots, we closely observed breeding birds (Fig. 2), watching and recording when eggs were laid and then following the success of each breeding pair through egg incubation and chick rearing. Simultaneously, we watched for disturbances to the breeding colony and recorded the frequency, duration, and consequences (e.g., loss of eggs or chicks) of these events. For prey identification, we used a digital camera and spotting scope (digiscoping; Fig. 3) to photograph fish in the bills of murres returning to the colony. This information allows us to analyze the birds' diet and provide information about foraging conditions and link to oceanographic investigations adjacent to these seabird colonies. We also conducted observations to estimate the time elapsed between chick feeding events, which can be used as a proxy for prey availability near the colony.

Results

In 2012 we logged 264 hours during 53 days of observations between 16 April and 19 July (Table 1). Common Murre chicks were first observed on 25 June and **median hatch date was 28 June, over a week earlier than the previous two years (2010-2011, but slightly later than some of the other years)**. Colony Rock and Flattop Rock were again synchronous in median hatch date. Among plots, only 46% ($\pm$ 0.09 SE, 0.00-0.88 range) of the eggs laid hatched a chick (hatching success) and 27% ($\pm$ 0.06 SE, 0.00-0.63 range) of the eggs laid produced chicks that fledged (reproductive success; chicks $\geq$ 15 days were considered fledged; Table 1). **Reproductive success in 2012 was similar to 2011, but less than half of the previous 4 years (2007-2010, Table 1) and the third lowest recorded for this colony during 11 years of data collection**. Only the reproductive success last year and during the very strong 1998 El Niño were slightly lower**.**

Like 2011, much of the reproductive loss in 2012 was due to egg and chick predators. The total number of species causing disturbances and the rate of murre egg and adult loss in 2012 was similar to 2011. The total number of disturbances and number of chicks lost in 2012, however, was much greater than 2011. Disturbance rates first began to increase in 2010, then greatly escalated in 2011 and 2012. **The past two years - each had a 3X or greater rate of disturbance than the previous four years (2007-2010; Table 1). Bald Eagles (*Haliaeetus leucocephalus*) were again the dominant disturbance source, however, 2012 was the first year that bald eagles caused only half of the disturbances (47%, 104 of 220 disturbances; Fig. 5).** Initially, disturbances

in 2012 were not as common as in 2011, were concentrated on the north part of Colony Rock, and appeared to decline in late June, as has occurred in years before 2011. However, a new group of eagles were observed and disturbances increased again and continued through chick-rearing, affecting most of Colony Rock. Whereas last year Turkey Vultures (*Cathartes aura*) ranked second in disturbances to eagles, this year Brown Pelicans (*Pelecanus occidentalis californicus*) were the second most common disturbance source (Fig. 5). **Disturbance by Brown Pelicans was especially destructive during fledging and caused substantial murre chick mortality. For example, 369 murre chick carcasses (Fig. 6) were found on an approximately 2.5 mi section of beach from Yaquina Head to Nye Beach following a large pelican disturbance the evening before.** Pelicans actively pursued and consumed murre chicks and caused general disruption of breeding murres by roosting, flapping and walking through the colony. Pelicans also were observed causing murre chicks to regurgitate fish so that the pelicans could eat the regurgitated fish. During 264 hrs of observation, we witnessed 220 disturbance events where 731 eggs, 305 chicks, and 46 adult murres were taken (Table 1).

Murre diets have varied annually. Preliminary results of forage fish species consumed in 2012 included smelt (Osmeridae) and secondarily Pacific herring or sardine (Clupeidae), Pacific sand lance (*Ammodytes hexapterus*), squid (likely *Loligo* sp.), and flatfishes (Pleuronectiformes; Fig. 7). **A notable difference in diets among the past five years was the dominance of sand lance in 2008, and the dominance of smelt in 2010, and the increased consumption of flatfishes in 2011. Preliminary results show 2012 as intermediate in composition among these years.**

For a third year we also conducted chick provision rate watches. Typically, we conduct four per year throughout chick rearing, however, due to large scale chick mortality from repeated disturbances, we only conducted two watches in 2012. Observers recorded the frequency that adult murres were delivering food to chicks at selected nests. Chick feeding rates (also foraging trip duration) are a good overall measure of food availability and will be a valuable metric to compare among years. We also collected feathers of beach-cast murre chick carcasses for stable isotope analyses of diet composition and nutrient sources. Interesting patterns are developing from analyses of these data that we look forward to reporting on.

Summary and Future Directions – Project Integration

The dramatic increase in pelican disturbance in 2012 was not unique to YHONA. There were similar occurrences of murre chick mortality at a colony on the south Oregon coast. Likewise, bald eagle disturbance was considerably greater on the north Oregon coast, causing at least one colony to completely fail to hatch any chicks. It may be that the cause(s) leading to this increased predator activity at seabird colonies in 2011 and 2012 are larger, regional-scale factors affecting predator distribution or their alternative prey. Nestling provisioning rates in 2012 were higher than the previous two years, indicating foraging conditions may have improved this year. Murre diets over the past few years reflected more warm water associated smelt in 2010 vs. cooler water associated sand lance (and fewer smelt) in 2011, which is consistent with El Nino vs. La Nina influenced summers, respectively, and intermediate conditions in 2012.

We will continue at least a portion of the study in 2013 with the ultimate goal of establishing long-term monitoring at this site. Throughout 2013, we will continue to

analyze observer and remote camera observations of the 2012 season from YHONA, Coquille Rock in southern Oregon (Bandon) and Cape Meares in northern Oregon. As anticipated, eagle disturbance was considerably less at the south coast colony and much more at the north coast colony. In 2012 we will scale back down to data collection at YHONA, but also hope to include remote camera monitoring for the second year to provide early season colony settlement and predator disturbance data during all daylight hours. We will also evaluate possibilities to connect the camera to internet access to enhance our data collection opportunities and provide an excellent public education and outreach tool.

Long-term research and monitoring efforts at YHONA are becoming increasingly valuable to oceanographic research and monitoring off Oregon, such as the Newport Hydrographic Line (sampled twice monthly at stations 1-25 nm offshore) and a wide array of other research conducted by NOAA Fisheries and Oregon State University, including the planned cabled ocean observing system offshore of Yaquina Head (Endurance Array http://www.whoi.edu/page.do?pid=29616 & http://www.nanoos.org/about_nanoos/intro.php).

In the News

OPB Ecotrope Story
http://ecotrope.opb.org/2012/07/at-yaquina-head-pelicans-roughing-up-murres/

Roy Lowe, USFWS, interview, Newport NewsTimes
http://www.newportnewstimes.com/v2_news_articles.php?heading=0&page=72&story_id=34682

News Lincoln County
http://www.newslincolncounty.com/?p=56590

Rob Suryan, OSU, interview
KVAL
http://www.kval.com/news/local/What-is-killing-baby-birds-on-the-Oregon-Coast-162934506.html?tab=video&c=y

KGW
http://www.kgw.com/news/local/163026376.html

TDN.com – daily news serving the lower Columbia Valley
http://tdn.com/news/state-and-regional/oregon/pelicans-attack-murre-colony-near-newport/article_fc99a8f1-436d-5b1b-9546-d860b53fdf87.html

KCFM Radio
http://www.kcfmradio.com/?p=7555

Acknowledgements

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Table 1. Preliminary summary metrics from studies of Common Murres at the Yaquina Head colony, 2007-2010.

	Observation			Hatch Date					Predation Rate # per hour[c] (total #)		
Year	Hours	Days	# plots	1st	Med	Hatching success[a]	Reproductive success[b]	# disturbances	Egg	Chick	Adult
2007	149	30	11[d]	6/20	6/27	0.70 (± 0.05 SE)	0.54 (± 0.07 SE)	23	0.21 (32)	0.00 (0)	0.06 (9)
2008	117	35	11[d]	6/10	6/23	0.86 (± 0.04 SE)	0.77 (± 0.05 SE)	20	0.21 (25)	0.00 (0)	0.04 (5)
2009	140	53[f]	10[e]	6/17	6/24	0.86 (± 0.03 SE)	0.77 (± 0.04 SE)	27	0.36 (50)	0.00 (0)	0.04 (6)
2010	223	56	11[d]	6/24	7/8	0.87 (± 0.04 SE)	0.68 (± 0.04 SE)	20	1.07 (239)	0.04 (10)	0.00 (0)
2011	372	79	11[d]	6/28	7/8	0.36 (± 0.07 SE)	0. 22 (± 0.05 SE)	186	2.78 (1034)	0.38 (142)	0.19 (70)
2012	264	53	12	6/25	6/28	0.46 (± 0.09 SE)	0.27 (± 0.06 SE)	220	2.69 (710)	1.16 (305)	0.17 (46)

[a]Chicks hatched per eggs laid (mean among plots)

[b]Chicks fledged (≥15 days old) per eggs laid (mean among plots)

[c]Total # observed taken/total # observation hours

[d]Two adjacent plots (CR5 & CR6) were combined because of a low number of visible eggs to follow

[e]Two sets of adjacent plots (CR2 & CR3, CR5 & CR6) were combined because of a low number of visible eggs to follow

[f]Thick fog limited observations to very short time periods or prevented observations altogether during some days in July – much more so than in previous years.

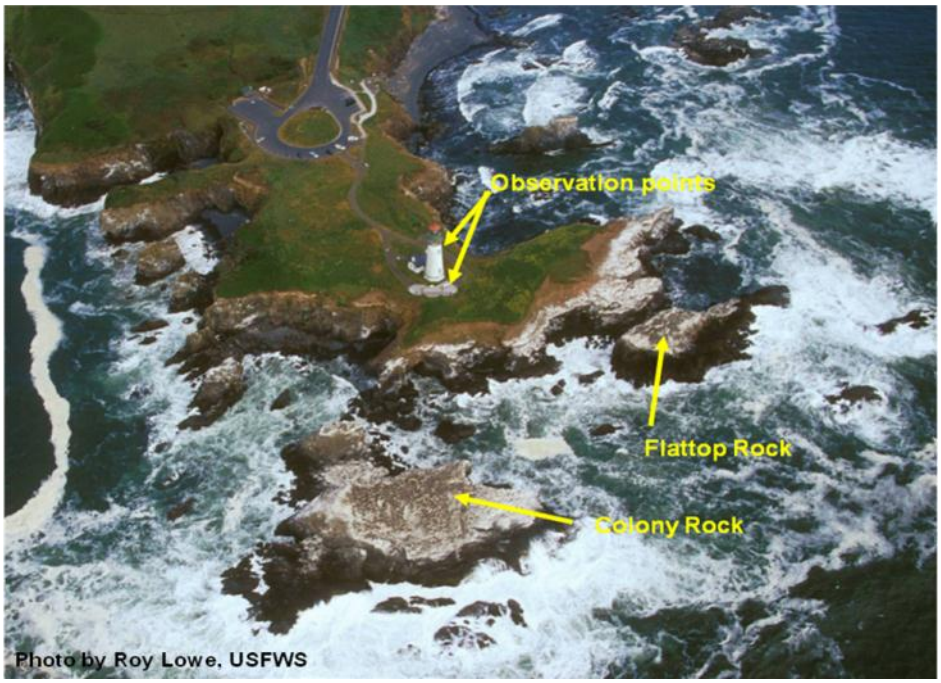

Figure 1. Study plots on Colony and Flattop Rocks.

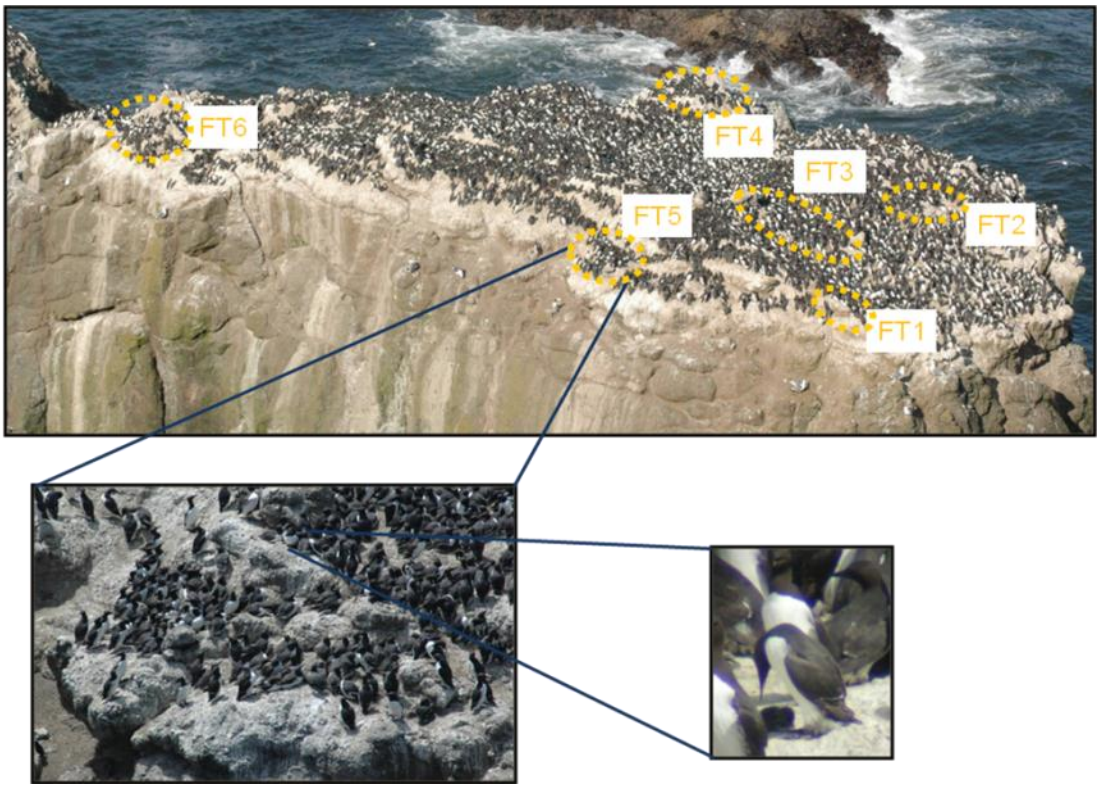

Figure 2. Close-up of Flattop Rock, plot #5, and an adult with a young chick

Figure 3. Digiscoping techniques for photographing and identifying forage fish delivered by adult murres to feed their chicks on the colony.

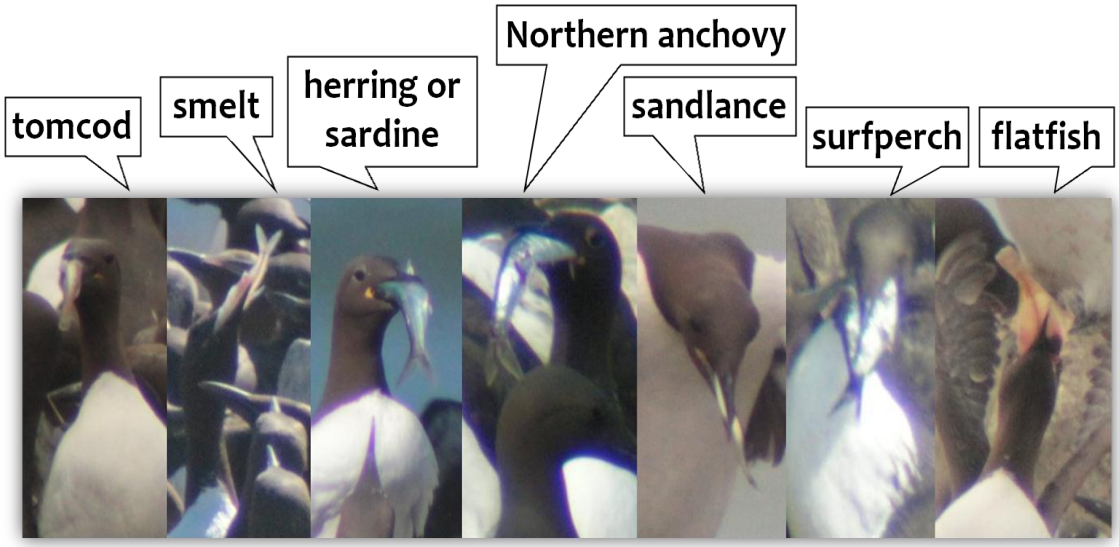

Figure 4. Prey photos taken from the observation deck at the base of the lighthouse.

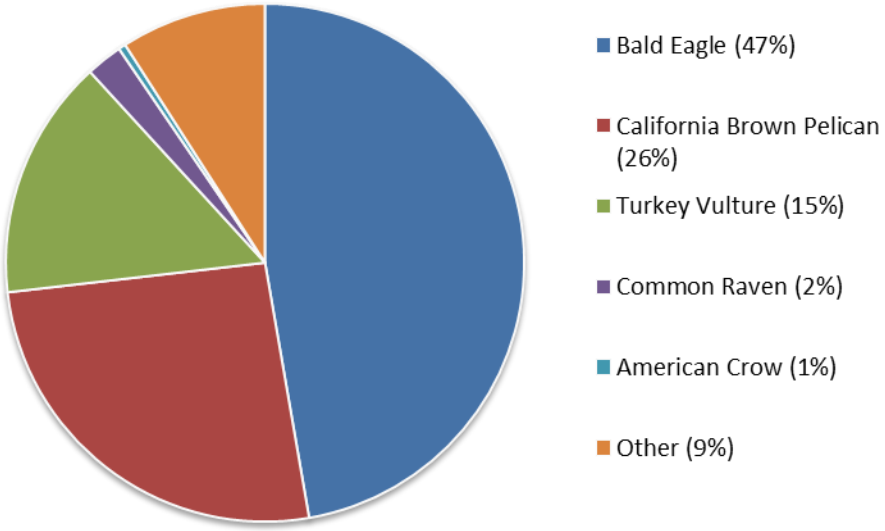

Figure 5. Sources of disturbance to Common Murres at Yaquina Head in 2012. A total of 220 disturbances were recorded**.** There were more disturbances by pelicans than any previous year recorded, leading to the highest murre chick mortalities recorded.

Figure 6. Common murre chick carcasses on Agate Beach in Newport, Oregon on 17 July following a disturbance of breeding murres by pelicans at the Yaquina Head colony the evening before. A total of 369 murre chick carcasses were counted along a 2.5 mi section of beach the following day.

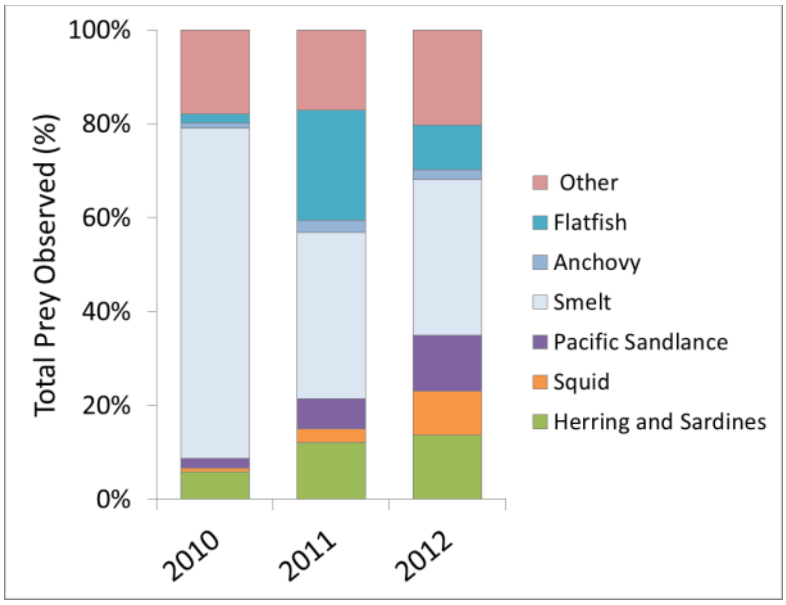

Figure 7. Diets of Common Murres (% occurrence) during 2010-2012. Diet in 2010 stands out as a remarkable year for smelt, 2011 is notable for an increased consumption of flatfish, and preliminary data show 2012 as more intermediate.