Yaquina Head Seabird Colony Monitoring
2010 Season Summary

Robert Suryan
Oregon State University, Hatfield Marine Science Center,
Newport, Oregon, rob.suryan@oregonstate.edu, 541-867-0223

Amanda Gladics
Marine Resource Management, College of Oceanic and Atmospheric Sciences,
Oregon State University, Corvallis, Oregon

Cheryl Horton,
U.S. Fish and Wildlife Service, Oregon Coast National Wildlife Refuge Complex
& Oregon State University, Newport, Oregon

Adrian Lohr
Oregon State University, Newport, Oregon

Leah Segui
National Science Foundation, Research Experience for Undergraduate Intern
Hatfield Marine Science Center, Newport, Oregon
& San Diego State University, San Diego, California

October 2010

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 2010 was the 4th 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 9 years). Unfortunately, no data were collected at YHONA from 2002-2006, a timeframe containing highly anomalous ocean conditions. With La Niña conditions in 2009, switching to El Niño conditions in 2010, and now a switching back to a projected La Niña into 2011, these are a critical series of years to capture seabird responses to environmental variability.

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. We monitor 12 plots on Colony Rock and Flattop Rock (Fig. 1) throughout the breeding season (May-August). We closely monitored breeding birds (Fig. 2), watching and recording when eggs were laid and then following the success of each breeding pair through incubation and chick rearing. Simultaneously, we watch for disturbances and record the frequency and duration of these events. For prey identification, we used a digital camera and spotting scope (digiscoping; Fig. 3) to photograph fish in the bills of birds 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.

One short-coming of our purely land-based data collection is that we do not know what offshore foraging areas murres are most often using, nor how far they are traveling to obtain food. This year, in collaboration with the U.S. Fish and Wildlife Service, we initiated a pilot study to capture murres on the water near Yaquina Head and attach miniature (4 g) radio transmitters (Fig. 7). While we were not able to track birds at- sea with this technology, our goal was to test whether actively breeding birds could be captured off colony. Ultimately, we were testing the feasibility of using more advanced (and more expensive) remote tracking devices at this site. These would include miniature GPS tracking devices with remote download capabilities that allow retrieval of tracking data after a week or two of foraging for their chicks on colony without recapturing the tagged birds.

Results

In 2010 we logged 223 hours during 56 days of observations between 24 May (some eggs were already present) and 17 August (Table 1). Common Murre chicks were first observed on 24 June and median hatch date was 8 July, **two weeks later** than the

previous three years. Unlike 2009, Colony Rock and Flattop Rock were fairly synchronous in median hatch date. Among plots, 87% (± 0.04 SE, 0.50-1.0 range) of the eggs hatched a chick (hatching success) and 68% (± 0.04 SE, 0.40-0.86 range) of the eggs laid produced chicks that fledged (reproductive success; chicks ≥ 15 days were considered fledged; Table 1). **Reproductive success in 2010 was slightly reduced** compared to 2008 and 2009, all still greater than 2007 (Table 1). Another notable occurrence among the years was the number of murre chick carcasses found on beaches during fledging (July). Fledgling carcass deposition rates in July were greatest in 2007, almost nonexistent in 2008, and moderate in 2009 and 2010. Many variables, of course, can effect deposition rates (e.g., wind, waves, etc.), but the patterns were quite striking for a beach immediately adjacent to seabird colonies at YHONA (Cobble Beach), and warrant further investigations.

During the past four years, murre diets varied annually. Overall dominant prey items included smelt (Osmeridae), Pacific herring or sardine (Clupeidae), northern anchovy (*Engraulis mordax*), and Pacific sand lance (*Ammodytes hexapterus*; Fig. 4). Other prey species included flatfish (Bothidae or Pleuronectidae), surfperch (Embiotocidae), and rockfishes (*Sebastes* spp.). **The most striking difference in diets among the past four years was the dominance of sand lance in 2008, and the dominance of smelt in 2010 (Fig. 5). Rock fish were most abundant in diets in 2008 and 2010.**

We collected and analyzed feathers of beach-cast murre chick carcasses for stable isotope analyses of diet composition and nutrient sources. Preliminary results show marked interannual variation, and some correlation with physical and biological oceangraphic processes, including upwelling indices.

Bald eagles (*Haliaeetus leucocephalus*) are known to cause significant disturbance to murre colonies in Oregon and they were the dominant disturbance source at YHONA in all years (Fig. 6). Disturbance by eagles, tends to, decline in mid-June, during late incubation for murres at YHONA, thus lessening the impact on murre reproductive output. This year eagle disturbance occurred in more sections of the colony than previous years. Even so, only relatively small sections of Colony and Flattop Rocks experienced complete reproductive failure. However, disturbance during early season does appear to affect lay dates noted above and no chicks were reared on the headland itself , likely due to predator disturbance (avian or mammalian), as in the past two years. Murre adults were most frequently killed by eagles and most eggs were removed by secondary predators (e.g., Western Gulls, *Larus occidentalis*). Unlike 2009, Common Ravens (*Corvus corax*) were again a minor disturbance source. During 223 hrs of observation, we witnessed 20 disturbance events where 239 eggs and 10 chicks were taken (Table 1). **The most surprising predation event was a juvenile brown pelican landing on the colony and eating 10 murre chicks**.

Weather and scheduling only permitted one nighttime capture. We were, however, successful in capturing and tagging eight birds. Two birds were captured soon after dark near the rocks beyond the headland and these two individuals were detected and monitored back on colony during the following weeks. It is highly possible that the other birds captured farther from the colony, were non-breeders or failed breeders. Starting earlier in the season and focusing our effort only on birds very near the colony and immediately after dark might provide the desired results to meet our objectives.

Data Considerations

This year we also conducted four full-day provision rate watches. Observers recorded the frequency that adults 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 with 2011. We did not attempt to estimate the number of murre pairs that laid an egg (required for estimating the total number of chicks produced at the colony). Prey identification was of any item brought to the colony regardless of whether or not it was fed to a chick. Determining the fate of each prey item would require considerably more observer effort and limit our ability to use photographic identification of prey items.

Future Directions – Project Integration

We plan to continue this study in 2011 with the ultimate goal of establishing long-term monitoring at this site. The colony site is particularly valuable for research and monitoring given the abundant and diverse group of seabirds and it's close proximity to oceanographic research and monitoring stations. These include 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 OSU's College of Oceanic and Atmospheric Sciences, including the planned cabled ocean observing system (the Endurance Array http://www.whoi.edu/page.do?pid=29616 & http://www.nanoos.org/about_nanoos/intro.php) for continuous monitoring of the coastal ocean for decades to come. We hope to begin a more detailed study of bald eagle disturbance and predation, and eventually we would like to add video monitoring of the colony as a research and public education/outreach tool.

In the News

The project received a bit of media coverage this summer. The following are links to these or related stories.

HMSC Chat
http://hmsc.oregonstate.edu/radio/HMSC_Radio/OSUs_Hatfield_Marine_Science_Center_-_Radio_Podcasts/OSUs_Hatfield_Marine_Science_Center_-_Radio_Podcasts.html

Register Guard
http://www.registerguard.com/csp/cms/sites/web/updates/25146862-55/murres-murre-eagles-eggs-birds.csp

OSU Press release
http://oregonstate.edu/ua/ncs/archives/2010/jul/rapidly-growing-murre-colony-draws-interest-scientists-%E2%80%93-and-predators

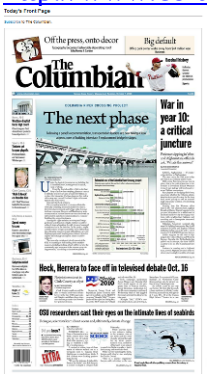
KPLU
http://www.publicbroadcasting.net/kplu/news.newsmain/article/1/0/1682390/KPLU.Local.News/Bald.Eagle.Comeback.Pressures.Coastal.Seabirds

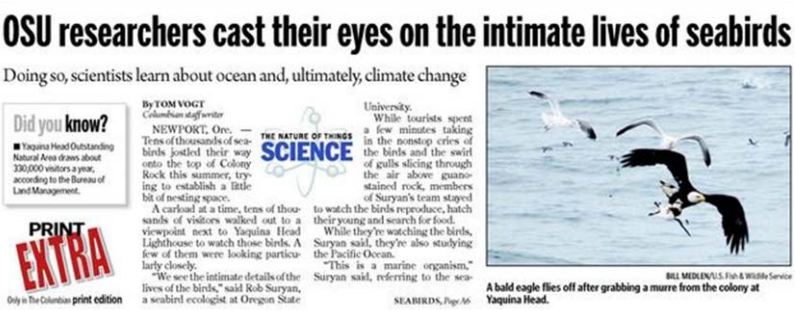
KEZI, Eugene
http://kezi.com/news/local/183218

Newport News Times
http://www.newportnewstimes.com/v2_news_articles.php?heading=0&page=72&story_id=23548

High Country News (March 1, 2010, Isabelle Groc) (Lowe, Parrish, et al.)

http://www.hcn.org/issues/42.4/new-world-order
The Columbia Basin Fish and Wildlife News Bulletin (July 30 2010)
http://www.cbbulletin.com/393656.aspx
The Columbian (October 7, 2010)
http://www.columbian.com/front-page/





OSU researchers cast their eyes on the intimate lives of seabirds

Doing so, scientists learn about ocean and, ultimately, climate change

Did you know?

■ Yaquina Head Outstanding Natural Area draws about 330,000 visitors a year, according to the Bureau of Land Management.

PRINT EXTRA

Only in The Columbian print edition

By TOM VOGT
Columbian staff writer

THE NATURE OF THINGS SCIENCE

NEWPORT, Ore. — Tens of thousands of seabirds jostled their way onto the top of Colony Rock this summer, trying to establish a little bit of nesting space.

A carload at a time, tens of thousands of visitors walked out to a viewpoint next to Yaquina Head Lighthouse to watch those birds. A few of them were looking particularly closely.

"We see the intimate details of the lives of the birds," said Rob Suryan, a seabird ecologist at Oregon State University.

While tourists spent a few minutes taking in the nonstop cries of the birds and the swirl of gulls slicing through the air above guano-stained rock, members of Suryan's team stayed to watch the birds reproduce, hatch their young and search for food.

While they're watching the birds, Suryan said, they're also studying the Pacific Ocean.

"This is a marine organism," Suryan said, referring to the sea-

SEABIRDS, Page A6

BILL MEDLEN/U.S. Fish & Wildlife Service

A bald eagle flies off after grabbing a murre from the colony at Yaquina Head.

Acknowledgements

Data collection during the 2010 field seasons would not have been possible without the support of the Bureau of Land Management (Tim Fisher, Jay Moeller and staff at the Yaquina Head Outstanding Natural Area) and the U.S. Fish and Wildlife Service (Roy Lowe, Dawn Grafe, Shawn Stephensen, Kris Robison and Rebecca Chuck of the Oregon Coast National Wildlife Refuge Complex). We also thank,Meg Duhr Schultz, Amy Kocourek, Caleb Price, Christopher Eardley, Megan MacClellan, Ann England for help in capturing murres and conducting provisioning rate observations. Funding for these studies was provided by the Bureau of Land Management, the U.S. Fish and Wildlife Service, and the National Science Foundation (through support of undergraduate interns).

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)

[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.

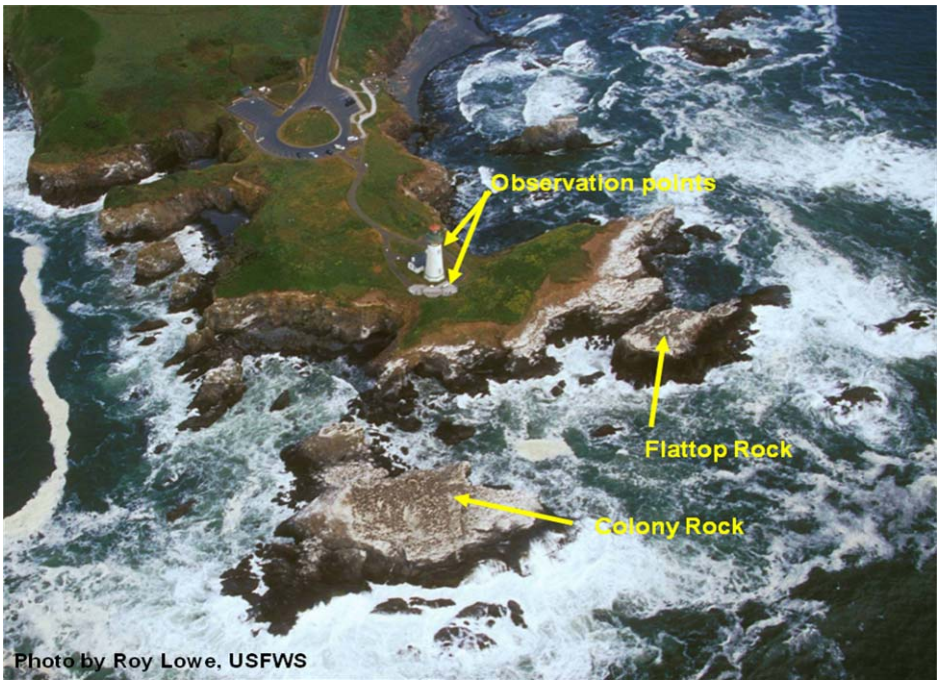


Figure 1. Study plots on Colony and Flattop Rocks.

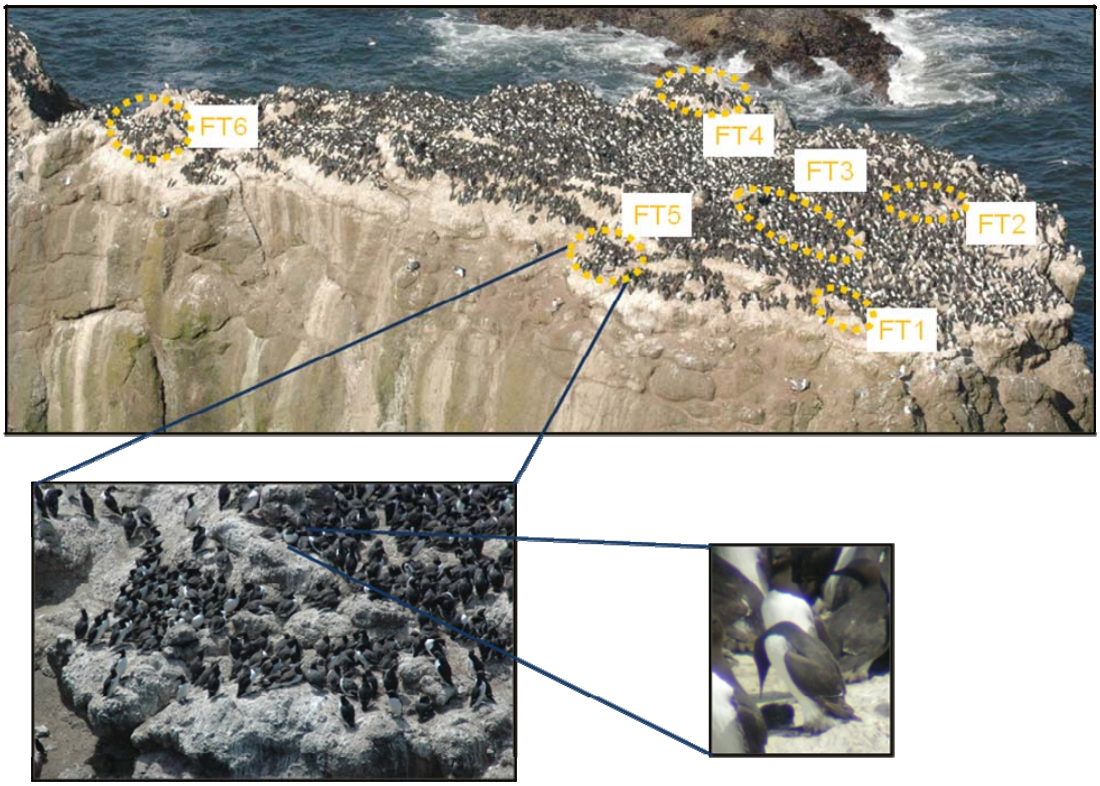


Figure 2. Close-up of Flattop Rock, plot #5, and an adult with a young chick

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

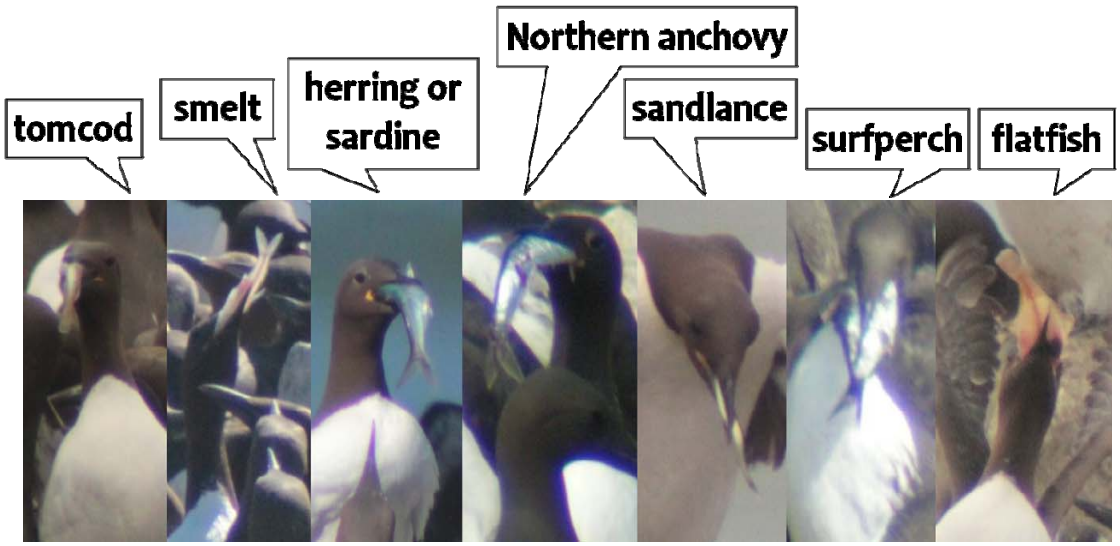


Figure 4. Prey photos taken from the observation deck at the base of the lighthouse.

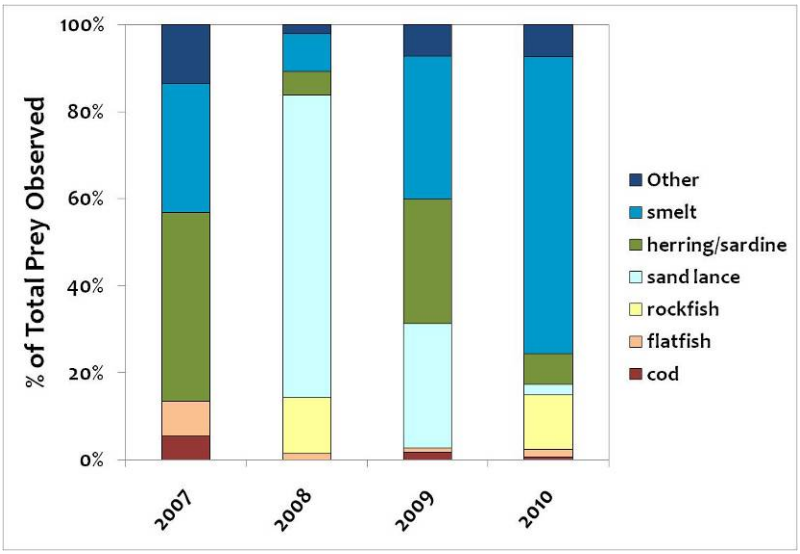


Figure 5. Diets of common murres (% occurrence) during 2007-2010. 2008 stands out as a remarkable year for sand lance consumption, 2010 for smelt, and both of these years for rockfish.

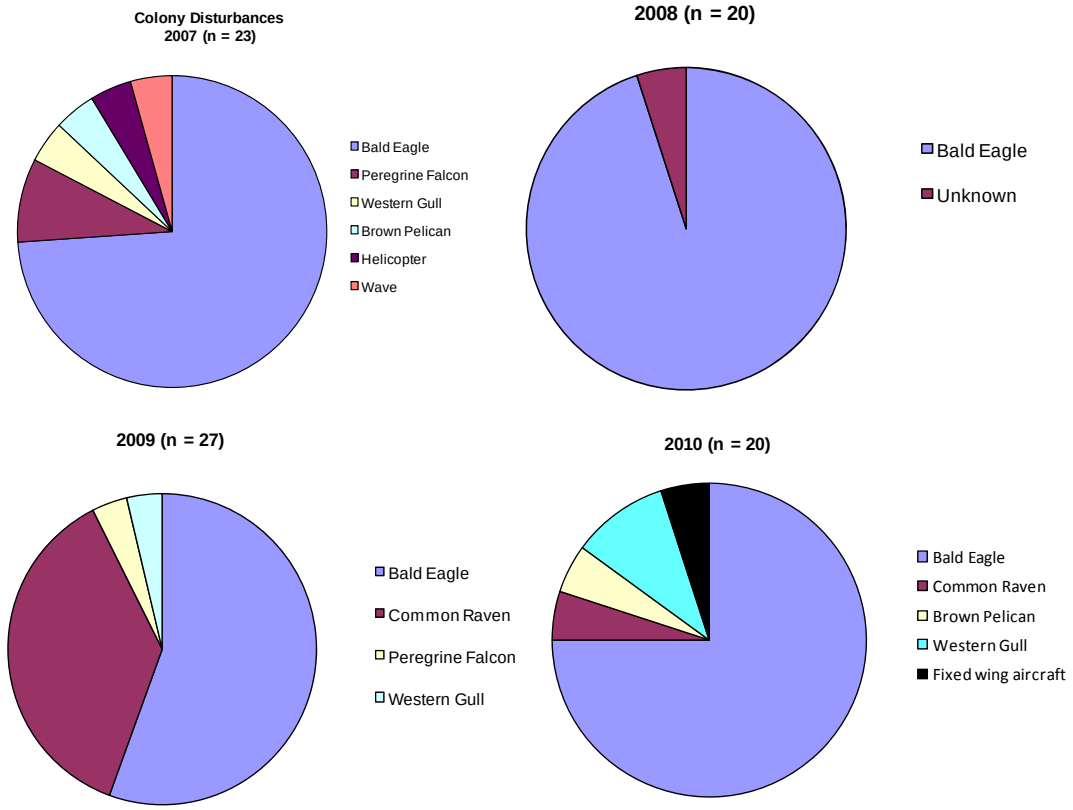


Figure 6. Sources of disturbance (≥ 1 bird leaving colony) to Common Murres, 2007-2010.

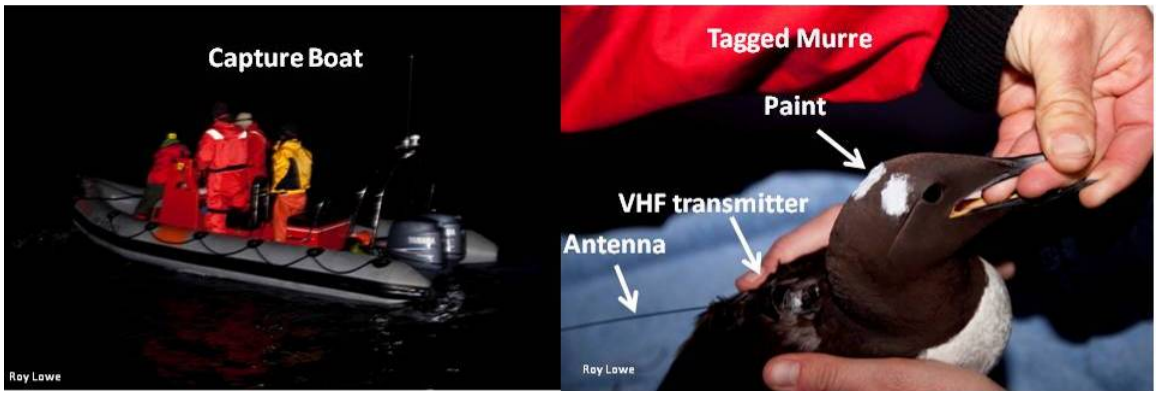


Figure 7. Nighttime capture and radio-tagging of adult common murres for a pilot study to test the feasibility of using more advanced (and much more expensive) remote tracking devices).