

Pigeon Guillemot Study  
Whidbey Island, Washington 2012 Breeding Season

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Abstract

A monitoring study of breeding Pigeon Guillemots was conducted on two beaches of Whidbey Island. The objective of this study was to continue building a data baseline of the Pigeon Guillemot population on Whidbey Island. Colony behavior, active burrows, prey selection to chicks, frequency of deliveries, and fledging success were documented. The breeding success of the Pigeon Guillemot has been correlated with the overall health of the Salish Sea. See note: Penn Cove oil spill May 2012 page 4. The data show prey choice of 56% gunnel, 30% sculpin and 14% other. 373 prey deliveries to chicks were recorded, producing a 71% fledging success.

Introduction

Pigeon Guillemots (*Cepphus columba*) are black and white seabirds in the Alcidae family. They are small with an average wingspan of 23 inches, and weighing just over one pound. Pigeon Guillemots populate the north Pacific Ocean, ranging year round from arctic Alaska to southern California, with an estimated population of 200-300,000 (Gaston and Jones 1998). The Pigeon Guillemot is a specialized underwater swimmer with a compact body, short wings and short tail. It dives from the water surface in pursuit of prey using its wings and feet for propulsion and steering. The adults consume their prey underwater, and prey brought to the surface is typically for delivery to chicks.

Pigeon Guillemots are local residents of the Salish Sea, coming to the shores of Whidbey Island to nest in cliff burrows, breeding from late June to late August. Pairs return to the same area and generally re-use the same nest from year to year. The average clutch size of the pigeon guillemot is two eggs: if the first eggs fail they will re-lay. Pigeon Guillemots have an average life span of 6 years, and typically do not breed until the third or fourth year (Gaston & Jones, 1998). When the time comes to fledge, the young Pigeon Guillemot tumbles out of the cliff burrow and heads for the water; it's wings not fully developed. Only 40% of Pigeon Guillemots will survive to breeding age. They are more vulnerable to land predation (raptors, raccoons, crows etc.) than marine predation (octopi, killer whales). Pigeon Guillemots are also susceptible to water pollution, oil spills, and gill netting (Irons and others, 2000; Ewins, 1993; Vermeer, Morgan and Smith 1993).

The two main prey choice that Whidbey Pigeon Guillemots feed to chicks are small sized sculpin and gunnel fish. Sculpin are a spiny fish with a large head in the Cottidae family, typically measuring less than 15cm. Their diet consists of small invertebrates. There are 35 species of sculpin found in the shallow waters of the Salish Sea. Gunnels are

an eel shaped fish in the Pholidae family. Although gunnel can be large, those chosen as pigeon guillemot prey are typically no more than 15 cm. Like sculpin, the diets of the gunnel fish consist of small invertebrates. There are six species of gunnels found locally in shallow near shore waters (University of Washington).

Pigeon Guillemots are an important species to be monitored. They are a visible marine organism that is high on the food chain; selecting small fish to feed chicks, and consuming small fish and invertebrates for themselves (Gaston and Jones 1998). These organisms in lower trophic levels of invertebrates, zooplankton and phytoplankton in turn are affected by changes in water quality (acidity, nutrients, temperature, light). Pigeon Guillemots feed and breed locally and their abundance and breeding success can echo the health of the Salish Sea. We want to find out how these birds are surviving year after year during the breeding season and to establish a baseline of populations and breeding data.

Over 25 Pigeon Guillemot colonies have been documented on Whidbey Island (a population of 1,000 individuals). Volunteers monitor all colonies, and specific colonies are chosen for detailed monitoring by interns/contractors.

## Materials and Methods

2012 marks the fifth year of the Pigeon Guillemot survey. Prey choice to chicks, frequency of burrow deliveries and fledging success were monitored. In the years 2008, 2009, and 2010 colonies at 5 beaches were surveyed: Shore Meadows, Harrington Lagoon North, Harrington Lagoon South, Mutiny Sands and Rolling Hills.

Due to funding constraints the Pigeon Guillemot study in 2011& 2012 monitored two colonies; Mutiny Sands and Rolling Hills.

Mutiny Sands is located on the southwestern side of Whidbey Island. The bluffs of Mutiny Sands are approximately 40 feet (12 meters). Despite a high frequency of beach walkers with dogs, Mutiny Sands continues to be a successful breeding colony. The Rolling Hills colony is located on the eastern side of central Whidbey on the north shore of Penn Cove. Rolling Hills is a rocky beach, with minimal human presence. The bluff height of Rolling Hills is similar to Mutiny Sands, at 40 feet (12 meters), and its guillemot population is also similar to Mutiny Sands.

This study took place from June 28 to August 23, 2012. Each of the beach sites was observed from sunrise to approximately 11:00 a.m. (five hours each day). Rolling Hills was observed on Wednesdays, Mutiny Sands on Thursdays. 8X42 power binoculars, 60X spotting scope, video camera, and digital still cameras were used at each site to aid in recording observations. Population counts of Pigeon Guillemots were recorded every 30 minutes. Each selection of prey was documented. Pigeon Guillemot prey that could not be identified, or prey that did not consist of sculpin or gunnel fish (i.e. perch, crab, shrimp), were cataloged as "other." An active burrow was deemed active only when a pigeon guillemot was observed entering that burrow with prey. Frequency of deliveries, anthropogenic and raptor disturbances, as well as other interactions between birds were also

recorded as they occurred. If a burrow received prey deliveries for three consecutive weeks that burrow was considered to have a successful fledging.

### Results and Discussion

The data show Pigeon Guillemots made prey choice to chicks comprising of 56% gunnel, 30% sculpin and 14% other in 2012. Year 2012 shows a slight increase in “other” prey and a decrease percentage of sculpin. Frequencies of gunnel prey choice remain similar in 2012, and 2011 (Table 1).

**Percentage of prey deliveries to chicks in Rolling Hills and Mutiny Sands**

<b>Year</b>	<b>Gunnel</b>	<b>Sculpin</b>	<b>Other</b>
2012	56.03%	30.03%	13.94%
2011	55.31%	40.00%	4.69%
2010	45.45%	48.31%	6.23%
2009	71.80%	22.38%	5.81%
2008	44.35%	33.91%	21.74%

Table 1. Percentage of gunnel and sculpin prey choice to chicks.

The total number of prey observed being delivered to chicks in 2012 was 373. This is a slight increase from the previous year, but a decrease from 2010. In 2008 prey deliveries were not observed for the entire breeding season, which accounts for the smaller number of prey (Table 2). Because of the incomplete survey for breeding year 2008, further tables have this year omitted.

**Total prey deliveries to chicks per year in Rolling Hills and Mutiny Sands**

<b>Year</b>	<b>Gunnel</b>	<b>Sculpin</b>	<b>Other</b>	<b>Total</b>
2012	209	112	52	373
2011	177	128	15	320
2010	175	186	24	385
2009	247	77	20	344
2008	51	39	25	115

Table 2. Total prey deliveries per fish type.

The fledging percent in tables 3 and 4 is determined by the number of burrows that received prey delivery for 3 consecutive weeks, divided by the total number of occupied burrows.

Fledging success at Mutiny Sands and Rolling Hills have remained around 70% over the last 4 years, despite varied number of active burrows. The number of suitable burrows in both colonies has decreased because of anthropogenic, (removal of large tree at Rolling Hills) and natural forces (bluff erosion at both Mutiny Sands and Rolling Hills (Table 3).

**Total burrows, burrow success and average fledging % in Mutiny Sands and Rolling Hills per year.**

Year	Total Number of Mutiny Sands and Rolling Hills Occupied Burrows	Number of Successful Burrow Fledging	% Fledged
2012	21	15	70.50
2011	20	15	75.00
2010	29	21	72.41
2009	19	15	78.95

Table 3. Total burrows and percent fledged.

Fledging percent of each colony has good and bad years (Table 4). Mutiny Sands fledging success was 12% lower in 2012 than in 2011. The 2012 breeding season at Mutiny Sands has endured more disturbances from raptors than in previous years. A total of 7 Pigeon Guillemot carcasses, including chicks and adults were found at the base of the Mutiny Sands bluff this year. A Red-Tail Hawk was observed attempting strikes on adults, this hawk made a habit of perching in front of an occupied burrow. Another burrow in the Mutiny Sands colony was occupied by two barn owls. A frequent beach walker reported an adult Guillemot was in the talons of a bald eagle. The beach walker observed zero Pigeon Guillemots in the water after the incident; this population absence lasted 2 days with no adult birds in the water, then after 3 days, population numbers slowly increased to its regular size. Mutiny Sands also endured a high number of anthropogenic disturbances; walkers with dogs and boaters.

Fledging success at Rolling Hills has fluctuated around 75% with the exception of a decrease in 2010. In 2012 The Rolling Hills colony also had a high number of raptors, mostly Bald Eagles. There were many windy mornings in 2012; favorable conditions for eagles cruising the bluffs. While these Bald Eagle fly bys did disturb and stress the colony Rolling Hills still had a 75% fledging success.

In May 2012, a derelict crabbing boat anchored in Penn Cove caught fire and sank. Over 5,000 gallons of oil products were removed/recovered (3,600 gallons diesel fuel was recovered). However, the Department of Ecology reported that it is unknown how much fuel was trapped in the vessel at the time of sinking. It appears the Penn Cove oil spill has

had no visible effect on the Rolling Hills Pigeon Guillemot fledging success population in 2012 (Table 4).

**Fledging percent in each colony over 4 years**

Year	Harrington N.	Harrington S.	Mutiny Sands	Shore Meadows	Rolling Hills
2012	Not Monitored	Not Monitored	66%	Not Monitored	75%
2011	Not Monitored	Not Monitored	78%	Not Monitored	73%
2010	25%	60%	92%	66%	58%
2009	83%	57%	71%	50%	76%

Table 4. Fledging percent per colony over 4 years.

Rolling Hills frequency of prey deliveries to chicks was high at the beginning of the season. The survey started on June 29<sup>th</sup> with a population of 46 at 5:30 a.m. This colony was very active despite a low tide, windy conditions, and heavy Bald Eagle presence; a total of 18 Bald Eagle disturbances were recorded on the first day of the survey. Rolling Hills had a high frequency of deliveries, peaking the week of July 19, with a larger percentage of “other” prey in 2012 than in previous year (15% in 2012) Figure 1 (3% in 2011) (Figure 2).

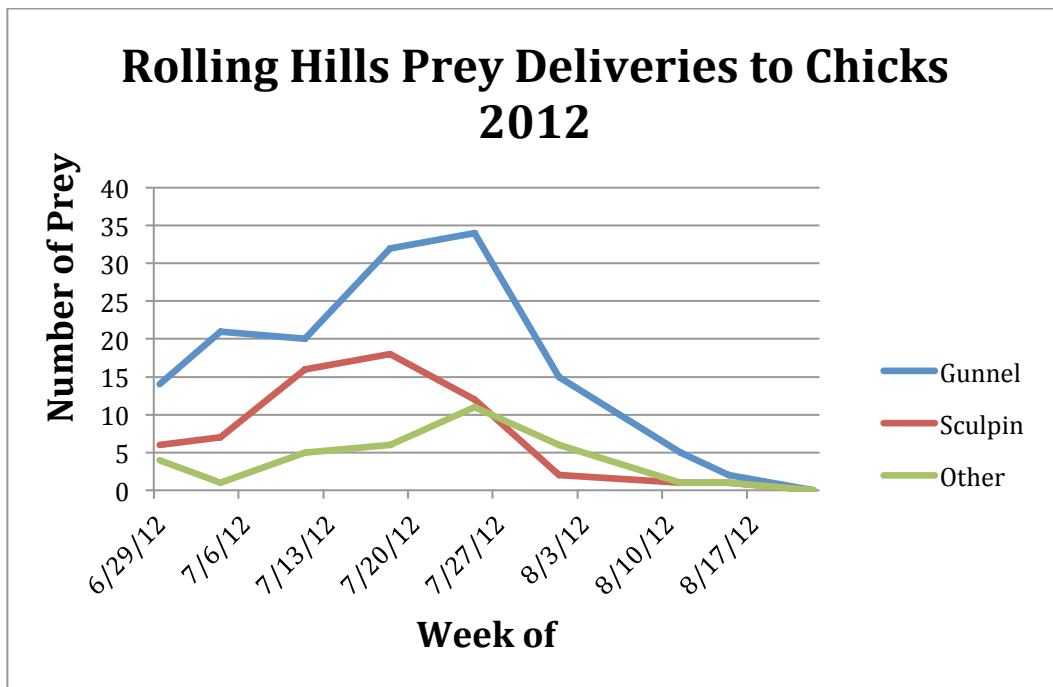


Figure 1. The number and selection of prey deliveries to chicks at Rolling Hills 2012.

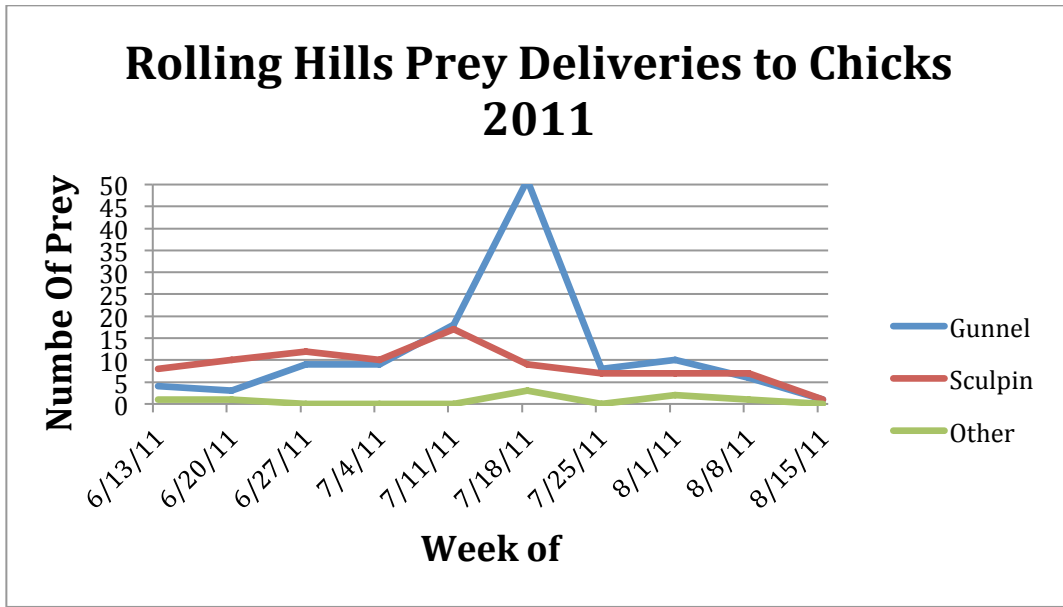


Figure 2. The number and selection of prey deliveries to chicks at Rolling Hills 2011.

The Mutiny Sands colony began prey deliveries later than Rolling Hills. The Mutiny Sands survey started on June 28<sup>th</sup>, with population count of 16 with one pair still incubating. Peak deliveries were during the week of July 19<sup>th</sup>. A second spike of deliveries occurred the week of August 9<sup>th</sup>. It is not determined if this may suggest a second clutch, or be from some other variable (Figure 3).

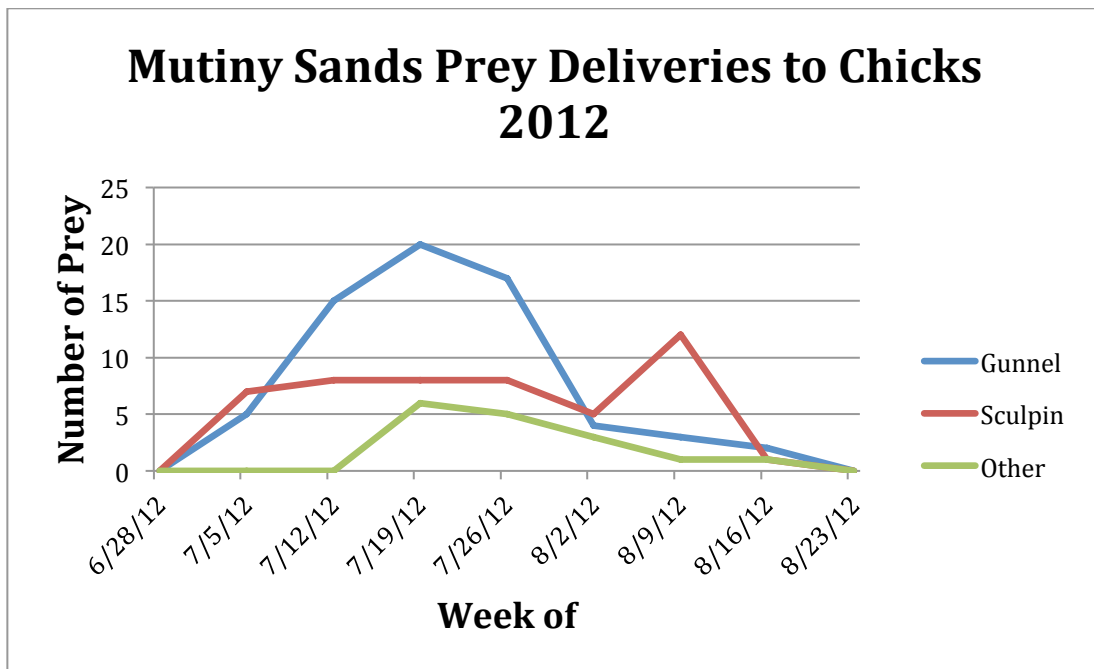


Figure 3. The number and selection of prey deliveries to chicks at Mutiny Sands 2012.

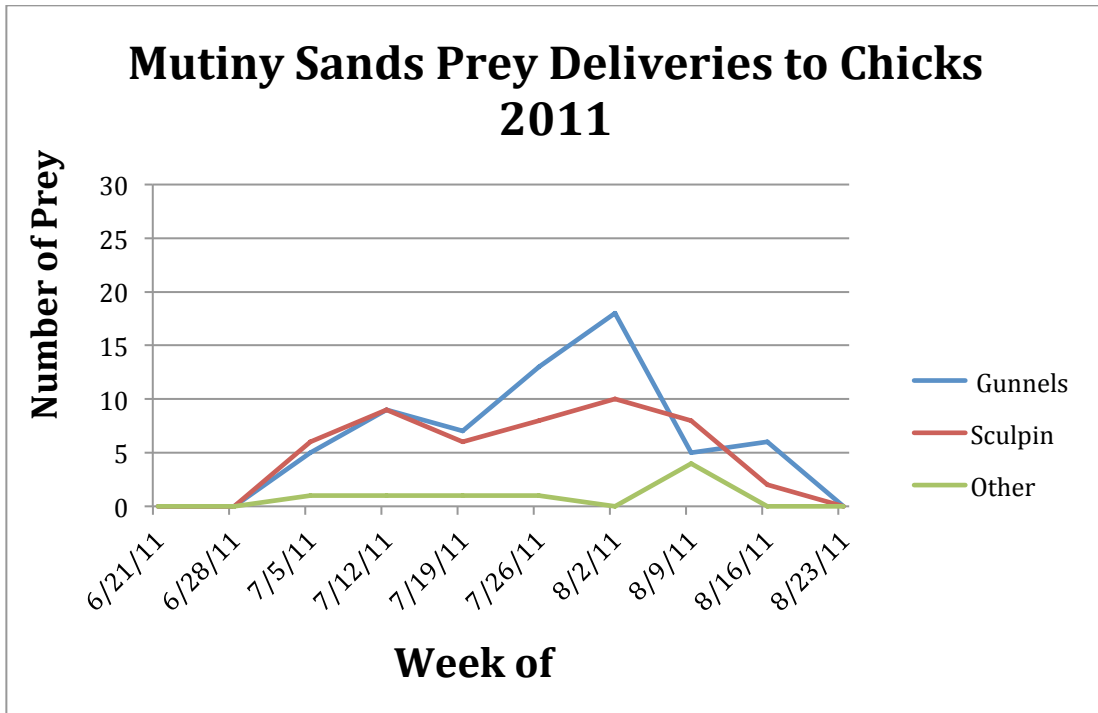


Figure 4. The number and selection of prey deliveries to chicks at Mutiny Sands 2011.

Rate of fish deliveries by pigeon guillemots at Mutiny Sands in 2012, 2011, and 2010 (Figures 3, 4, and 5) are consistent with the bulk of deliveries occurring mid-to-late July.

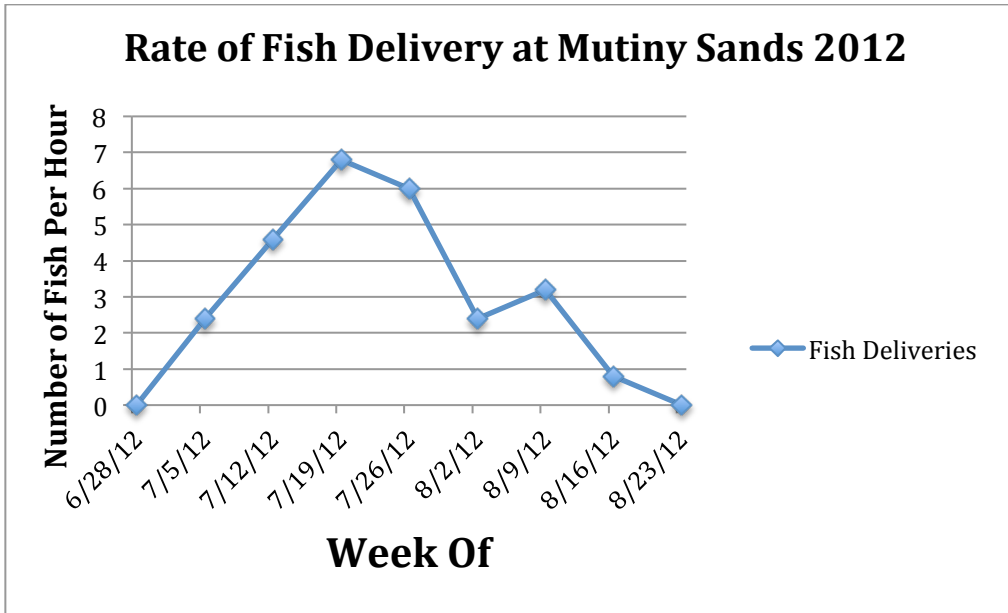


Figure 3. Rate of fish deliveries at Mutiny Sands 2012.

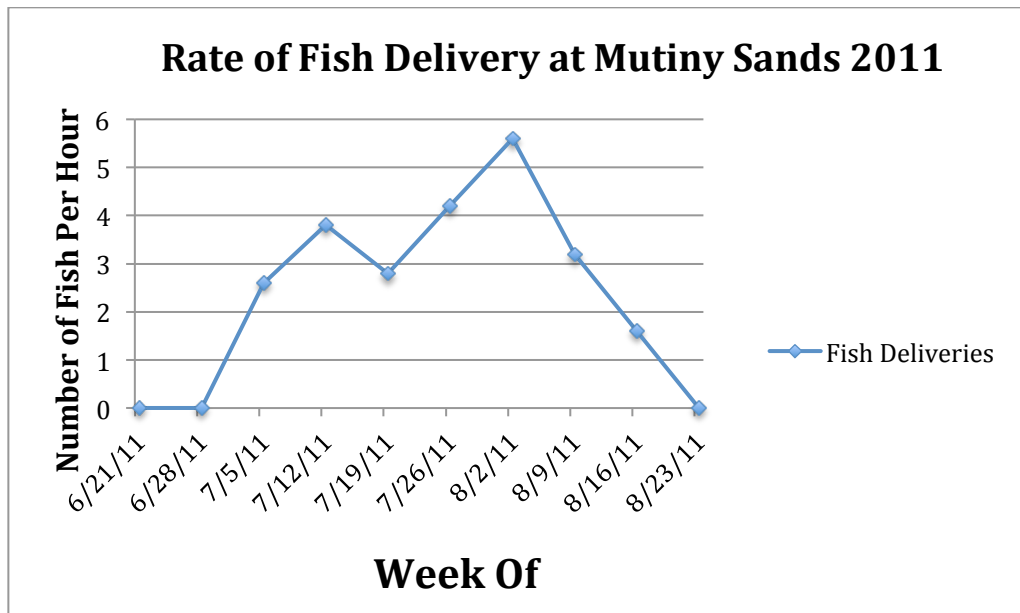


Figure 4. Rate of fish deliveries at Mutiny Sands 2011.

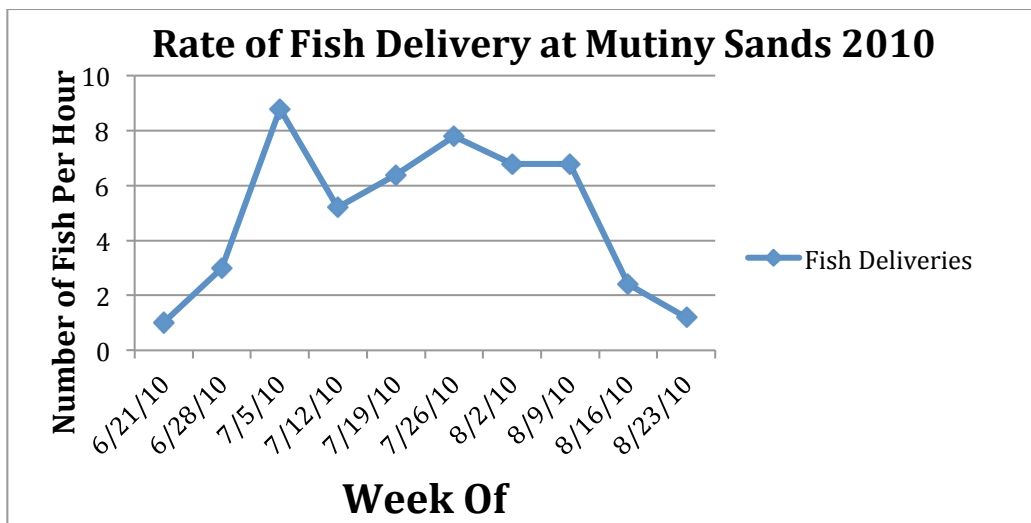


Figure 5. Rate of fish deliveries at Mutiny Sands 2010.

Rate of fish deliveries by pigeon guillemots at Rolling Hills in 2012, 2011 and 2010 (Figures 6, 7 and 8) are consistent with the bulk of deliveries occurring mid-to-late July.



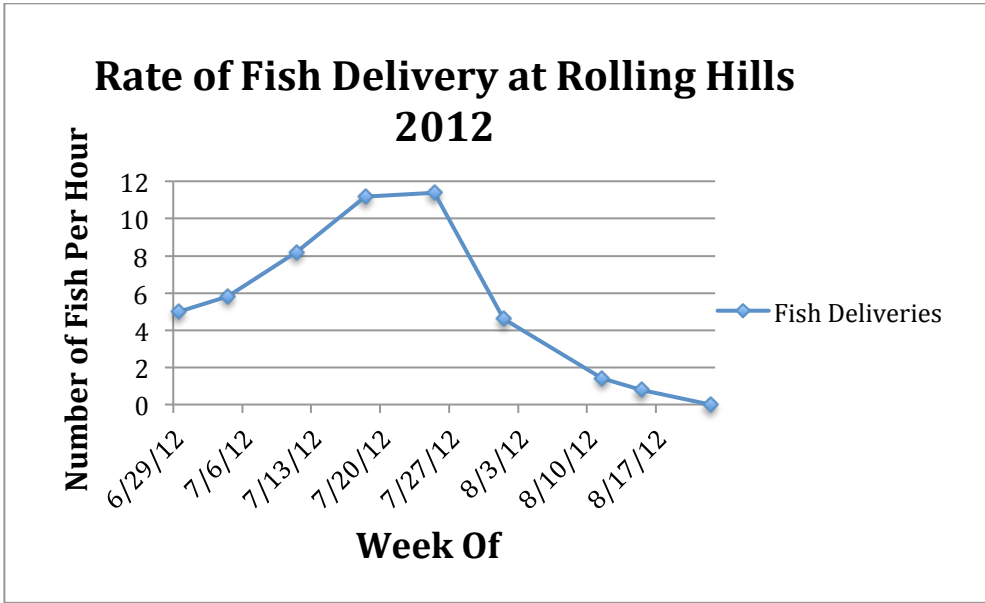


Figure 6. Rate of fish delivery at Rolling Hills 2012.

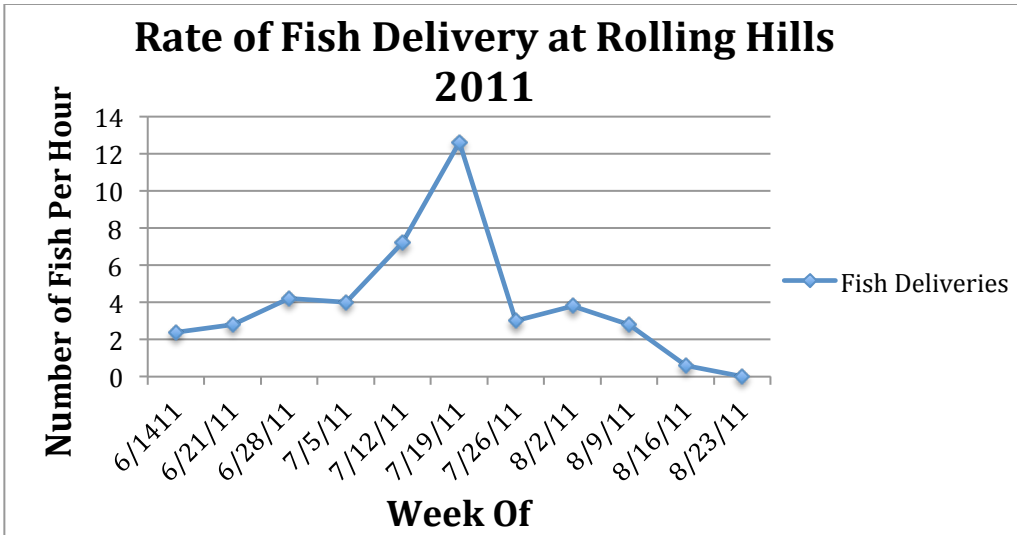


Figure 7. Rate of fish deliveries at Rolling Hills 2011.

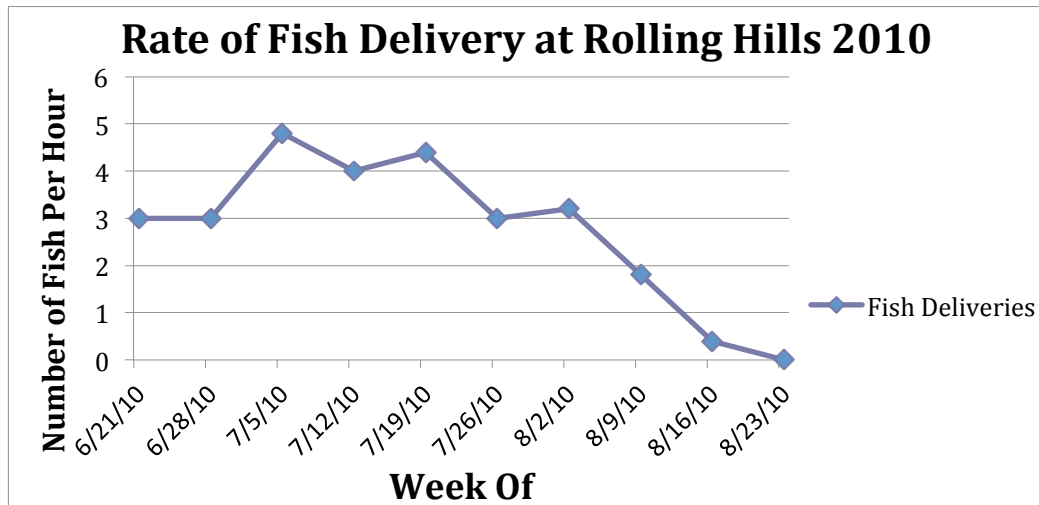


Figure 8. Rate of fish deliveries at Rolling Hills 2010.

Pigeon Guillemots are the only seabirds that nest on Whidbey Island: By studying their breeding, chick diet behavior we get a better idea of the health of the marine ecosystem. It is recommended that the Pigeon Guillemot study be continued. Further observations and data collection may provide a deeper understanding of the factors contributing to their breeding success.

Further monitoring of the Rolling Hills colony located in Penn Cove should also continue. Although the derelict vessel oil spill appeared to have resulted in no change regarding the 2012 population and fledging success, it would be prudent to continue monitoring this colony, and compare its 2013 breeding season to previous recordings.

#### Acknowledgements

Thanks to the Island County Marine Resources Committee and to Whidbey Audubon Society for funding this project.

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