

Pigeon Guillemot Study
Whidbey Island, 2010 Breeding Season

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Abstract

A monitoring study of breeding Pigeon Guillemots was conducted on five beaches of Whidbey Island. The objective of this study is to continue building a data base line of the Pigeon Guillemot population on Whidbey Island. Colony behavior, active burrows, prey selection, frequency of deliveries, and fledging success are documented. Pigeon Guillemots are predominantly benthic feeders (gunnel and sculpin fish). Their breeding success has been correlated with the overall health of Puget Sound. The data shows an average of 50% gunnel and 44% sculpin choice, and 6% other. Over 1,230 prey deliveries were recorded indicating a 60% fledging success.

Introduction

Pigeon Guillemots (*Cephus columba*) are in the alcid/auk family. They are a small seabird, with an average wingspan of 23 inches, and weigh 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 235,000). The Pigeon Guillemot is a specialized underwater swimmer, with a compact body, short wings and short tail. It dives, using its wings and feet for steering and propulsion, in pursuit of prey. (Seattle Audubon). They 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 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 most birds do not breed until the third or fourth year (Gaston & Jones, 1998). Only 40% of Pigeon Guillemots will survive to breeding age. They are vulnerable to predation (raptors, octopi, crows etc.), water pollution, and gill netting. When the time comes to fledge, the young Pigeon Guillemot stumbles out of the cliff burrow for the first time and heads for the water; it's wings are not fully developed (Ewins, 1993; Vermeer, Morgan and Smith 1993).

Over 25 Pigeon Guillemot colonies have been documented on Whidbey Island (a population of 1,000 individuals). Out of the 25 Whidbey colonies, five colonies representing a spectrum of beaches (sandy, rocky, high and low bluffs, east and west side of the island) were chosen for detailed monitoring.

2010 marks the third year that these five beaches have been monitored for Pigeon Guillemot prey choice, frequency of burrow deliveries and fledging success. The sites

chosen were: Mutiny Sands, Rolling Hills, Harrington Lagoon North, Harrington Lagoon South, and Shore Meadows.

Mutiny Sands is located on the South Western 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. Because of the successful fledging at Mutiny Sands (91% compared to average of 60% for all five colonies), this colony is detailed more closely in the paper.

Shore Meadows is a sandy beach located North of Mutiny Sands. Whereas Mutiny Sands is a short beach with a low bluff, Shore Meadows is a long beach with a high bluff, measuring approximately 85 feet (25 meters) high. Out of the five sites in the study, Shore Meadows is the only public beach, and is frequented by beach walkers with dogs. Shore Meadows houses the largest Pigeon Guillemot population.

Harrington Lagoon North and Harrington Lagoon South colonies are located on a long stretch of beach on the Eastern side of Central Whidbey. These beaches are rocky and support small Pigeon Guillemot populations. The bluffs at Harrington are medium height 50 feet (15 meters). Beach walkers and dogs are infrequent at these sites.

Rolling Hills colony is located on the Eastern side of Central Whidbey on the North shore of Penn Cove. Similar to the Harrington beaches, Rolling Hills is a rocky beach, with minimal human presence. The bluff height of Rolling Hills is similar to Mutiny Sands, ranging at 40 feet (12 meters), and its population is also similar to Mutiny Sands.

The two main prey choices of Whidbey Pigeon Guillemots are small sized sculpin and gunnel fish. Sculpin are a small fish in the Cottidae family, typically measuring less than 15cm. Sculpin are a spiny fish with a large head; 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 sculpins, 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).

Materials and Methods

This study took place from June 21 to August 27, 2010. Each of the 5 beach sites was observed from sunrise to approximately 11:00 a.m. (five hours each day, Monday through Friday). Mutiny Sands was observed on Monday, Rolling Hills on Tuesday, Harrington North on Wednesday, Harrington South on Thursday, and Shore Meadows on Friday. 8X42 power binoculars, 60X spotting scope, video camera, and digital still camera were used at each site to aid in recording observations. A Treetop™ camera was also employed to look into specific burrows.

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 recorded as they occurred. If a burrow received prey deliveries for at least three weeks, that burrow was then considered having a successful fledgling.

Results and Discussion

The data showed an overall prey choice of 50% gunnel fish, 45% sculpin fish and 6% other in 2010. Compared to previous years, the prey choice of 2010 is not as specialized. It is unknown whether sculpin fish are an easier prey for the Pigeon Guillemot, or if they were just more abundant in the 2010-breeding season (Table 1).

Fledging success in 2010 was lower than in 2009, even with a larger number of active burrows. All of the Whidbey Pigeon Guillemots nest in bluffs that are subject to erosion. It is the author's opinion that the bluffs chosen for nesting in 2010 breeding season were not as desirable as those chosen in previous years (safe from predators, suitable height and bluff slope angle) (Table 2).

Two peaks of fish deliveries bracket a trough of low deliveries. This may be due to nest failure, with a re-laying of eggs. It may be worth noting that sculpin prey was being delivered more frequently than gunnel fish at the end of the breeding season. Again it is unknown if the sculpin fish are more abundant, easier to catch, or more desirable for a soon to fledge chick (see Figure 1).

Both Mutiny Sands and Rolling Hills are about even in the division of gunnel and sculpin fish choice. However the fledging success of Mutiny Sands resulted in 91% compared to the fledging success of Rolling Hills, 58%. Shore Meadows had a fledging success (66%) between the Mutiny Sands and Rolling Hills sites (Figure 2, and Table 3). The breeding success of Mutiny Sands could be due to an absence of Accipiters on this beach. A Cooper's Hawk was observed attempting to make a strike against an adult Pigeon Guillemot at Rolling Hills, and numerous Cooper's Hawks scouting burrow entrances at Shore Meadows.

Harrington North and South both have a high number of gunnel fish deliveries, but both beaches had a small number of active burrows (four and five) with a combined fledging success of 42.5% (Table 3).

Mutiny Sands colony had 13 active burrows in the 2010 breeding season. All but two burrows fledged. The top six burrows with most prey deliveries consisted of either an even number of sculpin and gunnel, with the exception of burrow number 6a or majority of gunnel fish (Figure 3).

Rate of fish delivery at Mutiny Sands was the highest of all the colonies; this was a busy beach peaking at nine fish per hour. This may be due to Mutiny Sands having the largest number of burrows (Figure 4).

Figure 5 and Figure 6 illustrate the prey choice of Mutiny Sands in two breeding seasons. 2009 had a greater specialization of gunnel prey than in 2010. It is also worth noting that at the height of prey deliveries than those in 2010 occurred one month earlier (July 5) than in 2009 (August 2).

It is recommended that the Pigeon Guillemot study continue at least through 2012. It is desirable to have five years of analyzable data showing populations, prey

selection and fledging success. Expanded data sheets may shed light on the health of breeding Pigeon Guillemots and the Salish Sea habitat. Studies to date show a fluctuation of Pigeon Guillemot populations; further observations and data collection may allow us to step back and view overall patterns.

It is unclear why one prey over another is selected, why in 2010 the prey choice was not as specialized as in previous years, nor why some burrows are successful and others fail. It is likely there are a multitude of variables which determine fledging success including weather, prey abundance, burrow condition and availability of burrows as well as population of predators, all effect the success of a breeding Pigeon Guillemot colony.

Acknowledgements

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Year	Gunnel	Sculpin	Other
2008	55%	24%	21%
2009	57%	18%	25%
2010	50%	44%	6%

Table 1. Percentage Of sculpin and gunnel prey choice

Year	Number of Burrows	Number of Fledged	% Fledged
2009	38	29	76%
2010	50	30	60%

Table2.

Percent of fledging success for all five colonies.

Year	Harrington N	Harrington S.	Mutiny Sands	Shore Meadows	Rolling Hills
2009	83%	57%	71%	50%	100%
2010	25%	60%	91%	66%	58%

Table 3. Number of burrows, and colony percentage of fledging in two year span.

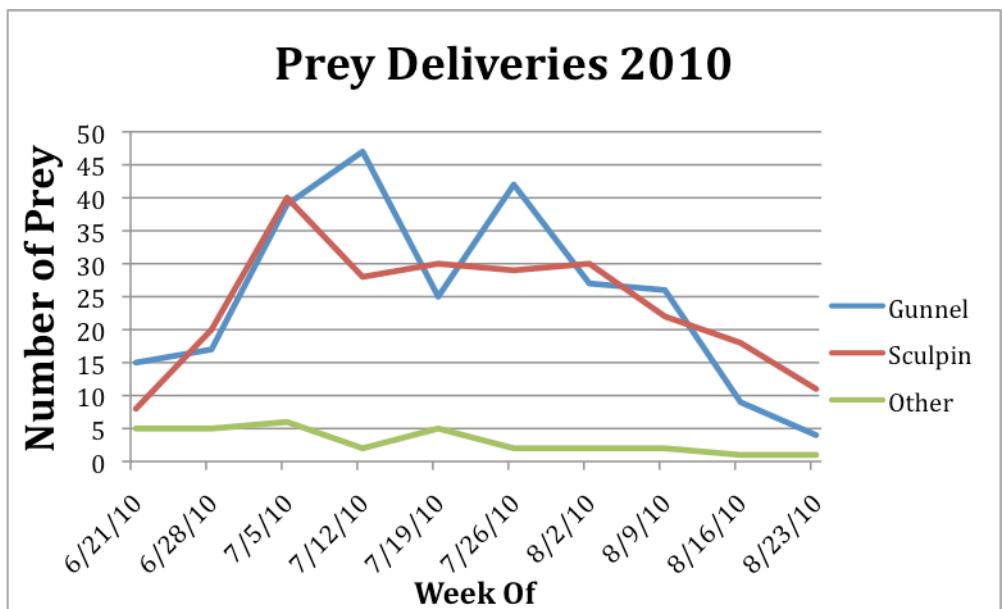


Figure 1. Number of prey delivered in 2010 by week in all five colonies.

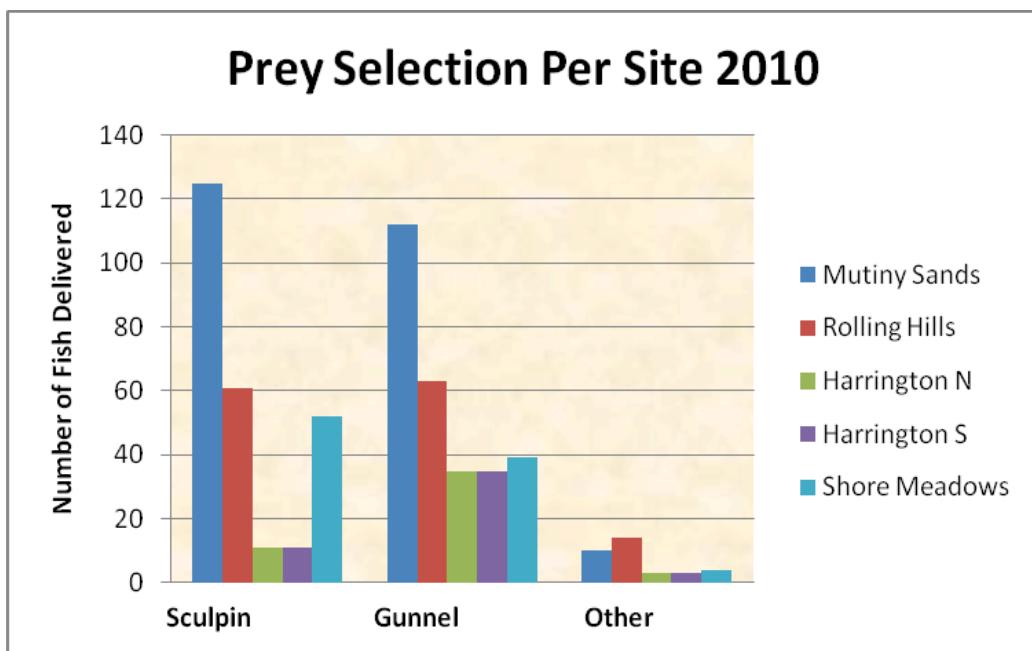


Figure 2. Comparison of prey selection of all 5 colonies.

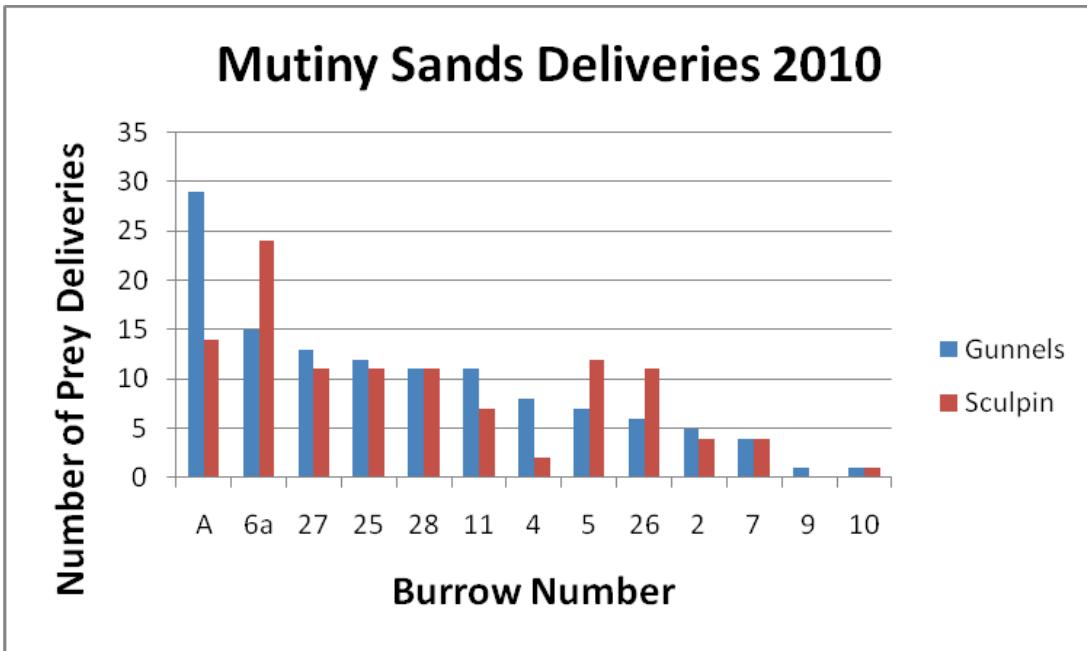


Figure 3. Prey selection by burrow number at Mutiny Sands.

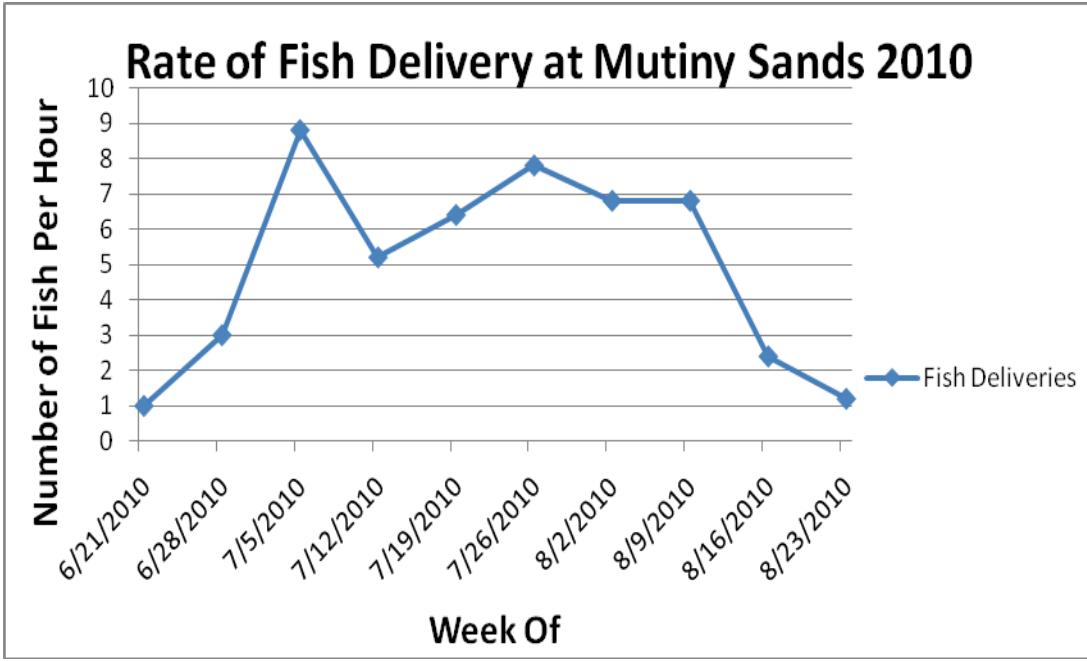


Figure 4. The rate of fish delivered at Mutiny Sands 2010.

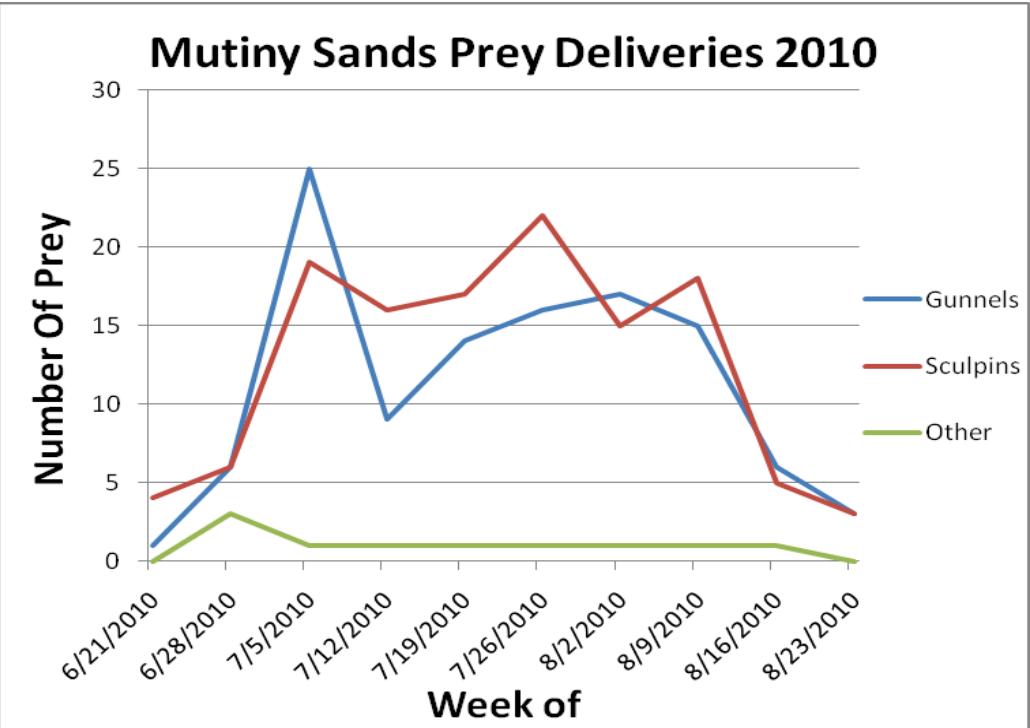


Figure 5. The number and division of prey selection at Mutiny Sands, 2010.

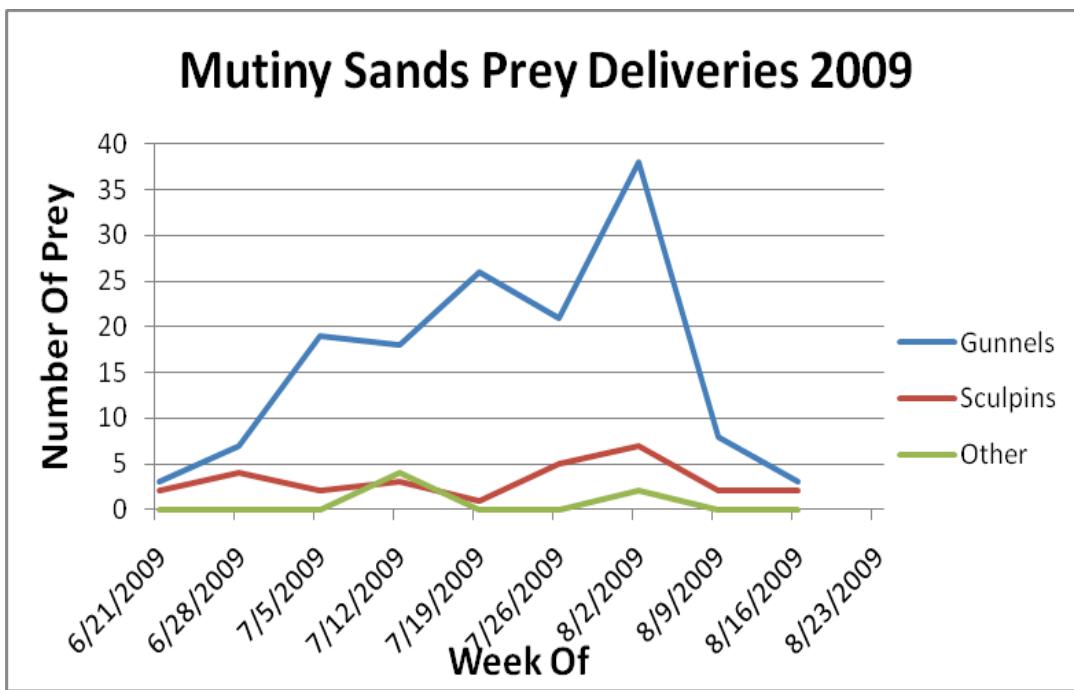


Figure 6. The number and division of prey selection at Mutiny Sands, 2009.

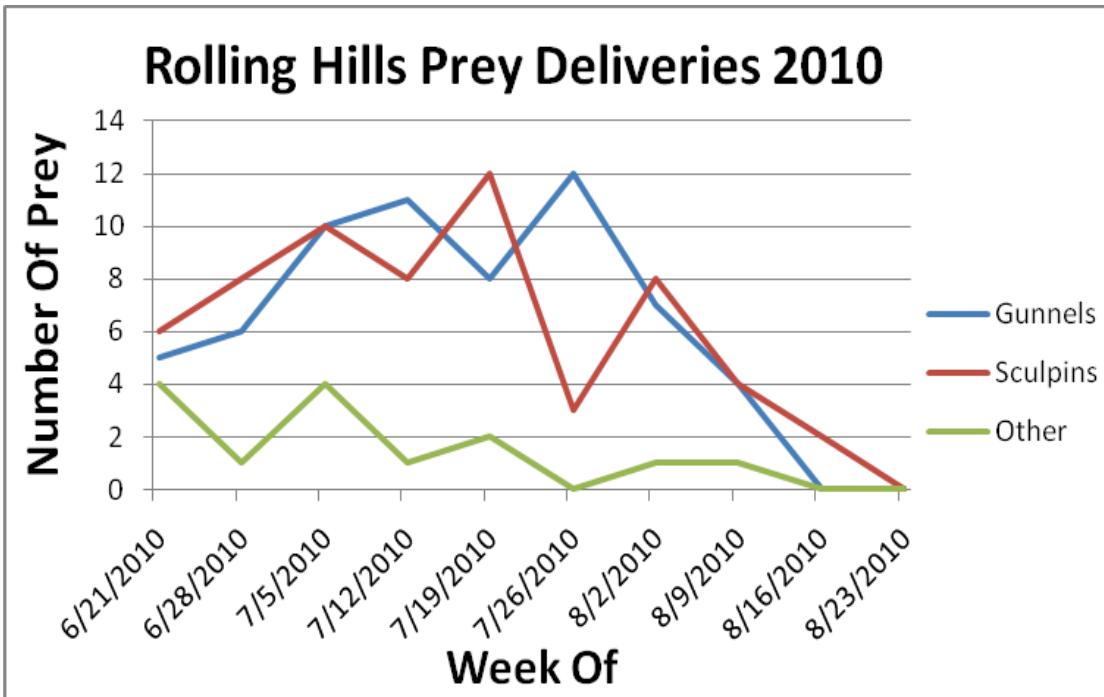


Figure 7. The number and division of prey selection at Rolling Hills, 2010.

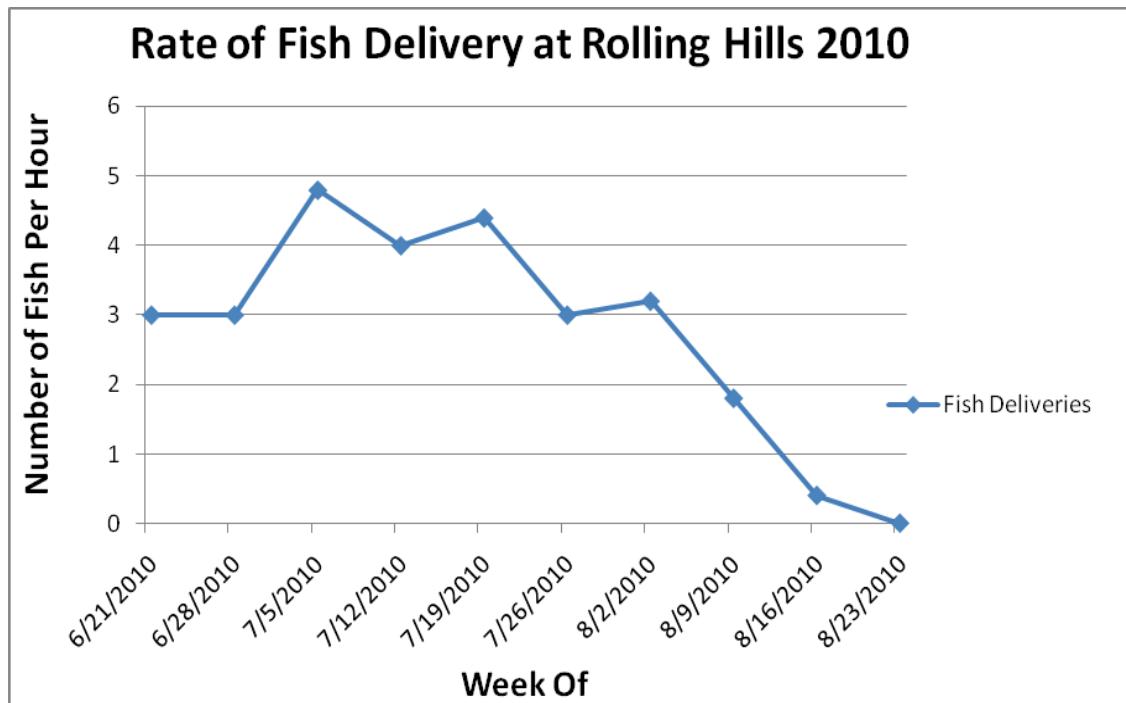


Figure 8. The rate of fish delivered at Rolling Hills, 2010

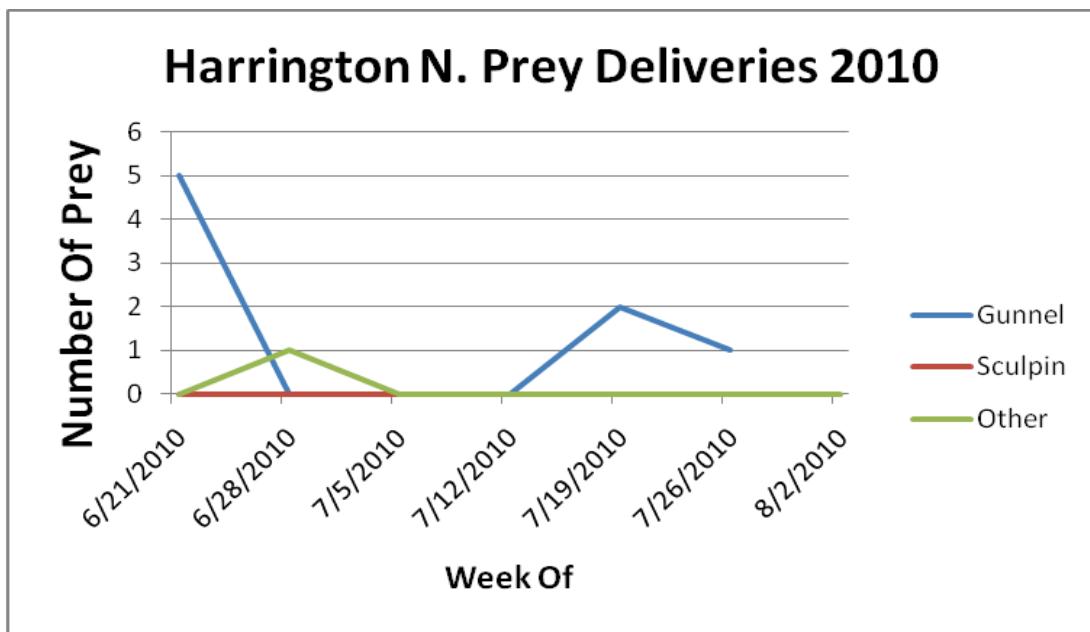


Figure 9. The number and division of prey selection at Harrington North, 2010.

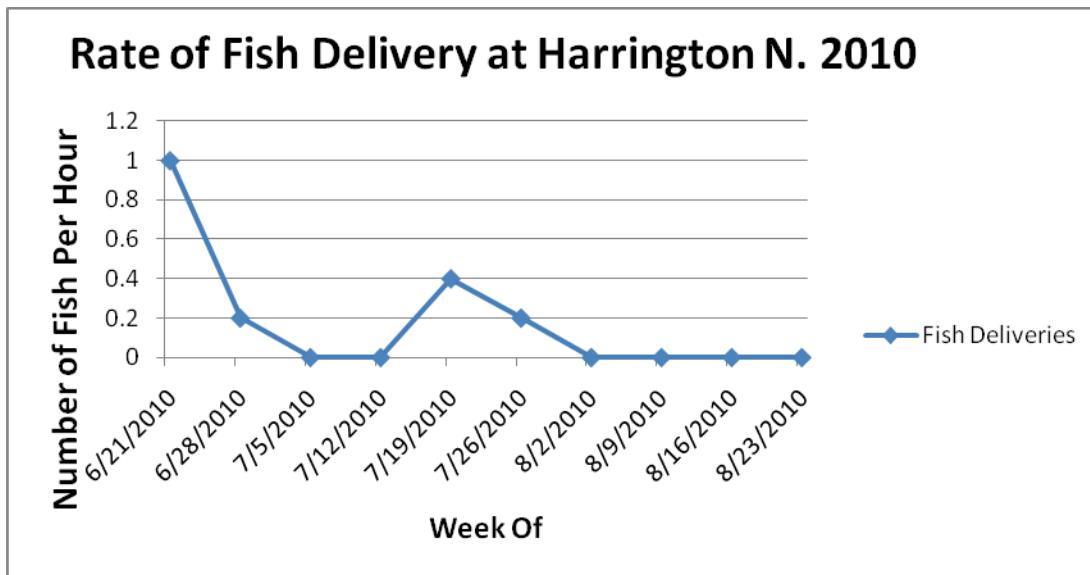


Figure 10. The rate of fish delivered at Harrington North, 2010.

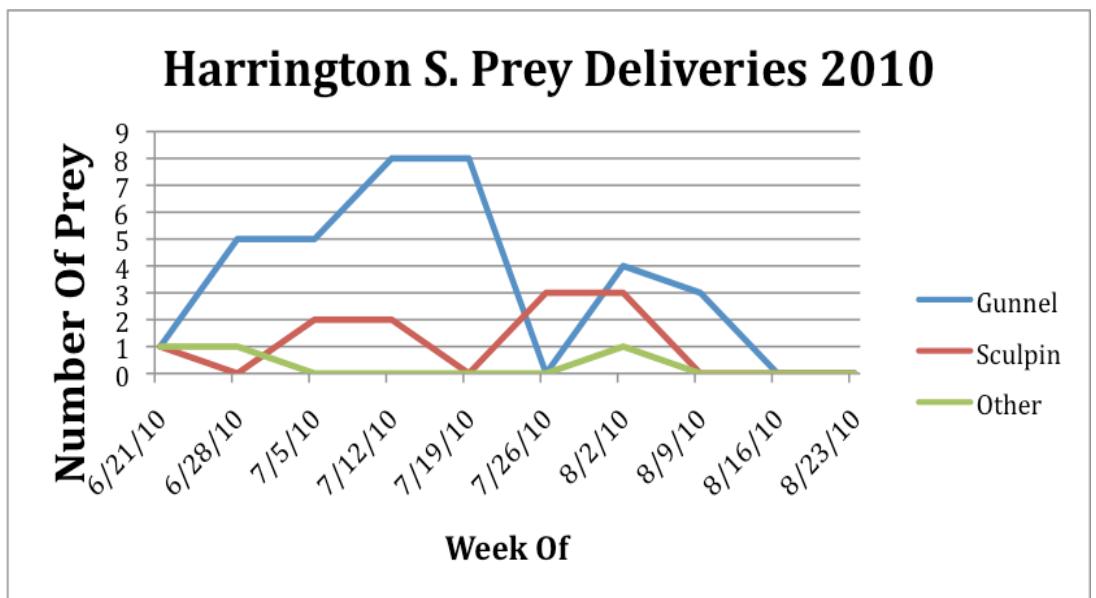


Figure 11. The number and division of prey selection at Harrington South, 2010.

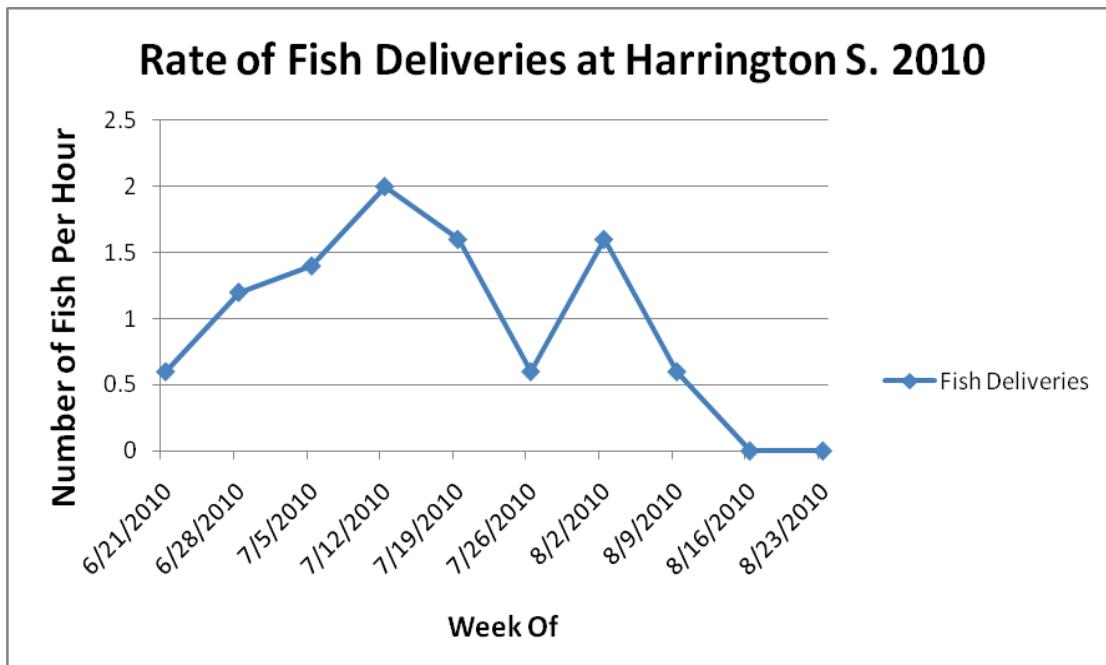


Figure 12. The rate of fish delivered at Harrington South, 2010.

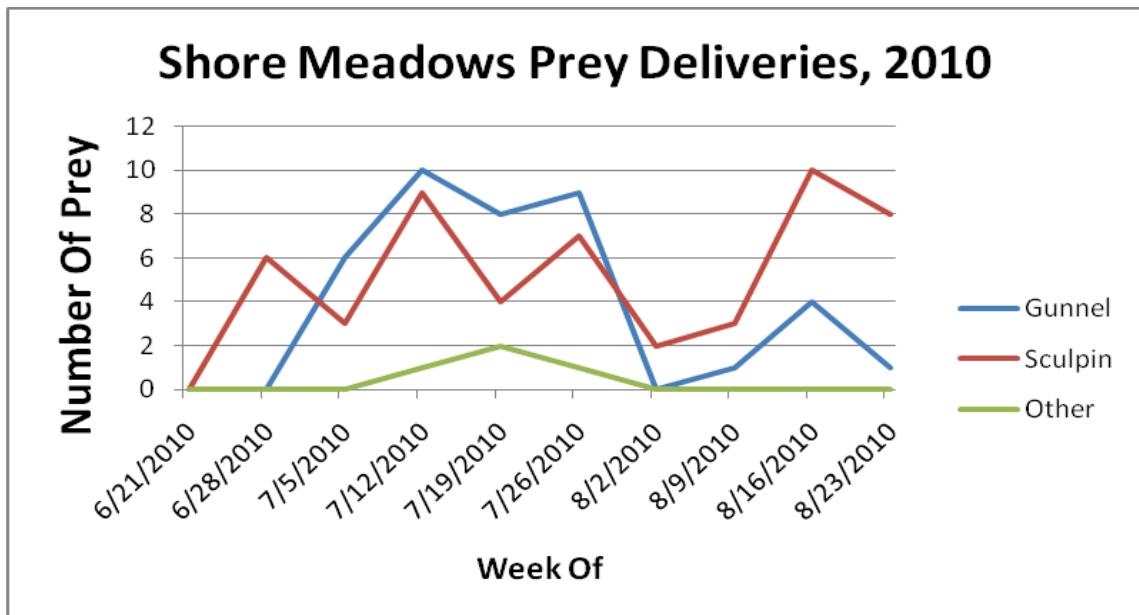


Figure 13. The number and division of prey selection at Shore Meadows, 2010.

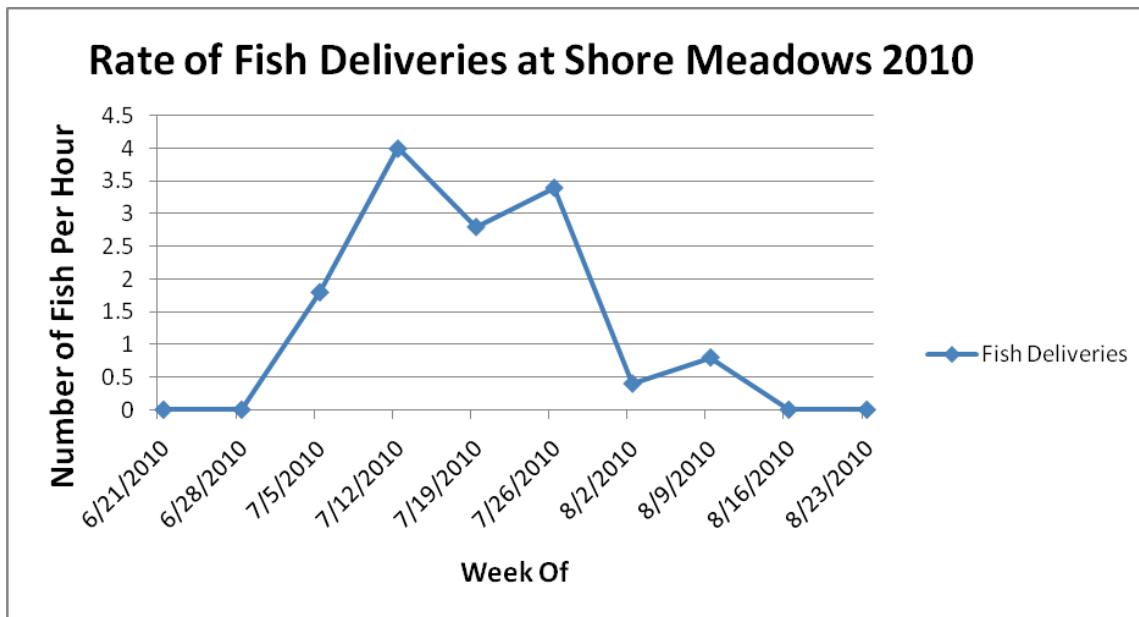


Figure 14. The rate of fish delivered at Shore Meadows, 2010.

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- Seattle Audubon Birdweb website with a summary of the Pigeon Guillemot retrieved from <http://www.birdweb.org/birdweb/bird>
- University of Washington website of gunnel and sculpin species from the Burke Museum webpage, retrieved from www.washington.edu/burke