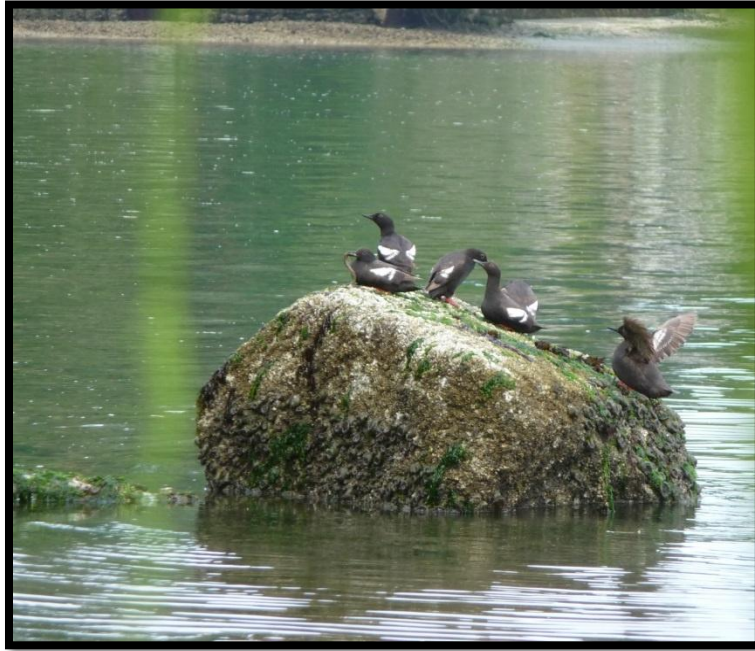


# Pigeon Guillemot Foraging and Breeding Survey in and Near the Nisqually Reach Aquatic Reserve

## 2013 Monitoring Report



Washington State Department of Natural Resources Grant #: PC-00J29801-0:  
Ensuring regulatory effectiveness in Puget Sound's most special places

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Nisqually Reach Aquatic Reserve Citizen Stewardship Committee

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## Publication Information

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Cover photo: Pigeon Guillemots at Zangle Cove. Note that the left-most bird is holding a gunnel. Photo by Bobbie Moody.

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## Contents

Figures .....	iv
Tables.....	iv
Abstract .....	5
Introduction .....	5
Goals and Objectives .....	8
Data-Collection Methodology.....	8
Narrative of the Field Research.....	9
Results .....	9
Site Monitoring.....	9
Prey Observations .....	10
Discussion .....	13
Delivery of Prey .....	15
Completeness of the Pigeon Guillemot Breeding Survey .....	17
Variation of Coverage Per Site .....	17
Assessment of the Feasibility of this Study.....	17
Recommendations for Changes to the Procedures and Program.....	17
Recommendations for Landowners .....	18
Conclusions .....	18
Literature Cited .....	19
Appendix: Acknowledgements and Volunteers.....	20

## Figures

Figure 1: Nisqually Reach Aquatic Reserve and surrounding areas .....	7
Figure 2: Colony locations for Pigeon Guillemot observations .....	11
Figure 3: Number of weeks that prey were observed at each burrow in the Reserve Area. ....	12
Figure 4: Number of weeks that prey were observed at each burrow Outside the Reserve Area. ....	12
Figure 5: Interactive map showing details for each colony .....	14
Figure 6: Maximum number observed in breeding colonies within the NRAR Area. ....	14
Figure 7: Maximum number observed in breeding colonies outside the NRAR Area.....	15
Figure 8: Type of Prey Delivered to Colonies in the Reserve Area. ....	16
Figure 9: Type of Prey Delivered to Colonies outside the Reserve Area. ....	16

## Tables

Table 1: Observation sites and observational period.....	10
Table 2: Prey items observed delivered by adult Pigeon Guillemots to burrows at each site. ....	11

# Pigeon Guillemot Foraging and Breeding Survey in the Nisqually Reach Aquatic Reserve and South Puget Sound

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## *2013 Monitoring Report*

### **Abstract**

The first Nisqually Reach Aquatic Reserve and South Sound Pigeon Guillemot Foraging and Breeding Survey was conducted in summer 2013 as part of the Nisqually Reach Aquatic Reserve Citizen Stewardship Committee monitoring program. More than 40 volunteers at 16 sites collected data weekly for one hour in the early morning, mainly during June, July, and August. Data collected included the number of adult birds seen in colonies, number of active burrows, trips to burrows, fish delivered to burrows, and disturbances to nesting areas. Gunnels were observed most often as the prey selected for chicks, followed by sculpin. Volunteers observed 50 active burrows. The pilot project provides the beginning of a dataset of the breeding population of Pigeon Guillemots in the Nisqually Reach Aquatic Reserve and nearby vicinity. Additional sites will be added to the 2014 survey to make the study more complete. Results of the study are provided to federal and state agencies, and organizations monitoring the health of Puget Sound.

### **Introduction**

The first Nisqually Reach Aquatic Reserve and South Sound Citizen Science Pigeon Guillemot Breeding Survey was conducted in summer 2013, in Thurston and Pierce County, Washington State. This pilot project was developed and designed by the Nisqually Reach Aquatic Reserve Citizen Stewardship Committee (NRARCSC) with assistance from the Washington Environmental Council (WEC) and in association with the Washington Department of Natural Resources (WDNR). The protocols for this survey were adopted from the work done by the Whidbey Island Pigeon Guillemot Research Group (WIPGRG).

The Nisqually Reach Aquatic Reserve (NRAR) is part of the WDNR Aquatic Reserves Program (WDNR, 2011). It is designated as an **educational, environmental, and scientific** reserve. **Educational reserves** are accessible areas of aquatic lands typical of selected habitat types which are suitable for educational projects; **environmental reserves** are areas of environmental importance, sites established for the continuance of environmental baseline monitoring, and/or areas of historical, geological or biological interest requiring special protective management; **scientific reserves** are sites set aside for scientific research projects and/or areas of unusually rich plant and animal communities suitable for continuing scientific observation.

The NRAR encompasses approximately 14,826 acres (6,000 hectares) of state-owned and DNR-managed tidelands and bedlands. The ownership of adjacent lands is diverse. This includes state parks; the Nisqually National Wildlife Refuge; local park districts; and private, tribal, Washington Department of

Fish & Wildlife (WDFW), military, city, and county lands. There are nearly 39 miles (63 km) of shoreline adjacent to the reserve, the majority privately owned. The NRAR area is shown in Figure 1.

As part of the *Ensuring regulatory effectiveness in Puget Sound's most special places* project, the NRARCSC developed a monitoring program for a resident species, the Pigeon Guillemot, *Cepphus columba*. These birds are commonly seen in Puget Sound throughout the year and are the only member of the alcid family breeding in South Puget Sound. Breeding-bird surveys have shown that Pigeon Guillemots nest throughout North and Central Puget Sound (Opperman, et al., 2006). However, only a single formal study of baseline breeding population or documentation of breeding sites exists for South Puget Sound (Evenson, et al, 2003). Additional anecdotal sightings of Pigeon Guillemots during breeding season and location of potential burrows indicate that there are small breeding colonies in the area. Past studies have also identified the presence of Pigeon Guillemots throughout the Sound in the fall, winter and spring seasons (Nysewander, et al, 2005; PSSS, 2012).

Pigeon Guillemots are viewed as one of the key marine bird indicators in Puget Sound (Pearson and Hamel, 2013). They nest in burrows on the shoreline, whether in the bluffs or among driftwood or other debris on the beach. They are a fish-eating species and prey are taken in the nearshore waters. The NRAR is home to foraging Pigeon Guillemots that nest in adjacent cliffs. Breeding pairs are believed to establish burrows in May and June, where they normally lay two eggs. Both the male and female incubate the eggs. For successful nests both adults are delivering fish and other marine prey to the young from hatching (late of June) until they fledge (usually in August).

The management plan (WDNR, 2011) for the Nisqually Reach Aquatic Reserve identifies five management goals:

1. Preserve, restore and enhance aquatic nearshore areas including intertidal and subtidal ecosystems with a special emphasis on native habitats for forage fish, salmonids, and marine birds.
2. Protect and restore the functions and natural processes of nearshore ecosystems in support of the natural resources of the reserve.
3. Promote stewardship of riparian and aquatic habitats and species by supporting and providing opportunities for outdoor education, scientific research including citizen science and interpretive studies.
4. Promote sustainable management of traditional recreational (e.g., boating, water skiing, fishing), commercial (e.g., marinas), and cultural uses in the aquatic reserve in a manner consistent with the other goals and objectives for the reserve.
5. Support the recovery and protection efforts for federal and state threatened, endangered and sensitive species, species of special concern and their habitats.

This Pigeon Guillemot monitoring program was developed to support these goals. Nest monitoring can provide basic biological information on this population, including reproductive success and diet composition. It can also provide critical information about health of the local food web as these birds feed primarily on small fish and other marine creatures. Observations can also help quantify behavioral responses of Pigeon Guillemots to disturbances of various types, including human, domestic animals,

and predators, such as raptors. This study also has the potential of providing trends in population, fecundity, and chick diet over time, as this project continues beyond the first year.

The aquatic reserve area encompasses only state tidelands and bedlands. Therefore, because all burrows are on bluffs and shoreline adjacent to tidelands and bedlands and many are on private property, all the nesting burrows of Pigeon Guillemots are outside the reserve; some are immediately adjacent to the reserve while others are more distant. Much of the foraging occurs within the reserve boundaries.

Long-term studies of Pigeon Guillemot breeding and prey selection have been conducted by the Whidbey Island Pigeon Guillemot Research Group (WIPGRG), with 11 years of observations recorded using a standardized methodology. The study in NRAR was modeled after the Whidbey Island program. Data collection procedures, field cards, training, mentoring, and support were provided by WIPGRG.

Additional details regarding the development and design of the program are given in the *Pigeon Guillemot Breeding Survey in the Nisqually Reach Aquatic Reserve and South Puget Sound Quality Assurance Project Plan* (Mills & Joyce, 2013).

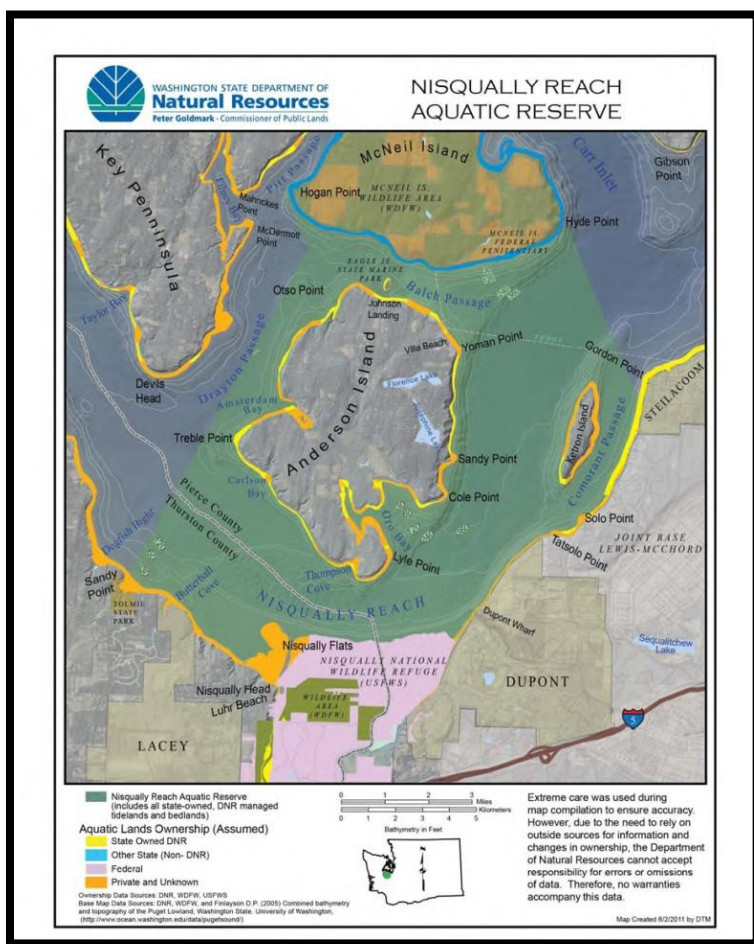


Figure 1: Nisqually Reach Aquatic Reserve and surrounding areas. (Source, WDNR, 2011)

## Goals and Objectives

The two main goals for this study, as stated in the quality assurance planning documents (Mills and Joyce, 2013), are:

- 1) Create a dataset of
  - The number of Pigeon Guillemot breeding sites adjacent to and in the vicinity of the NRAR
  - The number of breeding pairs using those sites
  - Total breeding population within the area
- 2) Create vital monitoring resources by involving, educating, and training citizen scientists to monitor the Pigeon Guillemot breeding sites.

The objectives of the program are to:

- Train at least 12 citizen scientists to identify and monitor active breeding burrows of Pigeon Guillemots
- Record weekly observations of breeding pairs at five or more sites.
- Compile and analyze the field data
- Distribute the results to agencies and individuals involved in the management and conservation of the reserve area
- Make recommendations to land owners (public or private) on how to protect breeding sites.

Because this was the first year of the study, the program was designed to examine the feasibility of conducting a citizen-science based study and determine the scope of monitoring that could be achieved.

## Data-Collection Methodology

In this document the nesting areas that are immediately adjacent to the reserve are referred to as being in the *Reserve Area*. Because birds foraging within the aquatic reserve may nest well beyond the boundaries of the reserve, nesting sites throughout the region were surveyed. The sites that are not immediately adjacent to the reserve are referred to as being *Outside the Reserve*.

The data-collection procedures were derived from the WIPGRG's standard operating procedure (Wood and Kind, 2013). The standard operating procedure for this project and the data-collection card used in recording data are provided in the project plan (Mills & Joyce, 2013).

The primary data collected were behavioral observations and counts of birds and burrows. Additionally, prey items were identified and counted. Data recorded included:

- 1) The maximum birds present during the survey period
- 2) The number of active burrows\*
- 3) The type and frequency of fish delivered to each burrow
- 4) Disturbances

*\*An active burrow is defined as one where an adult Pigeon Guillemot was observed entering or leaving the burrow.*



## **Narrative of the Field Research**

Potential Pigeon Guillemot breeding sites were identified beginning in Fall 2012. In preparation for the project, the project coordinator attended volunteer training and volunteer appreciation/data presentation for Whidbey Island Pigeon Guillemot survey in 2012. A presentation about Pigeon Guillemots was given to the NRARCSC. The Pigeon Guillemot project was selected by the committee.

Volunteers were recruited from a wide variety of backgrounds via email, flyer distribution, presentation, word of mouth, and outreach by Black Hills Audubon. Thirty-two people attended the first volunteer training held on May 18, 2013 at Nisqually Reach Nature Center. A training session for Anderson Island residents was held June 7, 2013 and attended by 10 people.

Observations were made from designated observation locations and conducted for one hour with observations conducted in the early morning and completed by 09:00 am. Observers supplied their own binoculars and some used spotting scopes for monitoring activity near a burrow. Data were recorded on field cards with information subsequently entered into Excel spreadsheets.

Observations were conducted weekly over 11 weeks, between June 25<sup>th</sup> and September 6, 2013.

## **Results**

The results of this pilot study are the first observations for a multi-year study. Therefore, the results are descriptive and are not intended to be used in statistical analysis.

### **Site Monitoring**

Forty-two volunteers participated in monitoring Pigeon Guillemot nesting activities. Of the 16 sites monitored, 14 were active, with 50 active burrows documented (Table 1).

Eight of the active sites, consisting of 32 active burrows, were in the Reserve Area (Figure 2). Twenty-one volunteer monitors spent 314 hours collecting the data during a weekly one hour visit at these sites. Six of the active sites and 18 burrows were Outside the Reserve Area and an additional 18 volunteers spent 286 hours collecting weekly observations in that area.

Table 1: Observation sites and observational period.

Vicinity codes: NRAR-A: Adjacent to the Nisqually Reach Aquatic Reserve on Anderson Island; NRAR-M: Adjacent to the Nisqually Reach Aquatic Reserve on the Mainland; SS: South Sound and not adjacent to the Reserve.

Location	SiteCode	Observation Date Range	Vicinity	Status of Site	Active Burrows	Maximum 1-Day Bird Count
Andy's Marine Park - West Bluff	AMPWAI	6/26-8/28/2013	NRAR-A	Active	6	16
Butterball Cove North	BubaN	6/30-8/25/2013	NRAR-M	Active	1	21
Butterball Cove South	BubaS	6/28-8/20/2013	NRAR-M	Active	7	21
Burfoot Park	BurPk	6/25-8/27/2013	SS	Active	3	11
Cole Point	CoPtAI	6/27-9/6/2013	NRAR-A	Active	2	12
Flapjack Beach	FlJa	6/29-8/18/2013	SS	Active	3	12
Frye Cove County Park	FrCo	6/30-7/28/2013	SS	Not active	0	0
Geoduck Beach @ TESC	GeoEv	7/10-7/13/2013	SS	Not active	0	1
Gull Harbor	GuHaN	6/29-8/14/2013	SS	Active	7	21
Higgins Cove	HiCoAI	6/28-8/30/2013	NRAR-A	Active	2	12
Jacobsens - Compass Rock	JaCRAI	6/?-8/20/2013	NRAR-A	Active	4	14
Lyle Point	LyPtAI	6/28-8/19/2013	NRAR-A	Active	5	27
Totten @ Elizan	TotElz	7/18-8/31/2013	SS	Active	2	14
Walnut Rd. NE	WalRd	7/3-8/21/2013	NRAR-M	Active	6	21
Young's Cove	YoCo	6/25-8/28/2013	SS	Active	1	19
Zangle Cove	ZaCoE	7/16-8/28/2013	SS	Active	2	12

## Prey Observations

Observations were made of fish being delivered to a burrow by an adult Pigeon Guillemot. The results, by prey species, are shown in Table 2. Most prey were gunnells, with a substantial number of sculpins also observed. The category Other Prey were observations of fish delivered that were not sculpin or

gunnel. Observations of prey delivery ranged from late June to late August. Some of the first deliveries were observed on the first day of observations, thus indicating that the range of deliveries may be greater than indicated here.

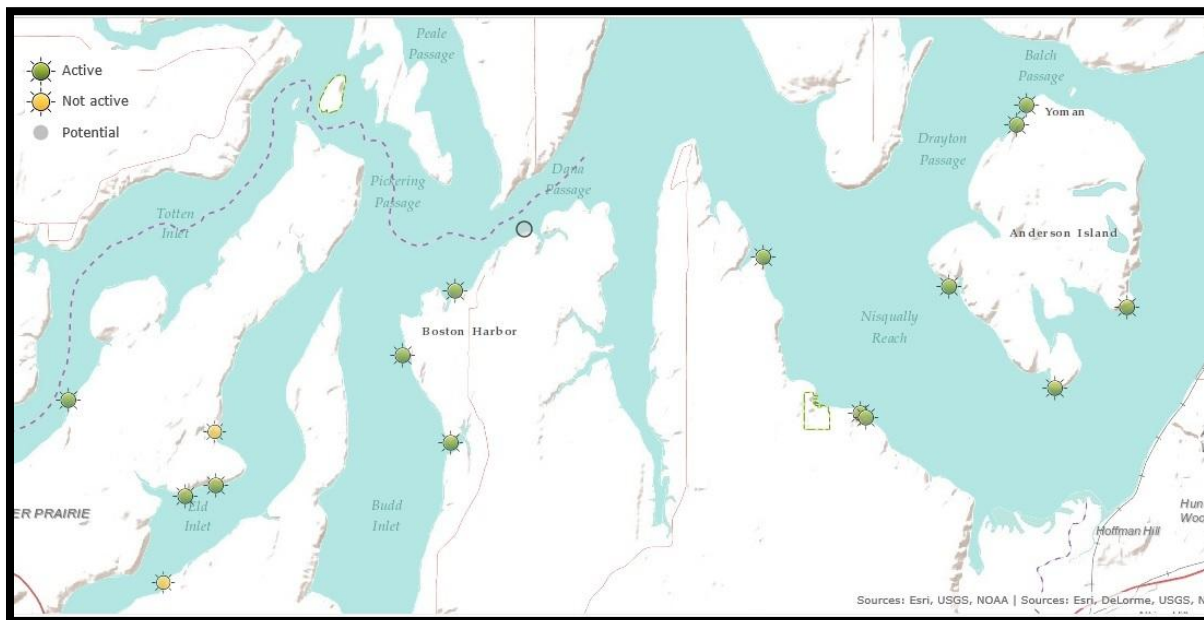


Figure 2: Colony locations for Pigeon Guillemot observations.(Ruth, 2013)

Table 2: Prey items observed delivered by adult Pigeon Guillemots to burrows at each site.

Site	Sculpin	Gunnel	Other prey	Date of First Fish Delivery	Date of Last Fish Delivery
AMPWAI	1	2	0	7/24/13	7/24/2013
BubaN	0	1	0	7/4/13	7/4/2013
BubaS	5	16	0	6/28/13	8/11/2013
BurPk	4	12	0	6/25/13	7/16/2013
CoPtAI	0	2	0	8/22/13	8/27/2013
FlJa	2	5	0	6/29/13	7/13/2013
GuHaN	0	14	1	6/29/13	7/21/2013
HiCoAI	2	7	2	7/19/13	8/23/2013
JaCRAI	1	7	0	7/1/13	7/23/2013
LyPtAI	6	11	3	6/28/13	8/13/2013
TotElz	0	5	0	7/18/13	8/16/2013
WalRd	1	8	0	7/3/13	7/24/2013
YoCo	1	1	0	7/16/13	7/16/2013
ZaCoE	0	12	0	7/16/13	8/5/2013
<b>Total</b>	<b>22</b>	<b>101</b>	<b>6</b>		

Figure 3 and 4 show the observed duration of fish being delivered to individual burrows. Only burrows where fish were observed being delivered are included. The delivery period ranged from one week (ten sites) to five weeks (one site).

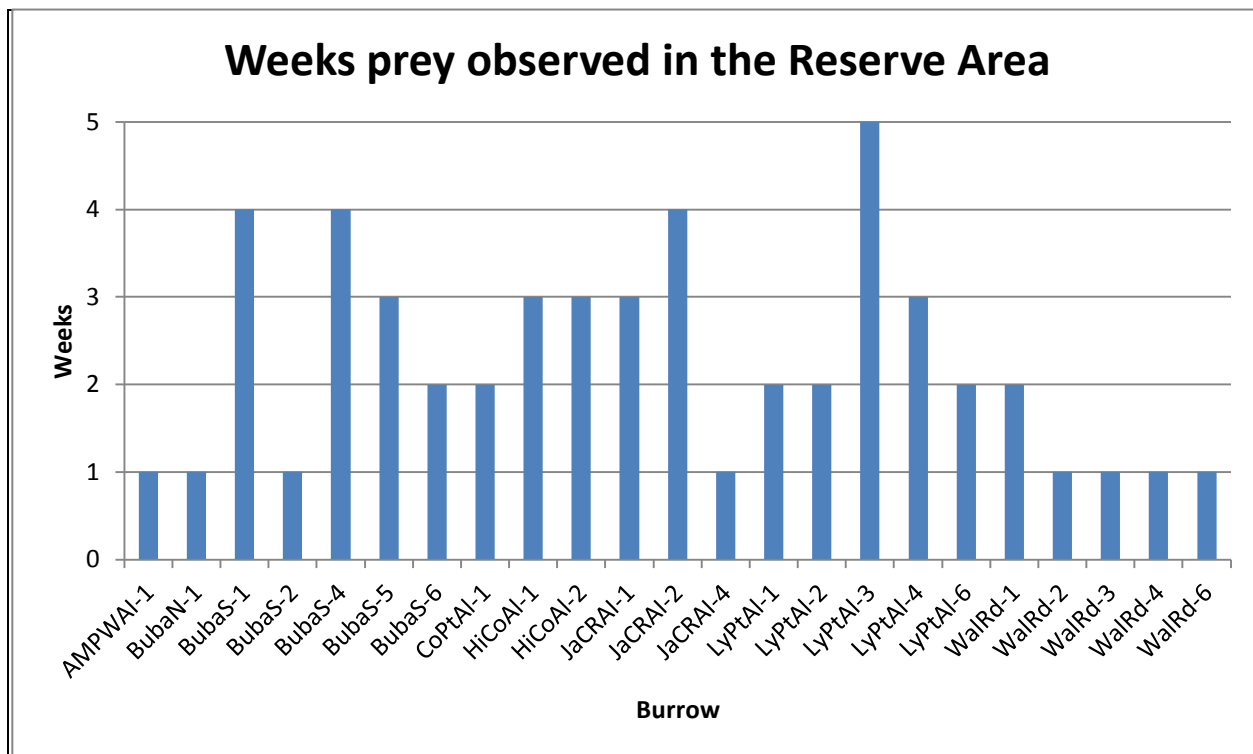


Figure 3: Number of weeks that prey were observed at each burrow in the Reserve Area.

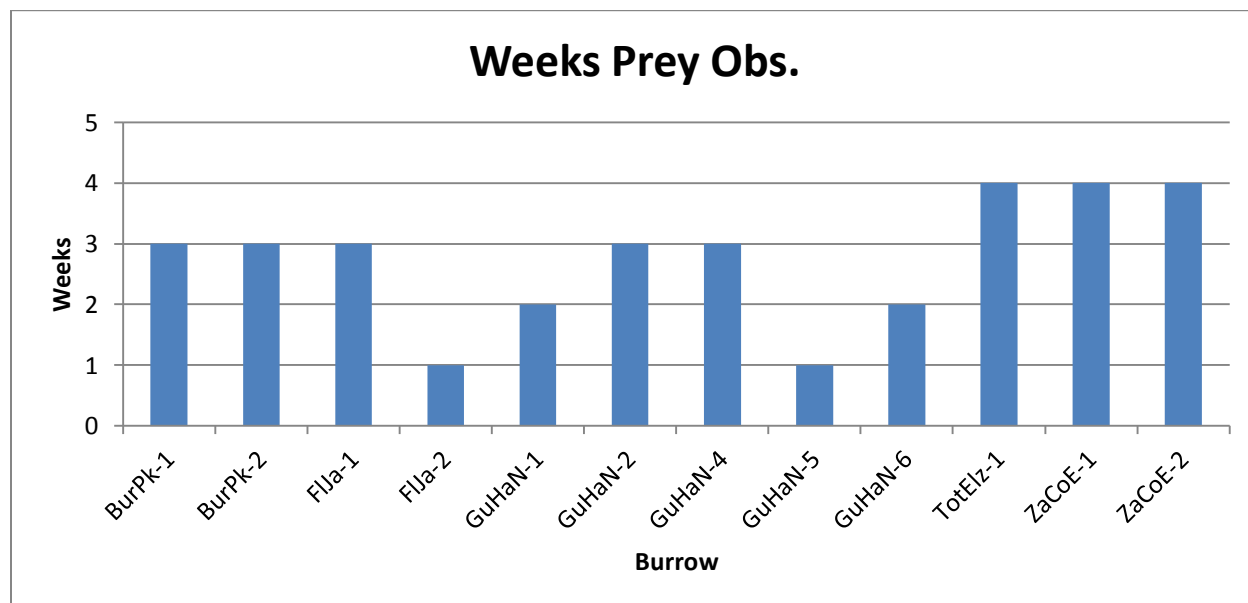


Figure 4: Number of weeks that prey were observed at each burrow Outside the Reserve Area.

## Discussion

This was the first year of this study, although the WIPGRG developed much of the study design work and protocols over time. This allowed the implementation of this established protocol in a new location and with different personnel. There were few problems in the development and execution of this pilot study. The problems encountered and their suggested modifications are discussed below.

The program's stated goals and objectives were mostly met. The first goal, to create a dataset for the number of breeding sites, the number of breeding pairs, and an estimate of the total population size was mostly achieved, but was limited due to uncertainty that all breeding sites were identified and monitored during the study. However, this issue will be addressed in the second year of study as stated below.

The second goal was to create a monitoring program that involves education and training citizen scientists. This, along with the stated objectives to train at least 12 citizen scientists to identify and monitor active breeding burrows at five or more active sites was met and exceeded. Forty-two citizen scientists were trained and participated in weekly monitoring of 16 sites, consisting of 50 active burrows. The collected data have been digitized and analyzed and are being released through public outreach programs and this report. Volunteer monitors became engaged and connected with a specific place (their monitoring site) and species (Pigeon Guillemot) of Puget Sound/Salish Sea. They also recorded observations of additional species and interactions within the ecosystem at their adopted site. Volunteers expressed appreciation for the beauty of the mornings on the beach where they sat. These benefits cannot be measured, but contribute to satisfying lives of the volunteers and possibly increased stewardship.

Additionally, an interactive map has been developed that shows the location of the observed colonies and provides location specific information, including number of burrows, maximum number of Pigeon Guillemots observed, and prey delivered. The map also features a photo for each site. This map is available to the public at the website <http://bit.ly/H68u3U>. Figure 5 shows an example of the interactive map.

The interactive map provides a great opportunity for public education and outreach and can assist in developing stewardship for both adjacent landowners and for the general public.

The monitoring indicates that a considerable number of birds are nesting both in areas adjacent to the Reserve and well outside the Reserve, as shown in Figures 6 and 7. This strongly suggests that while the NRAR is an important area for foraging Pigeon Guillemots, the South Sound colonies likely depend on the health and vitality of many areas well outside of the reserve. Additionally, it is assumed that not all breeding colonies have been identified and monitored, both inside the outside of the Reserve area.

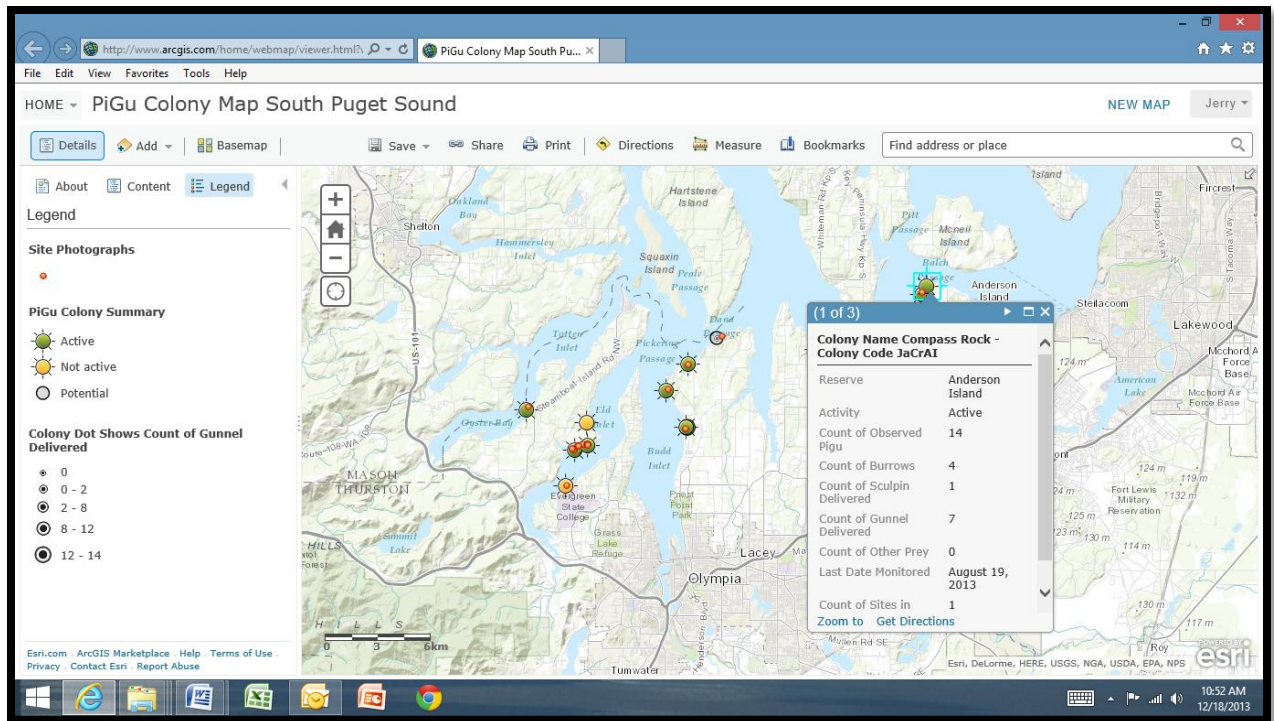


Figure 5: Interactive map showing details for each colony. (Ruth, 2013)

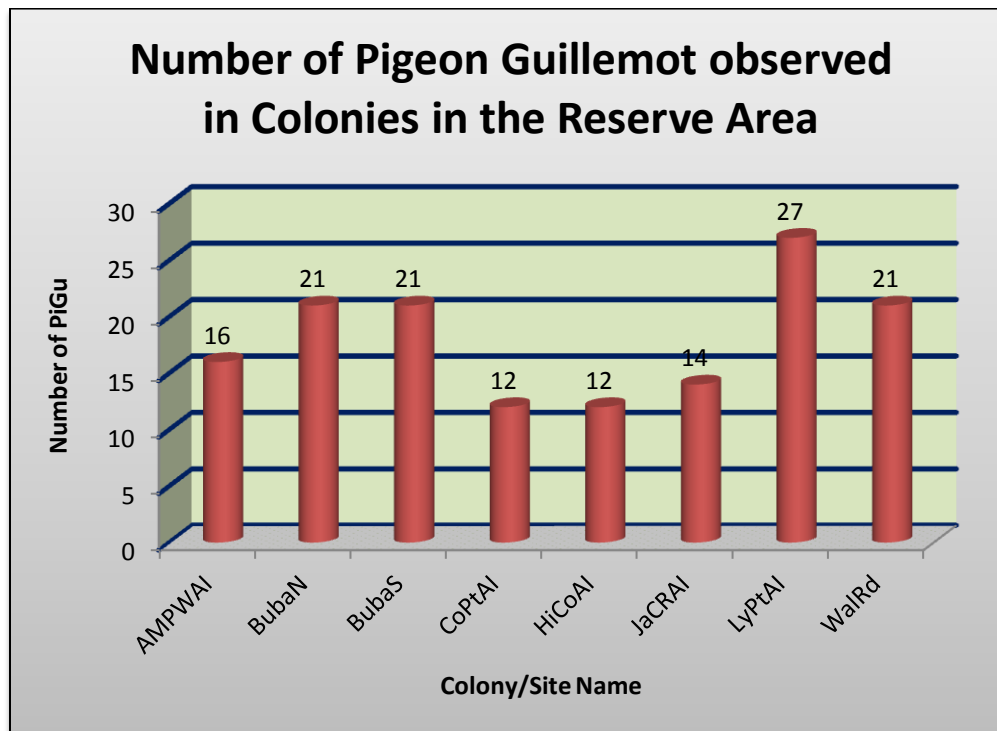


Figure 6: Maximum number of Pigeon Guillemots observed in breeding colonies within the NRAR Area.

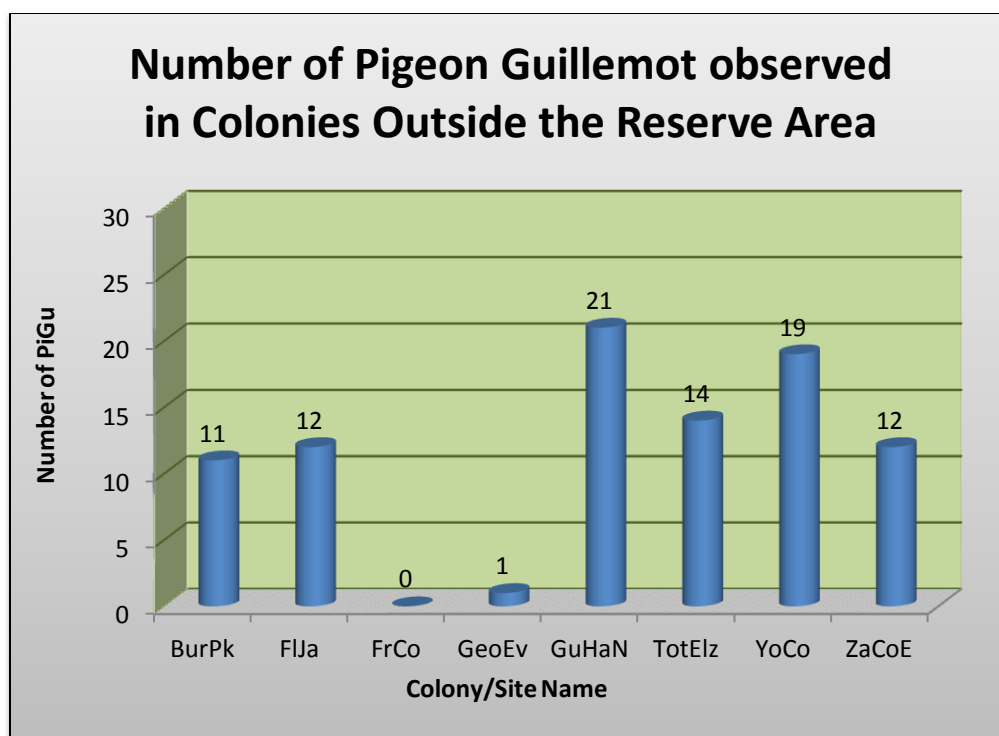


Figure 7: Maximum number of Pigeon Guillemots observed in breeding colonies outside the NRAR Area.

## Delivery of Prey

The delivery of prey provides substantial information on the activities in the colonies. The last date of delivery, as shown in Table 2, indicates the general time of fledging of the young. Since observations were conducted weekly, the date of fledging can only be determined within a week.

Determining the duration of providing food is problematic. The study began the week of June 25, 2013 and seven of 11 active sites recorded burrow visits (both inside and outside NRAR area) that first week. Four of those reported fish deliveries the first week, indicating that hatching may have already begun. In addition, fish deliveries were observed when monitoring began in July at three sites discovered later, so it is not known when birds began delivering fish at these sites. Several volunteers felt they may have missed a substantial number of fish deliveries occurring previous to their first monitoring date. This indicates that the time frame for this study should be expanded by beginning earlier in June.

The prey composition is also revealing. Most of the fish delivered (79%), as shown in Table 2, were gunnells. There is some indication, as shown in Figures 8 and 9, that there may be different prey usage between the colonies inside and outside the reserve area. However, this is a small sample and it is very likely that the entire period of prey delivery was not observed. Therefore, additional observations are needed before further analysis of prey utilization can be made.

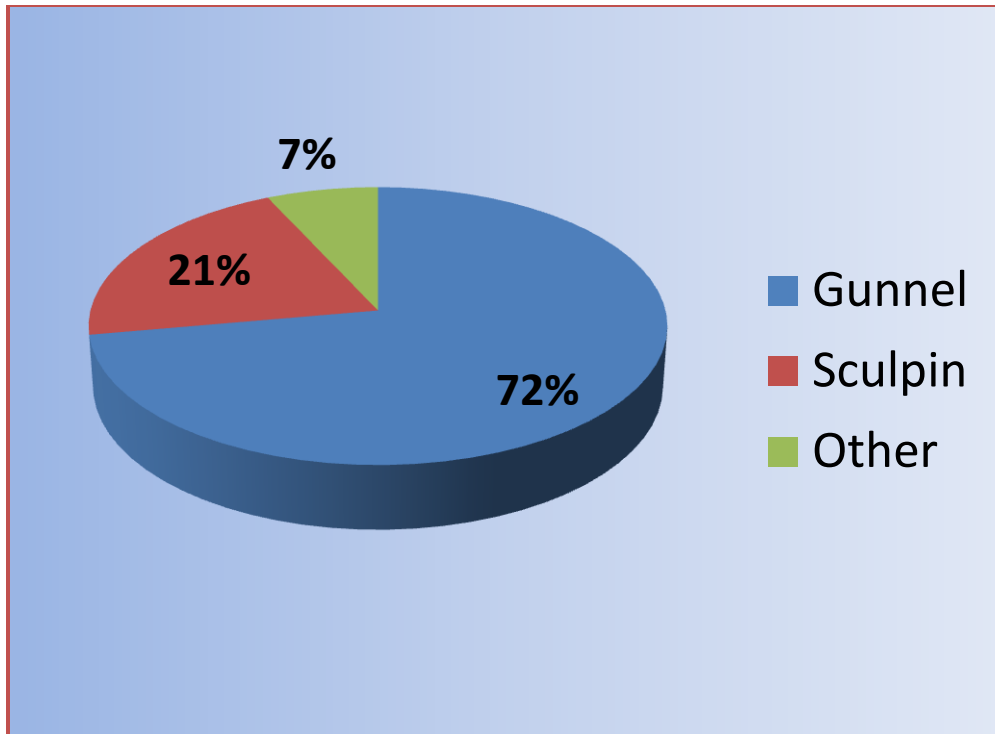


Figure 8: Type of Prey Delivered to Colonies in the Reserve Area.

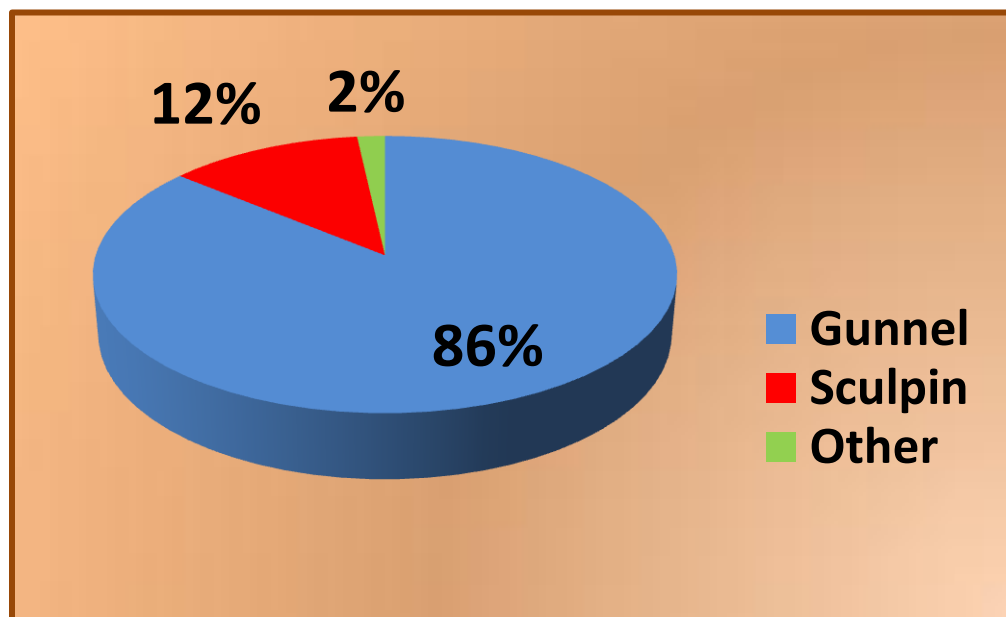


Figure 9: Type of Prey Delivered to Colonies outside the Reserve Area.

The WIPGRG (Wood and Kind, 2013 pers comm) uses the duration of fish deliveries to a burrow as a measure of success in rearing young to fledging. Their measure is to observe three consecutive weeks of fish deliveries to a burrow. Using that measure, Figure 3 and 4 shows the number of burrows in each colony where food deliveries were observed for at least three weeks. The figures shows that there were nine burrows in the Reserve Area and seven burrows Outside the Reserve Area that had three or more



weeks of food delivery. Assuming that the measure of three or more consecutive weeks of food delivery accurately reflects fledging success, 16 breeding pairs fledged young. With a longer observational period and the expansion of the survey to include other potential nesting sites, future studies may show a larger number of successful burrows in the area.

### **Completeness of the Pigeon Guillemot Breeding Survey**

Since numerous potentially active sites were not monitored, a second season is needed to achieve completeness for “all breeding sites.” Big Fishtrap, the southern tip of Ketron Island, additional sites on Anderson Island, Eld and Totten Inlets, and the southern tip of Harstine Island, are suspected active breeding sites. These sites are thought to be active because of 1) the appearance of the burrows and bluffs with colonies of birds observed near shore, and/or 2) reports of anecdotal observation. Accessibility of sites, landowner identification and permission, limitation of scouting hours and opportunities, and available volunteers all contributed to these sites not being monitored during the 2013 season.

### **Variation of Coverage per Site**

Volunteers are allowed to schedule their monitoring day/time, as long as they conduct observations on the same day each week at their site when possible and complete the hour of observation by 9 a.m. Therefore monitoring is not consistently occurring on the same day or time throughout the area. Conditions such as temperature, tide, precipitation, wind, and possibly location of prey may vary between monitoring events and locations. In addition, tides affecting site accessibility force volunteers to change their monitoring day about once a month. This results in monitoring events being more or less than a week apart.

Observations ended at the last site on September 6. Most sites ended at the end of August or when no Pigeon Guillemots were observed.

### **Assessment of the Feasibility of this Study**

The study worked well, partly because the protocol and data cards created and shared by the WIPGRG had been developed, used, and refined for 11 years. There may be some differences between the South Sound and Whidbey Island portions of Puget Sound/Salish Sea that will require changes/adaptations, such as the beginning dates of the survey (breeding season) and the impact of more extreme tides in South Sound.

### **Recommendations for Changes to the Procedures and Program**

We recommend the following procedural changes:

- 1) Begin monitoring the second week of June, about two weeks earlier than in the 2013 study. Seven of eleven sites had burrow visits or fish deliveries on the first week of monitoring (the week of June 25). Most volunteers felt they had missed some portion of the season and the fish delivery activity.
- 2) Add tide level (and incoming or outgoing) at the beginning of the survey to the field data card. This information may be instrumental in determining if feeding activity is greater

during high tides. Many volunteers felt activity to burrows was greater at higher tides and some reported birds being absent during low tides.

## Recommendations for Landowners

Possible actions landowners could take to protect the breeding process and habitat of Pigeon Guillemots:

- Public sites should include signage with education about Pigeon Guillemot breeding and warnings of the danger and damage from climbing on bluffs or defacing bluffs.
- Removal of vegetation and construction above or near the bluff should be avoided during breeding season if possible.
- Covering bluff habitat with erosion prevention material should be avoided if possible.

Landowners can help by reporting dead birds and suspicious activity near burrows. They can report observed adults and juveniles. Landowners can participate fully in the survey or allow volunteers to monitor from the property if they are unable or unwilling to commit.

## Conclusions

This program was successfully conducted with useful information collected. Some minor changes in scheduling may be necessary for better coverage of the monitored sites. Additionally, expansion of the study to include other possible colonies is needed to meet the goal of conducting a more comprehensive census of breeding Pigeon Guillemots in the area. However, even without complete coverage of all colonies, the study provides important information on the distribution and life history of these birds in and adjacent to the Aquatic Reserve area.

Additional years of study would substantially increase the robustness of the dataset and, over time, provide population trends for the South Sound Pigeon Guillemots.

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## Appendix: Acknowledgements and Volunteers

The first annual Nisqually Reach Aquatic Reserve (NRAR) and South Sound Pigeon Guillemot Breeding Survey was completed with effort from many volunteers and community partners.

The dedicated volunteer monitors and their sites are listed in the table below. These volunteers showed up weekly by eight am or before, regardless of weather, recorded their observations, and were consistent in sending in their completed field cards.

Site Name	Volunteers
<b><i>Nisqually Reach Aquatic Reserve (NRAR) Area</i></b>	
Butterball Cove North	Judy Murphy, team lead;
	Treesa Hertzell
Butterball Cove South	Pat Michael, co-team lead
	Hal Michael, co-team lead
	Sandra Guth
	Ella Cereghino
Walnut Rd. NE	Ursula Smircich, team lead
	Ron Smircich
	Sandra Guth
	Ella Cereghino
<b><i>Anderson Island</i></b>	Carol Paschal, Anderson Island Coordinator
Andy's Marine Park - West bluff	Karin Van Vlack, team lead
	Mary McNutt, Substitute
	Connor McNutt, Substitute
Cole Point	Carol Paschal, team lead
	Jeanne McGoldrick
Higgins Cove	Lianne Heckman
	Jane Groppenberger
Jacobsens - Compass Rock	Mary McNutt, team lead
	Connor McNutt
Lyle Point	Sarah Garmire, team lead
	Margaret Gilbert
	Jon Pollack
	Patti Stennett
	Nathan Bunz, guest

<b><i>Outside NRAR Reserve Area</i></b>	
Burfoot Park	Bert Stevens, team lead
	Melody Mayer
	Cynthia Coble
	Cathy Tarabulski, guest
Flapjack Beach (north of Young's Cove)	Rhoda Donkin
	Mary McCallum
Frye Cove County Park	Rob Glassman
Geoduck Beach @ TESC	Terence Lee, team lead
Gull Harbor N	Leslie Cushman, team lead
	Jodi Smith
	Liz Alberti
	Sam Cushman, guest
Totten @ Elizan	Sharon Berquist-Moody
	Laura Kraig, substitute
Young's Cove	Maria Ruth, team lead
	Lesley Willardson
	Josephine Trople
	Anand Maliakel, Beach house site
Zangle Cove	Bobbie Moody
	Paul Moody

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- Carol Paschal for coordinating the Anderson Island volunteers and hosting the Anderson Island training.
- Mike Ruth, ESRI, for many volunteer hours creating an interactive map that allows the public to see where the birds have been monitored and the results.
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- Judy Murphy for checking data entry.
- Laura Kraig for making a life-like Pigeon Guillemot stuffed doll, conducting numerous pre-season observations of Beachcrest beach, and helping with substitute monitoring during the summer survey.
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- Jerry Johannes for contacts for volunteers and landowners on Anderson Island.
- Dennis Mills for encouragement and support from home 😊.

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