Species Management Report and Plan ADF&G/DWC/SMR&P–2018–41

Deer Management Report and Plan, Game Management Unit 6:

Report Period 1 July 2011–30 June 2016, and

Plan Period 1 July 2016–30 June 2021

Charlotte L. Westing

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Alaska Department of Fish and Game Division of Wildlife Conservation

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Species management reports and plans provide information about species that are hunted or trapped and management actions, goals, recommendations for those species, and plans for data collection. Detailed information is prepared for each species every 5 years by the area management biologist for game management units in their areas, who also develops a plan for data collection and species management for the next 5 years. This type of report is not produced for species that are not managed for hunting or trapping or for areas where there is no current or anticipated activity. Unit reports are reviewed and approved for publication by regional management coordinators and are available to the public via the Alaska Department of Fish and Game's website.

This species management report and plan was reviewed and approved for publication by Cynthia M. Wardlow, Management Coordinator for Region II for the Division of Wildlife Conservation, Anchorage.

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Purpose of this Report

This report provides a record of survey and inventory management activities for deer (*Odocoileus hemionus sitkensis*) in Unit 6 for the previous 5 regulatory years (RY11–RY15) and plans for survey and inventory management activities in the 5 years following the end of that period (RY16–RY20). A regulatory year (RY) begins 1 July and ends 30 June (e.g., RY10 = 1 July 2010–30 June 2011). This report is produced primarily to provide agency staff with data and analysis to help guide and record its own efforts but is also provided to the public to inform them of wildlife management activities. In 2016 the Alaska Department of Fish and Game's (ADF&G) Division of Wildlife Conservation (DWC) launched this 5-year report to more efficiently report on trends and describe potential changes in data collection activities over the next 5 years. It replaces the deer management reports of survey and inventory activities that were previously produced every 2 years and supersedes the 1976 draft Alaska wildlife management plans (ADF&G 1976).

I. RY11–RY15 Management Report

Management Area

Game Management Unit 6 (10,140 mi^2) is located in Prince William Sound (PWS) and North Gulf Coast, Alaska (Fig. 1).

Summary of Status, Trend, Management Activities, and History of Deer in Unit 6

The Cordova Chamber of Commerce introduced Sitka black-tailed deer into Unit 6 between 1916 and 1923 (Paul 2009). At least 24 deer were released on Hawkins and Hinchinbrook islands in PWS. This was the first big game translocation in the state and was one of the most successful. Deer quickly occupied vacant habitat on most islands and adjacent mainland in PWS. Nearly the entire deer population occurs in Unit 6D. The population peaked in 1945, resulting in habitat damage and long-term reduction in carrying capacity (F. C. Robards, U.S. Fish and Wildlife Service, annual report game, fur and game fish, 1952, memorandum, Cordova). High winter mortality events occurred in the late 1940s, mid-1950s, late 1960s, early 1970s (Reynolds 1979), and late 1990s (Crowley 2001). Predation is minimal because there are few wolves and coyotes off the mainland and bears are believed to prey on them only opportunistically. Because nearly the entire population exists in Unit 6D, we focus all of our monitoring efforts there.

Sitka black-tailed deer in Unit 6 are at the extreme northern limit of their range (Cowan 1969). The population usually thrives because of mild, maritime climate conditions on islands in PWS (Shishido 1986). Snow-shading canopies of old-growth forest provide accessible forage and shelter during winter, especially on the larger watersheds of the big islands (Hawkins, Hinchinbrook, and Montague) (Shishido 1986; Reynolds 1979). If forbs eventually become buried by deeper snow, blueberry stems (*Vaccinium ovalifolium)* become important forage, as does kelp.

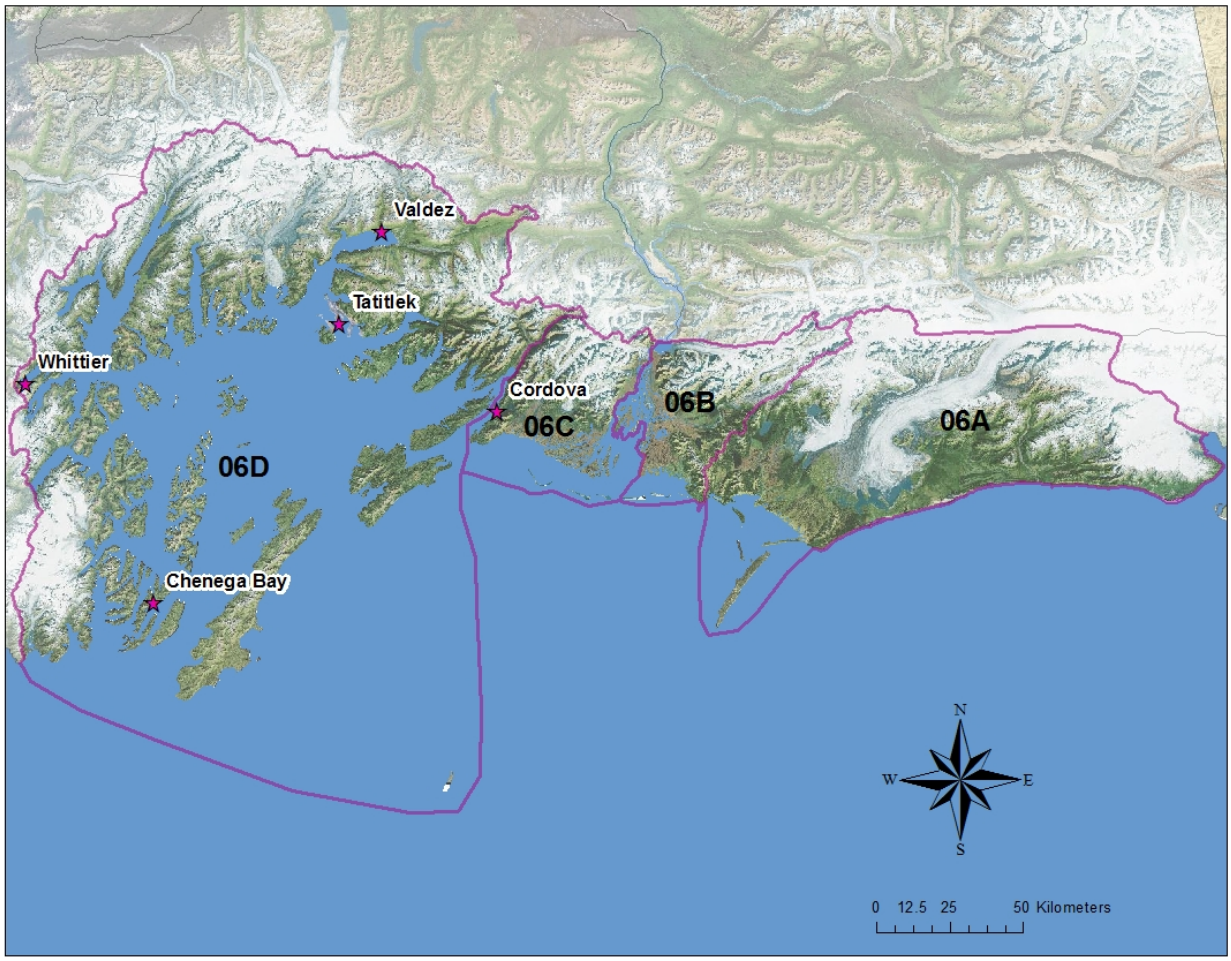

Figure 1. Map showing Game Management Unit 6, Prince William Sound and North Gulf Coast, Alaska.

Sitka black-tailed deer are excellent swimmers and often take to the sea in small herds for travel to neighboring islands. A resulting conclusion held by some local residents is of a seasonal migration of deer in PWS. Reynolds (1979) and Shishido (1986) reported that marking studies of deer in PWS do not support this idea. Deer may be dispersing from areas of high density in search of better forage, particularly when deer numbers are increasing. Deer-tagging studies in PWS indicated that seasonal movements were primarily changes in elevation, with only 2 deer traveling up to 14 km from the locations where marked (Shishido 1986; Reynolds 1979). Schoen and Kirchhoff (1984) tracked a movement of 13.6 km by only 1 radiocollared deer in Southeast Alaska and determined it had dispersed from its natal watershed.

The most important factors limiting the deer population are snow depth and snowpack duration (Reynolds 1979). The population of deer in PWS represents the northernmost extent of their acceptable range (Cowan 1969). A series of mild winters allows deer to increase and disperse to less favorable habitat, only to decline during severe winters from starvation. Regardless of management actions taken, weather will primarily influence population trajectory. Hunting can, however, be a limiting factor in local areas when deep snow concentrates deer on beaches during open season (Reynolds 1979). Harvest may become a more significant factor in the future if

numbers of hunters increase. However, weather will continue to constrain hunter access. ADF&G can and has adjusted season length for does or for any deer if needed to prevent additive harvest. The U.S. Forest Service (USFS) may follow state closures or they may adjust seasons and bag limits for federally qualified users on federal land or they may leave seasons only open to these users. These changes may be announced using emergency order authority in response to early and substantial snowfall that is likely to be persistent.

Legal deer hunting began in 1935. It was monitored from 1960 through 1979 by harvest reports and hunter contacts. Beginning in 1980, ADF&G collected most information through questionnaires mailed to deer harvest ticket holders. Annual harvests before 1978 probably ranged between 500 and 1,500 (Reynolds 1979). Harvests began to increase after 1978 and rose to 3,000 by 1987. The average estimated harvest during the 1990s was 2,160, ranging from 1,300 to 3,000 deer. The average estimated harvest during the 2000s was 2,460, ranging from 1,400 to 3,500 deer. In 2011, ADF&G began collecting deer harvest data within the harvest ticket system. Rather than sampling participants, gathering data from all individuals that acquired harvest tickets was pursued. Evaluation of this new system is ongoing.

Clear-cut logging of old-growth forest on private land in PWS was once the most important deer management concern in Unit 6 (Nowlin 1997). Currently there are no logging operations planned within important deer habitat. Intensive management objectives for population and harvest were set in 2001.

Management Direction

Existing Wildlife Management Plans

None presently specific to deer. Direction in Southcentral Alaska management plan (ADF&G 1976) has been modified by Alaska Board of Game regulatory actions over the years.

Goals

None in existing management report.

Codified Objectives

Amounts Reasonably Necessary for Subsistence Uses

Deer unitwide: 1,000–1,250.

Intensive Management

Population objective: 24,000–28,000.

Harvest objective: 2,200–3,000.

Management Objectives

Current management objectives mirror legal objectives listed above.

Additional objectives include:

- Maintain at least 60% males in the harvest.
- Maintain a minimum hunter success rate of 50%.

MANAGEMENT ACTIVITIES

Methods for data collection and results for all activities during RY09 are in Crowley (2011) and during RY10 and RY11 are in Westing (2015).

1. Population Status and Trend ACTIVITY 1.1. Conduct deer pellet transects.

Data Needs

Assess the general level of the population to attempt to understand if harvest is additive or compensatory. Deer pellets can give a general index of population level. Kirchhoff and Pitcher (1988) recommended the following classifications: <1.00 mean pellet groups/plot (MPGP) is a low-density population, 1.00–1.99 MPGP is a moderate density population, >2.00 MPGP is a high-density population. These densities were generated for Southeast Alaska and are not reasonable (have never been observed) in PWS. Deer are likely not as productive here with more rain and colder temperatures. Jenks natural breaks optimization was used to analyze the PWS deer pellet data into high, medium, and low categories. Based on these data, mean pellet groups per plot below 0.89 MPGP may indicate a low population, between 0.89 and 1.35 MPGP may indicate a medium population, and above 1.35 MPGP may indicate that the population is high.

Methods

ADF&G and USFS cooperate to monitor the population trend in PWS. We conduct annual pellet group surveys along transects (Kirchhoff and Pitcher 1988) during late May and early June at 8 sampling locations (Fig. 2). Each location has 3–5 transects consisting of a straight line of 1×20 meter plots running uphill from the beach fringe along a compass heading. Most transects terminate at alpine habitat. Those not reaching alpine habitat terminate after we examine 100 plots. The number of plots varies, depending on the distance from the beach to the alpine and the persistence of snow during the survey. The minimum number of plots within a location was 164. The number of plots completed in each area depends on the amount of persistent snow. Transects are terminated when snow cover approaches 100% for the remainder of the transect. We calculate MPGP for each location but combine all locations for an average MPGP for informing unitwide inferences on deer abundance.

Results and Discussion

Deer density indices in PWS, based on MPGP, were variable during the reporting period (Figs. 2 and 3; Table 1; Appendices A, B, C, and D). Deer numbers appear to have declined due to the winter of RY11, which was the most severe winter on record in terms of total snowfall and snow retention, particularly in western PWS (Figs. 4–6). These results correspond with anecdotal reports that estimated a 50–70% decline in the population. The first survey to detect the magnitude of this decline was in 2013 (RY12, Appendix A) because during the RY11 season, pellets were deposited by deer that later died. Since 2013, MPGP increased each year until the 2016 survey (Appendices B, C, and D). The decline in pellets between 2015 and 2016 may have

been related to warmer than average temperatures and precipitation that predominantly fell as rain. We do not believe that this truly reflects the abundance of deer.

A few additional factors may have affected the observability of pellet groups. In most winters, snow influences the distribution of deer and concentrates them in lower elevations where pellet transects focus. However, with so little snow accumulation, this concentration may not have occurred at all. Additionally, since snowmelt and green-up were so early in 2016, an additional month of pellet deposition was missed compared with years prior to 2014. Observers were especially careful to part vegetation and look closely for pellets underneath, however, conditions were not ideal and pellet groups were undoubtedly missed. The influence of these factors on the overall number of pellet groups observed is unknown.

One factor that is somewhat understood is the impact of moisture on pellet persistence. One study that examined the persistence of black-tailed deer fecal pellets in coastal habitats found that moisture significantly reduced the persistence of pellets (Harestad and Bunnell 1987). In fact, moisture was the most important factor influencing pellet degradation. In addition, pellet degradation was accelerated in the summer months which may be from the confounding variables of temperature and summer diet.

With so much of our precipitation falling as rain instead of snow (which may preserve pellets), increased rates of pellet degradation may help explain why deer pellet densities do not seem to reflect the population trend. Additionally, with plants leafing out so soon, deer pellets may have transitioned earlier to feces that reflect their summer diet and are formed more as patties. Hard pellets are more durable against moisture than patties with dissolve into smudges. Many of these apparent smudges were observed this year.

The Hawkins and Hinchinbrook islands tend to accumulate less snow than islands in western PWS because a slight temperature cline produces more rain in the east. Indeed, higher pellet group densities were observed there. In addition, both eastern islands have extensive old growth forests to support wintering deer, whereas the smaller islands of western PWS have smaller watersheds and much less winter habitat. Although Montague Island has large watersheds, much of the best deer winter habitat was clear-cut during the 1980s and 1990s and the island often receives tremendous amounts of snowfall. The deer pellet surveys in 2013, the first year expected to detect the results of the severe winter of RY11, found the lowest indices on record. The 2014 survey found slight improvement and corresponds with anecdotal reports that deer numbers are increasing.

Despite these improvements, deer pellet survey findings of ≤1 MPGP still indicate that deer may be occurring at low to moderate densities relative to other years.

Recommendations for Activity 1.1

Continue.

Table 1. Unit 6D deer population trends as indicated by spring pellet-group surveys, Southcentral Alaska, 2012–2016.

Area	Specific location/UCU[a]	Survey year	MPGP[b]	95% CI[c]	No. of plots
Knight Island	Bay of Isles	2012	0.28	0.17–0.39	164
	1503	2013	0.18	0.09–0.28	174
		2014	0.31	0.17–0.44	176
		2015	0.36	0.26–0.47	176
		2016	0.17	0.10–0.24	176
Naked Island	1701	2012	0.56	0.37–0.75	187
		2013	0.23	0.11–0.34	203
		2014	0.43	0.32–0.55	210
		2015	0.74	0.61–0.81	210
		2016	0.65	0.49–0.80	210
Montague Island	Rocky Bay	2012	0.76	0.54–0.99	217
	1803	2013	0.31	0.20–0.42	218
		2014	0.74	0.57–0.92	218
		2015	1.01	0.81–1.21	218
		2016	0.57	0.41–0.74	218
	San Juan Bay	2012	No survey		
	1810	2013	0.59	0.43–0.75	234
		2014	0.43	0.30–0.55	214
		2015	0.83	0.66–1.00	234
		2016	0.23	0.15–0.30	234
Hinchinbrook Island	Port Etches	2012	1.38	1.10–1.65	193
	1903	2013	0.67	0.51–0.83	225
		2014	1.16	0.92–1.39	243
		2015	0.56	0.42–0.70	243
		2016	0.52	0.38–0.67	243
	Hook Point	2012	1.29	1.02–1.56	206
	1905	2013	1.01	0.81–1.22	221
		2014	1.27	1.06–1.48	239
		2015	1.49	1.26–1.73	239
		2016	1.33	1.11–1.56	239
Hawkins Island	NE Hawkins	2012	1.41	1.11–1.72	211
	2001	2013	1.00	0.76–1.23	223
		2014	1.04	0.83–1.24	240
		2015	1.18	0.92–1.45	240
		2016	0.79	0.59–0.99	240
	SW Hawkins	2012	1.33	1.00–1.66	141
	2003	2013	0.54	0.39–0.68	216
		2014	0.67	0.50–0.84	222
		2015	0.99	0.81–1.17	222
		2016	0.79	0.61–0.97	222

Area	Specific location/UCU[a]	Survey year	MPGP[b]	95% CI[c]	No. of plots
All areas		2012	1.01	0.91–1.11	1,319
		2013	0.58	0.52–0.64	1,714
		2014	0.78	0.72–0.85	1,762
		2015	0.92	0.85–0.98	1,782
		2016	0.65	0.59–0.71	1,781

[a] UCU = uniform coding units.
[b] MPGP = mean pellet groups per plot.
[c] CI = confidence interval.

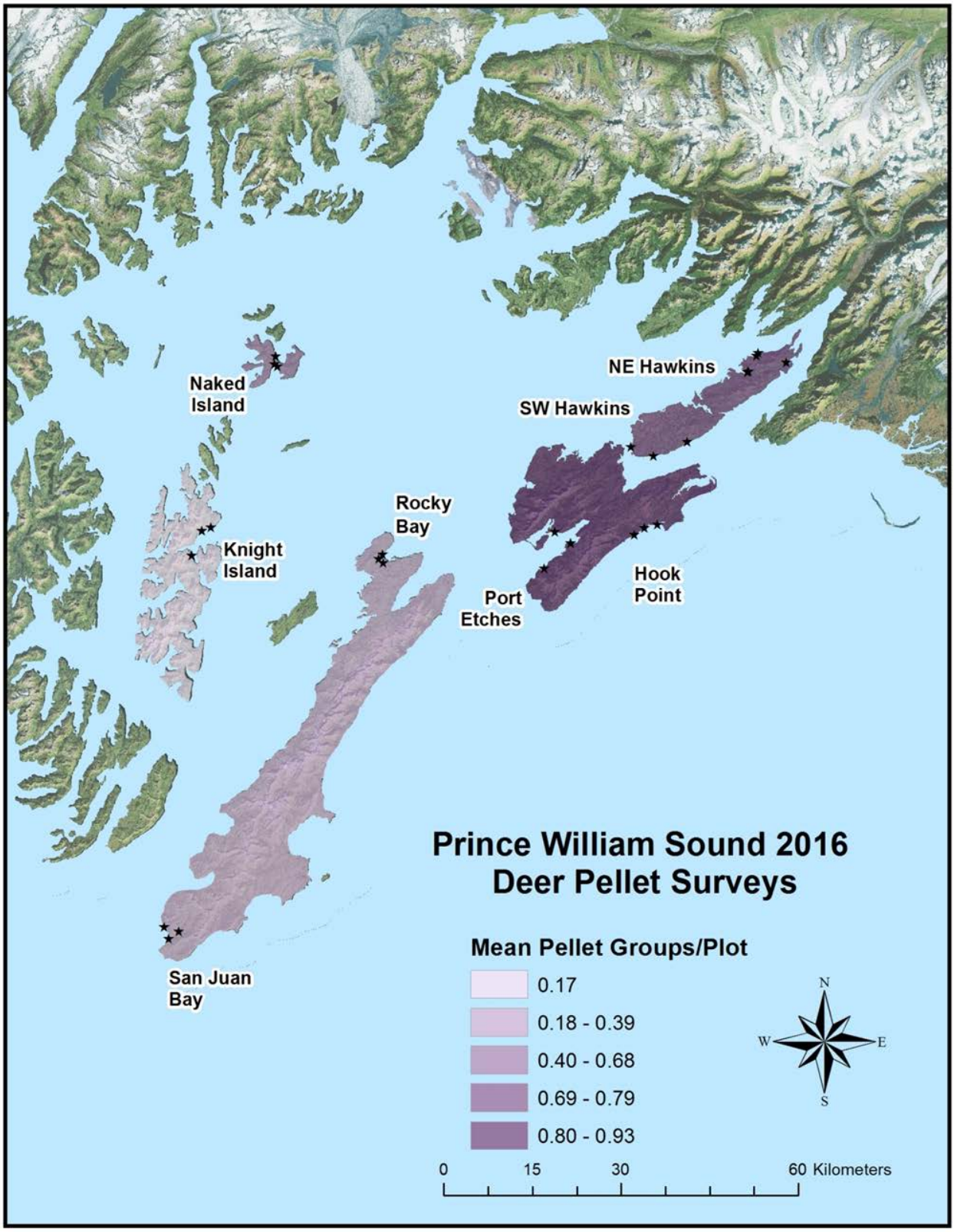

Figure 2. Locations of pellet group transects (stars) and deer pellet density by island for deer in Unit 6, Alaska. Prince William Sound is Unit 6D.

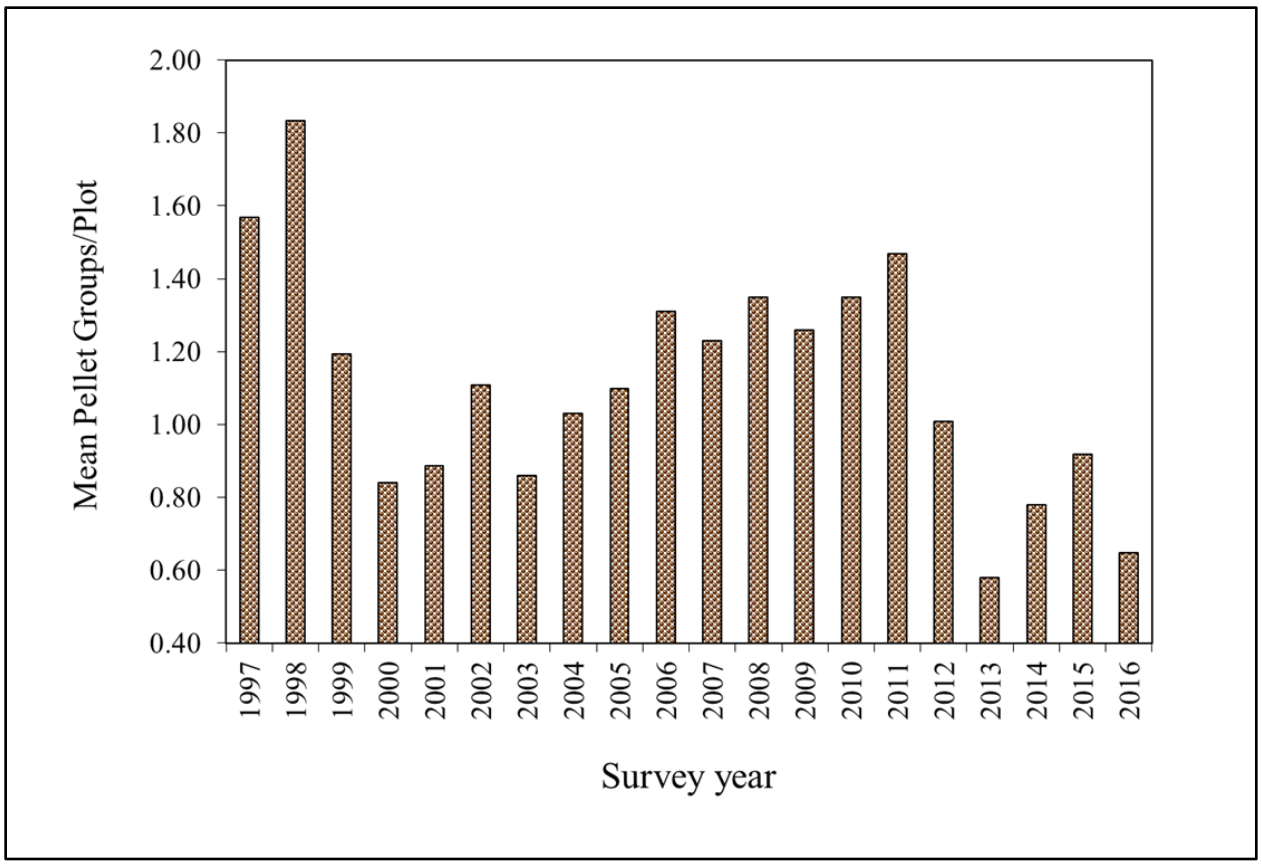

Figure 3. Deer pellet density observed in Unit 6D, Prince William Sound, Alaska. This composite index is based on multiple survey areas detailed in Table 1, this document.

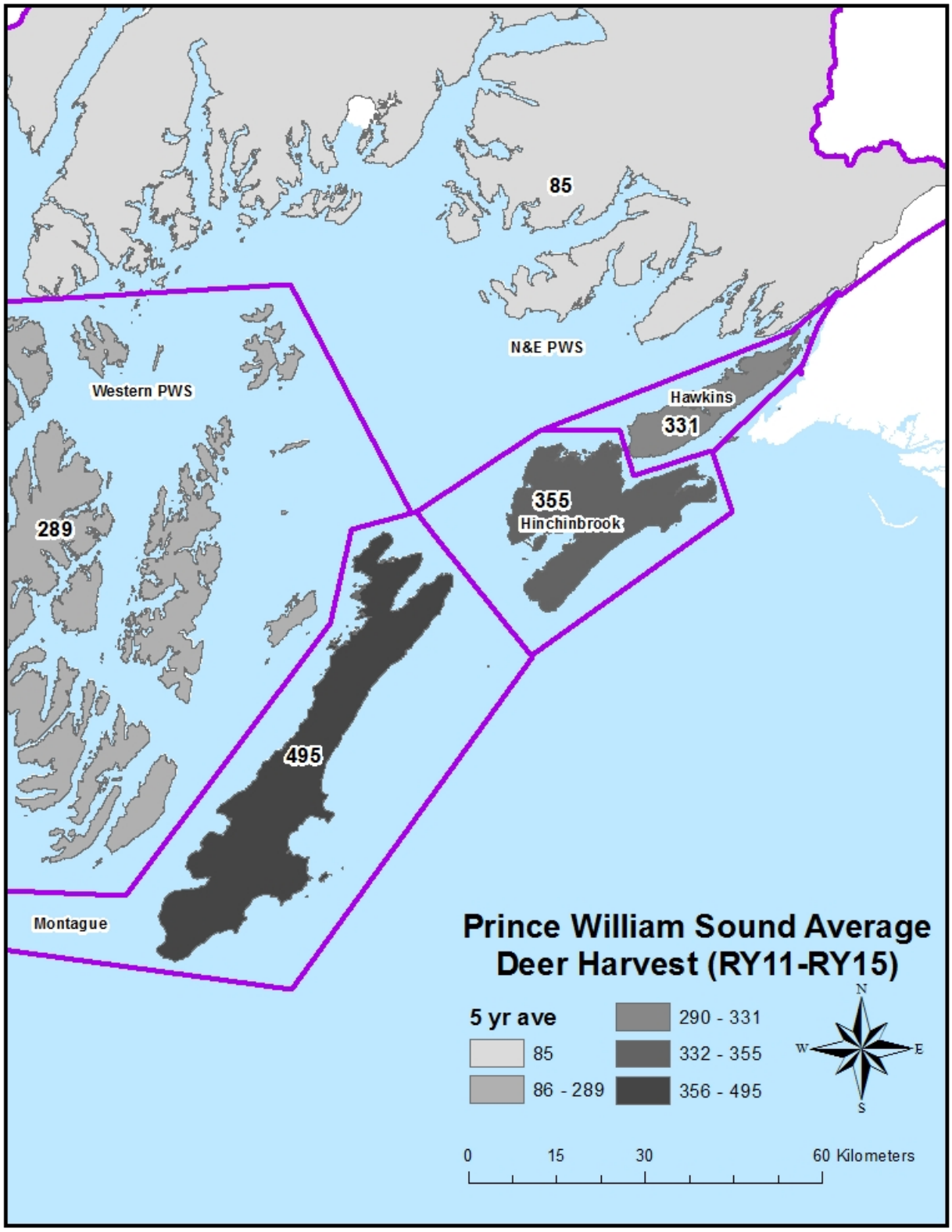

Figure 4. Average deer harvest estimates by hunt area in Unit 6D, Prince William Sound, Alaska, regulatory years[a] 2011–2015.

[a] A regulatory year (RY) begins 1 July and ends 30 June, e.g., RY11 = 1 July 2011–30 June 2012.

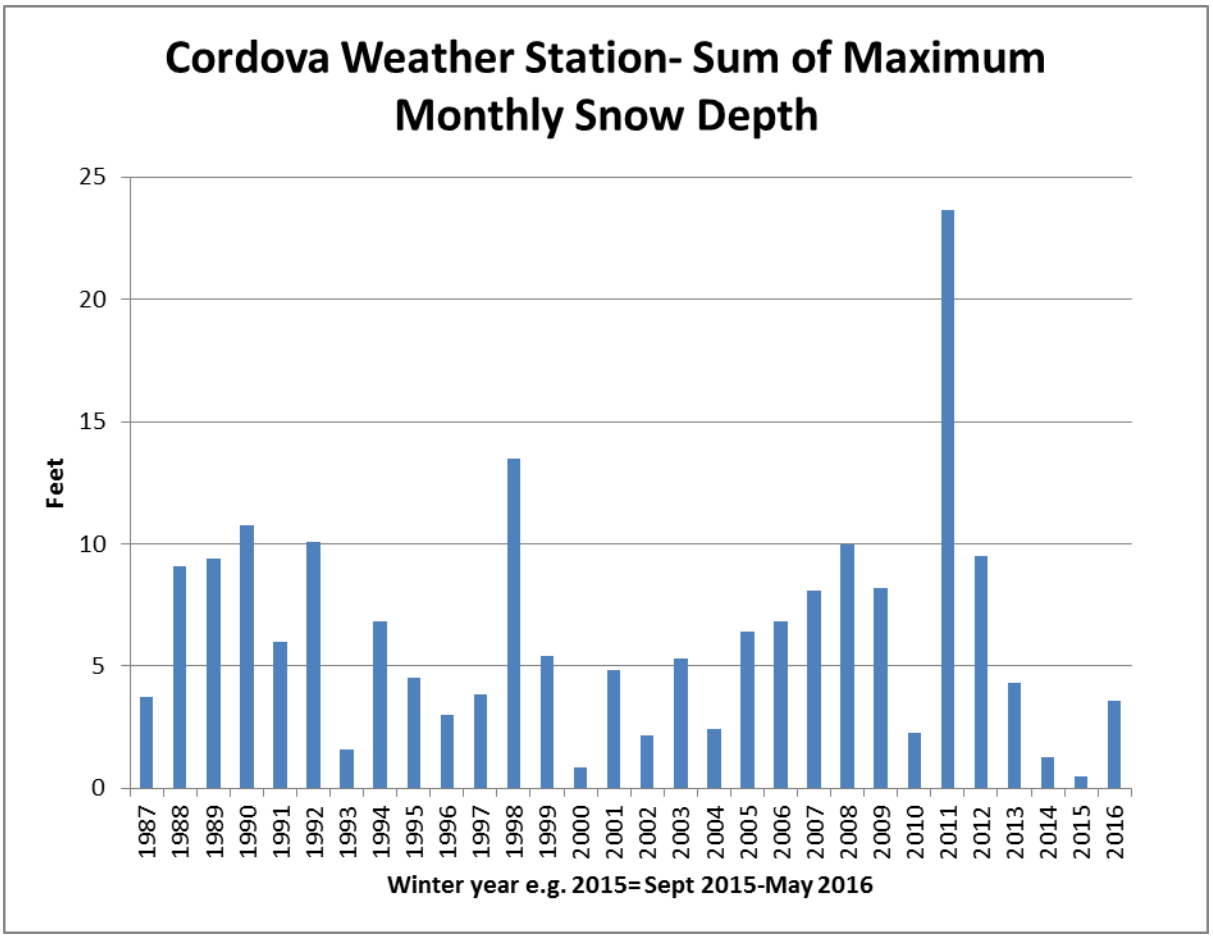

Figure 5. Weather data for Cordova as an index for weather in Prince William Sound, Alaska.

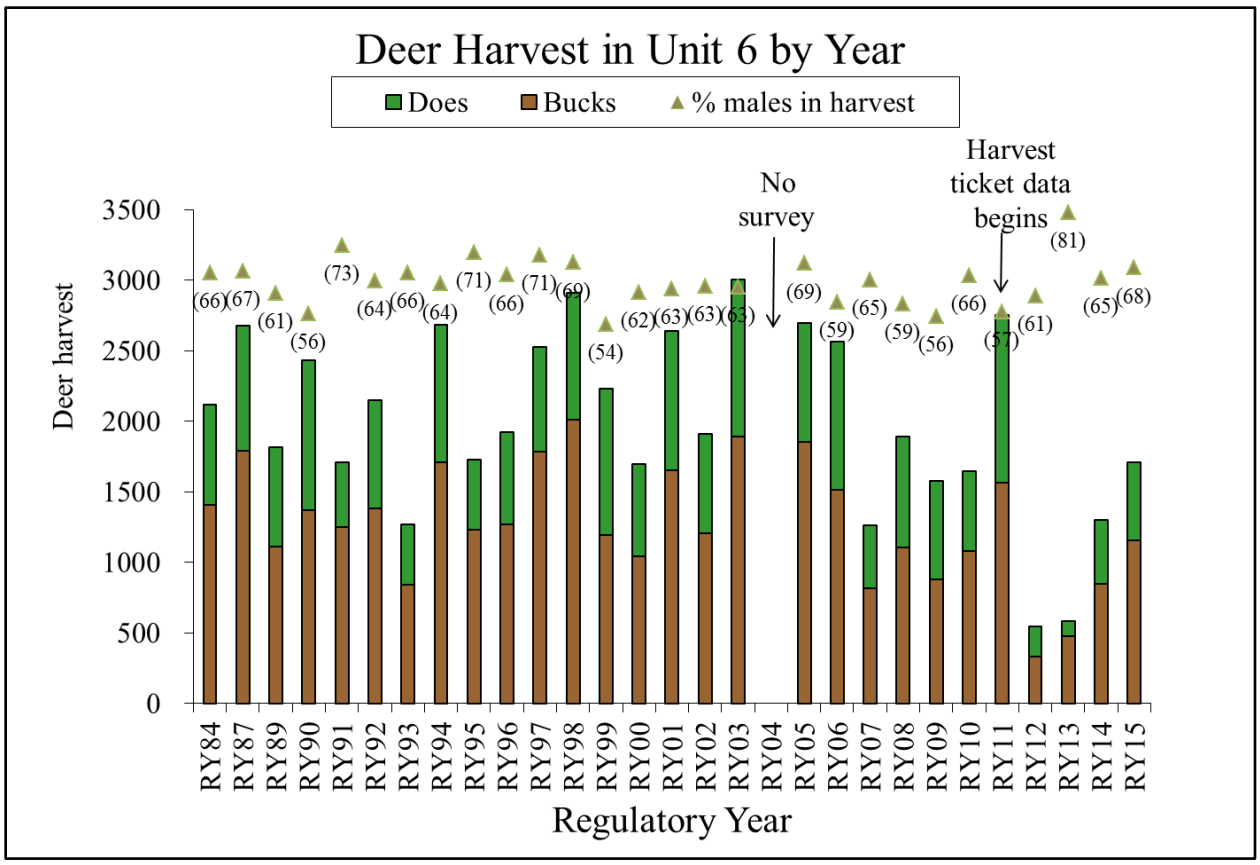

Figure 6. Estimated deer harvest by sex (percent male above bars) in Unit 6D, Prince William Sound, Alaska. Note gaps in regulatory years[a] (RY) prior to 1989.

[a] A regulatory year (RY) begins 1 July and ends 30 June, e.g., RY84 = 1 July 1984–30 June 1985.

2. Mortality–Harvest Monitoring and Regulations

ACTIVITY 2.1. Quantify and analyze harvest data.

Data Needs

With a positive customary and traditional finding and a corresponding amount reasonably necessary for subsistence established, as well as intensive management objectives, harvest must be assessed to evaluate the achievement of these goals. Current management objectives for harvest are not used as triggers for corrective action on perceived abundance of this introduced population that is primarily limited by winter severity.

Methods

Harvest data are summarized by regulatory year. From RY80 to RY10, we estimated deer harvest from responses to questionnaires mailed to deer hunters who were issued harvest tickets in Southcentral Alaska. Approximately 3,000 questionnaires (30% of harvest ticket holders) were mailed to hunters annually, with a response rate averaging 66%. Follow-up letters were sent to nonresponders to attempt to achieve more complete data.

Data since RY11 was produced by using the harvest ticket system. Rather than select participants receiving questionnaires, all hunters are expected to report their activity. These data must be edited for accuracy in coding and reviewed for data entry errors. While the harvest questionnaire provided a map for hunters to indicate where they focused their effort, the harvest ticket system relies on an open-ended response to location. As a result, follow-up letters from the Cordova office must be sent to many hunters, to get more precise harvest location data. Response rates are low; therefore, harvest estimates must be expanded to account for nonresponse. This information was summarized for total harvest, hunter residency and success, harvest chronology, and transportation methods for Unit 6. Harvest data were grouped into geographic areas that included Hinchinbrook Island, Montague Island, Hawkins Island, western PWS, and northern and eastern PWS (Fig. 3).

Season and Bag Limit

The season for resident and nonresident hunters was 1 August–31 December. The bag limit was 5 deer for residents and 4 for nonresidents. Female deer could be taken beginning 1 October.

Results and Discussion

Harvest by Hunters

Although the deer population level is usually somewhat reflected by harvest, prevailing weather conditions during the season can influence hunter activity and harvest totals. Harvest was high in RY11 (3,168 deer) due to the early onset and persistence of significant snow that concentrated deer on the beach where they could be harvested (Table 2, Figs. 5 and 6). Conversely, the 2 years that followed the extreme weather event of RY11 have 2 of the lowest harvests on record. In RY12, the harvest was estimated at 630 deer. While this seems extreme, anecdotal reports suggest that many people perceived that the population was too low to present a reasonable chance of success. Harvest in RY13 increased slightly to 674 deer. Reduced effort and a low deer

population contributed to this low harvest. The last 2 years of this reporting period, harvests have increased with 1,495 and 1,969 deer in RY14 and RY15 respectively.

Harvest declines were most significant on Hawkins Island where harvest dropped from 978 deer in RY11 to 54 in RY12 (a 95% decline) (Table 2). Hinchinbrook Island had the second largest decline in harvest, dropping from 659 deer in RY11 to 124 in RY12 (an 81% decline.) These declines may have been influenced by effort as well as population status. Cordova residents predominantly hunt on these 2 islands. Being keenly aware of the severity of winter 2011–2012 and the resulting deer die off, more hunters may have abstained from hunting in the years that have followed. Harvests in the western portion of PWS changed from 521 deer in RY11 to 114 in RY12 (a 78% decline). The effects of the RY11 winter were thought to have been worse in the western portion of PWS so the harvest decline is less severe compared to other areas. This may be a result of proportionally fewer hunters electing to not pursue deer.

The average (5-year) harvest of deer by area demonstrates that Montague Island (495 deer) yields the highest number of deer followed by Hinchinbrook (355 deer) and Hawkins Island (331 deer) (Fig. 4).

Harvest was composed of more than 60% males in most areas in most years. In RY11 when the harvest was exceptionally high, more areas exceeded the desired number of females in the harvest. The average male harvest for all areas is 64% (10-year average RY06–RY15). Hawkins Island had the highest proportion of males in the harvest with 70% males (10-year average). Western PWS had the lowest proportion of males in the harvest with 57% males (10-year average).

Hunters have been somewhat slow to acknowledge the mandatory reporting requirement that is being used instead of the previous survey system (used until RY11) which sampled hunters (only selected hunters were required to respond). Due to high rates of “nonreporting” adjustments are made to account for harvest that is likely to have come from nonresponders. Without these adjustments, harvest ticket data would not be comparable with past data.

Permit Hunts

None.

Hunter Residency and Success

Deer hunters had annual success rates (harvest of at least 1 deer reported during the season) of 50% and 56%, respectively, during the 2 years of the reporting period. This is a return to more normal success rates following the previous 2 years (RY12 and RY13) which were the lowest since we began officially quantifying harvest in a comparable way in 1984 (Table 3). The success rate of 68% in RY11 may be a result of early and substantial snowfall, as mentioned above, that increased efficiency. Nonlocal residents represented 65% and 60% of successful hunters for RY14 and RY15 respectively. Local residents on average (5-year average) killed 1.5 deer per hunter compared to 1.0 deer per hunter for nonlocal residents. The number of deer taken per hunter in both years of this reporting period was lower than the 10-year average. For local residents, the number of deer harvested per hunter was slightly higher for the 2 years of this

reporting period than RY12 and RY13 which were the lowest on record. Nonresidents remained minor contributors to the deer harvest.

Harvest Chronology

In this reporting period, hunters killed the most deer during October and November (Table 4). During November the rut was in progress, making bucks more vulnerable to harvest. A higher proportion of the harvest was taken in October than December which is a return to the more normal trend.

Transport Methods

Similar to previous years, hunters primarily used boats (80% 5-year average) but some use airplanes (17% 5-year average). Other modes, including 3- and 4-wheelers, highway vehicles, and walking were not used significantly (Table 5).

Other Mortality

Wounding loss and illegal harvest together was estimated to be at least 15% of the total reported harvest (Table 2). No major mortality events were observed during this reporting period.

Alaska Board of Game Actions and Emergency Orders

An emergency order was issued that closed the state deer season on 7 December 2012 to respond to the extreme winter mortality event of the previous winter. The hunting season for federally qualified users on federal land closed for antlerless concurrently but remained open for antlered deer for the duration of the season.

In 2013, an emergency order was issued in response to the confirmed decline in the population. The buck season was unaffected, but the doe season was closed on 31 October 2013. The season for does on federal land was also closed on 1 November 2013. No emergency orders were issued in RY14 or RY15.

Recommendations for Activity 2.1

Modify – An important factor in the continuance of the harvest ticket system is to understand nonresponse bias that is evident. Validity of assumptions related to expansion factors need to be assessed for the new harvest ticket system.

- Biometric review should focus on the assessment of nonresponse bias and developing a process for correcting for harvest that is unreported (approximately 30% of harvest is extrapolated to account for harvest of nonresponders.) One method would be to send multiple reminder letters or to use a random sample of responses (or nonresponses) to estimate for harvest that is not reported. This will require a unified, statewide approach however since these data are handled on a statewide level.

Table 2. Unit 6 deer harvest, Southcentral Alaska, regulatory years[a] 2011–2015.

Area	Regulatory year	Estimated legal harvest[b] M	(%)	F	(%)	Total	Estimated illegal/ unrecovered harvest[c]	Total
Hawkins Island	2011	461	(54)	389	(46)	850	128	978
	2012	33	(70)	14	(30)	47	7	54
	2013	73	(88)	10	(12)	83	12	95
	2014	127	(71)	53	(29)	180	27	207
	2015	195	(70)	83	(30)	278	42	320
Hinchinbrook Island	2011	351	(61)	222	(39)	573	86	659
	2012	63	(58)	45	(42)	108	16	124
	2013	106	(91)	11	(9)	117	18	135
	2014	236	(71)	96	(29)	332	50	382
	2015	292	(71)	122	(29)	414	62	476
Montague Island	2011	384	(56)	304	(44)	688	103	791
	2012	149	(59)	103	(41)	252	38	290
	2013	143	(78)	41	(22)	184	28	212
	2014	296	(65)	160	(35)	456	68	524
	2015	386	(67)	187	(33)	573	86	659
Western PWS[d]	2011	251	(55)	202	(45)	453	68	521
	2012	56	(57)	43	(43)	99	15	114
	2013	108	(71)	44	(29)	152	23	175
	2014	131	(54)	110	(46)	241	36	277
	2015	181	(58)	129	(42)	310	47	357
Northern and Eastern PWS	2011	77	(56)	61	(44)	138	21	159
	2012	26	(81)	6	(19)	32	5	37
	2013	21	(91)	2	(9)	23	3	26
	2014	27	(52)	25	(48)	52	8	60
	2015	96	(76)	30	(24)	126	19	145
Unit 6 - Unknown	2011	39	(74)	14	(26)	53	8	61
	2012	6	(60)	4	(40)	10	2	12
	2013	26	(96)	1	(4)	27	4	31
	2014	30	(77)	9	(0)	39	6	45
	2015	8	(73)	3	(0)	11	2	13
Unit 6 - Total	2011	1,563	(57)	1,192	(43)	2,755	413	3,168
	2012	333	(61)	215	(39)	548	82	630
	2013	477	(81)	109	(19)	586	88	674
	2014	847	(65)	453	(35)	1,300	195	1,495
	2015	1,158	(68)	554	(32)	1,712	257	1,969

[a] A regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2011 = 1 July 2011–30 June 2012.
[b] Derived from harvest ticket data.
[c] Unquantified but estimated to be 15% of reported total.
[d] PWS = Prince William Sound.

Table 3. Unit 6 deer hunter residency and success, Southcentral Alaska, regulatory years[a] 2011–2015.

	Successful					Unsuccessful					
Regulatory year	Local resident[b]	Nonlocal resident	Nonresident	Total	(%)	Local resident[b]	Nonlocal resident	Nonresident	Total	(%)	Total hunters
2011	368	570	27	965	(68)	87	339	22	448	(32)	1,413
2012	77	198	12	287	(33)	119	418	38	575	(67)	862
2013	106	172	3	281	(37)	99	343	35	477	(63)	758
2014	200	389	6	595	(50)	142	413	31	586	(50)	1,181
2015	298	483	30	811	(56)	139	480	20	639	(44)	1,450

[a] A regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2011 = 1 July 2011–30 June 2012.
[b] Resident of Unit 6.

Table 4. Unit 6 deer harvest chronology percent by month, Southcentral Alaska, regulatory years[a] 2011–2015.

Regulatory	Harvest chronology percent by month						
year	Aug	Sep	Oct	Nov	Dec	Unk	*n*
2011	4	2	20	37	24	13	2,745
2012	10	3	30	37	20	0	542
2013	11	5	34	23	26	0	575
2014	9	3	36	39	11	2	1,299
2015	9	2	34	31	23	0	1,713

[a] A regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2011 = 1 July 2011–30 June 2012.

Table 5. Unit 6 deer harvest percent by transport method, Southcentral Alaska, regulatory years[a] 2011–2015.

Regulatory year	Percent harvest by transport method						
	Airplane	Boat	3- or 4-wheeler	Highway vehicle	Foot	Unknown	*n*
2011	11	84	0	0	0	4	2,730
2012	29	68	1	0	1	1	538
2013	18	80	1	0	0	1	570
2014	16	80	2	0	1	1	1,292
2015	12	86	0	0	1	0	1,712

[a] A regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2011 = 1 July 2011–30 June 2012.

3. Habitat Assessment–Enhancement

Currently, habitat has not been prioritized as a monitoring tool.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

We are transitioning to a new harvest reporting process. More work should be done to inform hunters about the new harvest reporting system. Additionally, the department must develop appropriate means of assessing unreported harvest within the new system.

Data Recording and Archiving

- Deer harvest data and survey memos are stored on an internal database housed on an internal server, ADF&G's Wildlife Information Network (WinfoNet) (http://winfonet.alaska.gov/index.cfm).
- Data sheets are scanned and stored on the Cordova ADF&G server (O:\DWC\Deer).
- Original datasheets are stored in file folders located in the Cordova Area Biologist's office.
- Historical survey notes and data sheets are being digitized and scanned for permanent storage on the file server.

Agreements

ADF&G and USFS–Chugach National Forest have a cooperative agreement that results in the sharing of costs to conduct deer pellet transects and the data that come from them.

Permitting

None.

Conclusions and Management Recommendations

Under intensive management law (AS 16.05.255) our mandated population objective is 24,000–28,000 deer and harvest objective 2,200–3,000. Because we have no estimate of population size, this objective is, at best, an educated guess at the number of deer required to support human needs. Obtaining a population estimate has not been identified as a priority because of the survey challenges associated with finding and counting forest dwelling animals. However, based on pellet-group density, reports from stakeholders, and carcass counts, it is likely that deer numbers declined in PWS because of unprecedented snowfall and are slowly rebuilding.

Deer pellet indices are highest on Hawkins and Hinchinbrook islands, possibly indicating that more deer occur there than on other islands. However, participation in the hunt (based on hunter days per area) is highest on Montague, followed by western PWS. This is likely due to access from Whittier and is not reflective of deer density. Although reasonable hunting opportunity exists to sustain the intensive management objective of 2,200–3,000 deer, hunters reported taking fewer deer during the reporting period. With increased fuel costs, effort may be focused in lower quality areas that are closer to port.

Pellet-group surveys and harvest data (via hunter questionnaires and now harvest ticket data) seem to be effective tools to monitor and manage deer harvest within variation affected primarily by winters of deep snow in Unit 6. MPGP has been a reliable index to population trend. A research project is being developed using money from a legislative CIP to investigate accuracy of deer pellet data using DNA. Other components of the study will likely involve movement, nutrition, and carrying capacity comparing between high- and low-density areas. I believe the population is presently limited by access to forage during periods of deep snow, but if mild winters with little persistence of deep snow continue, understanding of forage limitation in accessible areas should be investigated as a limiting factor.

II. Project Review and RY16–RY20 Plan

Review of Management Direction

MANAGEMENT DIRECTION

- Provide a bag limit that allows for compensatory harvest and the prevention of habitat degradation from high abundance achievable following mild winters (5 deer for residents, 4 for nonresidents).
- Reduce additive harvest (in season when possible) following extreme weather events. Weather-caused mortality events cannot be prevented. Therefore, management decisions seek to build the population back to moderate levels quickly while maintaining reasonable harvest opportunity.
- Evaluate the current harvest objective based on improved harvest reporting and modify. Harvest objectives have only been met 11 times in 28 years.

GOALS

The management goal for Unit 6 deer is to maintain healthy, productive populations, sufficiently abundant and resilient to harsh winters to ensure good hunting opportunities and success.

CODIFIED OBJECTIVES

Amounts Reasonably Necessary for Subsistence Uses

Deer unitwide: 1,000–1,250.

Intensive Management

Population objective: 24,000–28,000.

Harvest objective: 2,200–3,000.

MANAGEMENT OBJECTIVES

Management objectives will vary based on population status.

Review current objectives for feasibility and utility (likely eliminate):

- Maintain a minimum harvest of 60% males.
- Maintain a minimum hunter success rate of 50%.

Proposed new objectives:

- When deer pellet transects indicate that the population is low, the 3-year average buck harvest should be >60% of the harvest. Harvest opportunity will be reduced if snow levels are identified as deep and persistent. (new objective)
- If MPGP are >1.5 for 3 consecutive years, education efforts will focus on increasing doe harvest. Board of Game action may be pursued to liberalize deer harvest. (new objective)

REVIEW OF MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Conduct deer pellet transects.

Evaluate measures of variance for average MPGP with a biometrician to better inform strength of information based on pellet counts.

Data Needs

No change from report section.

Methods

We will continue to follow data collection methods from the prior reporting period.

2. Mortality–Harvest Monitoring

ACTIVITY 2.1. Monitor hunter harvest via WinfoNet data from harvest ticket reports.

Data Needs

No change from report section.

Methods

We will continue to follow data collection methods from the prior reporting period.

ACTIVITY 2.2. Mortality risk assessment: Additive or compensatory. (new activity)

Data Needs

Identify whether annual hunting mortality is most likely additive or compensatory.

Methods

Collect and consider anecdotal reports of body condition. If fall and early winter are very mild and the population is low, body condition may be very good. If the population is high (based on deer pellet transect results) or the winter is dominated by below average temperatures and/or above average snow fall, animals may be entering the winter in poorer body condition. Evaluate game camera footage for changes in deer per day relative to other years. Use footage to document dramatic changes in body condition or inhibitive snow levels (sternum height). Monitor in-season harvest using anecdotal reports, dock checks, and reports from the Alaska Wildlife Troopers to assess harvest relative to established normal levels.

3. Habitat Assessment–Enhancement

ACTIVITY 3.1. Monitor snow depth. (new activity)

Data Needs

Identify extreme weather events, specifically depth of snow that is limiting (Habitat Assessment–Enhancement from a quantity not quality standpoint).

Methods

Deploy snow stakes that can be read via plane or trail camera at index stations in PWS (one in each hunt area: Montague, Hawkins [could use Cordova], Hinchinbrook, and Knight [could use Whittier depth]). Snow depth indicators could be deployed at SnoTel stations in the study area (ca. $1,000 per station in cooperation with National Resource Conservation Service). Existing weather stations–cameras in Cordova, and at Johnstone Point on Hinchinbrook, and Naked Island may also be used.

When Cordova snowfall gets to sternum height (>2 feet) and is expected to be persistent (more than 1 week), stakes are flown once a month while snow at that depth is persistent.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Data Recording and Archiving

- Deer harvest data and survey memos are stored on the internal ADF&G database WinfoNet (http://winfonet.alaska.gov/index.cfm).
- Data sheets are scanned and stored on the Cordova ADF&G server (O:\DWC\Deer).
- Original datasheets are stored in file folders located in the Cordova Area Biologist's office.
- Historical survey notes and data sheets are being digitized and scanned for permanent storage on the file server.

Agreements

ADF&G and USFS–Chugach National Forest have a cooperative agreement that results in the sharing of costs to conduct deer pellet transects and the data that come from them.

Permitting

None.

Acknowledgments

USFS contributes financially and with personnel to deer monitoring in PWS.

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♦ ♦ ♦

Appendix A. Survey memo for 2013 deer pellet surveys in Prince William Sound, Alaska.

THE STATE of ALASKA
GOVERNOR SEAN PARNELL

Department of Fish and Game
DIVISION OF WILDLIFE CONSERVATION
Cordova Office

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July 31, 2013

MEMORANDUM

To: Gino Del Frate
Management Coordinator
Anchorage

From: Charlotte Westing
Wildlife Biologist III
Wildlife Conservation Division
Cordova

Subject: Completion of deer pellet surveys in Prince William Sound

INTRODUCTION

Sitka black-tailed deer, an introduced species in Unit 6, are at the extreme northern limit of their range (Cowan 1969). The population usually thrives because of mild, maritime climate conditions on islands in Prince William Sound (PWS) (Shishido 1986). Snow-shading canopies of old-growth forest provide accessible forage and shelter during winter, especially on the larger watersheds of the big islands (Hawkins, Hinchinbrook and Montague) (Shishido 1986; Reynolds 1979). If forbs eventually become buried by deeper snow, blueberry stems (*Vaccinium ovalifolium)* become important forage.

The most important factors limiting the deer population are snow depth and duration (Reynolds 1979). A series of mild winters allows deer to increase and disperse to less favorable habitat, only to decline during severe winters from starvation. Hunting can be a further limiting factor in local areas when deep snow concentrates deer on beaches during open season (Reynolds 1979).

Deer pellet-group surveys have been conducted since 1987 to generate an index for monitoring deer populations in Prince William Sound. These indices in concert with anecdotal reports and carcass counts help managers confirm deer mortality events and reduce additive mortality if necessary.

METHODS

The Alaska Department of Fish and Game (ADF&G) and the U.S. Forest Service (USFS) cooperate to monitor the deer population trends in PWS. We conduct annual pellet-group surveys along transects (Kirchhoff and Pitcher 1988) during late May and early June at 8 sampling locations (Fig. 1). Two more locations were added to annual surveys beginning in 2000–2001 (Naked Island and Bay of Isles on Knight Island) to monitor the western PWS population after the road to Whittier opened. Each location has 3–5 transects consisting of a straight line of 1x20-meter plots running uphill from the beach fringe. Most transects terminate at alpine habitat. Those not reaching the alpine terminate after we examine 100

plots. The number of plots varies, depending on the distance from the beach to the alpine and the persistence of snow during the survey. The minimum number of plots within a location was 164. We calculate mean numbers of pellet groups per plot (MPGP) for each location and all locations combined.

Transect crews this year included, Milo Burcham, Charlotte Westing, Kristin Kirkby, Brian Korth, Ken Marsh, Dave Saalfeld, Pete Mickelson, Lance Westing, Jillian Jablonski, Ellen Martin, Anita Smyke, and Bob Berceli. The multiday vessel charter was on the R/V Auklet with Dave and Annette Janka based out of Cordova.

RESULTS AND DISCUSSION

We completed deer pellet transects starting May 30 at Shipyard and finishing June 14 at Port Etches. Unlike most years, we only experienced a few days with rain showers and had mostly glorious weather. Our only logistical snag was due to a USFS boat mechanical for our trip to Port Etches. We were able to secure the USFS workskiff and get the survey completed. There have only been 3 other years in the last 20 that all transects were sampled.

Although snow depths were unremarkable compared with the previous year, it seemed to persist later. Despite a somewhat late start, we still encountered some snow that led to transect truncation. However, the plant phenology was ideal and pellets were easily seen.

We encountered only a few bone piles but the general feeling was that there was not much deer sign. Some live deer were observed at Hook Point and San Juan Bay on Hinchinbrook and Montague Island respectively.

This year's Mean Pellet Groups/Plot (MPGP) was 0.58, the lowest on record (1994/95 was the first year that a comparable sample area was considered) (Figure 1). This is a 61% decline since 2010/2011. The winter of 2011/2012 received the highest snowfall on record with over 18 feet of snow recorded in Cordova. Kirchhoff and Pitcher (1988) suggested that MPGPs of 0.50 to 0.99, 1.00 to 1.99, and 2.00 to 2.99 were low, moderate, and high densities, respectively, for Southeast Alaska. Deer pellet counts for the 2012, immediately following the severe weather conditions also demonstrated a decline. However because deer may deposit pellets over the course of the winter until they die, there is a lag effect on the data. Therefore, the drop in the deer population is likely a result from the winter of 2011/2012 and not 2012/2013 which was largely seen as a mild winter.

Densities of deer vary among the islands as they differ in topography and snow retention. Figure 2 shows the density observed on the 2013 survey in each of the study areas. Declines in deer pellet group densities were observed on all islands and in nearly every location, this year was the lowest data point on record (Figures 3-10).

In 2012, the deer season was shortened to December 7 to reduce harvest when deer congregate on beaches after significant snow fall. Although the decline in the deer population is not anthropogenic, similar action will likely be taken this year to avoid undue pressure on the population as it rebuilds from reduced numbers.

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Figure 1: Mean Pellet Groups/Plot 1994/1995-2012/2013

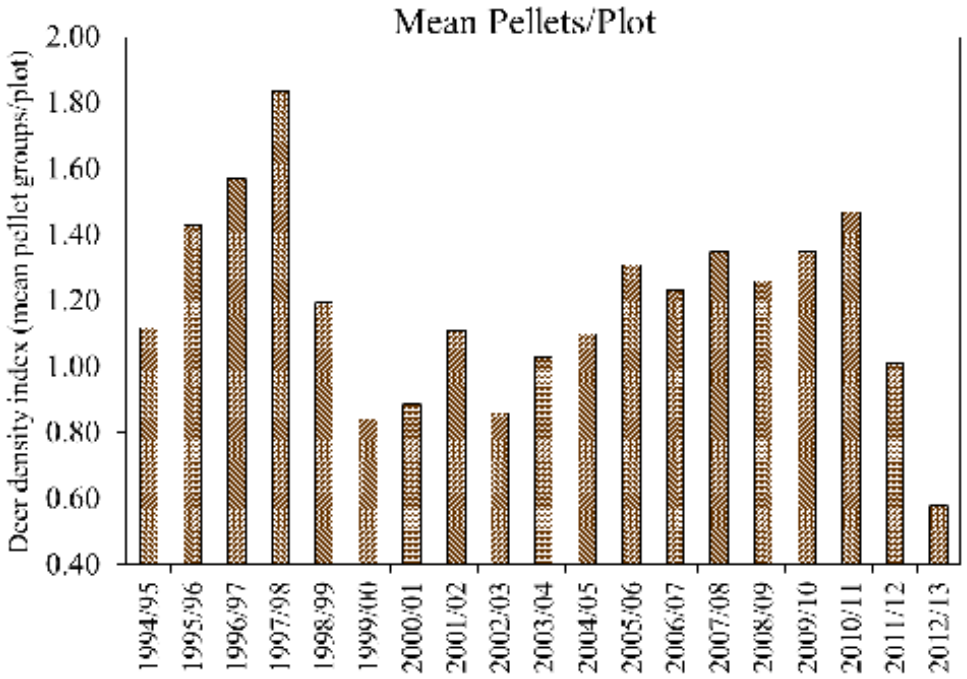


Figure 2:

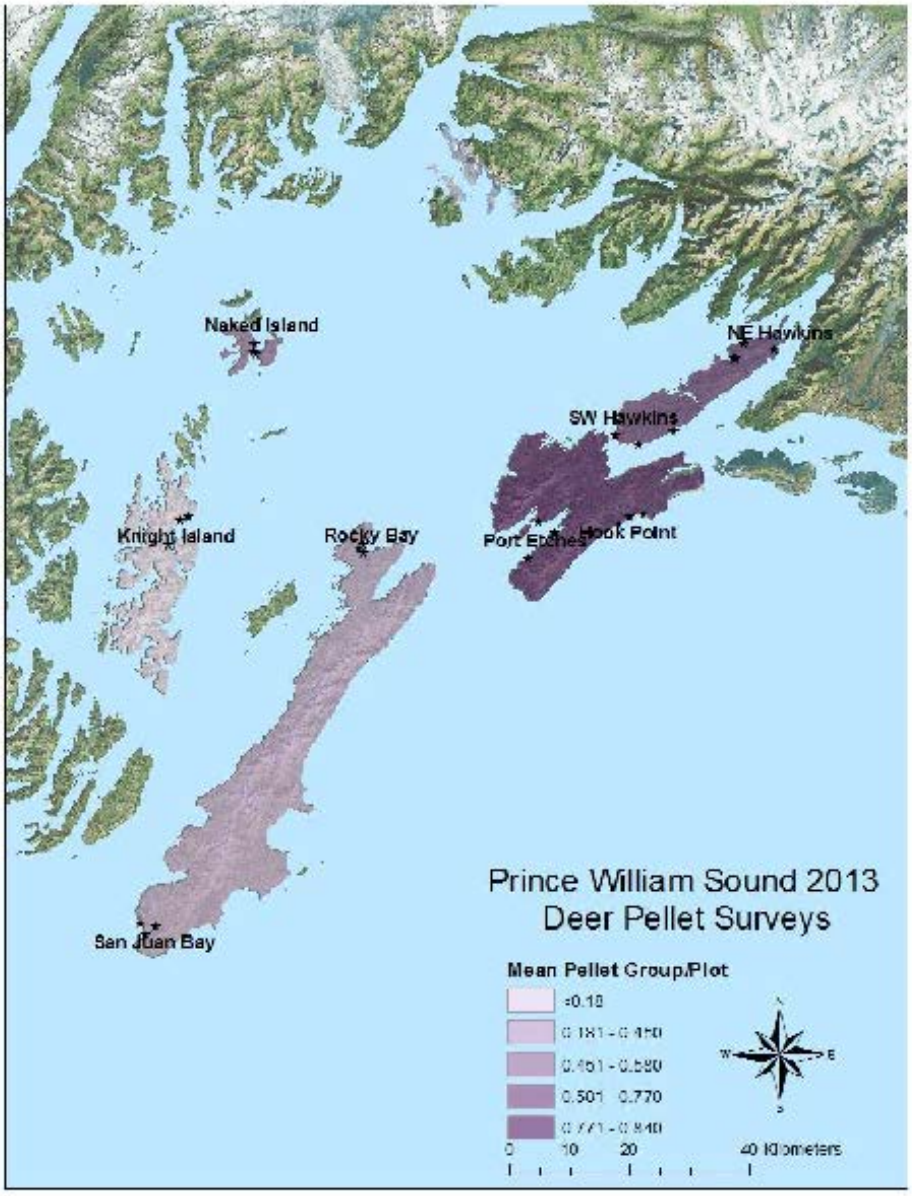
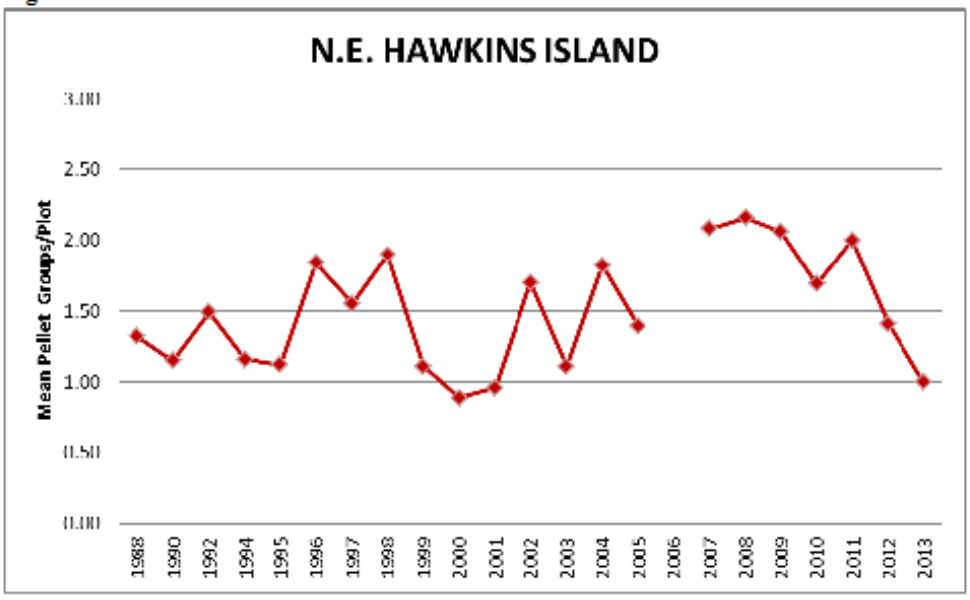

Naked Island
NE Hawkins
SW Hawkins
Knight Island
Rocky Bay
Port Etches
Hook Point
San Juan Bay
Prince William Sound 2013
Deer Pellet Surveys
Mean Pellet Group/Plot
≤0.10
0.451 - 0.580
0.581 0.770
0
10
20
40 Kilometers

Figure 3:



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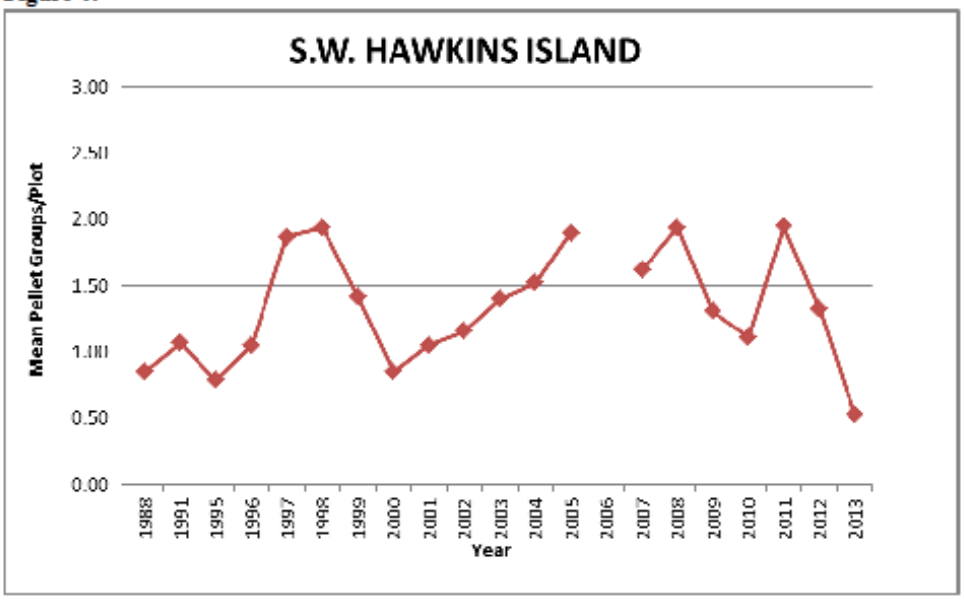

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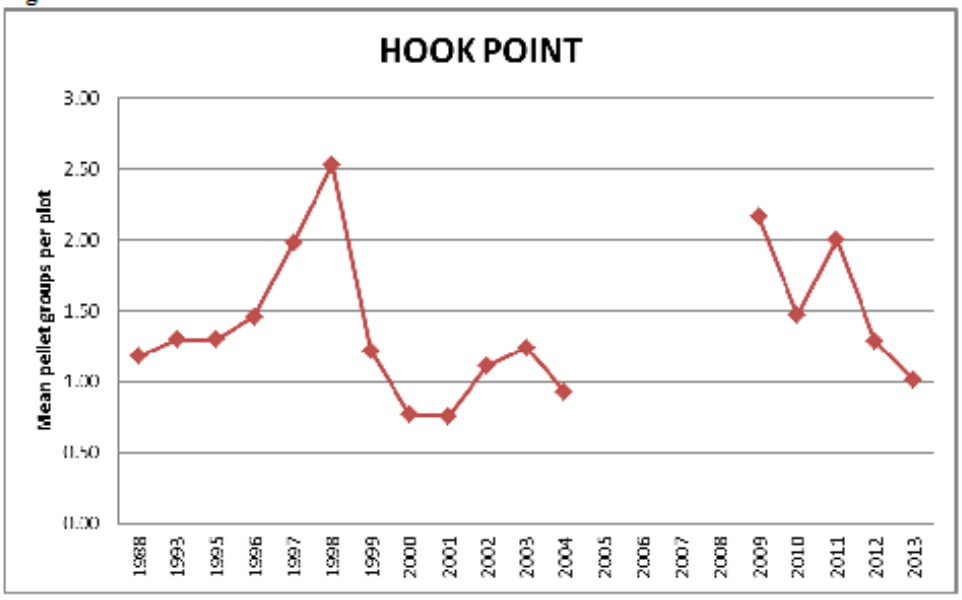

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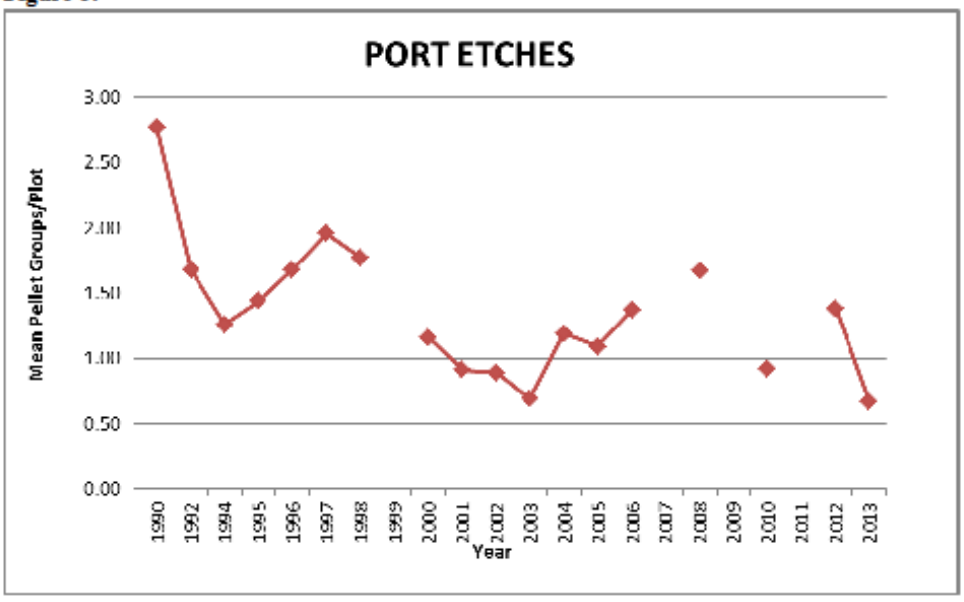

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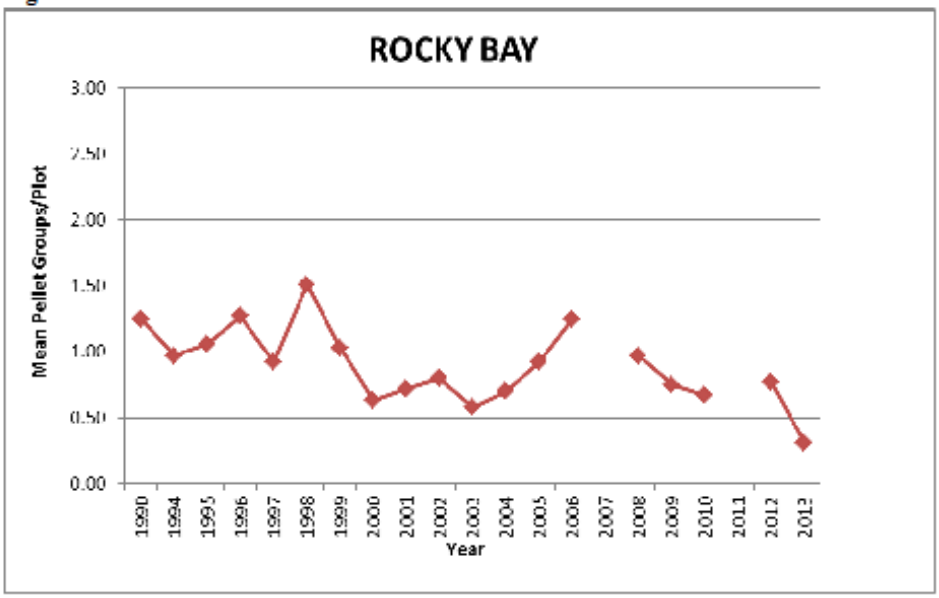

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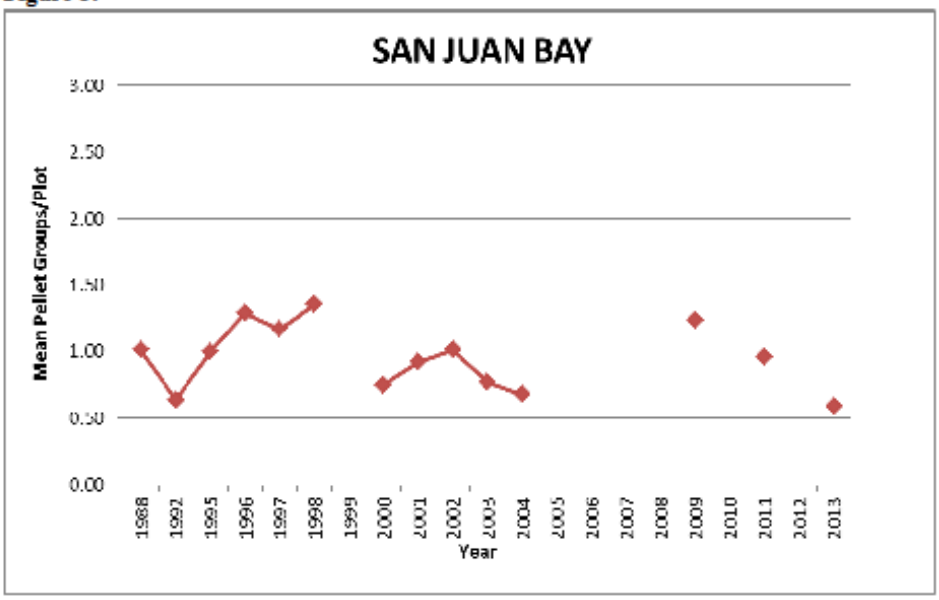

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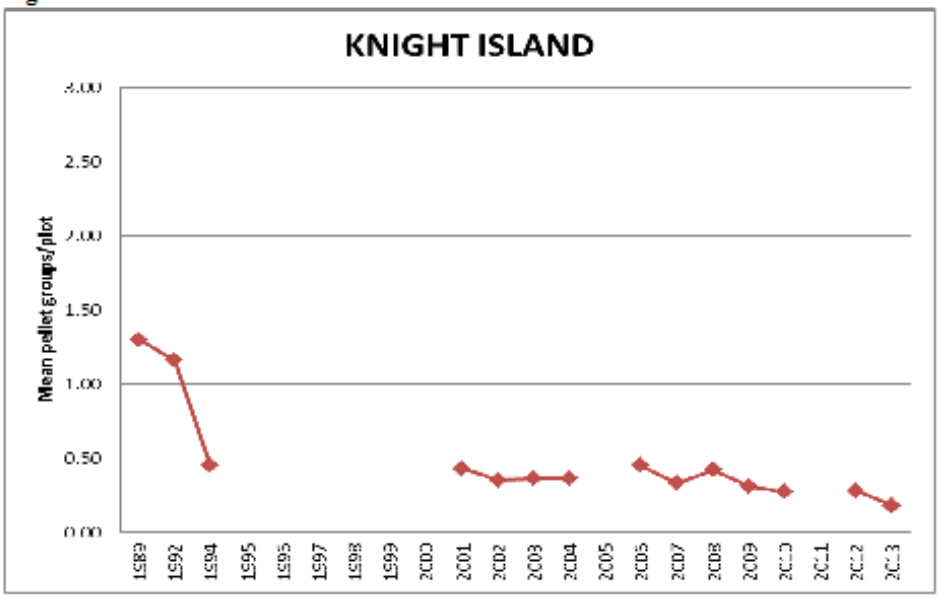
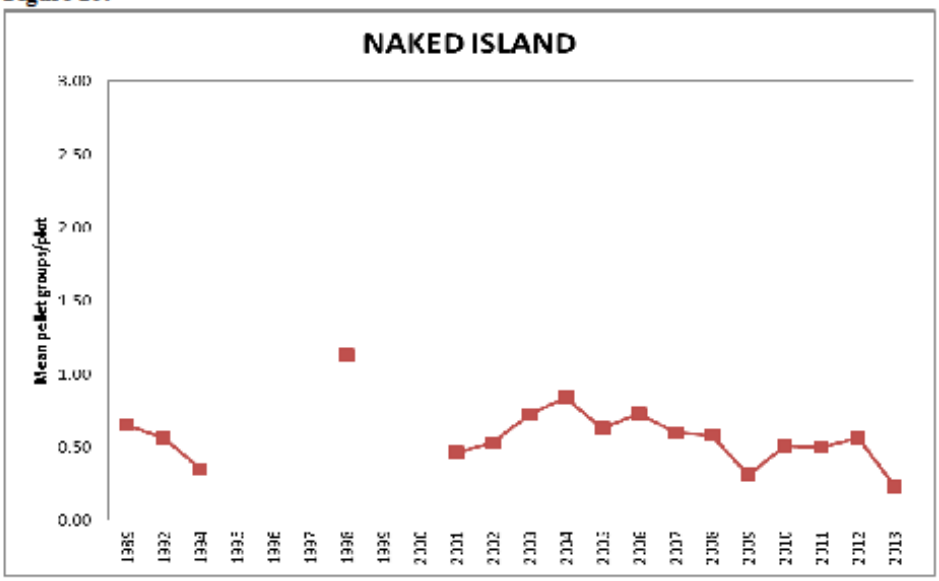


Figure 10:



Appendix B. Survey memo for 2014 deer pellet surveys in Prince William Sound, Alaska.

THE STATE of ALASKA
GOVERNOR SEAN PARNELL

Department of Fish and Game
DIVISION OF WILDLIFE CONSERVATION
Cordova Office

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June 27, 2014

MEMORANDUM

To: Gino Del Frate
Management Coordinator
Anchorage

From: Charlotte Westing
Wildlife Biologist III
Wildlife Conservation Division
Cordova

Subject: Completion of deer pellet surveys in Prince William Sound (GMU 6D).

INTRODUCTION

Sitka black-tailed deer, an introduced species in Unit 6, are at the extreme northern limit of their range (Cowan 1969). The population usually thrives because of mild, maritime climate conditions on the islands of Prince William Sound (PWS) (Shishido 1986). Snow-shading canopies of old-growth forest provide accessible forage and shelter during winter, especially on the larger watersheds of the big islands (Hawkins, Hinchinbrook and Montague) (Shishido 1986; Reynolds 1979). If forbs eventually become buried by deeper snow, blueberry stems (*Vaccinium ovalifolium)* become important forage.

The most important factors limiting the deer population are snow depth and duration (Reynolds 1979). A series of mild winters allows deer to increase and disperse to less favorable habitat, only to decline during severe winters from starvation. Hunting can be a further limiting factor in local areas when deep snow concentrates deer on beaches during open season (Reynolds 1979).

Deer pellet-group surveys have been conducted since 1987 to generate an index for monitoring deer populations in Prince William Sound. These indices in concert with anecdotal reports and carcass counts help managers confirm deer mortality events and reduce additive mortality if necessary.

METHODS

The Alaska Department of Fish and Game (ADF&G) and the U.S. Forest Service (USFS) cooperate to monitor the deer population trends in PWS. We conduct annual pellet-group surveys along transects (Kirchhoff and Pitcher 1988) when snow melt is sufficient and plants have not fully leafed-out. This usually occurs during late May and early June at 8 sampling locations (Fig. 1). Two of these locations were added to annual surveys beginning in 2000–2001 (Naked Island and Bay of Isles on Knight Island) to monitor the western PWS population after the road to Whittier opened. Each location has 3–5

transects consisting of a straight line of 1x20-meter plots running uphill from the beach fringe. Most transects terminate at alpine habitat. Those not reaching the alpine terminate after we examine 100 plots. The number of plots varies, depending on the distance from the beach to the alpine and the persistence of snow during the survey. The minimum number of plots within a location was 176. We calculate mean numbers of pellet groups per plot (MPGP) for each location and all locations combined.

Transect crews this year included, Milo Burcham, Charlotte Westing, Elena Fernandez, Samantha Stevenson-Renner, Robert Skorkowski, Jessy Coltrane, Dan Jenkins, Meghan Urton, Andy Morse, Rich Brenner, Bert Lewis, Marley Young, Lance Westing, Alberta Laktonen, Jeremy Botz, Anita Smyke, and Karl Becker. The multiday vessel charter was on the R/V Auklet with David and Annette Janka based out of Cordova. Air charters were provided by Alaska Wilderness Air also of Cordova.

RESULTS AND DISCUSSION

We completed deer pellet transects starting May 7 at Shipyard Bay on northeast Hawkins Island, finishing May 28 at Hook Point on Hinchinbrook Island. Unlike most years, we only experienced a few days with rain showers and had mostly glorious weather. Our only logistical snags were related to an accelerated timeline which caused more scheduling conflicts and trouble getting a wheeled plane for Hook Point and San Juan Bay. There have only been 5 other years in the last 20 that all transects were sampled.

The winter of 2013/14 was remarkable for a lack of snow. Accumulation was minimal and melted quickly with unseasonably warm spring temperatures. According to Steve "Hoots" Witsoe of the Alaska Avalanche Information Center, "Looking at weather data from the station at Mt Eyak (~500 m elevation), the daily average temperature from October 1st through May 31st was 1.3 degrees Celsius higher than the average from 2005-2012. Precipitation amounts for that same time period were near average. In contrast, October 2011 through May 2012 temperatures were 0.7 degrees Celsius below average, and precipitation was about 50% greater." As of mid-February, there was no snow up to 1000 feet elevation. This year's surveys were the earliest start and completion dates on record and green-up was advancing quickly by survey completion. We examined a record number of plots this year due to the absence of snow. Very few transects were truncated due to snow cover. No carcasses from the preceding winter were observed.

This year's Mean Pellet Groups/Plot (MPGP) was 0.78, the second lowest on record (since 1994/95 which was the first year that a comparable sample area was considered) (Figure 1). The lowest point in 2013 marked a 61% decline since the 2011 estimate. The winter of 2011/2012 received the highest snowfall on record with over 27 feet of snow recorded in Cordova. The MPGP is now 47% lower than the 2011 estimate. This may indicate that the population is slowly increasing, which corresponds with anecdotal reports from those familiar with the area. Nevertheless, the MPGP appear to be low which may also suggest that the deer population is low. Kirchhoff and Pitcher (1988) suggested that MPGPs of 0.50 to 0.99, 1.00 to 1.99, and 2.00 to 2.99 were low, moderate, and high densities, respectively, for Southeast Alaska.

Densities of deer probably vary among the islands as they differ in topography and snow retention. Figure 2 shows the mean pellet groups per plot observed on the 2014 survey on each island. All islands showed increased prevalence of pellets compared to the 2013 surveys which were the lowest on record (Figures 3-10).

In 2013, the season for female deer was shortened to the month of October to reduce additive harvest while the population is low. Although deer pellet surveys suggest slight improvement in the abundance of deer since the severe winter of 2011-2012, the population still appears to be low. A few additional factors may have affected the observable pellet groups. In most winters, snow influences the distribution of deer and concentrates them in lower elevations where pellet transects focus. However, with so little snow accumulation, this concentration may not have occurred at all. Additionally, since snow melt and green-up were so early this year, an additional month of pellet deposition was missed. The influence of these factors on the overall number of pellet groups observed is unknown.

Anecdotal reports suggest that the population recovery is happening faster than deer pellet surveys suggest. Reports from the 2013 hunting season indicated that harvested animals were very fat. The last two winters have been very mild and most hunters believe that animals have fared well as a result. However, most people agree that the population is still low but improving. If action is taken this year to alleviate pressure on the population, it will likely be in response to an early, major snow event that could lead to additive harvest while the population is low.

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Reynolds, J. R. 1979. History and current status of Sitka black-tailed deer in Prince William Sound. Pages 177–183 *in* O. C. Wallmo and J. W. Schoen, editors. Sitka black-tailed deer: Proceedings of a conference in Juneau, AK. U.S. Department of Agriculture Forest. Service, AK. Region, Juneau, Alaska. Series No. R10–48. 231pp.

Shishido, N. 1986. Seasonal distribution and winter habitat use by Sitka black-tailed deer in the Prince William Sound region, Alaska. M.S. Thesis. University of Alaska Fairbanks. 105pp.

Figure 1: Mean Pellet Groups/Plot RY94-RY13

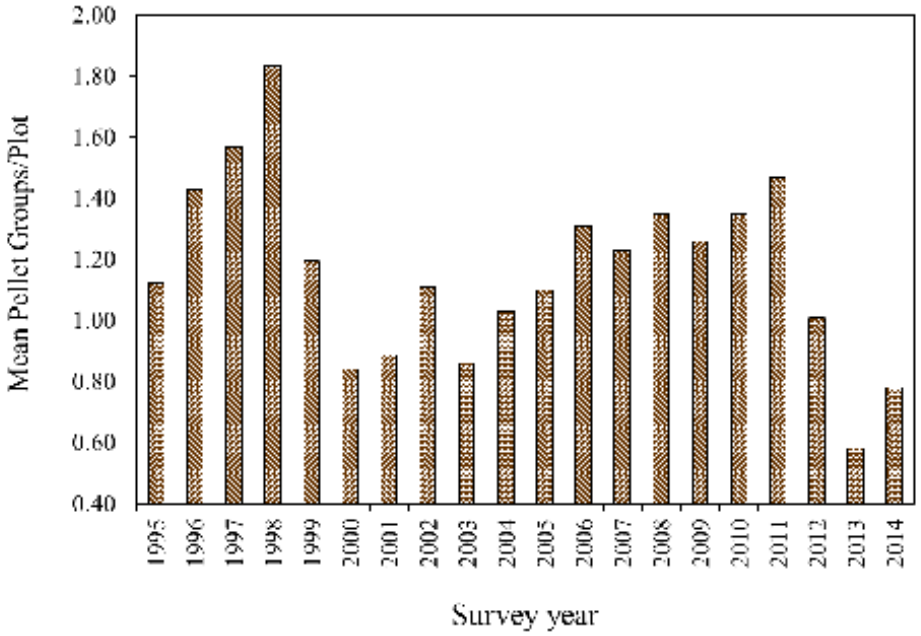


Figure 2:

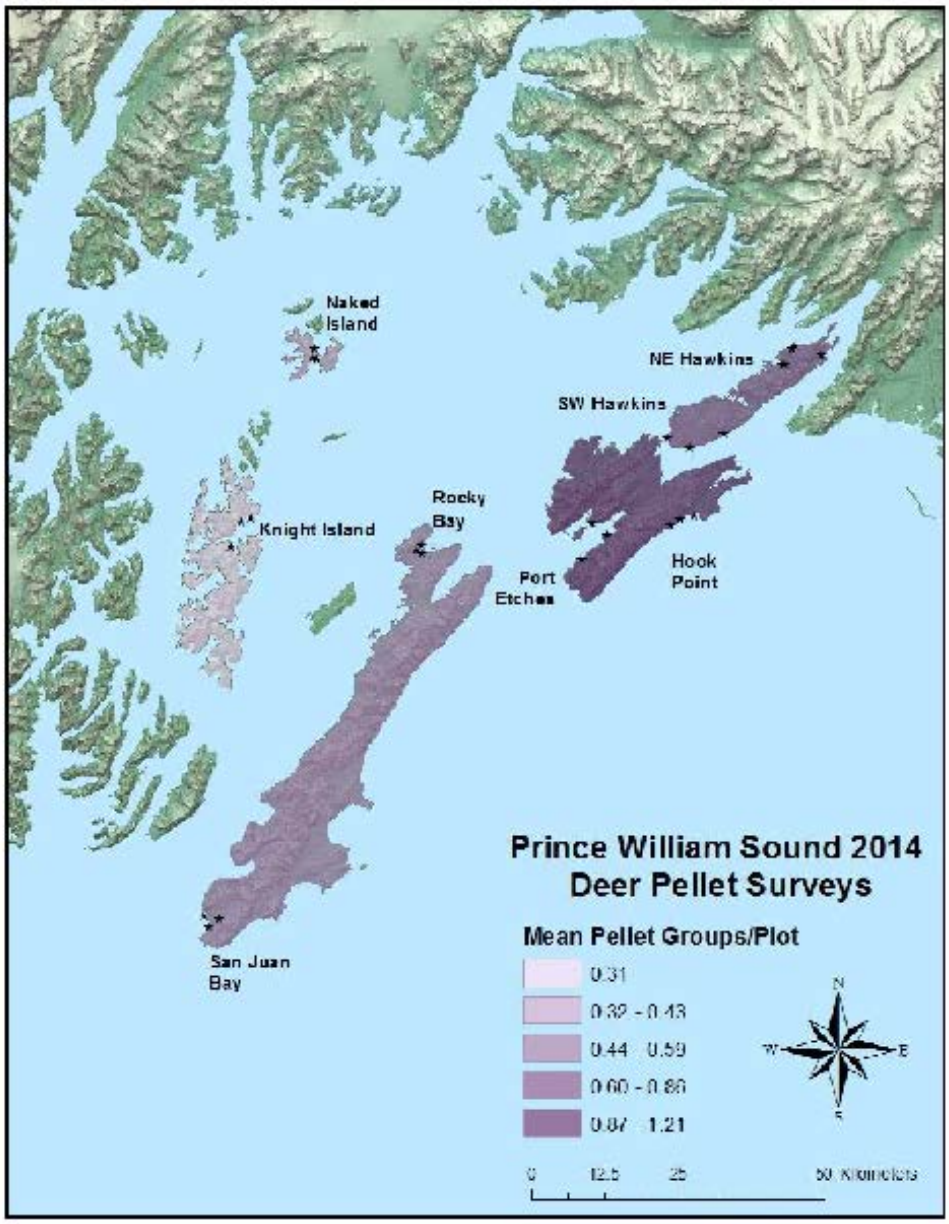
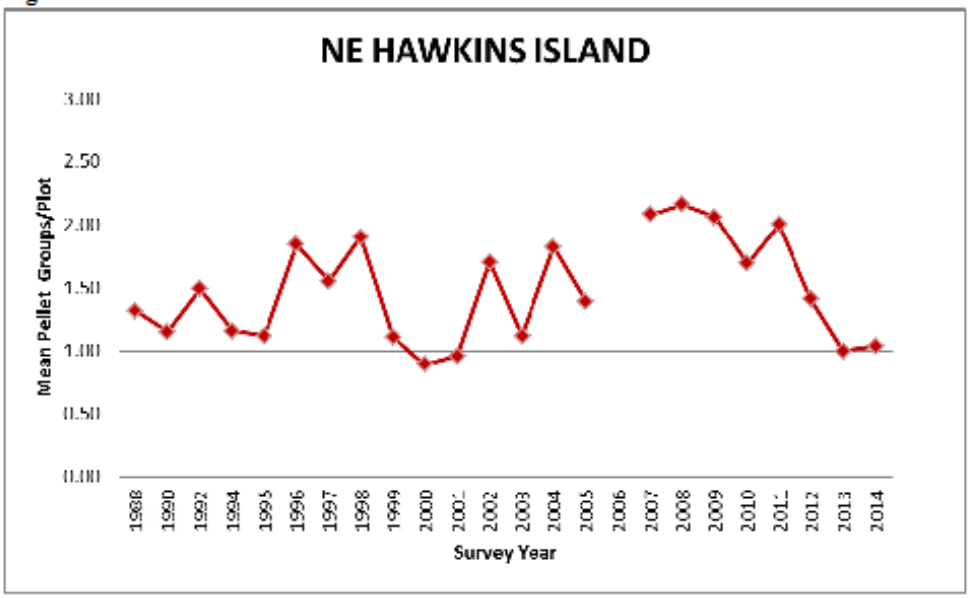

Naked Island
NE Hawkins
SW Hawkins
Rocky Bay
Knight Island
Port Etches
Hook Point
San Juan Bay
Prince William Sound 2014
Deer Pellet Surveys
Mean Pellet Groups/Plot
0.31
0.32 - 0.43
0.44 - 0.59
0.60 - 0.86
0.87 - 1.21
N
W
E
S
0
12.5
25
50 Kilometers

Figure 3:



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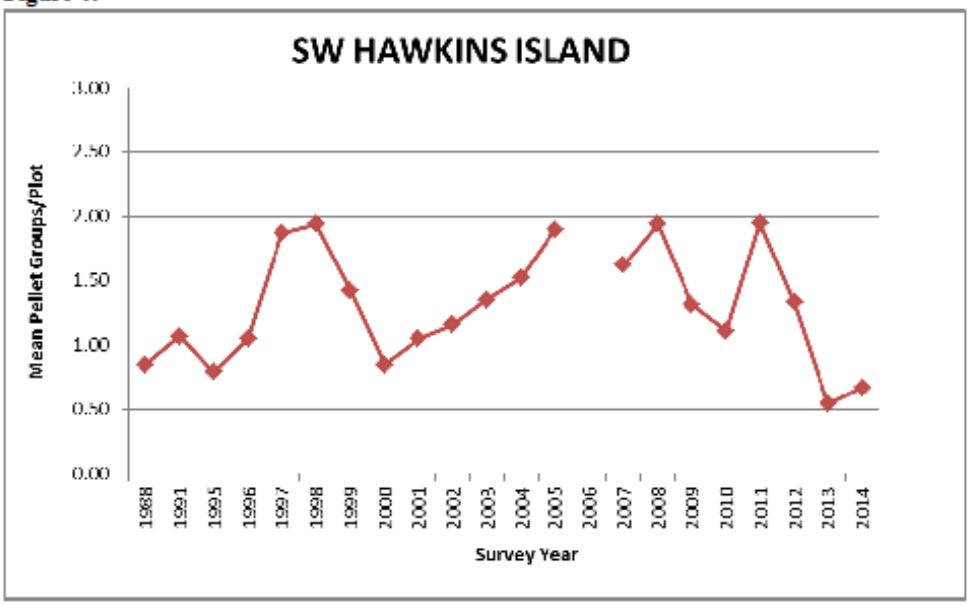

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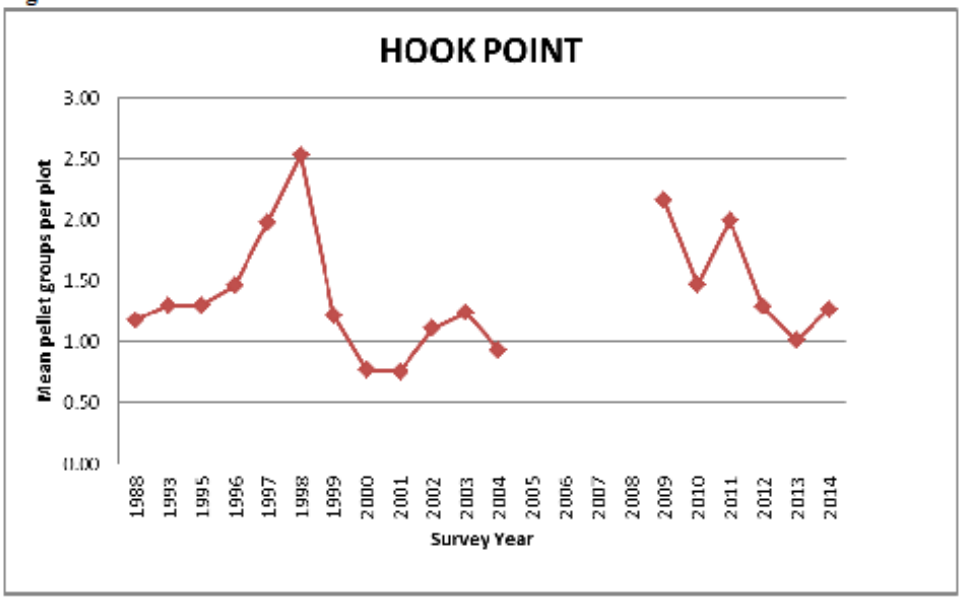


Figure 6:

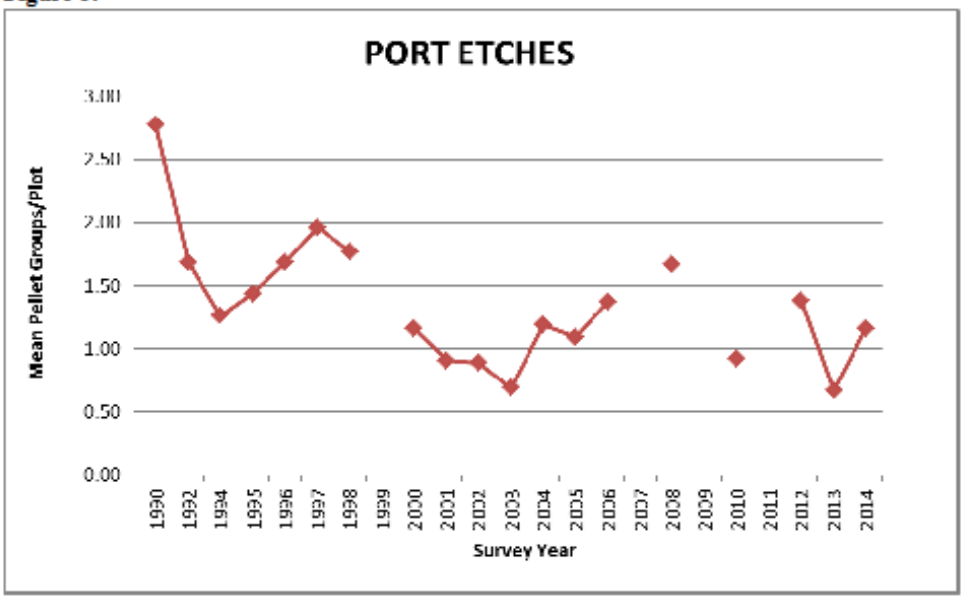


Figure 7:

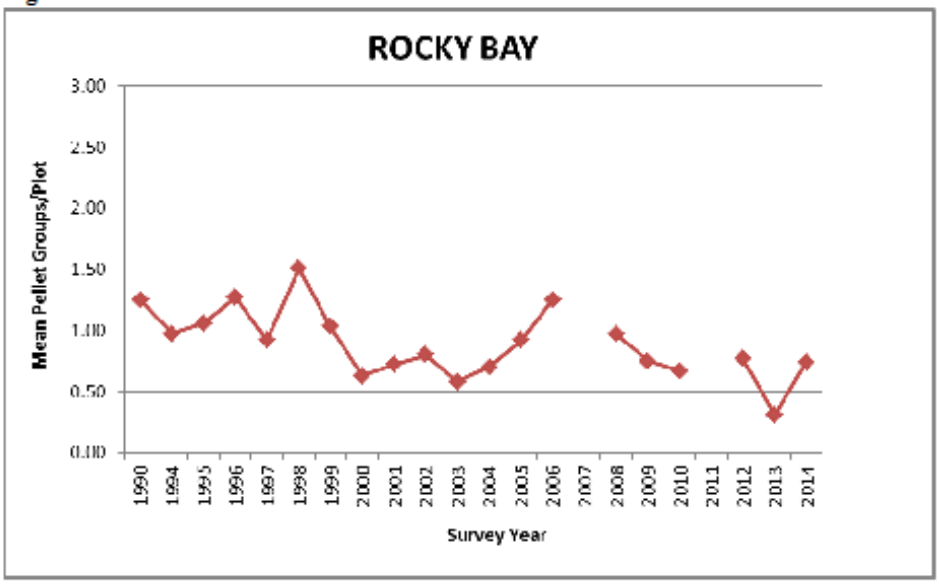


Figure 8:

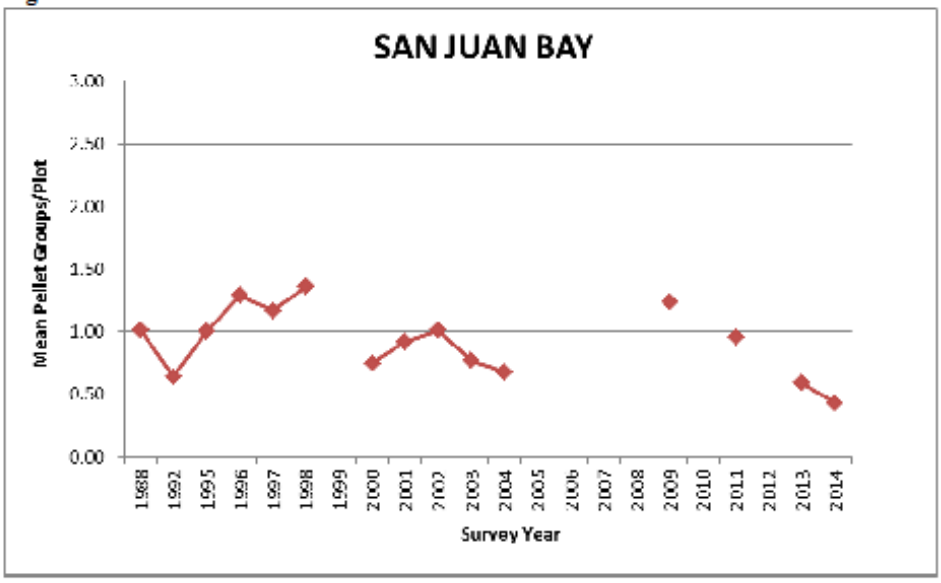


Figure 9:

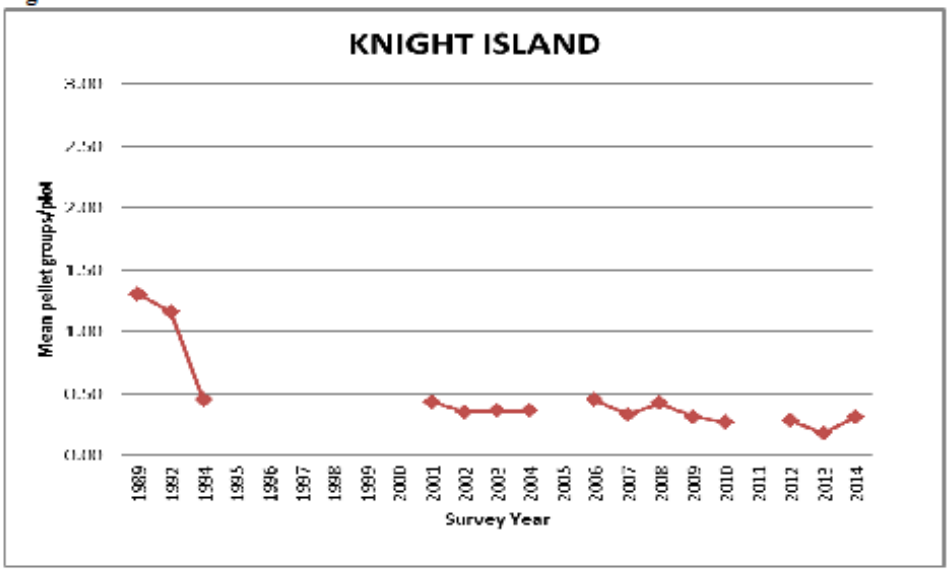
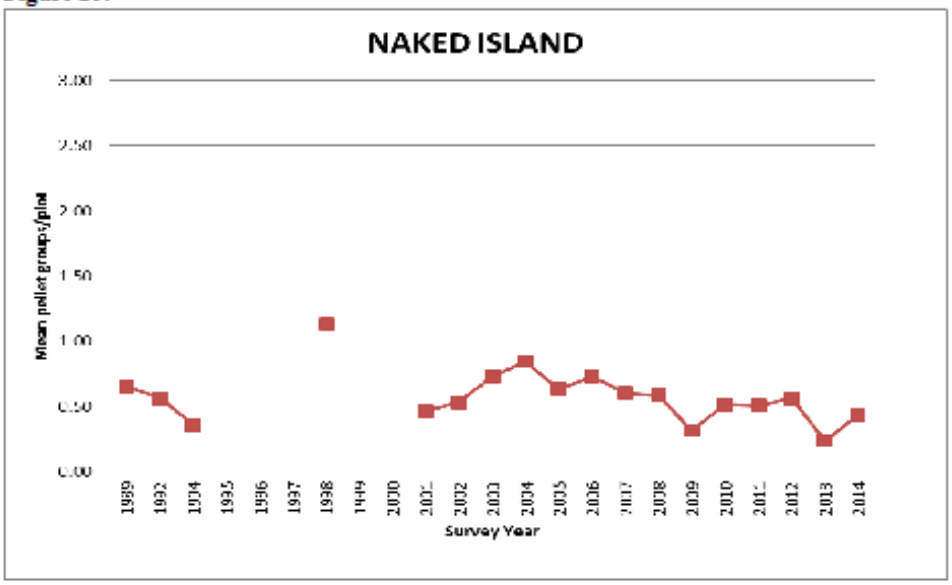


Figure 10:



Appendix C. Survey memo for 2015 deer pellet surveys in Prince William Sound, Alaska.

THE STATE of ALASKA
GOVERNOR SEAN PARNELL

Department of Fish and Game
DIVISION OF WILDLIFE CONSERVATION
Cordova Office
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June 16, 2015

MEMORANDUM

To: Gino Del Frate
Management Coordinator
Anchorage

From: Charlotte Westing
Wildlife Biologist III
Wildlife Conservation Division
Cordova

Subject: Completion of deer pellet surveys in Prince William Sound (GMU 6D).

INTRODUCTION

Sitka black-tailed deer, an introduced species in Unit 6, are at the extreme northern limit of their range (Cowan 1969). The population usually thrives because of mild, maritime climate conditions on the islands of Prince William Sound (PWS) (Shishido 1986). Snow-shading canopies of old-growth forest provide accessible forage and shelter during winter, especially on the larger watersheds of the big islands (Hawkins, Hinchinbrook and Montague) (Shishido 1986; Reynolds 1979). If forbs eventually become buried by deeper snow, blueberry stems (*Vaccinium ovalifolium)* become important forage.

The most important factors limiting the deer population are snow depth and duration (Reynolds 1979). A series of mild winters allows deer to increase and disperse to less favorable habitat, only to decline during severe winters from starvation. Hunting can be a further limiting factor in local areas when deep snow concentrates deer on beaches during open season (Reynolds 1979).

Deer pellet-group surveys have been conducted since 1987 to generate an index for monitoring deer populations in Prince William Sound. These indices in concert with anecdotal reports and carcass counts help managers confirm deer mortality events and reduce additive mortality if necessary.

The winter of 2011/2012 received the highest snowfall on record with over 27 feet of snow recorded in Cordova. The population is believed to have declined by about 50-70% due to winter mortality and high harvest, some of which may have been additive. Hunting seasons were modified in RY12 and RY13 to reduce additive harvest while the population is low. The winters that have followed have been mild and hunters have reported animals entering the winter in superb body condition.

METHODS

The Alaska Department of Fish and Game (ADF&G) and the U.S. Forest Service (USFS) cooperate to monitor the deer population trends in PWS. We conduct annual pellet-group surveys along transects (Kirchhoff and Pitcher 1988) when snow melt is sufficient and plants have not fully leafed-out. This usually occurs during late May and early June at 8 sampling locations (Fig. 1). Two of these locations were added to annual surveys beginning in 2000–2001 (Naked Island and Bay of Isles on Knight Island) to monitor the western PWS population after the road to Whittier opened. Each location has 3–5 transects consisting of a straight line of 1x20-meter plots running uphill from the beach fringe. Most transects terminate at alpine habitat. Those not reaching the alpine terminate after we examine 100 plots. The number of plots varies, depending on the distance from the beach to the alpine and the persistence of snow during the survey. The minimum number of plots within a location was 176. We calculate mean numbers of pellet groups per plot (MPGP) for each location and all locations combined.

Transect crews this year included, Milo Burcham, Charlotte Westing, Chrissy Skorkowski, Jeff Bryden, Samantha Stevenson-Renner, Dan Jenkins, Gino Del Frate, Sarah Hoephner, Pete Schneider, Andy Morse, Kristin Carpenter, Stormy Haught, and Karl Becker. The multiday vessel charter was on the R/V Auklet with David and Annette Janka based out of Cordova. Air charters were provided by Cordova Air.

RESULTS AND DISCUSSION

We completed deer pellet transects starting May 6 at Shipyard Bay on northeast Hawkins Island, finishing May 23 at Port Etches on Hinchinbrook Island. Unlike most years, we only experienced a few days with rain showers and had mostly glorious weather. There have only been 6 other years in the last 20 that all transects were sampled.

The winter of 2014/15 was the second consecutive winter that was remarkable for a lack of snow. Accumulation was minimal and melted quickly with unseasonably warm spring temperatures. According to Steve "Hoots" Witsoe of the Alaska Avalanche Information Center, this winter showed a similar pattern to last with temperatures considerably warmer than average and precipitation falling as rain rather than snow. As of mid-February, there was no snow accumulation below 1500 feet elevation. This year's surveys were the earliest start and completion dates on record and green-up was advancing quickly by survey completion. We examined a record number of plots this year due to the absence of snow. For the first time, no transects were truncated due to snow cover. No carcasses from the preceding winter were observed.

This year's Mean Pellet Groups/Plot (MPGP) was 0.92, the sixth lowest on record (since 1994/95 which was the first year that a comparable sample area was considered) (Figure 1). The index is now comparable with previous times of population depression observed in the early 2000s. The lowest point in 2013 marked a 61% decline since the 2011 estimate. The MPGP is now only 37% lower than the 2011 estimate. This may indicate that the population is slowly increasing, which corresponds with anecdotal reports from those familiar with the area. Nevertheless, the MPGP appears to be low which may also indicate that the deer population is still low. Kirchhoff and Pitcher (1988) suggested that MPGPs of 0.50 to 0.99, 1.00 to 1.99, and 2.00 to 2.99 were low, moderate, and high densities, respectively, for Southeast Alaska.

Densities of deer probably vary among the islands as they differ in topography and snow retention. Figure 2 shows the mean pellet groups per plot observed on the 2015 survey on each island. All locations except Port Etches showed increased prevalence of pellets compared to the 2013 surveys which were the lowest on record (Figures 3-10). The reason for the Port Etches anomaly is unknown but the 3 transects were considerably lower and one was identical to the previous year (there are 4 transects). The presence of this area brings down the average slightly from 0.97 MPGP to 0.92 MPGP. In the previous 2 years, the inclusion of Port Etches increased the average. Considering the overall trend among all areas, it is likely that pellets observed is more due to distribution, a sampling anomaly or pellet persistence than deer abundance. Port Etches was the last site visited this year, so green-up was the most advanced. However, it was still not as advanced as last year.

Although deer pellet surveys suggest improvement in the abundance of deer since the severe winter of 2011-2012, the population still appears to be low. A few additional factors may have affected the observable pellet groups. In most winters, snow influences the distribution of deer and concentrates them in lower elevations where pellet transects focus. However, with so little snow accumulation, this concentration may not have occurred at all. Additionally, since snow melt and green-up were so early this year, an additional month of pellet deposition was missed. The influence of these factors on the overall number of pellet groups observed is unknown. Since the last two years have seen similar winter conditions, the relative increase between the two is likely real.

Anecdotal reports suggest that the population recovery is happening faster than deer pellet surveys suggest. Reports from the 2014 hunting season indicated that harvested animals were very fat. The last two winters have been very mild and most hunters believe that animals have fared well as a result. However, most people agree that the population is still low but improving. If action is taken this year to alleviate pressure on the population, it will likely be in response to an early, major snow event that could lead to additive harvest while the population is low.

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Cowan, M. I. 1969. What and where are the mule and black-tailed deer? Pages 335–360 *in*: W. P. Taylor, editor. The deer of North America. Stackpole Co., Harrisburg, Pennsylvania. 668pp.

Kirchhoff, M. D. and K. W. Pitcher. 1988. Deer pellet-group surveys in Southeast Alaska, 1981–1987. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Report. Project W-22-6. Job 2.9. Juneau, Alaska. 113pp.

Reynolds, J. R. 1979. History and current status of Sitka black-tailed deer in Prince William Sound. Pages 177–183 *in* O. C. Wallmo and J. W. Schoen, editors. Sitka black-tailed deer: Proceedings of a conference in Juneau, AK. U.S. Department of Agriculture Forest. Service, AK. Region, Juneau, Alaska. Series No. R10–48. 231pp.

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Figure 1: Mean Pellet Groups/Plot RY95-RY14

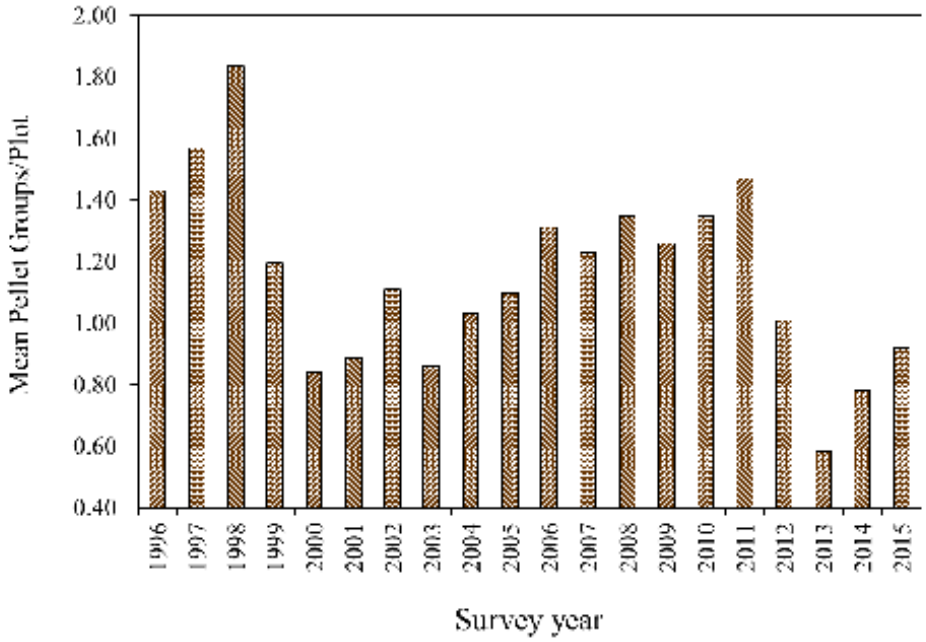


Figure 2:

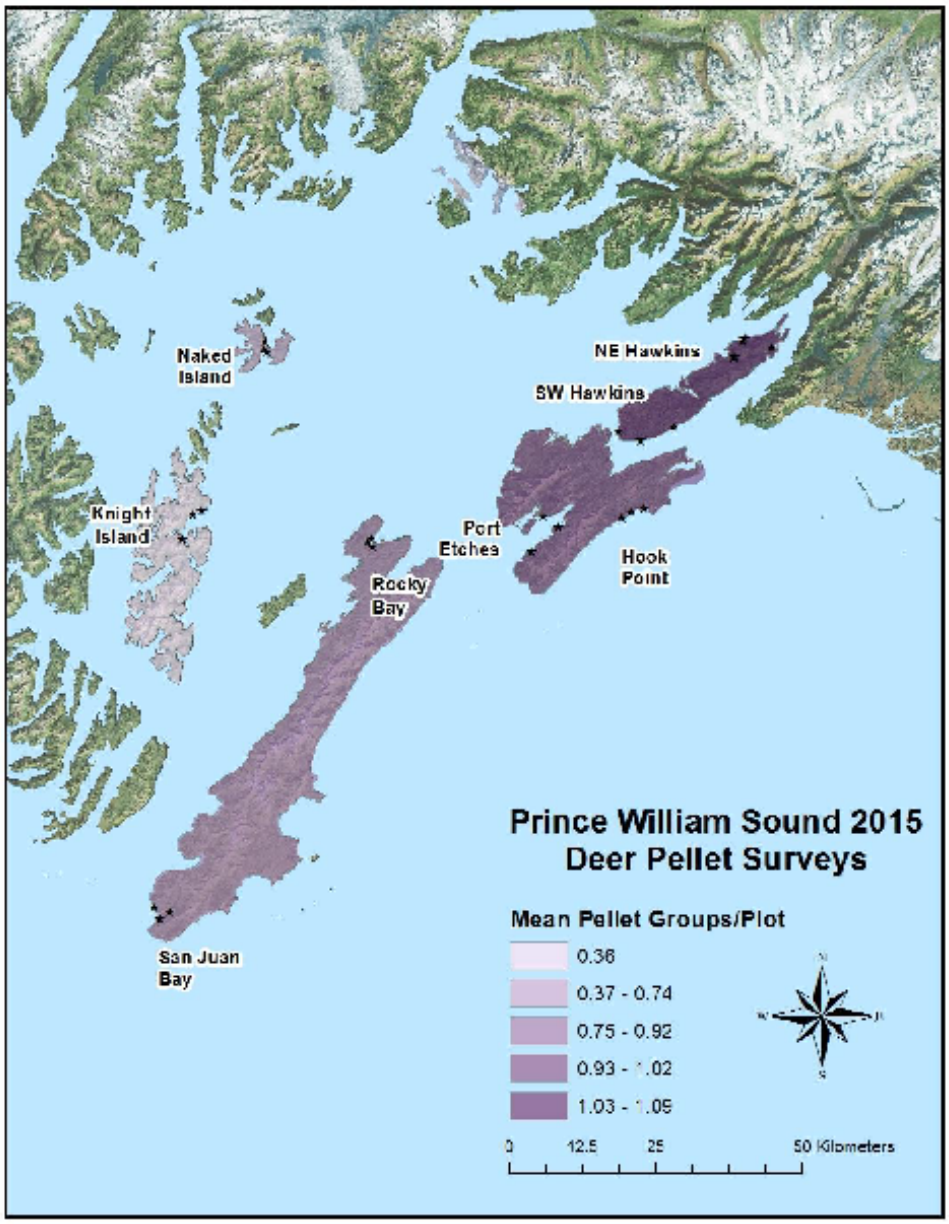
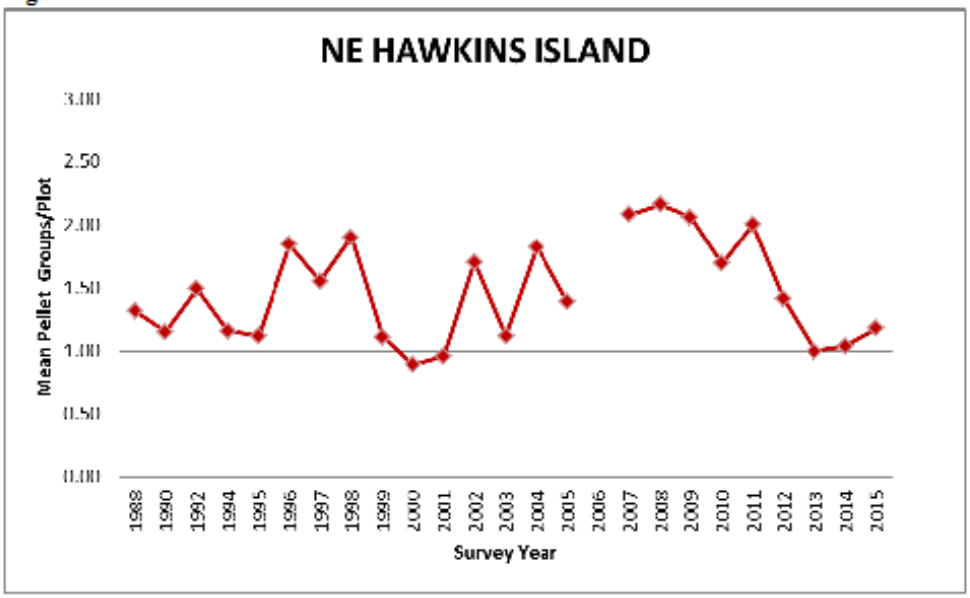

Naked Island
NE Hawkins
SW Hawkins
Knight Island
Port Etches
Hook Point
Rocky Bay
San Juan Bay
Prince William Sound 2015
Deer Pellet Surveys
Mean Pellet Groups/Plot
0.36
0.37 - 0.74
0.75 - 0.92
0.93 - 1.02
1.03 - 1.09
0
12.5
25
50 Kilometers

Figure 3:



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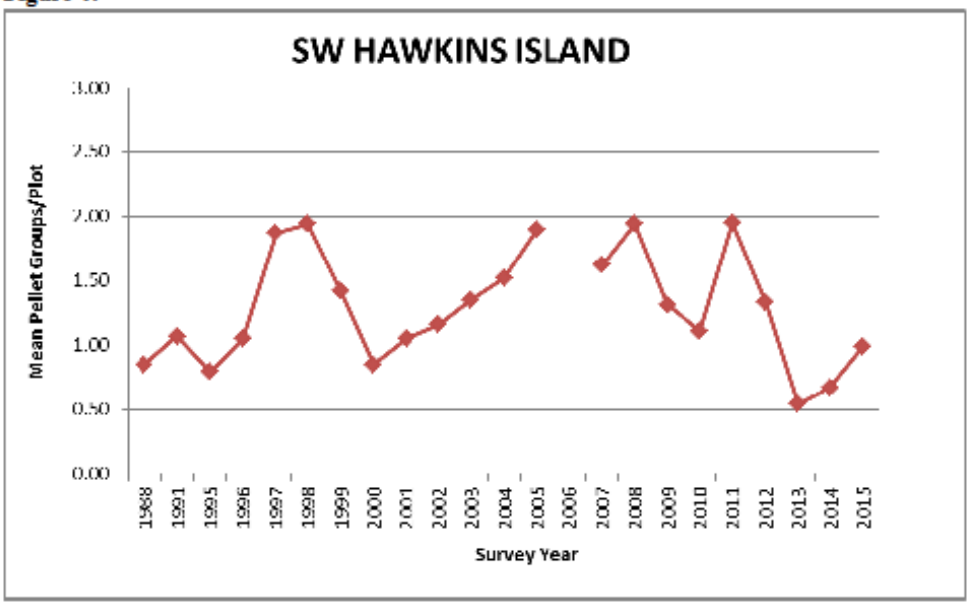

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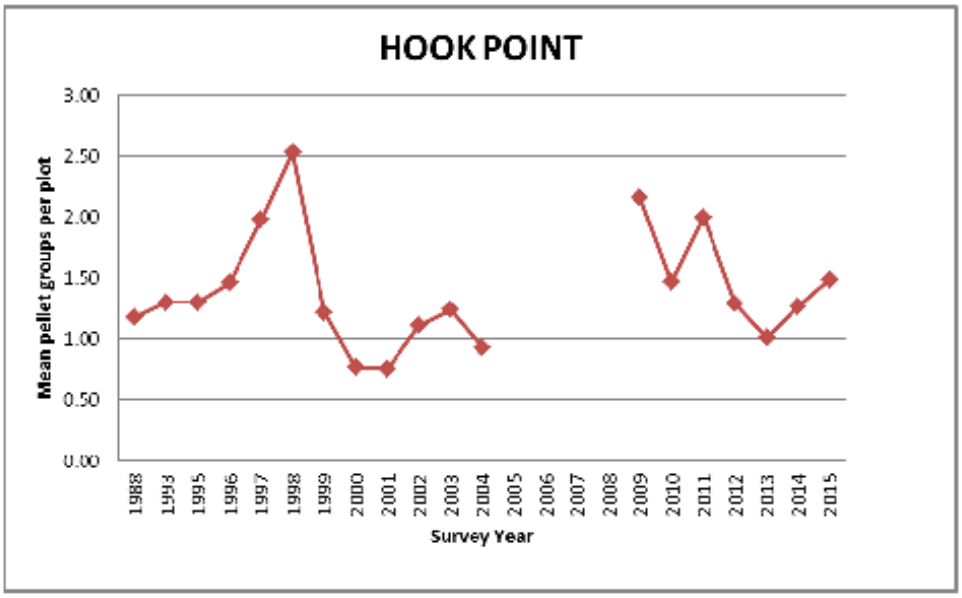

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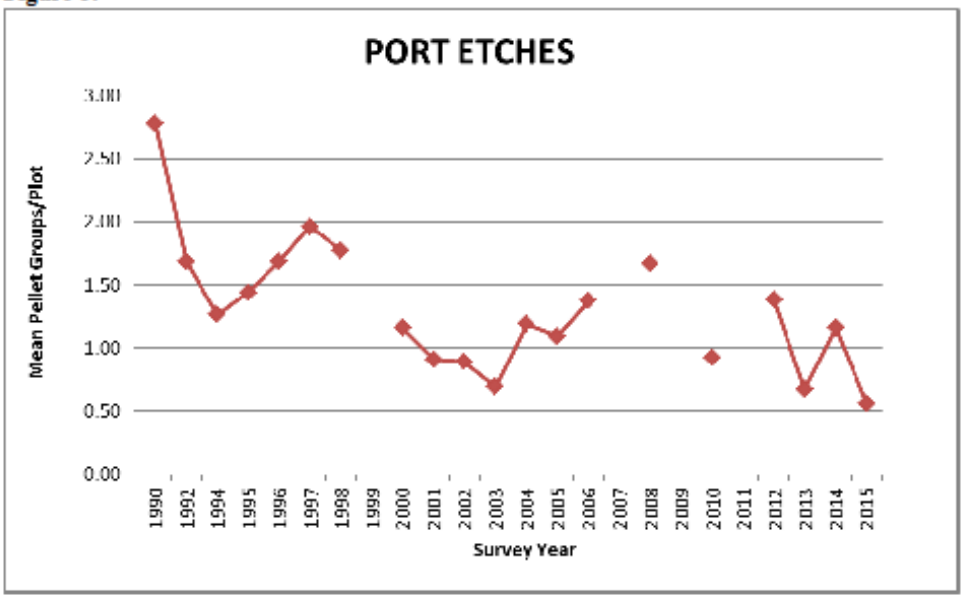
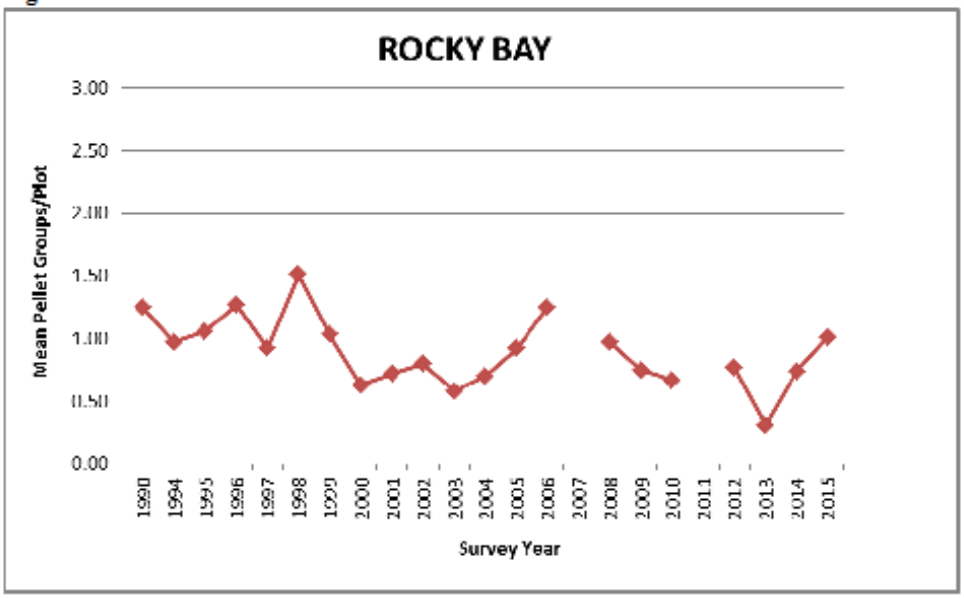


Figure 7:



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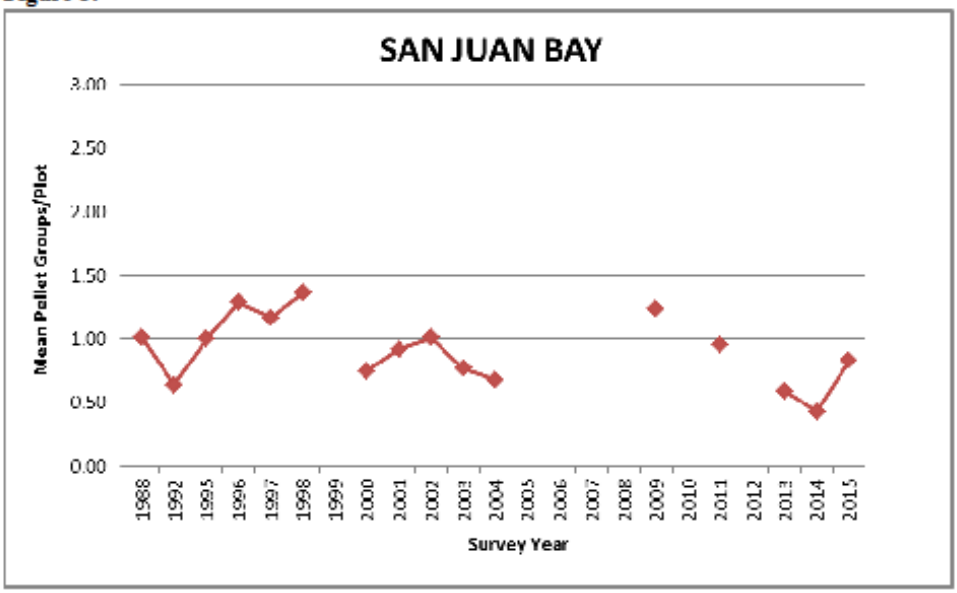
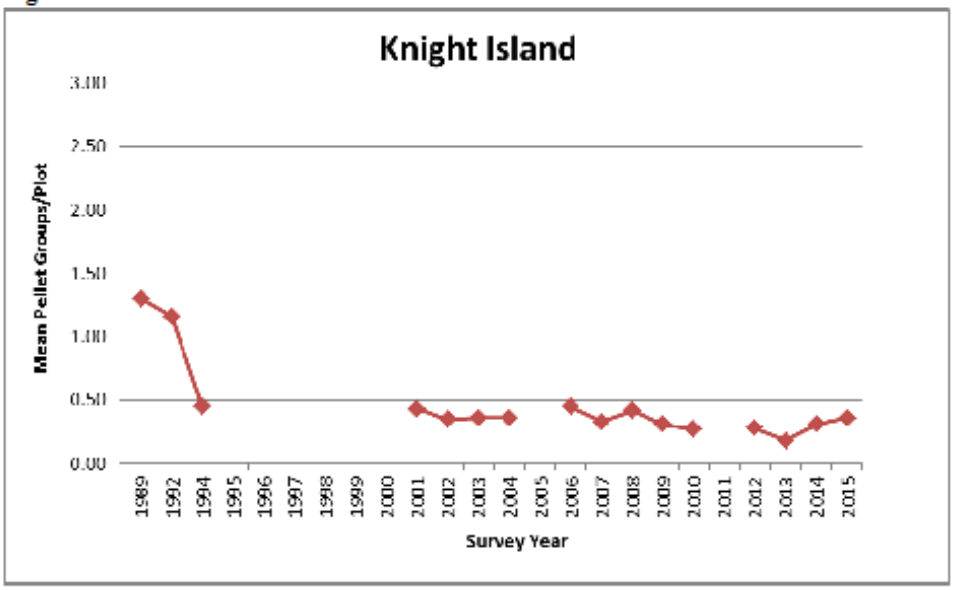


Figure 9:



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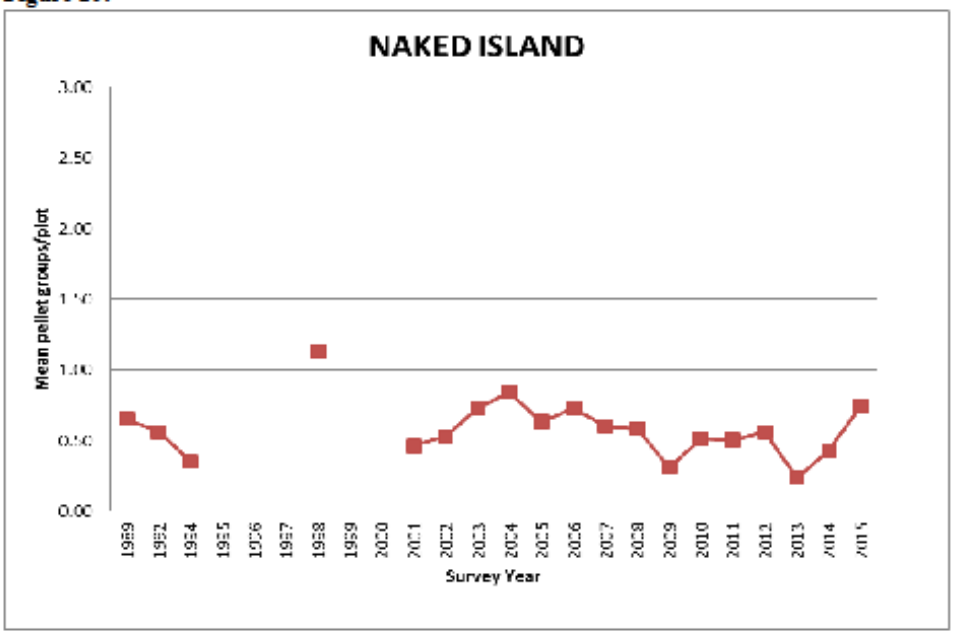

Appendix D. Survey memo for 2016 deer pellet surveys in Prince William Sound, Alaska.

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Fish and Game
DIVISION OF WILDLIFE CONSERVATION
Cordova Office

401 Railroad Avenue
Cordova, Alaska 99574-0669
Main: 907.424.3215
Fax: 907.424.3235

June 9, 2016

MEMORANDUM

To: Cynthia Wardlow
Acting Management Coordinator
Wildlife Conservation Division
Anchorage

From: Charlotte Westing
Wildlife Biologist III
Wildlife Conservation Division
Cordova

Subject: Completion of deer pellet surveys in Prince William Sound (GMU 6D).

INTRODUCTION

Sitka black-tailed deer, an introduced species in Unit 6, are at the extreme northern limit of their range (Cowan 1969). The population usually thrives because of mild, maritime climate conditions on the islands of Prince William Sound (PWS) (Shishido 1986). Snow-shading canopies of old-growth forest provide accessible forage and shelter during winter, especially on the larger watersheds of the big islands (Hawkins, Hinchinbrook and Montague) (Shishido 1986; Reynolds 1979). If forbs eventually become buried by deeper snow, blueberry stems (*Vaccinium ovalifolium)* become important forage.

The most important factors limiting the deer population are snow depth and duration (Reynolds 1979). A series of mild winters allows deer to increase and disperse to less favorable habitat, only to decline during severe winters from starvation. Hunting can be a further limiting factor in local areas when deep snow concentrates deer on beaches during open season (Reynolds 1979).

Deer pellet-group surveys have been conducted since 1987 to generate an index for monitoring deer populations in Prince William Sound. These indices in concert with anecdotal reports and carcass counts help managers confirm deer mortality events and reduce additive mortality if necessary.

The winter of 2011/2012 received the highest snowfall on record with over 27 feet of snow recorded in Cordova. The population is believed to have declined by about 50-70% due to winter mortality and high harvest, some of which may have been additive. Hunting seasons were modified in RY12 and RY13 to reduce additive harvest while the population is low. The winters that have followed have been mild and hunters have subjectively reported that harvested deer were entering the winter in exceptional body condition relative to other years.

METHODS

The Alaska Department of Fish and Game (ADF&G) and the U.S. Forest Service (USFS) cooperate to monitor the deer population trends in PWS. We conduct annual pellet-group surveys along transects (Kirchhoff and Pitcher 1988) when snow melt is sufficient and plants have not fully leafed-out. This usually occurs during late May and early June at 8 sampling locations (Fig. 1). Two of these locations were added to annual surveys beginning in 2000–2001 (Naked Island and Bay of Isles on Knight Island) to monitor the western PWS population after the road to Whittier opened. Each location has 3–5 transects consisting of a straight line of 1x20-meter plots running uphill from the beach fringe. Most transects terminate at alpine habitat. Those not reaching the alpine terminate after we examine 100 plots. The number of plots varies, depending on the distance from the beach to the alpine and the persistence of snow during the survey. The minimum number of plots within a location was 176. We calculate mean numbers of pellet groups per plot (MPGP) for each location and all locations combined.

Transect crews this year included the following people: Milo Burcham, Charlotte Westing, Chrissy Skorkowski, Dave Pearson, Samantha Stevenson-Renner, Bill Lindow, Dana Smyke, Anita Smyke, Eric Sanders, Scott Pegau, Sarah Hoephner, Robin Pegau, Steve Moffitt, Lance Westing and Stormy Haught. The multiday vessel charter was on the R/V Auklet with David and Annette Janka based out of Cordova. Air charters were provided by Cordova Air and Alaska Wilderness Outfitters.

RESULTS AND DISCUSSION

We completed deer pellet transects starting May 7 at Shipyard Bay on northeast Hawkins Island, finishing May 18 at San Juan Bay on Montague Island. As with the last 4 years, we only experienced a few days with rain showers and had mostly spectacular weather. There have only been 7 other years in the last 20 that all transects were sampled. This was the most compressed time period in which surveys have been completed. This was done in response to accelerated green-up and the concern about pellet group sightability.

This year's survey started at the earliest possible day for data comparability with other years. However, green-up was very advanced even compared with the last two years. Whereas last year blueberries were flowering by the time we started, this year all the blossoms had already dropped. Skunk cabbage was observed blooming in February rather than early May as is more typical. All but one transect (Garden Cove, Port Etches) were completely devoid of snow. No transects were truncated due to snow cover but one plot was not considered due to snow coverage. No carcasses from the preceding winter were observed.

The winter of 2015/16 was the third consecutive winter that was remarkable for a lack of snow. Snow accumulation was minimal below 1000 feet and melted quickly with unseasonably warm spring temperatures. According to Steve "Hoots" Witsoe of the Alaska Avalanche Information Center, this winter showed a similar pattern to the last two with the warmest average temperature (over 2 degrees Celsius) observed in the 11 years of the Mount Eyak monitoring station (1500ft elevation). Precipitation amounts were normal but with most falling as rain rather than snow. The maximum accumulation of snow at the site was less than 1.5 meters, about half of what is normal. Much of this weather can be attributed to the presence of "the blob" in the North Pacific Ocean, reported by NOAA as a large swath (hundreds of miles across) of water in the Gulf of Alaska that is as much as three degrees C warmer than normal, in combination with a large El Nino event. Trail cameras at 3 locations recorded regular deer activity and only a few brief periods with snow accumulation at approximately 300 feet in elevation

during the months where they were active (through December at Port Etches and Hook Point and throughout the winter on Southwest Hawkins Island.)

This year's Mean Pellet Groups/Plot (MPGP) was 0.65, the second lowest on record (since 1994/95 which was the first year that a comparable sample area was considered) (Figure 1). The lowest point in 2013 marked a 61% decline since the 2011 estimate. While the last two years showed improvement in the index, this year fewer pellets were observed. The MPGP is now 56% lower than the 2011 estimate. This contradicts what we believe to be true based on anecdotal reports, improved harvest numbers, success rates, and weather conditions. Nevertheless, the MPGP appears to be low which may also indicate that the deer population is still low. Kirchhoff and Pitcher (1988) suggested that MPGPs of 0.50 to 0.99, 1.00 to 1.99, and 2.00 to 2.99 were low, moderate, and high densities, respectively, for Southeast Alaska.

Densities of deer probably vary among the islands as they differ in topography and snow retention. Figure 2 shows the mean pellet groups per plot observed on the 2016 survey on each island. Last year, all locations except Port Etches showed increased prevalence of pellets compared to the 2013 surveys which were the lowest on record (Figures 3-10). This year, four locations had lower pellet abundance even relative to the 2013 surveys and the remaining sites had pellet abundance that was one of the lowest on record.

Although deer pellet abundance has decreased since 2015 and in some areas since 2013, we do not believe that this truly reflects the abundance of deer. A few additional factors may have affected the observability of pellet groups. In most winters, snow influences the distribution of deer and concentrates them in lower elevations where pellet transects focus. However, with so little snow accumulation, this concentration may not have occurred at all. Additionally, since snow melt and green-up were so early this year, an additional month of pellet deposition was missed compared with years prior to 2014. Observers were especially careful to part vegetation and look closely for pellets underneath, however, conditions were not ideal and pellet groups were undoubtedly missed. The influence of these factors on the overall number of pellet groups observed is unknown.

One factor that is somewhat understood is the impact of moisture on pellet persistence. One study that examined the persistence of black-tailed deer fecal pellets in coastal habitats found that moisture significantly reduced the persistence of pellets (Harestad and Bunnell 1987). In fact, moisture was the most important factor influencing pellet degradation. In addition, pellet degradation was accelerated in the summer months which may be from the confounding variables of temperature and summer diet.

With so much of our precipitation falling as rain instead of snow (which may preserve pellets), increased rates of pellet degradation may help explain why deer pellets densities do not seem to reflect the population trend. Additionally, plants leafing out so soon, deer pellets may have transitioned earlier to feces that reflect their summer diet and are formed more as patties. Hard pellets are more durable against moisture than patties which dissolve into smudges. Many of these apparent smudges were observed this year.

Deer pellet surveys can be a valuable tool for quantifying the magnitude of a population crash. However, they are probably not sensitive enough to detect gradients of change and are vulnerable to the factors mentioned above. The last population crash followed a big snow event in the winter of 1997/98 (shown

as 1998 in Figure 1). The pattern demonstrated following the event is very similar even 5 years since the snow event. This is likely just coincidence but it worth pondering.

Anecdotal reports suggest that the population recovery is continuing despite what deer pellet surveys suggest. Harvest is 2.4 times higher than at its lowest point in 2013. Reports from hunters during the 2015 hunting season indicated that harvested animals were very fat. The last three winters have been very mild and most hunters believe that animals have fared well as a result. However, most people agree that the population is still low but improving.

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Figure 1: Mean Pellet Groups/Plot RY97-RY16

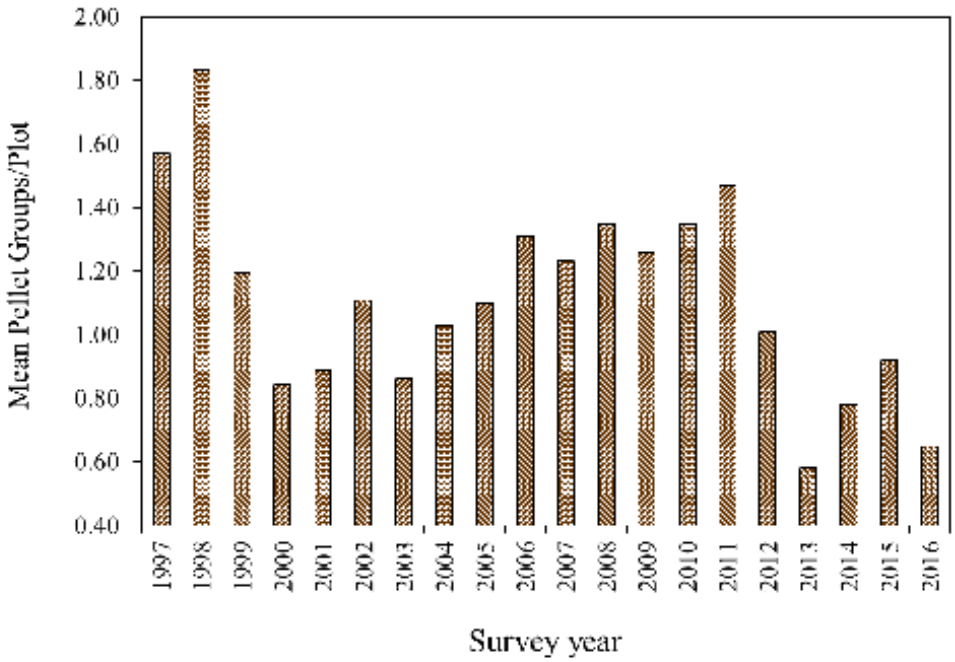


Figure 2:

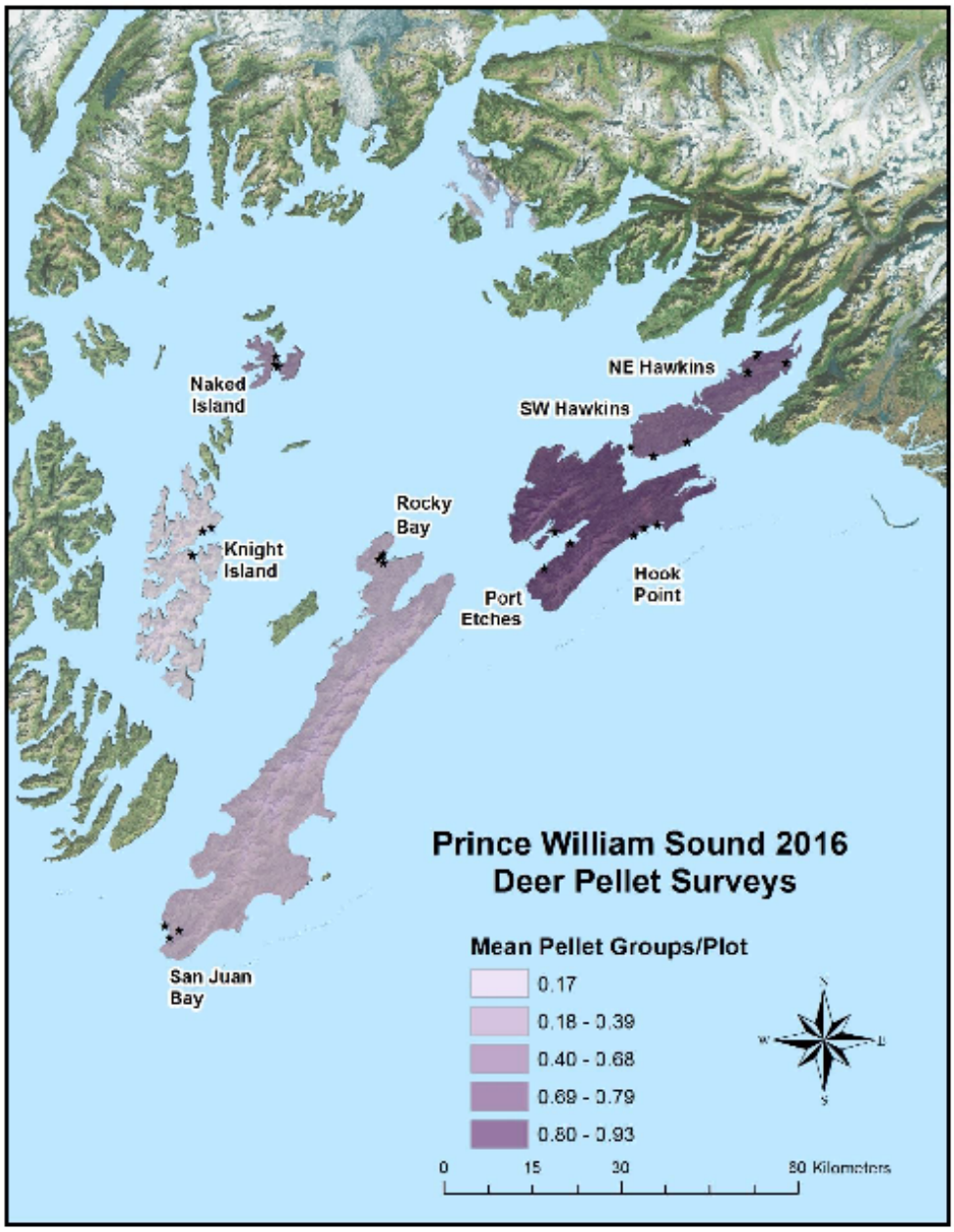
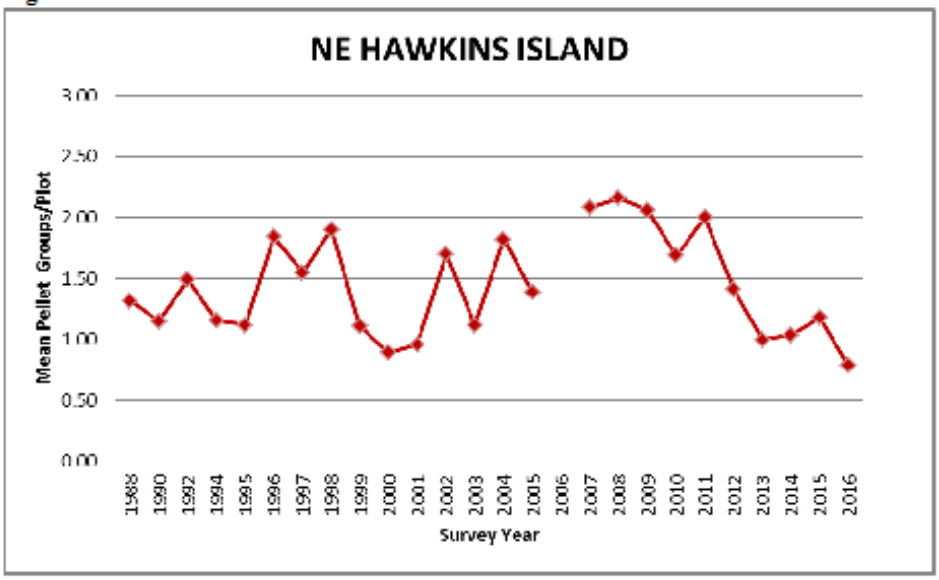

Naked Island
NE Hawkins
SW Hawkins
Rocky Bay
Knight Island
Hook Point
Port Etches
San Juan Bay
Prince William Sound 2016
Deer Pellet Surveys
Mean Pellet Groups/Plot
0.17
0.18 - 0.39
0.40 - 0.68
0.69 - 0.79
0.80 - 0.93
0
15
30
60 Kilometers

Figure 3:



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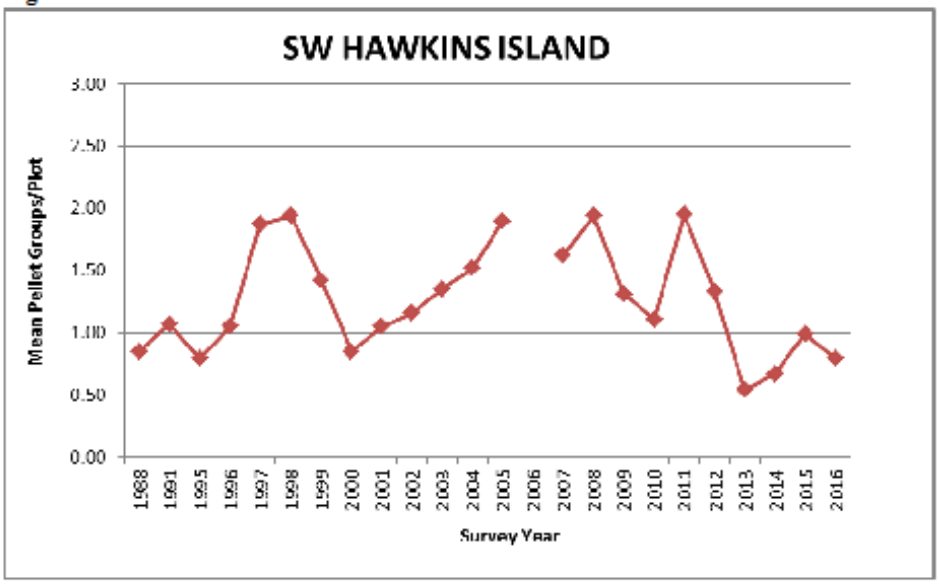

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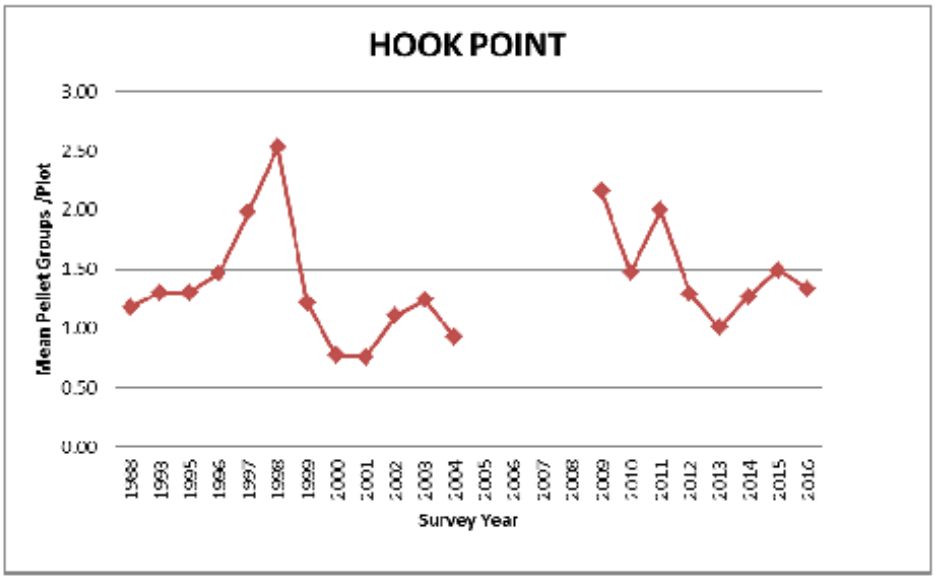

HOOK POINT
Mean Pellet Groups /Plot
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1988
1993
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Survey Year

Figure 6:

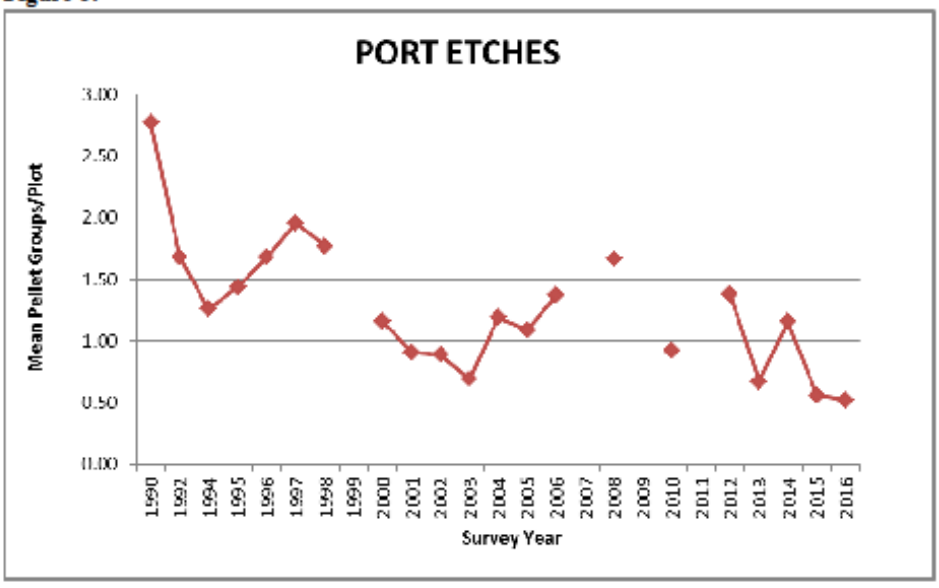
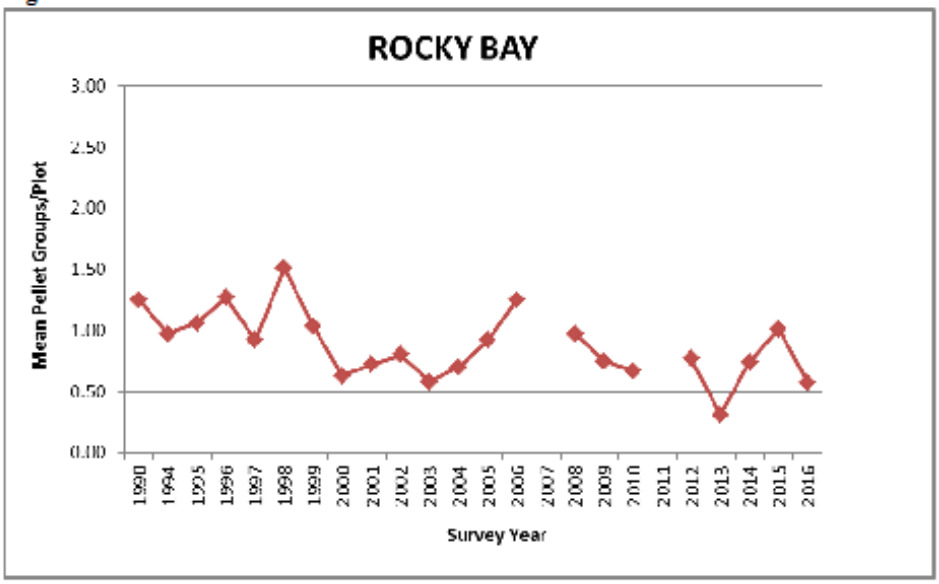

PORT ETCHES
Mean Pellet Groups/Plot
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1990
1992
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Survey Year

Figure 7:



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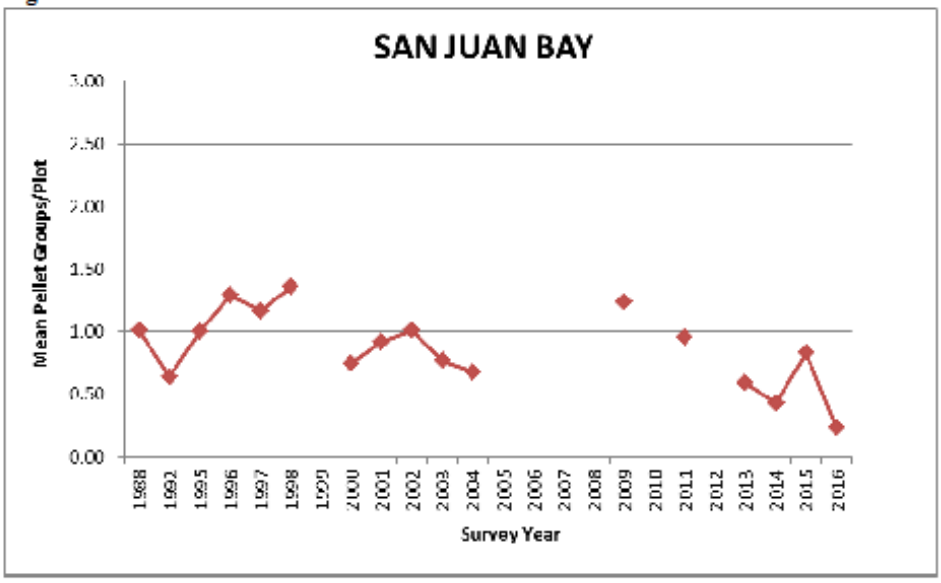

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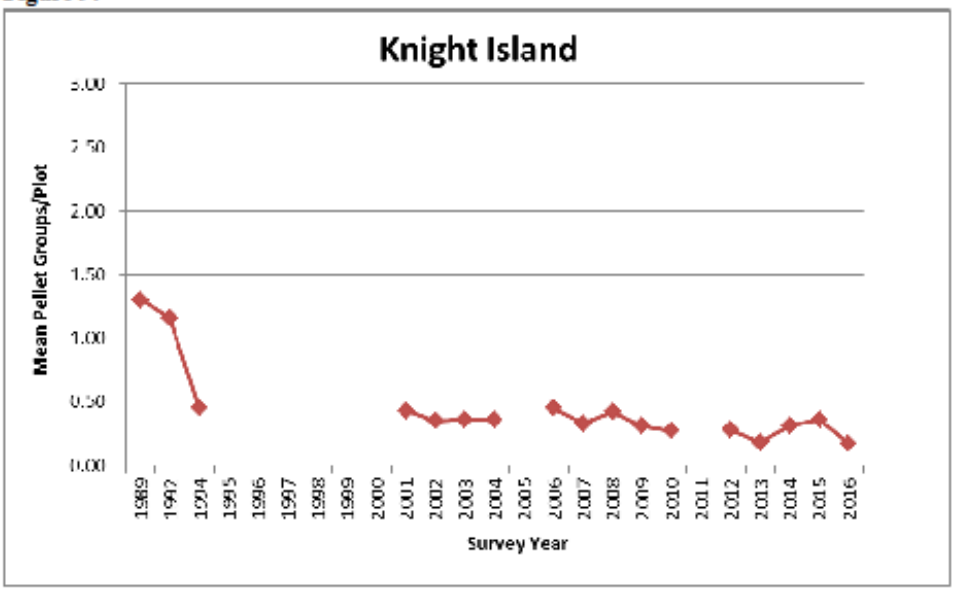
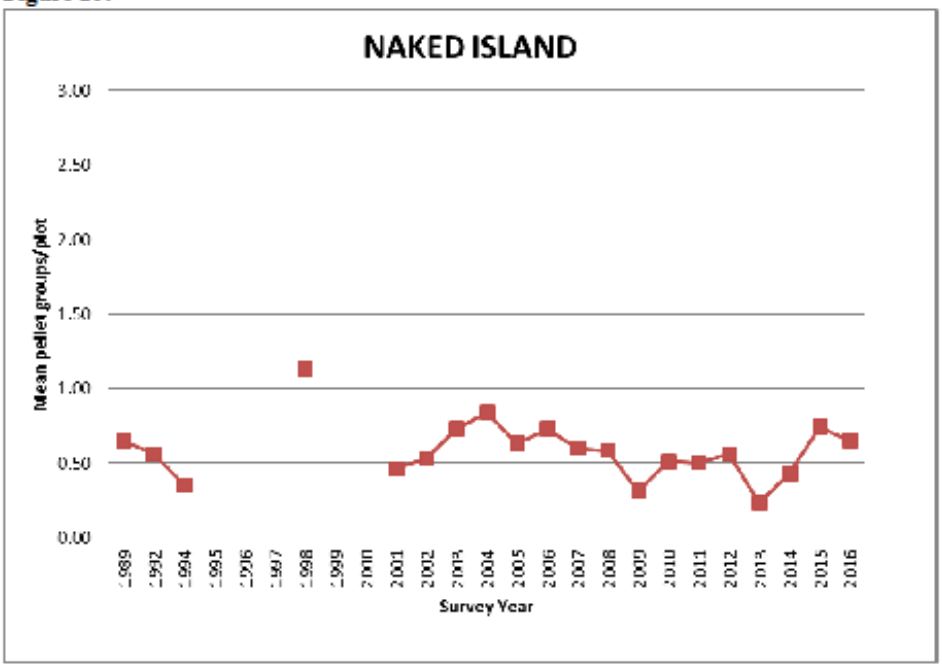


Figure 10:

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