ADFG Deer Population Monitoring Program

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Main Objective: Monitor changes in deer numbers

Why?: Deer are an important species for subsistence and the most widely hunted species in Southeast Alaska.

Influences:
Winter severity: thought to be the most important factor affecting deer numbers. But there is an interplay with this and other factors.

Hunting and predation: is generally thought to be largely compensatory.
However, where winter kill has reduced populations, hunting (primarily in heavily roaded areas near communities) or predators can become additive and keep deer at lower population levels.

Range Deterioration/Loss: where over-browsing or timber management has reduced forage availability or primary winter range (POG <1500 feet), winter severity can take a higher toll.

Management Options:
Hunting Closures or Restrictions (usually sex or location-specific)
Predator Control

Historical Deer Population Assessment Techniques: (Discontinued or Intermittent Use)

Winter mortality beach surveys – discontinued in recent years because of variability. Many deer die up in the woods rather than on beaches, and the proportion of deer in the woods or in the beach fringe varies each winter. Deer often die below the high tide line, so carcases wash away (sometimes arriving elsewhere). Merriam indicated inter-year correlation was low, but better correlation with winter range utilization.

Winter track and spotlight Counts: used historically in some areason roaded systems. Biased because it is restricted to deer use of habitats that exist around roads. Not practical for remote areas of southeast Alaska, largely discontinued.

Line-distance transects: mention of this in the early literature, which indicated they do not work well in the densely vegetated habitats of southeast Alaska. Discontinued.

Aerial alpine surveys – conducted in late summer. Counts can be variable because some individuals remain hidden in forest. Time of day and weather affect results. Merriam indicated correlation between surveys was low. Still used intermittently as an indication of minimum numbers of deer. Radio collars with sightability analysis could improve understanding of results. Rich Lowell will discuss in his area overview.

Current Deer Population Assessment Techniques

Primary Methods Employed:

- Deer Harvest Statistics: Hunter Success and Effort
- Deer Pellet Group Counts
- Deer Abundance Estimation (using fecal DNA mark-recapture)

Secondary Methods Being Employed and/or Investigated:

- Aerial alpine surveys (Rich Lowell in GMU 3)
- Forage availability and browse utilization surveys (Regional office GMU 3, 1A)
- Body Composition surveys (Phil Mooney in GMU 4)
- Radio collaring + demographics (Sophie Gilbert study on POW)
- Camera Trapping (potential to monitor deer or their predators)
- GIS analyses of changes in forage availability due to habitat change (loss/succession) using the USFS FRESH model.

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Deer Pellet Group Counts

Pellet Group count methodology established in early 80's and conducted in cooperation with USFS for 30 years in SEAK as our primary index of deer abundance.

Methods: within each watershed, survey 3 straight-line transects (~2500m length), in POG habitat only, usually traversing from 0-1500 feet of elevation. PG outside of the 1m wide transect are not counted, deviations from the bearing are only taken to avoid dangerous obstacles.

Pros: Easy to implement widely across the region, relatively inexpensive, field work can provide yearly insights.

Cons:

Index: do not get an actual unbiased estimate of deer numbers

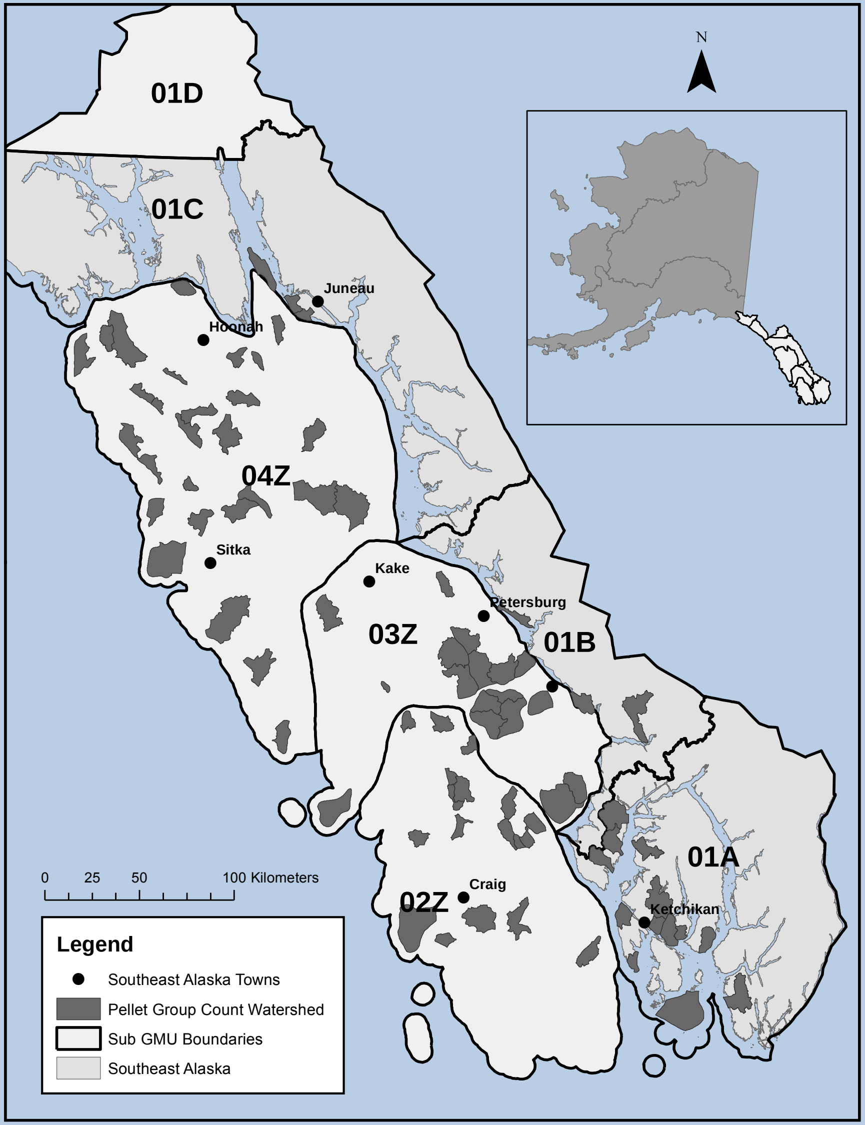
Imprecise: able to detect a only a 30% (or greater) change in trend.

Inefficient for management: because pellets persist beyond life of animals there is a lag-time before you will see any effect. Further, rather than die, PG numbers may change due to confounding effects rather than actual increases or decreases in deer.

Confounding factors: sampling design, observer bias, PG detectability, variability in conditions (winter weather), defecation rates, and pellet persistence can all influence changes in PG numbers

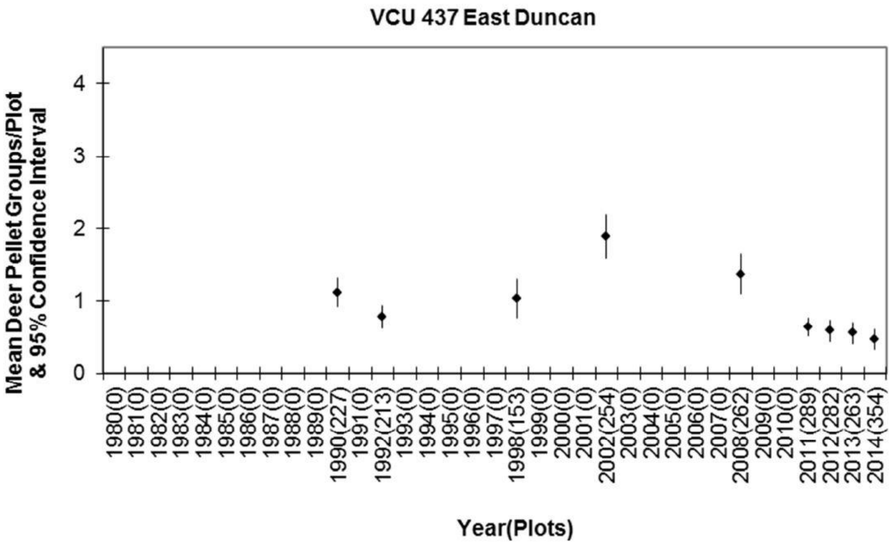
Traditional Pellet Group Counts

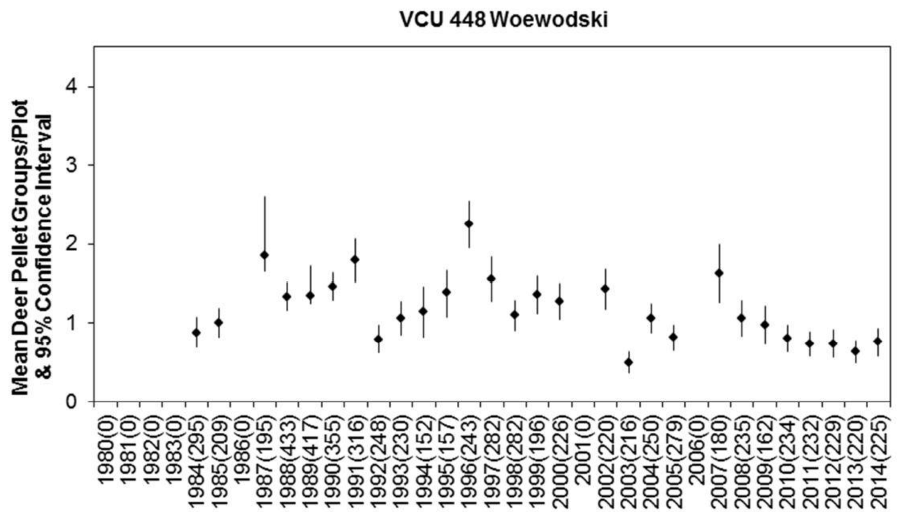
- 85 watersheds surveyed over 30 years
- 12-24 watersheds surveyed per year for the region historically. Less recently.
- Some surveyed only once. Others every 1-5 years.
- Some discontinued due to changes in priority or habitat (logging)
- New watersheds added as management concerns arose.

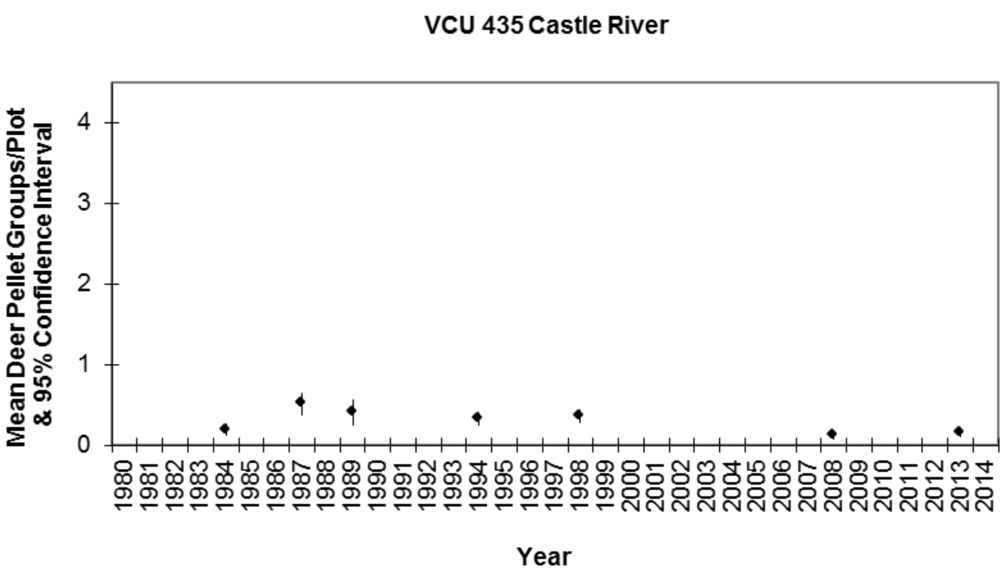


Traditional Deer Pellet Group Counts

GMU 3Z: Kupreanof and Mitkof Islands

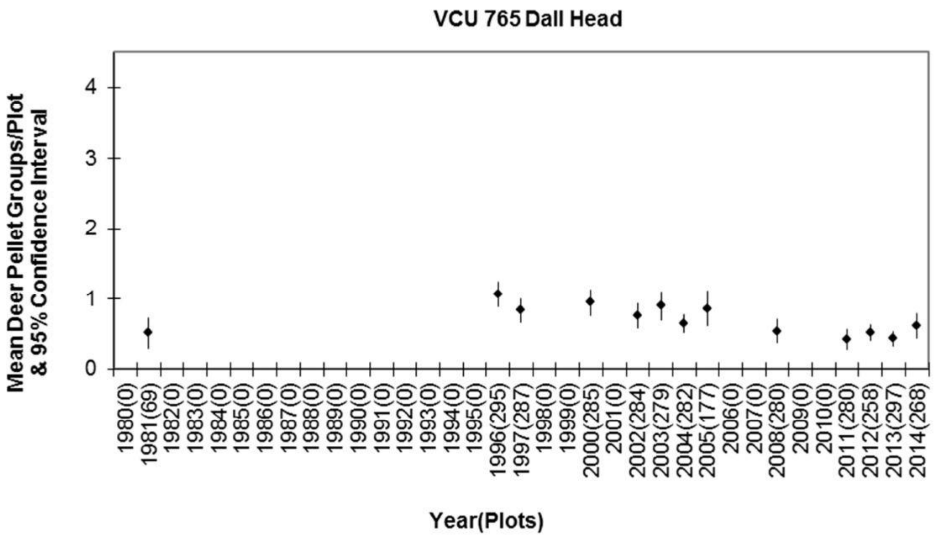


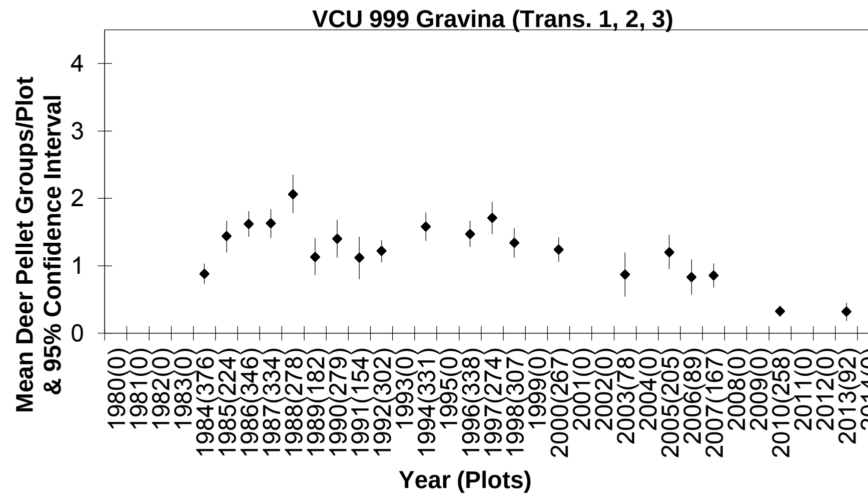


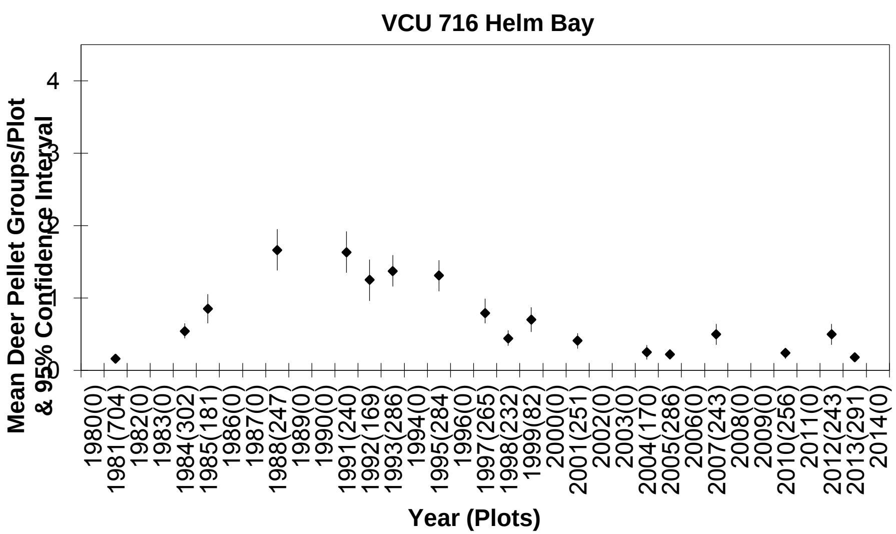


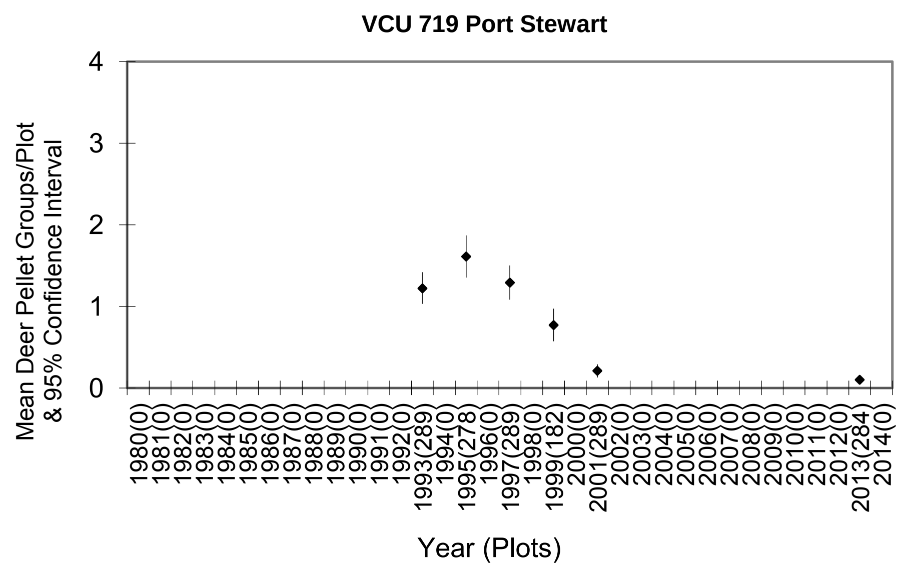
Traditional Deer Pellet Group Counts

GMU 01A: Gravina Island and Cleveland Peninsula









Deer Mark-Recapture Using Fecal DNA

Method:

Surveyors follow deer trails along general transects/bearings to maximize potential for fresh pellet collection. All available habitats are surveyed below 1500 feet. All non-sampled pellet groups on “path” are counted, all ‘fresh’ pellets anywhere (on or off ‘path’) are collected.

Advantages (over traditional PG survey trend data)

- Actual point-estimate of abundance or density can be achieved
- Fewer confounding effects (sample all habitats and use fresh pellets)
- Can wait longer between sampling and still have valid comparison, while trend data requires more frequent (ideally yearly) sampling.

Disadvantages (over traditional PG survey trend data)

- More expense, effort, and time required for each watershed (weeks versus a day).
- Not practical when densities are very low (not enough samples/recaptures).
- Not practical to get a “snapshot” of many watersheds across the region

Deer DNA Density/Abundance Estimation

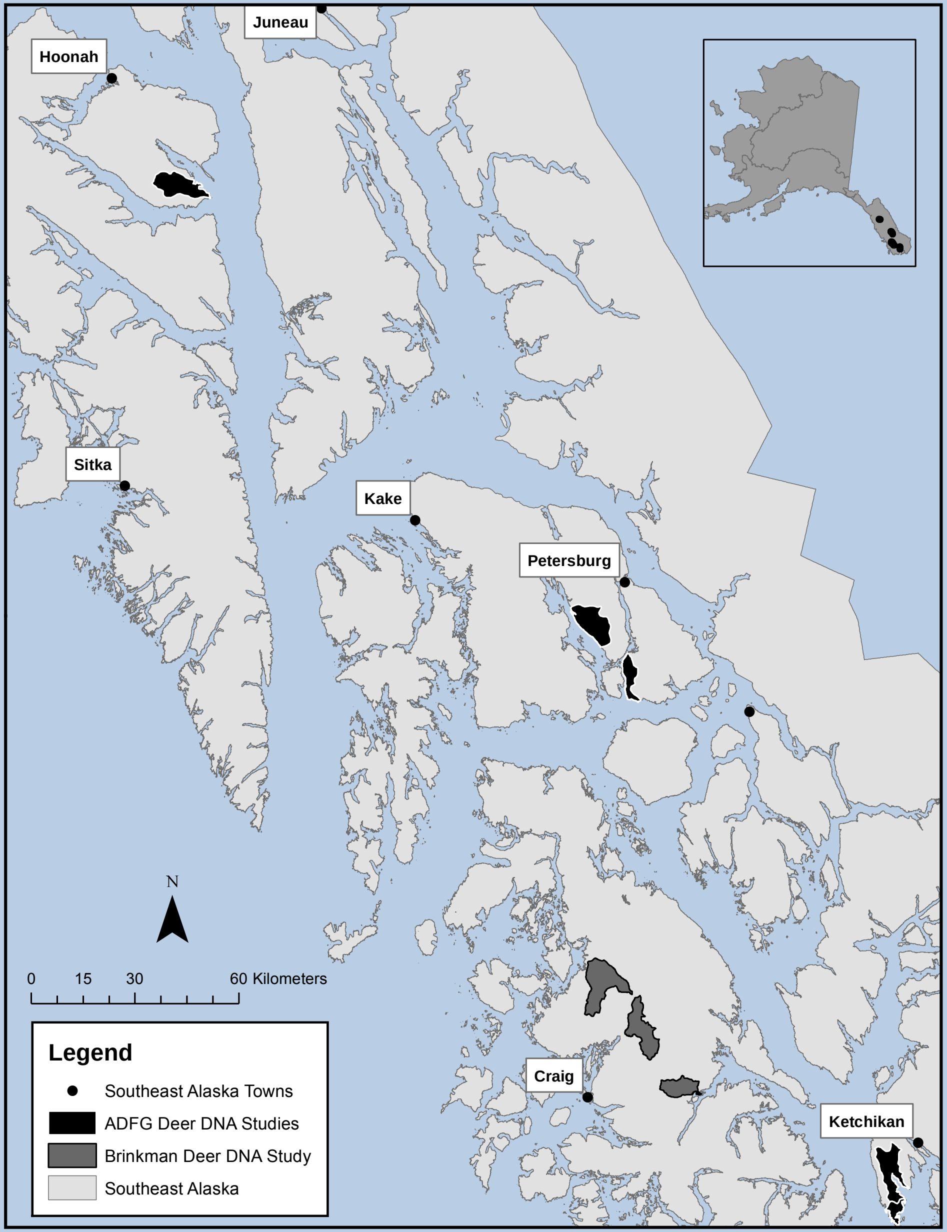
(Mark-recapture estimates using fecal DNA)

Density Estimates completed:

Prince of Wales Island (Brinkman et al. 2011)
Maybeso, Steelhead, Staney Watersheds
Managed: 9.4 deer/km2
Unmanaged: 12.2 deer/km2

Chichagof Island (McCoy et al. 2013):
Pavlof Watershed
"Comparable Analysis" of same transects
2010: 6.5 deer/km2
2011: 8.4 deer/km2

2014 (In progress):
Kupreanof (East Duncan)
Mitkof (Woewodski)
Gravina (Dall Head)
Gravina (Bostwick Inlet/Road system)



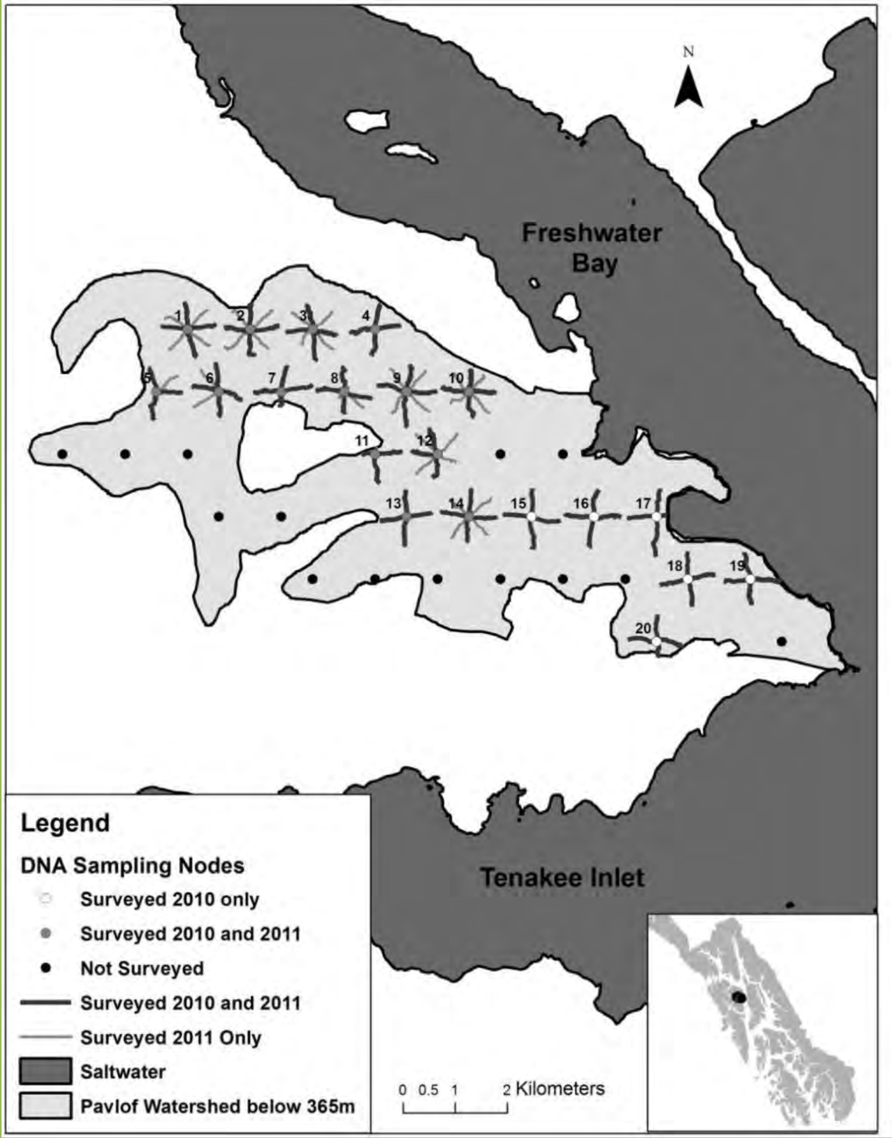
Chichagof Sampling: Lessons Learned

-Node and spoke design logistically inefficient.

-Single-visit mark-recapture is possible in higher density areas. More cost effective and easier logistically, but yields slightly more variable estimates.

-To compare density estimates between years, sample at ~ equal intensity and locations on the landscape (density varies across the landscape, even within watersheds).

-Higher density of transects reduces variability and may yield more precise estimates (maximizes recaptures)



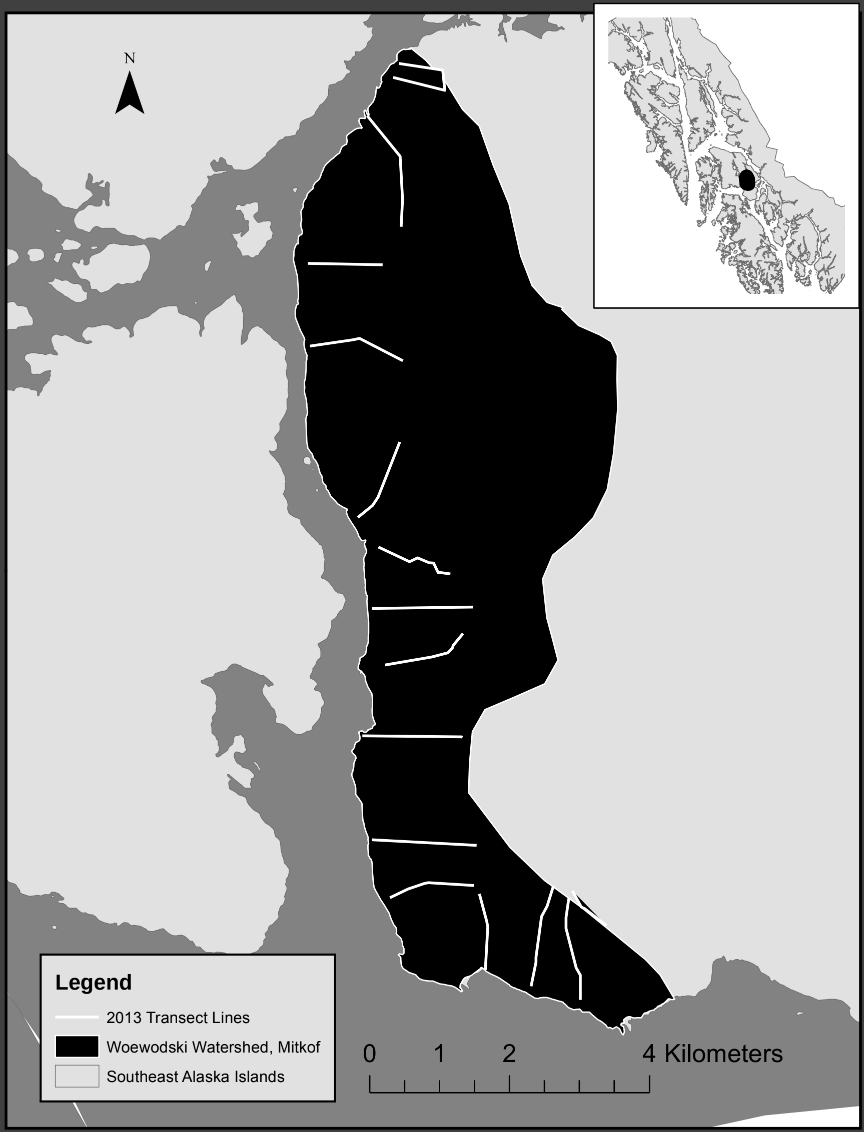
Deer DNA Sampling Effort & Results

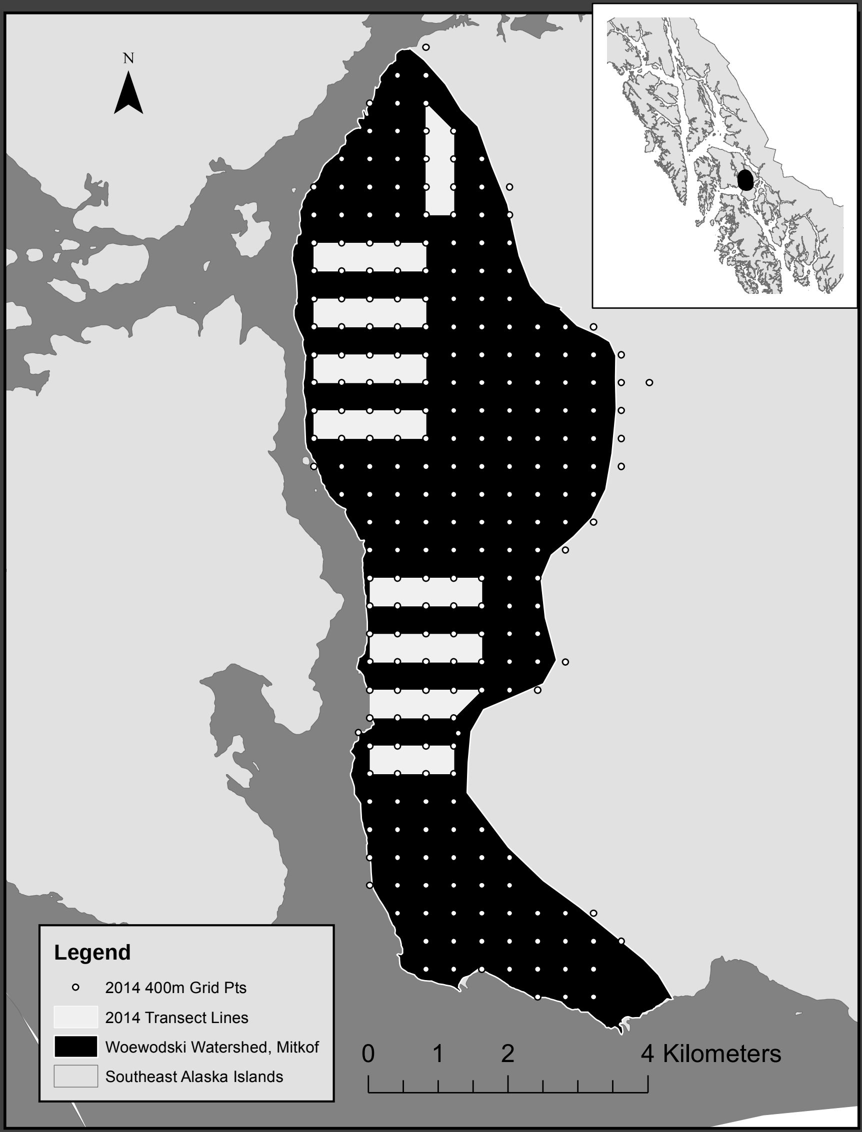
Year	Location	~Transect Length(m)* occasion	Samples Taken	Pellet Groups (PG) Seen	Samples per 20-m transect	Pellet Groups per 20-m transect
2011	Chichagof[a]	29,363	169	2,054	0.12	1.40
2013	Kupreanof- E. Duncan[b]	17,219	19	631	0.02	0.73
2013	Mitkof- Woewodski[b]	14,936	13	745	0.02	1.00
2013	Gravina - Dallhead[b]	21,479	16	662	0.01	0.62
2013	Gravina - Bostwick[b]	34,190	29	1332	0.02	0.78

[a] Includes transects (N, S, E, W) on nodes 1–14, 1st sampling session only.

[b] Includes all transects and data (only one sampling session conducted).

Evolving Sampling Designs: Mitkof Island 2013-14





Multiple capture sessions and higher transect density are needed where deer density is lower.

Deer DNA Sampling Effort & Results

Year	Watershed (Session)	Transect Length (M)	Samples	Pellet Groups on Path	Samples per 20-m transect	Pellet Groups per 20-m transect
2013	Kupreanof – E. Duncan	17,219	19	631	0.02	0.73
2014	Kupreanof – E. Duncan	106237	87	2079	0.02	0.39
	Session1	57367	55	1838	0.02	0.64
	Session2	48870	32	241	0.01	0.10
2013	Mitkof - Woewodski	14,936	13	745	0.02	1.00
2014	Mitkof - Woewodski	139743	147	2615	0.02	0.37
	Session1	54863	74	2076	0.03	0.76
	Session2	46713	35	409	0.01	0.18
	Session3	38167	38	130	0.02	0.07
2013	Gravina - Bostwick	34,190	29	1332	0.02	0.78
2014	Gravina - Bostwick	180748	210	3232	0.02	0.36
	Session1	74994	128	2392	0.03	0.64
	Session2	76628	62	676	0.02	0.18
	Session3	29126	20	164	0.01	0.11
2013	Gravina – Dallhead	21479	16	662	0.01	0.62
2014	Gravina – Dallhead	87614	101	2442	0.02	0.56
	Session1	46877	63	1941	0.03	0.83
	Session2	40737	38	501	0.02	0.25

Deer DNA Genotyping Results

Year	Island	Total Samples	Samples that Genotyped	Genotyping success	Male	Female	Unknown Sex	Individuals	# Indiv. Recaptured (Within Year)
2012	Kupreanof	37	31	84%	5	20	1	26	4
2013	Kupreanof	37	32	86%	8	17	1	26	5
2014	Kupreanof	87	73	84%	19	40	2	61	9
2012	Mitkof	33	24	73%	5	9	2	16	6
2013	Mitkof	13	10	77%	3	6	1	10	0
2014	Mitkof	146	92	63%	24	45	4	73	16
2013	Gravina	51	48	94%	9	27	0	36	10
2014	Gravina	309	250	81%	80	91	21	192	48

Where to from here

General Monitoring Strategy:

DNA-based monitoring in a few watersheds each year, then re-do in 3-5 years

Continue with pellet-group counts in indicator watersheds in 1A an 3Z

Continue to investigate methods to reduce cost and improve sampling efficiency

Intensive Management Areas:

- Need to further analyze 2014 results in order to make a plan for future efforts
  - spatial patterns of recaptures
  - temporal patterns of recaptures

- Investigate other research methods:
  - collaring for movement and sightability with alpine surveys
  - trail cameras for deer or predator monitoring
  - further vegetation monitoring
  - GIS-based analyses of habitat/forage change

QUESTIONS?