Deer Management Report and Plan, Game Management Unit 4:

Report Period 1 July 2016–30 June 2021, and

Plan Period 1 July 2021–30 June 2026

Stephen W. Bethune

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Alaska Department of Fish and Game Division of Wildlife Conservation

Species Management Report and Plan ADF&G/DWC/SMR&P-2022-27

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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 public website.

This species management report and plan was reviewed and approved for publication by Richard Nelson, Management Coordinator for Region I for the Division of Wildlife Conservation.

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Cover Photo: Doe feeding in alpine as the moon rises over Southeast Alaska. ©2019 ADF&G. Photo by Stephen Bethune.

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Purpose of this Report

This report provides a record of survey and inventory management activities for Sitka black-tailed deer (*Odocoileus hemionus sitkensis)* in Game Management Unit 4 for the 5 regulatory years 2016–2020 and plans for survey and inventory management activities in the next 5 regulatory years, 2021–2025. A regulatory year (RY) begins 1 July and ends 30 June (e.g., RY14 = 1 July 2014–30 June 2015). This report is produced primarily to provide agency staff with data and analysis to help guide and record agency efforts but is also provided to the public to inform it of wildlife management activities. In 2016 the Alaska Department of Fish and Game's (ADF&G, the department) Division of Wildlife Conservation (DWC) launched this 5-year report to report on trends more efficiently and to describe potential changes in data collection activities over the next 5 years. It replaces the deer management report of survey and inventory activities that was previously produced every 2 years.

I. RY16–RY20 Management Report

Management Area

Unit 4 encompasses Admiralty, Baranof, Chichagof, and adjacent islands (Fig. 1). It consists of approximately 5,820 square miles of land and over 5,000 miles of shoreline. Approximately 90% of the unit is Tongass National Forest lands. Sitka, located on Baranof Island, is the largest community in the unit with approximately 8,500 residents. Other communities include Hoonah, Pelican, Elfin Cove, and Tenakee Springs on Chichagof Island; and Angoon on Admiralty Island. All residents of Unit 4 are qualified to deer hunt under federal subsistence regulations.

Northeast Chichagof Island east of Port Frederick and north of Tenakee Inlet is managed separately from the remainder of Unit 4 with a slightly more conservative bag limit (3 deer total versus 6 deer total; Fig. 2). This area traditionally has higher than average (for Unit 4) snowfalls and is highly roaded due to past logging activity.

Unit 4 has 3 large and 1 small federally protected wilderness areas. The West Chichagof-Yakobi Wilderness was Alaska's first federally designated wilderness area and was the result of a citizen petition led by Chuck Johnstone. Johnstone co-founded the Sitka Conservation Society in opposition to large scale commercial logging taking place in Southeast Alaska. It encompasses 265,286 acres and includes most of Yakobi Island and the entire west side of Chichagof Island as well as numerous smaller associated islands. The 956,255-acre Kootznoowoo Wilderness is all of Admiralty Island except for the Mansfield Peninsula and Alaska Native Corporation lands on the west shore associated with the village of Angoon. The South Baranof Wilderness is 319,568 acres and encompasses much of the south half of Baranof Island. All 3 of these wilderness areas were designated by Congress in 1980 as part of the Alaska National Interest Lands Conservation Act. The fourth designated wilderness is the Pleasant/Lemesurier/Inian Islands Wilderness. The 23,151 acres are situated in Icy Straits between the north end of Chichagof Island and Glacier Bay National Park to the north. These islands were designated by Congress in 1990.

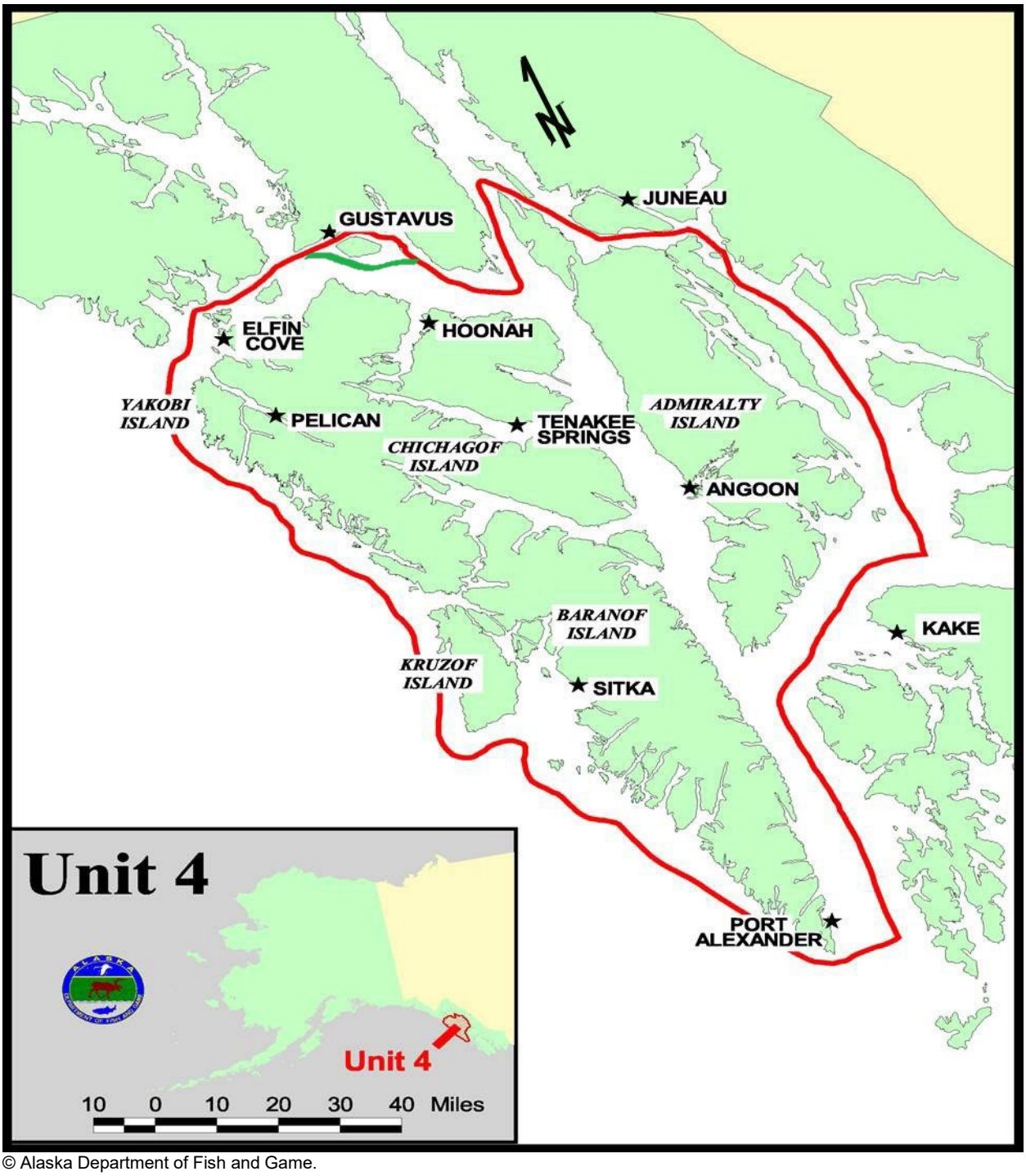

Figure 1. Map of Game Management Unit 4. Note that there is a new boundary line near Pleasant Island shown in green.

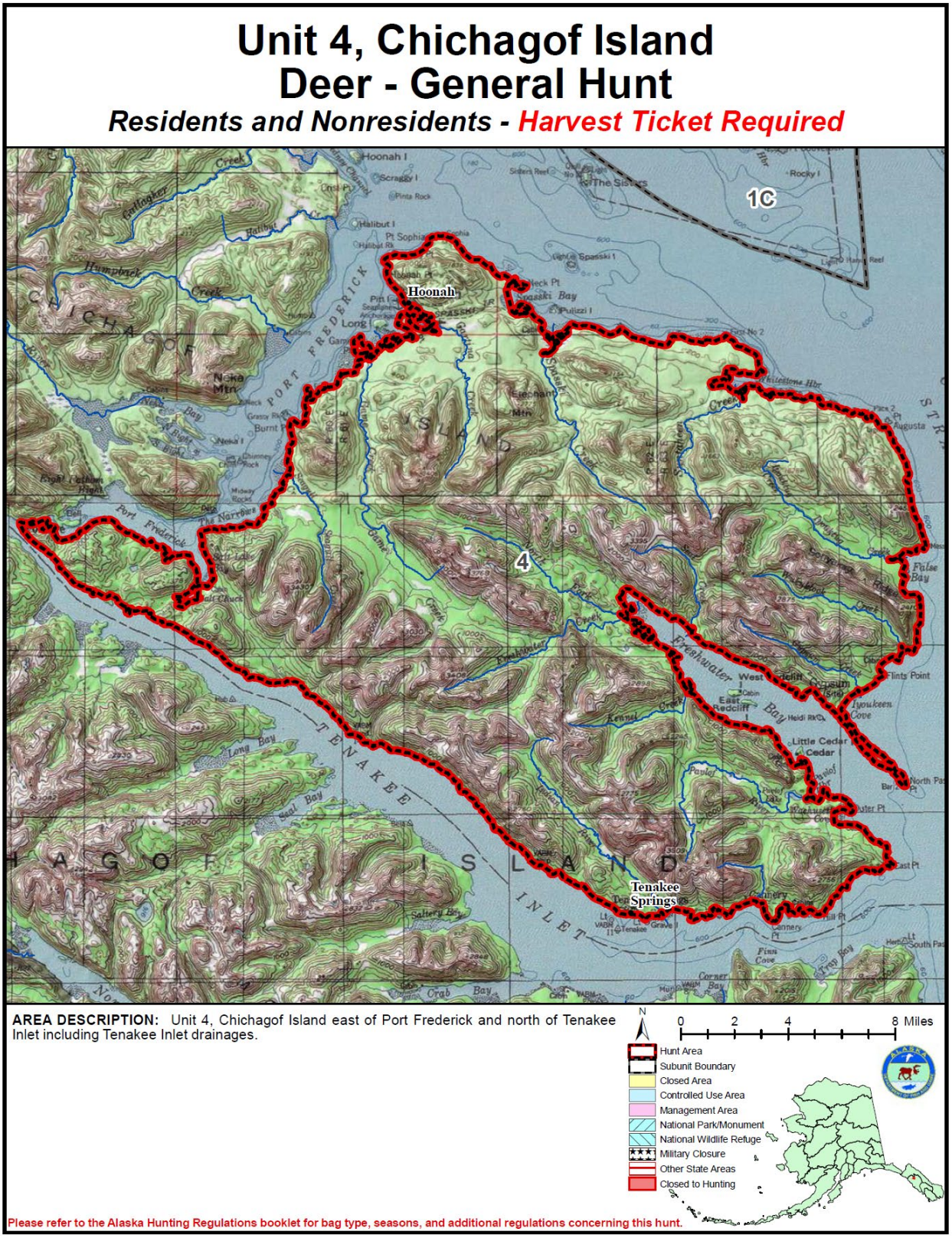

Figure 2. Northeast Chichagof Island general deer hunt area as shown in the Alaska Hunting Regulations.

Some of the protections afforded to these wilderness areas include prohibitions on commercial enterprises (except guides and outfitters), building new roads, timber harvest, the use of motorized land vehicles (except snow machines), and helicopters.

Beginning in RY22, Pleasant Island will be included in Unit 1C rather than Unit 4. This decision was made by the Board of Game (BOG) at the March 2022 statewide meeting. Pleasant Island is much more ecologically and geographically associated with the Gustavus forelands than Chichagof Island. For management purposes, regulations for Unit 1C are more appropriate than Unit 4 regulations. For example, there will now be opportunities for black bear hunting on Pleasant Island and more conservative deer bag limits.

Unit 4, like most of Southeast Alaska, has a maritime climate with moderate summer and winter temperatures and high precipitation (U.S. climate data 2022). Temperatures (Fahrenheit) range from the mid-30s in the winter to mid-50s in the summer. Rainfall in Sitka averages approximately 87 inches per year, but totals are highly variable from year to year and within the unit. For example, Little Port Walter on the southeast coast of Baranof Island, one of the rainiest places in North America, recorded 216 inches of rain in 2019 (NOAA [n.d.]). Sitka averages 33 inches of snow annually, but again, annual snowfall is highly variable across the unit and from year to year. In some years deep and persistent snow can accumulate at sea level in the northern and eastern portions of the unit.

The landscape of Unit 4 is characterized by steep and rugged terrain with mountains, fjords, wetlands, estuaries, and short, swift rivers. Elevation within Unit 4 ranges from sea level to 5,328 feet. Predominant vegetative communities occurring at low-moderate elevations (<1500 feet) are dominated by western hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*), with western red cedar (*Thuja plicata*) and Alaska yellow-cedar (*Chamaecyparis nootkatensis*) old-growth coniferous forests. Mixed-conifer muskeg and deciduous riparian forests are also common. Mountain hemlock (*Tsuga mertensiana*) dominated forest comprises a subalpine, timberline band between 1,500- and 2,500-feet elevation. Because of the high rainfall, natural disturbance to the forest occurs via landslides and wind-throw events rather than fire.

Unit 4 is relatively isolated from the mainland of Southeast Alaska and supports a limited diversity of land mammals. Sitka black-tailed deer and brown bears (*Ursus arctos*) are the only large native land mammals. In 1923, mountain goats (*Oreamnos americanus*) were introduced to Baranof Island. However, recent genetic evidence (Shafer et al. 2011a, Shafer et al. 2011b, Shafer et. al 2012) suggests that the island may have supported a vestigial native population at the time of the introduction. Unit 4 supports a high density of brown bears; and bears occasionally take both fawn and adult deer. Wolves are absent from the unit (except for Pleasant Island which was formerly part of Unit 4). Winter severity and range condition are thought to limit deer in Unit 4.

Summary of Status, Trend, Management Activities, and History of Deer in Unit 4

Sitka black-tailed deer are native to Southeast Alaska and present throughout Unit 4. Deer are extremely important to local residents for food and recreation and to a lesser extent for the commercial guiding industry. Bucks in Unit 4 generally develop smaller antlers than deer on

nearby Prince of Wales Island or on Kodiak Island, so they are not typically targeted by trophy hunters. Nonetheless Unit 4 provides abundant deer hunting opportunity and a greater harvest than any other game management unit in Alaska. Over the past 5 years (RY16–RY20), approximately 34% of the statewide deer harvest has come from Unit 4, compared to 31% from Unit 8 (Kodiak Island), and 14% from Unit 2 (Prince of Wales Island)[1].

Significant changes in deer density over time are normal in Unit 4. Periodic declines are attributable to severe winter weather, most importantly deep snow (Olson 1979). Deer populations were low in the late 1940s following years of high winter mortality. By 1956, deer increased to exceed carrying capacity (Klein and Olson 1960). In recent history severe winters appear to be on an 11-year cycle, with intervening mild winters. Most winters in Unit 4 were mild from the mid-1970s through 1987–1988, with high survival of fawns and adult deer. However, during the winter of 1988–1989, persistent deep snow caused significant deer mortality, but that was a short-term setback. A series of mild winters, beginning in 1999 and extending through 2005, allowed the population to rebuild to a point where it likely approached or exceeded the habitat capability needed even during a moderate winter (Mooney 2015).

The winters of 2006–2008 set new records for snow depth not only in Unit 4 but throughout much of Southeast Alaska. Based on data collected from aerial surveys, boat-based shoreline condition surveys, mortality surveys, road surveys, anecdotal information from hunters who saw few deer in alpine areas during fall 2007 and 2008, guides, and project crews working in the area; deer mortality on heavily logged northern Chichagof Island was very high, estimated at about 75% by the area management biologist. During late winter and spring of 2007, multitudes of deer were found dead on the beaches and floating in the bays revealing just how devastating the winter had been. Other areas within the unit with more intact natural habitats (i.e., lack of industrial-sized clear-cut logging units) and favorable topographic features did not appear to be hit quite as hard (Mooney 2015).

The winters of 2009–2010 had substantially less snowfall than the previous 3-year period and significantly fewer deer succumbed to winter mortality. We saw noticeable increases in the numbers of fawns and yearlings during our survey and research work, as did hunters. Above average snowfall with a persistent snowpack extending into early May occurred again in 2011 and 2012. However, it appeared that the snow accumulation was more gradual and allowed deer to maintain open paths from the beach fringe timber and the shoreline.

Most recently Unit 4 has experienced 8 consecutive mild winters (winters of 2013–2014 through 2020–2021). Deer are abundant throughout the unit and are likely exceeding severe winter carrying capacity in some watersheds.

The current winter (2021–2022) appears to be on track for a severe winter that could impact deer populations. However, the extent will not be known until spring surveys are conducted.

Most land in Unit 4 is managed by the U.S. Forest Service, Tongass National Forest. Since 1990, both state and federal subsistence hunting regulations have been in effect on federally managed

[1] Alaska Department of Fish and Game. Region I deer harvest reports: Deer harvest database of hunter survey results, 2016–2020, Wildlife Information Network (WinfoNet) [unpublished internal database]. Division of Wildlife Conservation, Anchorage. (Accessed 19 January 2022).

lands in Unit 4. Regulations adopted by the Alaska Board of Game (BOG) apply on all lands in Unit 4. The Federal Subsistence Board promulgated regulations that apply only on federal lands and ensure a subsistence priority on those lands, usually through more liberal season dates and bag limits. Although the 2 sets of regulations were initially similar, they have diverged over time. This dual-management authority is a management concern because it confuses hunters and makes enforcement problematic.

Although management actions will always be a secondary and distant factor to weather with regards to the influence on deer populations, hunting can be a limiting factor in local areas when deer are concentrated on beaches due to deep and persistent snowpack (Reynolds 1979). The department may adjust season and bag limits by emergency order if needed to prevent additive harvest. This was done most recently in 2007 when the harvest of does was restricted in-season for the Northeast Chichagof Controlled Use Area. The Federal Subsistence Board also closed this area to the taking of does. This restriction, to help the deer population recover, remained in effect through the RY12 hunting season. By RY13, summer deer surveys indicated deer numbers were sufficient to lift this restriction (Mooney 2015).

Summer and winter home range areas vary from 30–1,200 acres, and for radiocollared deer on Admiralty Island, they average about 200 acres (Schoen and Kirchhoff 1990). For comparison, a National Football League (NFL) field is 1.3 acres. Migratory deer have larger annual home ranges than resident deer. The average distance between summer and winter home ranges is 5 miles for migratory deer and one-half mile for resident deer. During winter, movement of deer between watersheds appears to be minimal and the distribution of deer at various elevations is heavily influenced by changing snow depth. During extreme snow accumulation, many deer congregate in heavily timbered stands at lower elevations, and some may even move on to the beach where tides melt snow. McCoy et. al (2015) conducted one of the first home range analyses of Sitka black-tailed deer using global positioning system (GPS) collars. She found deer on Northern Chichagof Island to have mean summer and winter home ranges of 1,179 acres and 459 acres, respectively. Average migration distance between summer and winter ranges was 2.4 miles. However small sample sizes and lack of entire year data sets for some deer complicate these findings.

Sitka black-tailed deer density estimates on old growth winter range vary widely (10–57 deer/km^2 or 26–148 deer/mi^2; Smith and Davies 1975, Herbert 1979, Brinkman 2009). The most accurate deer estimates to date for Southeast Alaska come from Brinkman et al. (2011), who estimated density using a fecal DNA-based mark-recapture design on Prince of Wales Island. In addition, McCoy et al. (2014) also estimated density using fecal DNA with both mark-recapture and spatial mark-recapture models on northeastern Chichagof Island. Brinkman et al. (2011) estimated 12 deer/km^2 (31 deer/mi^2) in unmanaged (unlogged) forest lands with a range of 8.5–17 deer/km^2 (22–44 deer/mi^2) across all habitat types. McCoy et al. (2014) estimated densities ranging from 4.4 deer/km^2 (11.4 deer/mi^2) to 11.9 deer/km^2 (30.8 deer/mi^2) based on the year and analysis used. In comparison, Kirchhoff (1994) estimated an average density of 35.6 deer/km^2 (92 deer/mi^2) based on pellet group counts. Density-estimate techniques using fecal DNA are some of the most advanced applications available to managers and can provide precise estimates; but they can be expensive, labor intensive, and results are only applicable to small areas.

Predation likely has little effect on deer populations in Unit 4; wolves are absent from the unit. Brown bears occur at high densities throughout Unit 4 and can be effective predators of fawns but less so for adult deer (Zager and Beecham 2006). The effects of clear-cut logging have and will continue to reduce carrying capacity for deer in heavily logged landscapes including northern Chichagof and Baranof Islands. Illegal hunting likely influences deer abundance in localized areas, generally in logged landscapes with road systems that are close to villages.

Pellet-group surveys have been the most common way trends in deer populations have been monitored by ADF&G. Reports from hunters, harvest data, deer harvest reports (which include effort even if no deer are harvested), and general observations also contribute to the overall picture. In some years, aerial surveys, deer body condition surveys, and mortality surveys are also conducted.

As of 2021, all samples collected from Alaska deer were free of chronic wasting disease.

Management Direction

Existing Wildlife Management Plans

Strategic Plan for Management of Deer in Southeast Alaska, 1991–1995, Population Objectives (ADF&G 1991).

Goals

- Manage for high sustainable harvest opportunity, that to the extent possible prevents deer from damaging winter range, commonly defined as productive old-growth forest below 800-feet elevation with some southerly aspect.

- Following winters with high mortality, reduce harvest, particularly of does, to rebuild the population while maintaining reasonable harvest opportunity.

Codified Objectives

Amounts Reasonably Necessary for Subsistence Uses

The Alaska Board of Game has made a positive subsistence finding for deer in Unit 4 with an amount necessary for subsistence (ANS) of 5,200–6,000 deer annually.

Intensive Management

As established by the Alaska Board of Game during its fall 2000 meeting in response to the Intensive Management of Game Law (AS 16.05.255 (k)(4)), the management goal for deer in Unit 4 is to maintain a population of 125,000 deer and an annual harvest of 7,800 deer (5AAC 92.108).

MANAGEMENT OBJECTIVES

- Maintain a population capable of sustaining a mean reported harvest of at least 1.5 deer per hunter.
- Maintain a population capable of providing a minimum reported success rate of 1 deer killed per 4 days of hunting effort.
- Maintain the male component of the deer harvest at a minimum of 60%.

MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Conduct deer pellet group transects.

Data Needs

In terms of hunter interest and harvest, deer are by far the most important hunted species in Region I. Monitoring abundance and trend is particularly important for hunted wildlife populations because of the need to set appropriate seasons and bag limits. Pellet-group transects are the most common method used to monitor deer population trends in specific watersheds throughout the unit and region. They are intended to document large changes (>30%) in deer density. The data also permit general comparisons of deer abundance among areas and years (McCoy 2011).

Deer pellets can give a general index of population level. Kirchhoff and Pitcher (1988) recommended the following classifications for Southeast Alaska: <1.00 mean pellet groups/plot (MPGP) is a low-density population, 1.00–1.99 MPGP is a moderate-density population, and >2.00 MPGP is a high-density population.

Methods

Deer-pellet surveys have been conducted in Southeast Alaska each spring since 1981. Biologists and technicians conduct these surveys by walking a transect line about a mile long stretching from the beach to the subalpine and counting deer pellet groups in a meter wide line. Deer defecate with great regularity, 12 times per day on average. Considering this rate as a constant, and that the pellets persist in the environment, it is possible to take information on the number of pellet groups observed and relate that back to the size of the deer herd in a particular area. The same areas are surveyed, so trends can be determined. Biologists consider anecdotal evidence as well as the pellet surveys when evaluating deer population trends. Transects have been established in fixed locations within value comparison units (VCUs) for each Game Management Unit (GMU, unit). VCUs are U.S. Forest Service (USFS) timber management units and are roughly equivalent to a watershed. Selected VCUs usually have 3 transects. These transects sample deer winter range from sea level to 1,500 feet elevation or 125, 20-meter segments, whichever comes first. Transect locations are chosen based on several different considerations, including habitat characteristics, harvest pressure, management concerns, and accessibility. VCUs of higher management concern are monitored on a yearly basis, while others are surveyed

at longer intervals. Over time the monitoring of some VCUs has been abandoned in lieu of monitoring other VCUs, usually in relation to changes in management concerns or habitat changes such as logging (McCoy 2011).

We conduct annual pellet-group surveys after snow melt and before vegetation leaf-out, which is usually during late April or early May. Most pellet group transects begin at sea level, at a marked tree or other landmark, and follow a compass line. One member of a team drags a 20-meter-long chain along the compass line, and an observer follows counting the number of pellet groups within half a meter on either side of the chain, thereby sampling a plot 20 meters long and 1 meter wide. Mean pellet groups per plot (MPGP) is calculated for each transect and for the VCU. Kirchhoff and Pitcher (1988) provided a detailed discussion of objectives, sample design, and field methodology of this program.

ADF&G and the U.S. Forest Service (USFS) cooperate to monitor the population trend in Unit 4. Historically up to 26 watersheds in Unit 4 have been monitored. These pellet counts were conducted off the live-aboard USFS Sitka Ranger boat. This boat has been decommissioned; as a result, reaching most historical survey areas in Unit 4 will be too difficult and/or expensive to conduct in the future. Surveys are now likely limited to watersheds that can be conducted on day trips with smaller vessels (McCoy 2017).

Results and Discussion

In 2017, surveys were completed at Hawk Inlet (Admiralty Island, VCU 128), Pleasant Island (VCU 185), Finger Mountain (Chichagof Island, VCU 247), Range Creek (Baranof Island, VCU 288), Nakwasina (Baranof Island, VCU 300), and Kalinin Bay (Kruzof Island, VCU 305; Table 1).

In 2018, surveys were completed at Barlow Cove (Admiralty Island, VCU 125), Pleasant Island, Finger Mountain, Nakwasina, and Kalinin Bay.

In 2019, surveys were completed at Pybus Bay (Admiralty Island, VCU 182), Pavlof Harbor (Chichagof Island, VCU 218), and Kelp Bay (Baranof Island, VCU 298).

No surveys were conducted in 2020 due to COVID-19 related travel restrictions and mitigations.

Pleasant Island was the only survey location in 2021.

Surveys in Hawk Inlet (2017), Barlow Cove (2018), Pybus Bay (2019), Pavlof Harbor (2019) and Kelp Bay (2019) had not been conducted for many years. Barlow Cove, for example, was last surveyed in 1990. Pybus Bay was last surveyed in 1998. All these surveys yielded higher

Table 1. Unit 4 Alaska deer population trends as indicated by spring pellet-group surveys 2011–2021.

Area	Specific location/VCU[a]	Survey year	MPGP[b]	95% CI[c]	Number of plots
Pleasant Island	185	2015	1.34	1.09–1.59	180
		2016	0.37	0.28–0.46	351
		2017	0.12	0.06–0.17	323
		2018	0.00	0.00–0.00	344
		2021	0.00	0.00–0.00	310
Admiralty Island	Hawk Inlet/128	2017	2.11	1.82–2.41	279
	Barlow Cove/125	2018	2.38	2.10–2.66	351
	Pybus Bay/182	2019	2.82	2.47–3.18	234
Chichagof Island	Finger Mountain/247	2011	4.13	3.48–4.78	209
	Finger Mountain/247	2015	1.86	1.58–2.14	197
	Finger Mountain/247	2017	4.29	3.78–4.81	217
	Finger Mountain/247	2018	3.61	3.14–4.09	261
	Pavlof Harbor/218	2019	2.47	2.17–2.78	295
Baranof Island	Nakwasina/300	2011	3.87	3.11–4.63	192
	Nakwasina/300	2015	2.02	1.71–2.34	207
	Nakwasina/300	2017	4.37	3.35–5.40	230
	Nakwasina/300	2018	3.24	2.76–3.73	229
	Range Creek/288	2017	2.01	1.74–2.29	375
	Kelp Bay/298	2019	2.44	2.14–2.74	257
Kruzof Island	Kalinin Bay/305	2011	1.58	1.25–1.91	232
	Kalinin Bay/305	2015	1.31	1.08–1.54	219
	Kalinin Bay/305	2017	1.91	1.63–2.18	248
	Kalinin Bay/305	2018	1.46	1.22–1.69	257

[a] Value comparison units (VCUs) are U.S. Forest Service timber management units and are roughly equivalent to a watershed.
[b] Mean pellet groups/plot (MPGP).
[c] 95% confidence interval.

MPGP than the previous survey. Other surveys that are conducted more regularly (Finger Mountain, Range Creek, and Nakwasina) all showed increases in MPGP in 2017 from their last survey (Table 1). In 2018 these same surveys resulted in slight reductions in MPGP from 2017. However, confidence intervals overlap between these years, and it is unlikely there was any real difference in deer densities in these areas.

Pleasant Island

Pleasant Island continued a downward trend in MPGP (Table 1). In 2018, and then again in 2021, survey crews did not find a single pellet group in different 3 transects. Pleasant Island is the only place (formerly) in Unit 4 regularly visited by wolves. Only in recent years have wolves been documented inhabiting Pleasant Island; deer-pellet surveys and hunter harvests reflect this. Mean pellet groups per plot declined from 1.96 in 2002, to 1.34 in 2015, to 0.00 in 2018. Hunters reported harvesting 170 deer on Pleasant Island between RY08 and RY14. Since then, only 3 harvested deer have been reported (ADF&G WinfoNet, unpublished data).

Recommendations for Activity 1.1

Discontinue. Unit 4 has a robust Sitka black-tailed deer population and limited management issues. The lack of wolf and black bear predation eliminates a major variable in management decisions. Additionally, limited roads restrict hunter access which provides for abundant refugia throughout the unit, except for NE Chichagof Island. During normal winters the Unit 4 deer population is expected to stay stable at current moderate-to-high densities. The biggest management concern for Unit 4 deer moving forward would be a substantial die-off due to a severe winter. In the future, management actions in Unit 4 will most likely be restrictions in response to over-winter mortality related to a severe winter. For this reason, managers in Unit 4 are relying on measures of winter severity such as body condition surveys, beach mortality transects, and measures of hunter effort (harvest, days per deer, deer per hunter) rather than pellet surveys to document changes in deer abundance.

Pellet surveys are used to document large changes in deer density (≥30%). Pellet group surveys have been the traditional survey technique for monitoring deer populations in Southeast Alaska. However, pellet-group data must be interpreted cautiously. Many factors other than changes in deer abundance can affect deer pellet-group density. For example, snowfall can influence pellet-group counts. In mild winters with little snow accumulation deer may be scattered across the landscape resulting in fewer pellets encountered. Conversely, in deep-snow winters, deer that deposit pellets in early winter may die by spring. Precipitation and warm temperatures speed pellet decomposition. Early green-up can cause issues with pellet detection on transects. Snow persisting into spring can limit the ability to survey consistently from year to year. In summary, snowfall, variability in survey efforts, pellet detectability, and habitat present confounding factors that limit the accurate interpretation of pellet-group survey results (McCoy 2017). Pellet surveys do provide a general comparison of deer abundance by area and from year to year. However, other measures are less expensive, require less staff, and provide more timely information to inform management decisions.

ACTIVITY 1.2. Body condition surveys.

Data Needs

During winter 1998 ADF&G developed methods to document the body condition of deer that were physiologically stressed due to severe winter conditions. Deer avoid deep snow by concentrating on beaches. Taking advantage of this, we established specific boat routes to visually monitor the body condition of deer. These shoreline surveys give managers a way to quantifiably measure the effects of winter severity on deer. It allows us to note mortalities on the

beach and go ashore to collect information on snow depth and condition of the habitat (levels of browsing). Body condition surveys provide a quantifiable index of winter severity for the deer population. Although other information collected during surveys is often anecdotal, it provides the manager with a sense of the state of the deer population and enhances credibility with the public.

Methods

Travelling 3–4 mph, deer are observed with high-powered optics. The boat operator attempts to get as close as possible to deer without harassing them and forcing them to leave the beach. General counts are obtained as well as composition. Deer are classified according to the following scale:

0. Dead. Observation should be accompanied by necropsy report or notes.

1. Animal may be unwilling or unable to stand. Ribs visible through coat.

2. "Humped" appearance, may be "shaky" in hind limbs when walking. Animal may be somewhat lethargic. Often hesitant to leave beach. Hips noticeably angular at anterior pelvis. Hair often showing patches of disarray or missing patches of hair. Some posterior ribs may be visible.

3. Hair usually patchy. Some angled appearance of hips when viewed from the side. When viewed from rump, backbone visible.

4. Rounded hips, sleek coat. May have "breeding patches" of missing/scuffed hair. Very alert.

5. Fat. Classification usually reserved for late summer/early fall.

U. Unclassified. Used when any particular animal is too far away to be accurately classified or has departed the beach fringe before classifying. Should still be recorded.

Body condition ratings can also be applied to deer opportunistically during other survey and inventory activities such as ground-based mortality surveys and traditional pellet-transect surveys.

Results and Discussion

Shoreline body condition surveys were conducted during spring of 2017, 2020, and 2021. Survey areas included Sitka Sound, Krestof Sound, Hoonah Sound, and Peril Strait. In those 3 years we classified 69, 168, and 249 deer, respectively. Mean condition of deer seen during those surveys was 3.5, 3.3, and 3.63, respectively. Deer composition for 2020 was 45 bucks:100 does and 90 fawns:100 does. Composition during 2021 was 47 bucks:100 does and 33 fawns:100 does. Composition counts were not calculated for 2017 due to low sample size and too many deer being an unidentifiable age and sex class. Overall, these scores indicate that winters had been mild, and that deer generally came through winters in good condition. The Sitka area did have a significant snowfall event in January 2020, but the overall winter was still categorized as

average. However, high densities of deer combined with the January snow may have resulted in reduced fawn recruitment in the spring 2021 survey. Anecdotal reports and field observations in fall 2020 indicate more over-winter mortality of older-age-class bucks than indicated by beach mortality surveys that spring. Several mortalities were found at higher elevations. For the winter of 2020–2021, Unit 4 did not see snow accumulation at sea level until February. This was followed by several snow-thaw cycles. The late snowfall likely allowed for adequate recovery of bucks after rut activities as observed by spring 2021 body condition scores and buck-to-doe ratios. Overall body condition scores during RY16–RY20 are indicative that there were no major reductions in the deer population.

Recommendations for Activity 1.2

Continue.

ACTIVITY 1.3. Winter beach mortality surveys.

Data Needs

Winter severity is believed to be the major limiting factor for deer in Southeast Alaska (Merriam 1968, 1970). Over-winter mortality and survival of deer is important for managers to assess. Several methods have been used to attempt this, including fall aerial surveys in the alpine, winter and spring aerial and boat-based composition surveys on beaches, and beach mortality transect surveys. Of these methods, ADF&G wildlife biologists historically believed that beach mortality transects were the method that provided the most consistent assessment of winter mortality.

Mortality transects for deer along beaches in Southeast Alaska were first conducted by Sigurd Olson in 1952 (Wallmo and Schoen 1979), who had estimated that 90% of winter-killed carcasses were found on or near the beach (Klein and Olson 1960). Mortality transects were established in fixed locations to enable biologists to make comparisons between years, and in many areas, surveys were conducted on transects for several decades, most commonly in Unit 4. Because Kirchhoff (1989) found them to be a relatively insensitive indicator of population trend, in recent years beach mortality transects have been conducted primarily to investigate mortality resulting from severe winters.

Methods

Beach mortality transects are conducted based on the following protocols:

Transects are usually a mile long and require 2 observers. One observer searches the area between the high-tide line and the beach fringe, and the other searches the area just inside the beach fringe. Observers stay in communication to assure the area is completely surveyed, to notify each other of mortalities encountered, and to avoid double counting in areas where carcasses are scattered.

Observers record the number of bones present, the condition of the marrow in long bones (red or pink indicates malnutrition), the age-class of the animal (adult or fawn) as determined by the size of the bones and/or the teeth in the jaw (cementum age: Severinghaus [1949] technique), and the sex of the animal (skull/pelvis). The proportion of adult males, adult females, and fawn mortalities gives an indication of winter severity. Usually fawns die first, followed by adult

males, and then adult females. Winters with a higher proportion of adult doe mortalities are considered more severe. Any information that cannot be determined is marked as unknown.

Mortalities that occurred prior to winter are noted but not counted in the over-winter mortality. Old kills will be hollow and dry with bones that are clean or bleached with diminished odor. Hunter-killed deer are also noted in comments, but not counted as over-winter mortality. Hunter-killed deer can be identified by some or all the following characteristics: leg bones missing, evidence of sawing or cutting bones, skull cap or skull missing, found at camp site, rope or cord near carcass, bone marrow firm and white, and/or bullet holes. White solid bone marrow indicates the animal was healthy and could have died due to hunter harvest, predation, falling, drowning, or other causes.

Results and Discussion

During RY16–RY20, beach mortality transects were completed in 2017 (11 transects), 2020 (14 transects), and 2021 (15 transects). Survey areas included Sitka Sound, Krestof Sound, south Kruzof Island, Cedar Pass, Hoonah Sound, Peril Strait, and Sitkoh Bay. Mortalities per mile of beach surveyed were 0.3, 0.65, and 0.1, respectively. For comparison, following the record-setting snows of the 2006–2007 winter, 2007 spring mortality surveys found 3.8 mortalities per mile (Mooney 2015). Beach mortality surveys indicate that there were no major over-winter mortality events that caused reductions in the deer population during RY16–RY20.

Recommendations for Activity 1.3

Continue.

ACTIVITY 1.4. Monitor abundance of deer in selected alpine areas using alpine aerial surveys.

Data Needs

Beginning in 2013, ADF&G staff and volunteers from the ADF&G office in Petersburg began conducting experimental aerial alpine deer surveys in 5 areas in central Southeast Alaska, including south Admiralty Island. The purpose was to gather preliminary data on whether aerial alpine deer surveys were feasible to provide an index of deer abundance. This metric is needed to assess the effectiveness of predator control as part of an Intensive Management (IM) program which aims to increase abundance of deer in nearby Unit 3.

Although the surveys were initiated in response to IM needs in Unit 3, the method may be an effective deer monitoring tool in any area with sufficient alpine deer habitat. Although research is required to verify whether the number of deer seen in the alpine corresponds to trends in the larger population, this method appears to provide an index of deer abundance that is timelier than and complimentary to existing techniques. Compared to other units in Region I, Unit 4 supports high densities of deer and has abundant alpine deer habitat making it well suited to this technique.

Methods

Surveys should be flown in a Piper Super Cub or similar aircraft during clear days in mid-summer, beginning 2 hours before sunset and ending at sunset. The pilot and observer count as many deer as possible while covering established alpine survey routes. Deer composition should be classified to large buck, small buck, doe, and fawn; although when abundance is high it is difficult to classify deer. The goal each summer is to fly at least 4 replicate surveys in each area to account for variability. Deer per survey hour is the standard metric (Lowell and Valkenburg 2017).

Results and Discussion

During RY16–RY20 surveys were conducted for 2 locations in Unit 4, Southern Admiralty Island (2016–2017) and Northeast Chichagof Island (2017–2018). Findings were summarized as deer counted per hour of survey time (Fig. 3). Southern Admiralty had the highest deer per hour of any survey area in Southeast Alaska. Estimates from Northeast Chichagof were similar to North Prince of Wales Island (POW) and higher than all other survey areas except Southern Admiralty and Central POW. Surveys were not conducted in 2019 or 2020 due to COVID-19 mitigations.

Recommendations for Activity 1.4

Continue.

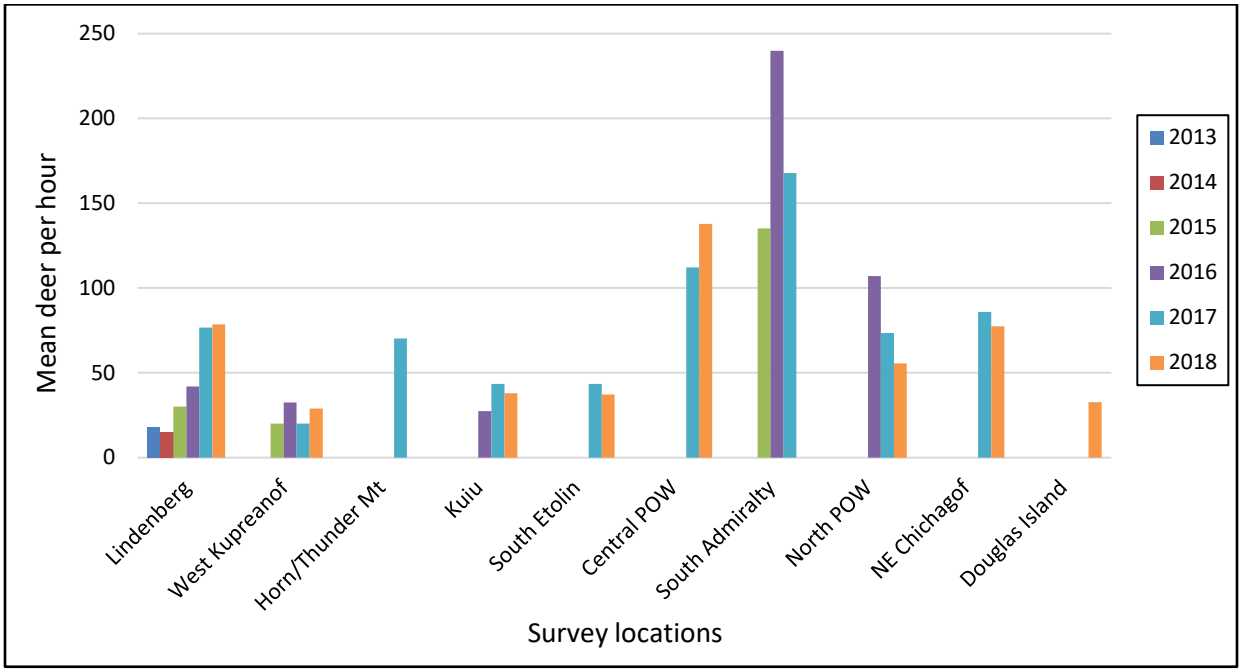

Figure 3. Mean number of deer counted per hour during mid-summer aerial alpine deer surveys in Southeast Alaska, 2013–2018. *Note*: POW is Prince of Wales Island.

2. Mortality-Harvest Monitoring and Regulations

ACTIVITY 2.1. Quantify and analyze harvest data.

Data Needs

With a positive customary and traditional finding, a corresponding established ANS, and intensive management objectives, harvest must be assessed to evaluate the achievement of these goals. Harvest data also helps managers determine if management objectives are being met such as deer per hunter, hunter effort, and sex ratio of harvest.

Methods

Harvest data are summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY12 = 1 July 2012–30 June 2013). Prior to RY11, we estimated deer harvest from responses to questionnaires mailed to a random sample of 33% deer hunters who were issued harvest tickets. Since RY11, hunter effort and harvest data has been collected through mandatory harvest reports. The average statewide reporting rate is about 70% but varies by community with lower reporting rates in many rural communities.

Season and Bag Limit

During RY16–RY20 the annual state hunting season in Unit 4 was from 1 August–31 December for both resident and nonresident hunters. Prior to 15 September, only bucks could be harvested. The total bag limit was 4 deer for most of Unit 4 until RY19 when it was increased to 6 by the BOG. The extensively roaded northeast portion of Chichagof Island east of Port Frederick and north of Tenakee Inlet has a limit of 3 deer.

On federal lands in Unit 4, federally-qualified hunters may hunt through 31 January and have a bag limit of 6 deer, with the allowed take of does beginning 15 September. There is also a liberal designated hunter program which allows any federally-qualified hunter to harvest deer on behalf of any other federally-qualified hunter.

Results and Discussion

Harvest by Hunters

Harvest levels generally reflect current population levels. For example, harvest dropped from 7,738 deer in RY06 to 1,933 in RY07 due to record snowfalls in the winter of 2006–2007. This resulted in mortality estimates of up to 80% in parts of the unit (Mooney 2015). The number of hunters also dropped significantly from 2006 to 2007 (35% from 3,430 to 2,185 hunters) because hunters were aware of the high die-offs the previous winter and chose not to hunt, thinking that populations were too low to be worth the effort and expense. Harvests can also fluctuate based on cold snaps and/or snowfall events that although not necessarily limiting, make deer more vulnerable to hunters. Harvests during this reporting period (Table 2) were variable but generally indicate a population that has fully recovered from the severe winters of 2006–2008. Shoreline habitat in some watersheds show evidence of heavy browsing that indicates that deer herds have likely reached carrying capacity.

The 5-year average (RY16–RY20) harvest of deer by area indicates that Chichagof Island (2,137 deer) yields the highest harvest of deer followed by Baranof Island (1,621 deer) and Admiralty (1,541 deer; Table 2).

Table 2. Unit 4 Alaska estimated legal deer harvest, regulatory years 2016–2020.

Area	Regulatory year	No. male	Male (%)	No. female	Female (%)	Total
Unit 4 Total						
	2016	5,474	(76)	1,718	(24)	7,192
	2017	3,959	(75)	1,296	(25)	5,255
	2018	4,151	(79)	1,078	(21)	5,229
	2019	4,423	(74)	1,556	(26)	5,979
	2020	3,498	(69)	1,557	(31)	5,055
Admiralty Island						
	2016	1,438	(80)	367	(20)	1,805
	2017	1,065	(72)	417	(28)	1,482
	2018	1,094	(77)	321	(23)	1,415
	2019	1,123	(77)	344	(23)	1,467
	2020	1,022	(67)	512	(33)	1,534
Baranof Island						
	2016	1,464	(70)	613	(30)	2,077
	2017	1,076	(75)	357	(25)	1,433
	2018	1,118	(78)	323	(22)	1,441
	2019	1,362	(70)	597	(30)	1,959
	2020	821	(69)	374	(31)	1,195
Chichagof Island						
	2016	2,119	(79)	577	(21)	2,696
	2017	1,554	(79)	424	(21)	1,978
	2018	1,638	(82)	365	(18)	2,003
	2019	1,618	(78)	464	(22)	2,082
	2020	1,379	(72)	546	(28)	1,925

Bucks comprised 75% of the harvest during this reporting period. Despite ADF&G promoting the take of female deer due to concerns of over utilization of winter habitat, hunters continued to harvest 67% to 82% bucks unitwide (Table 2). Juneau residents hunting on Admiralty Island took the highest proportion of does.

It is important to note again that in 2011 ADF&G's method for estimating hunter effort and harvest changed from a mail-out survey to mandatory harvest reporting. Although reporting is mandatory for anyone who acquired harvest tickets, the Board of Game never adopted an enforcement mechanism. Consequently, there is no penalty for not reporting. During RY16–RY20 the statewide reporting rate for deer hunters ranged from about 60% to 70%. However, reporting rates in smaller rural communities were often much lower, sometimes less than 30%. To account for effort and harvest by hunters who did not report, data from hunters who did report are expanded. Because hunters who live in the same community likely have the most similar hunting habits, data are proportionally expanded by community of residence. In small communities with low reporting rates, expanded data may be based on the reports of only a handful of hunters, which results in a good deal of uncertainty about the expanded data.

Hunter Residency and Success

Deer hunters enjoyed high success rates during RY16–RY20, ranging between 66% (RY20) and 75% (RY16) with an average of 70% (Table 3). In all years, success rates of local hunters exceeded nonlocal hunters and success rates of nonlocal hunters exceeded nonresident hunters. Nonlocal Alaska resident hunters made up the largest segment of Unit 4 hunters (approximately 53%) due to the high number of Juneau hunters who hunt nearby Admiralty Island. Nonresident hunters make up just a small fraction (approximately 6%) of the Unit 4 hunters. Unit 4 likely attracts fewer nonresident hunters because it is not known for producing large antlered bucks compared to places such as Kodiak and Prince of Wales Island.

Harvest Chronology

Most Unit 4 hunters target their effort and harvest toward the latter part of the season. About half the total harvest takes place during November and about two thirds during November and December (Table 4). Although hunting in the alpine during August and September provides a high-quality hunt, both in aesthetics and meat quality, most hunters prefer the November–December period because snowfall moves deer to lower elevations, and the rut occurs during November making bucks more vulnerable to harvest. Other hunters wait to hunt until does become legal. Although all Unit 4 residents are federally qualified subsistence users, less than 5% of the annual harvest normally occurs during the extended January portion of the federal subsistence season. Weather can significantly affect hunter numbers and effort. The high percentage of January harvest in RY19 is likely attributable to a series of November storms with winds and heavy rains that made hunting difficult. A snowfall event in January made deer accessible on beaches prompting hunters who had not been successful during the November rut to participate in the January season.

Transport Methods

Unit 4 has very little road accessible hunting areas with the exception of the NE Chichagof Controlled Use Area, so it is no surprise that 80% of the annual Unit 4 harvest is by boat-based hunters (Table 5). Other modes of transportation include airplane, all-terrain vehicles (ATVs), highway vehicles, and by foot, but rarely is one of these transport modes associated with more than 10% of the annual harvest.

Table 3. Unit 4 Alaska deer hunter residency and success, regulatory years 2016–2020.

	Successful					Unsuccessful					
Regulatory year	Local resident[a]	Nonlocal resident	Nonresident	Total	(%)	Local resident	Nonlocal resident	Nonresident	Total	(%)	Total hunters[b]
2016	1,327	1,327	155	2,809	(75)	273	585	71	929	(25)	3,742
2017	1,076	1,171	114	2,361	(68)	378	649	88	1,115	(32)	3,478
2018	1,084	1,194	115	2,393	(69)	341	623	88	1,052	(31)	3,449
2019	1,184	1,148	110	2,442	(72)	229	623	84	936	(28)	3,382
2020	908	1,144	98	2,150	(66)	354	640	101	1,095	(34)	3,252

[a] Resident of Unit 4.
[b] Includes unknown residency.

Table 4. Unit 4 Alaska deer harvest chronology percent by month, regulatory years 2016–2020.

Regulatory year	Harvest period						
	August	September	October	November	December	January	*n*
2016	6	9	18	35	28	4	7,192
2017	7	9	13	51	16	4	5,255
2018	7	7	14	51	16	5	5,229
2019	7	10	14	38	16	15	5,979
2020	7	8	11	53	15	6	5,055

Table 5. Unit 4 Alaska deer harvest percent by transport method, regulatory years 2016–2020.

	Percent of harvest						
Regulatory year	Airplane	Boat	ATV[a]	Highway vehicle	Foot	Unknown/ other	*n*
2016	7	81	2	8	2	0	7,192
2017	8	79	2	8	2	1	5,255
2018	8	78	2	10	2	0	5,229
2019	7	82	2	6	2	1	5,979
2020	10	82	1	4	2	1	5,055

[a] All-terrain vehicle (ATV).

HUNTER EFFORT

Two of our 3 management objectives relate directly to hunter effort, harvest of deer per hunter, and number of hunter days per deer. The number of deer per hunter ranged from 1.5 in RY17 and RY18 to 1.9 in RY16 and averaged 1.7 for the reporting period (RY16–RY20; Table 6). We met or exceeded this objective every year of the RY16–RY20 reporting period. Days per deer ranged from 2.0 in RY16 to 2.6 in RY18 and averaged 2.3 days per deer, exceeding the management objective of 1 deer for every 4 days of hunting effort every year of this reporting period. Deer hunting in Unit 4 is extremely efficient compared to deer hunter effort required to harvest a deer elsewhere in the state. In comparison, hunters on Prince of Wales Island (Unit 2) averaged 4.6 days of hunting per deer harvested, Kodiak (Unit 8) averaged 3.5 days per deer, Unit 1A (Ketchikan) averages 4.4 days/deer, Unit 3 (Petersburg/Wrangell) averages 5.5 days/deer, Unit 6 (Prince William Sound) averages 2.8 days/deer, and in Unit 1C (Juneau) hunters average 7.6 days/deer (ADF&G RY16–RY20). The effort required to harvest 1 deer in Unit 4 (2.3 days/deer) is lower than anywhere else in Alaska.

Table 6. Unit 4 Alaska deer hunter effort, regulatory years 2016–2020.

Regulatory year	Total hunters	Successful hunters	Total hunt days	Successful hunter days	Deer/ hunter	Deer/successful hunter	Days/ hunter	Days/ deer
2016	3,742	2,813	14,535	11,735	1.9	2.6	3.9	2.0
2017	3,478	2,362	12,555	9,262	1.5	2.2	3.6	2.4
2018	3,449	2,394	13,425	10,065	1.5	2.2	3.9	2.6
2019	3,382	2,445	12,870	10,101	1.8	2.4	3.8	2.2
2020	3,252	2,153	12,712	9,186	1.6	2.3	3.9	2.5

Other Mortality

Although big game may be hunted from boats throughout much of the state, that practice is illegal in Southeast Alaska (Units 1–5) without a permit to hunt from a boat in GMUs 1–5, 6D, which requires the hunter be at least 70% physically disabled (AS 16.05.940(26)). Deer commonly forage on beaches and are often undisturbed by boats. Therefore, some hunters ignore the regulation and take their chances at being cited. Shooting from a boat can result in high crippling rates and loss of deer. Every year the Alaska Wildlife Troopers cite people for shooting from their boat, but law enforcement is insufficient to fully discourage the practice. Rates of deer mortality resulting from wounding loss, unreported or illegal take, predation by brown bears, and diseases and parasites are difficult to estimate, but have historically been estimated at a rate of 25% of the reported harvest (Whitman 2003). These other sources of mortality are thought to have little influence on the population compared to severe winters.

Alaska Board of Game Actions and Emergency Orders

At the 2019 Region I BOG meeting, the board passed 2 proposals related to deer hunting in Unit 4. The first (Proposal 18) raised the bag limit from 4 to 6 deer. It is worth noting that the bag limit of 4 deer had been in place since statehood. Under federal subsistence hunting regulations, federally qualified hunters already had a bag limit of 6 deer. This proposal mainly provided additional opportunity for Juneau residents who hunt nearby Admiralty Island. The other (Proposal 19) created the Greens Creek Mine Closed Area with restrictions on the use of

wheeled vehicles (including bicycles) for hunting. This proposal was based on safety concerns between the public and mining operations.

At the 2022 statewide BOG meeting, the board passed proposal 170 which changed the northern boundary of GMUs 1C and 4 to include Pleasant and Porpoise islands within Unit 1C instead of Unit 4. This was done because these islands are more ecologically and geographically associated with the Gustavus forelands than they are to Chichagof Island. Current regulations for Unit 1C are more appropriate than Unit 4 regulations. For example, the deer bag limit on Pleasant Island will now be 2 bucks instead of 6 deer, and there is now a season for black bears.

Recommendations for Activity 2.1

Continue.

3. Habitat Assessment-Enhancement

Since the 1960s land in Unit 4, including those managed by the U.S. Forest Service and Alaska Native corporations on northern Baranof, northern Chichagof, and portions of Admiralty Island, has been subject to commercial clear-cut timber harvest. Clear-cutting can initially result in an abundance of forage. However, 25–35 years after timber harvest occurred, the regenerating trees shade out forage species. For decades to follow the result is harvested stands that retain little value for deer. Most clear-cuts in Unit 4 have reached the stem-exclusion stage where understory species have been shaded out, and the ability of those lands to support deer has declined. Networks of logging roads have also been built in support of the timber industry which greatly increased hunter access to the interior of islands, particularly when connected to a community.

Deer densities in some portions of Unit 4 are expected to decline in the long term due to habitat alteration caused by commercial logging. McCoy and Gregovich (2021) used resource selection function models of satellite telemetered deer to demonstrate the strong selection of deer for lower elevation and commercially valuable productive old-growth forests as high-quality winter range. Kirchhoff (1994) pointed out that following clear-cut logging browse availability initially increases but then declines for a prolonged period as forest regeneration progresses. He also noted that snow accumulation in clear-cut areas during severe winters precludes use by deer, resulting in potential starvation mortality. Differences in habitat use and mortality may be attributed to forage abundance and availability (Wallmo and Schoen 1980, Farmer and Kirchhoff 1998, Farmer et al. 2006), nutritional quality (Hanley et al. 1989), snow (Kirchhoff and Schoen 1987), and predation risk (Kirchhoff 1994). Precommercial thinning (PCT) of second growth stands may provide some increase in forage biomass for deer. However, this takes 6–9 years post thinning to become available because of slash associated with the thinning. Stem exclusion properties return to PCT stands approximately 15 years post PCT (Jon Martin and Todd Brinkman, unpublished data). No mechanisms exist to restore old-growth forest structure on deer winter range other than natural regeneration, which may take several hundred years.

No habitat assessment or enhancement activities were conducted by ADF&G in Unit 4 during RY16–RY20.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Data Recording and Archiving

All records related to deer pellet group transects, harvest tickets, and hunter reports are archived on network servers in the ADF&G Region I office in Douglas. Original data sheets are filed in the Douglas area office.

Records related to alpine surveys, mortality transects, and body condition surveys are saved to the regional shared drive (network/dfg.alaska.local/DWC/Douglas/Region1shared-DWC/S&I-Survey Memorandum/Sitka). Original data sheets are filed at the ADF&G office in Sitka.

Harvest data are stored on ADF&G's internal Wildlife Information Network (WinfoNet).

Agreements

None.

Permitting

None.

Conclusions and Management Recommendations

Under Intensive Management law (AS 16.05.255) our mandated population objective is 125,000 deer and annual harvest objective is 7,800 deer. Because we have no estimate of population size, that 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 all the information available to us at this time, we believe the Unit 4 population is high, near carrying capacity, and sufficient to meet human needs.

During this reporting period (RY16–RY20) harvest only approached the harvest objective of 7,800 deer once when an estimated 7,192 deer were harvested in RY16. The current harvest objective appears unrealistically high, being met only once in the last 30 years (ADF&G, Wildlife Information Network [WinfoNet] database, unpublished data). Other management objectives have been consistently met during this reporting period.

Our survey methods (mortality transects, body condition surveys, aerial alpine surveys, and future trail-camera monitoring) along with harvest reporting seem adequate to monitor and manage deer at a gross level. Further research to better understand how the number of deer seen during alpine surveys relates to abundance and trend of the larger population is needed.

Researchers in Unit 3 are currently developing population estimation techniques using motion-activated cameras (Eaker et al. *In prep*). Advanced technology such as this or forward-looking infra-red (FLIR) will be the tools of the future.

Although hunting may have localized effects on deer abundance adjacent to roads and certain beaches, the relatively low human population, lack of extensive road systems, and light predation result in low mortality. As a result, the Unit 4 population is primarily regulated by habitat capability and winter severity. Currently deer populations throughout Unit 4 are at high densities and may exceed severe winter carrying capacity in some watersheds.

II. Project Review and RY21–RY25 Plan

Review of Management Direction

MANAGEMENT DIRECTION

GOALS

- Manage for high sustainable harvest opportunity, that to the extent possible prevents deer from damaging winter range, commonly defined as productive old-growth forest below 800-feet elevation with some southerly aspect.
- Following winters with high mortality, reduce harvest, particularly of does, to rebuild the population while maintaining reasonable harvest opportunity.

CODIFIED OBJECTIVES

Amounts Reasonably Necessary for Subsistence Uses

The Alaska Board of Game has made a positive subsistence finding for deer in Unit 4 with an amount necessary for subsistence of 5,200–6,000 deer annually.

Intensive Management

We do not recommend any changes to the current management direction. However, we do recommend reevaluating and updating the IM population and harvest objectives in 5AAC 92.108 to reflect a reasonable population size based on habitat capability and harvest levels achieved within the last decade. The current IM harvest objective is based on the average harvest from RY94–RY98 plus 10% (ADF&G 2013). The objective is skewed high based on the harvest estimate of 10,836 deer during RY94. High harvests and success rates in RY94 were the result of early snows in November that made deer readily available on beaches during the rut and federal subsistence regulations that allowed shooting from a boat (Faro 1997). A revised harvest objective based on either the most recent 5 or most recent 10 years plus 10% would be approximately 6,325 or 6,200 deer, respectively. This hypothetical harvest objective would have been met in 3 of the past 10 seasons.

REVISED MANAGEMENT OBJECTIVES

Unit 4	Plan Objective
Population objective	None
Annual harvest objective	10-year running average
Average deer per hunter	1.5 deer
Hunter effort per deer	4 days/deer harvested
Sex composition of harvest	60% bucks

During a June 2017 deer summit with DWC deer biologists and managers from both Regions I and II, staff from across the state expressed frustration at Intensive Management population and harvest objectives. The current Unit 4 population objective of 125,000 deer represents a density of 21.5 deer/mi^2 throughout the entire land area of the unit (approximately 5,820 mi^2). A considerable portion of Unit 4 is not suitable deer habitat, especially during winter. Consequently, meeting the current population objective would require carrying a very high and probably unsustainable density of deer in suitable habitat. Further, ADF&G has few options for influencing deer abundance. Brown bears, the only predator inhabiting most of Unit 4, are thought to have little effect on deer abundance. There is considerable uncertainty about the value of thinning or other habitat enhancement techniques for improving stem-exclusion second-growth forest as habitat for deer. Population objectives for deer in Southeast Alaska are also unverifiable because managers have no way of estimating abundance relative to objectives. Until a reliable and feasible method for estimating deer abundance is developed, we recommend eliminating the population objective.

Estimated total deer harvest has come close to meeting the current annual IM harvest objective of 7,800 deer only once (RY06, 7,734 deer harvested) since its inception in 2000. That objective appears unrealistically high.

Harvest is related to deer abundance and hunter effort. Through RY10 deer harvest was estimated using surveys mailed to 35% of deer hunters. Since RY11 total harvest estimates have been based on mandatory harvest reports. Statewide, about 70% of hunters turn in harvest reports, so harvest by hunters who did not report is estimated by proportional expansion of data from hunters who did report. The accuracy of this estimated harvest is unknown. It is also possible that with the addition of illegal or unreported take and wounding loss that total deer mortality resulting from hunting exceeds the current harvest objective. We have historically added 25% to estimated reported take to account for illegal take and wounding loss but have no way of quantitatively estimating mortality resulting from those causes.

Beyond encouraging hunters to take full bag limits, managers have few options for increasing harvest to meet the current objective. Therefore, we recommend developing a new harvest objective based on a 10-year running average of estimated harvest. Using that method during the RY16–RY20 reporting period would have resulted in harvest objectives ranging from 4,936 to 5,708 deer and those objectives being exceeded twice, nearly met once, and unmet twice. Average annual harvest during RY16–RY20 was 5,742 deer. Using a running average, rather than a static number, would also automatically adjust the annual objective for effects of severe winters and declining habitat value in managed forest stands.

REVIEW OF MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Monitor late-winter and early spring body condition of deer through boat-based surveys along selected segments of beach.

Data Needs

No change. Data needs are the same as Activity 1.2 in the above RY16–RY20 report.

Methods

No change. We recommend continuing this activity with the same methods used in Activity 1.2. of the above RY16–RY20 report.

ACTIVITY 1.2. Monitor over-winter mortality by searching for and counting deer carcasses within and outside the beach fringe along selected segments of beach.

Data Needs

No change. Data needs are the same as Activity 1.3 in the above RY16–RY20 report.

Methods

No change. We recommend continuing this activity as written in Activity 1.4 of the above RY16–RY20 report, particularly following winters with deep and persistent snow.

ACTIVITY 1.3. Monitor abundance of deer in selected alpine areas using alpine aerial surveys.

Data Needs

No change. Data needs are the same as Activity 1.4 in the above RY16–RY20 report.

Methods

No change. We recommend continuing this activity with the same methods used in Activity 1.4. of the above RY16–RY20 report.

ACTIVITY 1.4. Monitor abundance of deer using remote trail cameras. This is a new Activity.

Data Needs

In terms of hunter interest and harvest, deer are by far the most important hunted species in Region I. Monitoring abundance and trend is particularly important for hunted wildlife populations because of the need to set appropriate seasons and bag limits. Trail camera technology and data analysis methods have advanced to the point that they are being used regularly now in wildlife population monitoring (Ausband et al. 2022, Pearson 2019, Loonam et.

al 2021, Steenweg et al. 2016). Management biologists across the Southeast Region are exploring these new technologies (Eaker et al. *In prep*).

Methods

Game cameras surveys are conducted annually to monitor deer across important hunting areas as determined by the DWC area management biologist. Within these areas, game cameras are installed to maximize detection of deer while minimizing survey effort at randomly selected locations within high-quality deer winter range (i.e., USDA U.S. Forest Service habitat suitability index (HSI) values 4 and 5). Cameras are placed within approximately 50 meters of randomly sampled locations. Suitable microsites generally have game trails running through them or other deer sign present (e.g., fecal pellets or obvious sign of browsing), and have a 5-meter minimum viewing distance. Final site locations are recorded with a GPS unit and any important directions to sites or habitat features are recorded. All field data are stored in a Microsoft Access database. Reconyx Hyperfire 2 Professional cameras (Reconyx Inc., Holmen, WI, USA) are used since they take excellent night photos and have battery capacity to last 1 year before needing service. Cameras are equipped with Energizer brand ultimate lithium batteries, desiccant sheets, and 32 gigabyte memory cards.

During installation, cameras are secured to live trees about 1 meter above the ground at approximately 5 meters from a game trail with a slightly downward angle. Cameras should face in a northernly direction to avoid the glare from sunlight, though this is not always necessary in dense conifer canopy. Vegetation is cleared or reduced at the site that would block the view of the camera or cause the camera to fire due to vegetation moving in the wind. The detection viewing distance is measured and marked out with flagging or other natural features (e.g., trees or stones in the camera viewshed) for each camera. Camera lock boxes are mounted using an impact driver to a live tree with 4 bolts and a locking cable to protect the camera from bear disturbance and theft, and from heavy snowfall altering the position of the camera. Cameras are programmed to motion trigger and take 5 rapid-fire photos without delay and 1 time lapse image each day at noon, the latter of which ensures that the date of camera failure (e.g., due to battery failure or water damage) is documented. After setup (but before securing the lock box and cable), cameras are tested using the walk test mode to ensure that deer will be detected in the viewshed; additionally, smart phones can be used to snap a photo in front of the camera lens as a quality check. Cameras will be serviced annually in summer to collect and replace camera memory cards, replace batteries and desiccant sheets, and clean and apply a silicone gel to camera seals.

Photo data will be processed into daily counts of fawns, does, and bucks following Furnas et al. (2018) to provide timely information on deer trend and age ratios in important hunting areas. While emerging statistical methods are currently proposed to estimate density of ‘unmarked’ populations from game camera photo data (e.g., N-mixture model, Royle 2004; REST model, Nakashima et al. 2018; spatial count model, Royle et al. 2014; space-to-event, Moeller et al. 2018), a simple index of deer per trap day will likely be used for inference into deer population trend and age ratios while more complex methods are being resolved. Important seasons for analysis include spring and summer (15 May–15 August) for fawn-to-doe ratios when fawns are highly identifiable by their spots; the rut period (1 November–15 December) for buck-to-doe ratios before bucks drop their antlers; and late-winter/early-spring (1 March–1 April) for overall

trend in deer abundance after most winter mortality has occurred but before deer begin to move to their summer range. Importantly, an index of buck-to-doe ratios from game cameras will likely be biased towards bucks as they have larger home ranges than adult females, and thus, they can be detected from farther out; however, bucks can be classified into age classes, and the annual change in age-class structure (e.g., spikes, forks, and large mature bucks) and index of bucks could also be informative. In summary, game cameras provide an efficient and cost-effective means to index abundance and trend for deer populations and can provide ancillary data on occurrence of brown bears and furbearer species.

2. Mortality-Harvest Monitoring

ACTIVITY 2.1. Quantify and analyze harvest and hunter effort data.

Data Needs

No change from the RY16–RY20 report.

Methods

No change from the RY16–RY20 report.

3. Habitat Assessment-Enhancement

The department does not have any plans for any habitat assessment or enhancement.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Data Recording and Archiving

All records related to deer-pellet-group transects, harvest tickets, and hunter reports will be archived on network servers in the ADF&G Region I office in Douglas.

Records related to alpine surveys, mortality transects, and body condition surveys will be saved to the regional shared drive (network/dfg.alaska.local/DWC/Douglas/Region1shared-DWC/S&I-Survey Memorandum/Sitka). Original data sheets are filed at the ADF&G office in Sitka.

Harvest data are stored on ADF&G's WinfoNet site.

Agreements

None.

Permitting

None.

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