Species Management Report and Plan ADF&G/DWC/SMR&P–2023–4

Dall Sheep Management Report and Plan, Game Management Units 20B, 20F, and 25C, White Mountains:

Report Period 1 July 2016–30 June 2021, and

Plan Period 1 July 2021–30 June 2026

Mark Nelson

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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 public website.

This species management report and plan was reviewed and approved for publication by Lincoln Parrett, Regional Supervisor for Region III for the Division of Wildlife Conservation.

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Purpose of this Report

This report provides a record of survey and inventory management activities for Dall sheep (*Ovis dalli dalli)* in Game Management Units 20B, 20F, and 25C 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., RY16 = 1 July 2016–30 June 2017). 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 more efficiently on trends and to describe potential changes in data collection activities over the next 5 years. It replaces the Dall sheep management report of survey and inventory activities that was previously produced every 3 years.

I. RY16–RY20 Management Report

Management Area

The White Mountains encompass approximately 534 mi^2 of Dall sheep habitat in east-central Alaska and is mostly comprised of portions of Units 20B, 20F, and 25C which includes the White Mountains National Recreation Area (WMNRA) and the Steese National Conservation Area (SNCA). Within the White Mountains, primary Dall sheep habitat consists of alpine areas above the tree line around Victoria Mountain, Mount Schwatka, Mount Prindle, Lime Peak (also referred to as Rocky Mountain), and along Fossil Ridge between the Big Bend in Beaver Creek and Willow Creek. This area generally consists of steep granite boulder fields, granitic tor outcroppings, and gravel slopes (Juday 1988) which provide escape habitat from predators. Dall sheep also occupy lower elevations near alpine habitat that can be dominated by black spruce (*Picea mariana*) and other mixed forest species including white spruce (*Picea glauca*), balsam poplar (*Populus balsamifera*), paper birch (*Betula papyrifera*), various alders (*Alnus* spp.), and willow (*Salix* spp.; Bertram et al. 2018). Temperatures occasionally reach 80°F in the summer and drop to −50°F in winter.

Summary of Status, Trend, Management Activities, and History of Dall sheep in Units 20B, 20F, and 25C, White Mountains

Dall sheep in the White Mountains occur in widely distributed groups associated with mountainous alpine habitats. Starting in 1999, the area surveyed for sheep was standardized to include the area of Big Bend along Fossil Ridge (Limestone Ridge) to Windy Gap, Windy Gap along Fossil Ridge to Willow Creek, Cache Mountain, Lime Peak (Rocky Mountain), Mount Prindle, Mount Schwatka, and Victoria Mountain. Finding and counting sheep that are below tree line is difficult and complicates estimating the population. Therefore, we only report minimum counts for these surveys and do not try to estimate sightability or population size. The population of Dall sheep in the White Mountains appears to be at a low level not seen since the 1980s (Durtsche et al. 1990, Hollis 2014). We speculate that longer winters with deeper snow and more frequent icing events are driving these declines. In the past, when sheep populations have declined, they typically bounced back following a series of winters with favorable

conditions. There is no evidence that this current decline is different than what has happened in the past.

Sheep harvest within all portions of the White Mountains has been open to both residents and nonresidents under a general harvest ticket for 1 full-curl ram during a 6-week season (August 10–September 20) since RY87. A full curl ram is defined as the tip of at least one horn has grown through 360° of a circle described by the outer surface of the horn as viewed down the axis of the helix, a ram with both lamb tips missing, or a ram at least 8-years old as determined by counting annual horn ring segments. A youth-only hunt was established beginning in RY16 during 1–5 August for the harvest of 1 full-curl ram. Nonresident youth and adult hunters are limited to 1 ram every 4 years instead of the 1-ram-every-year regulation for resident hunters.

Management Direction

Existing Wildlife Management Plans

The current goals and objectives were outlined in the most recent Dall sheep management report and plan (Nelson 2019). Prior to publication of the first 5-year Dall sheep report and plan in 2019 (Nelson 2019), Dall sheep management in the White Mountains was guided by a statewide Alaska wildlife management plan (ADF&G 1976).

Goals

G1. Maintain a harvestable population of Dall sheep in the White Mountains.

Codified Objectives

Amounts Reasonably Necessary for Subsistence Uses

The Alaska Board of Game (BOG, board) has not made a customary and traditional use finding for the White Mountains Dall sheep population in Units 20B or 20F. The BOG made a negative customary and traditional use finding in Unit 25C.

Intensive Management

No Dall sheep populations are identified for intensive management under 5 AAC 92.106.

Management Objectives

During RY16–RY20 the White Mountains Dall sheep management objective was as follows:

M1. Maintain the opportunity to harvest full-curl rams from a population of at least 250 Dall sheep.

The primary purpose of this management objective is to provide for the opportunity to harvest Dall sheep while focusing the harvest on mature rams. This strategy has proven to be a cost-

effective approach to allow maximum harvest without impacting the production of lambs and recruitment of young sheep (Whitten 2001).

MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Population abundance (minimum count) and composition.

Data Needs

Minimum count population data and composition estimates will be used to 1) inform the public of population status and trends, and 2) for general long-term monitoring of the population (Objective M1).

Methods

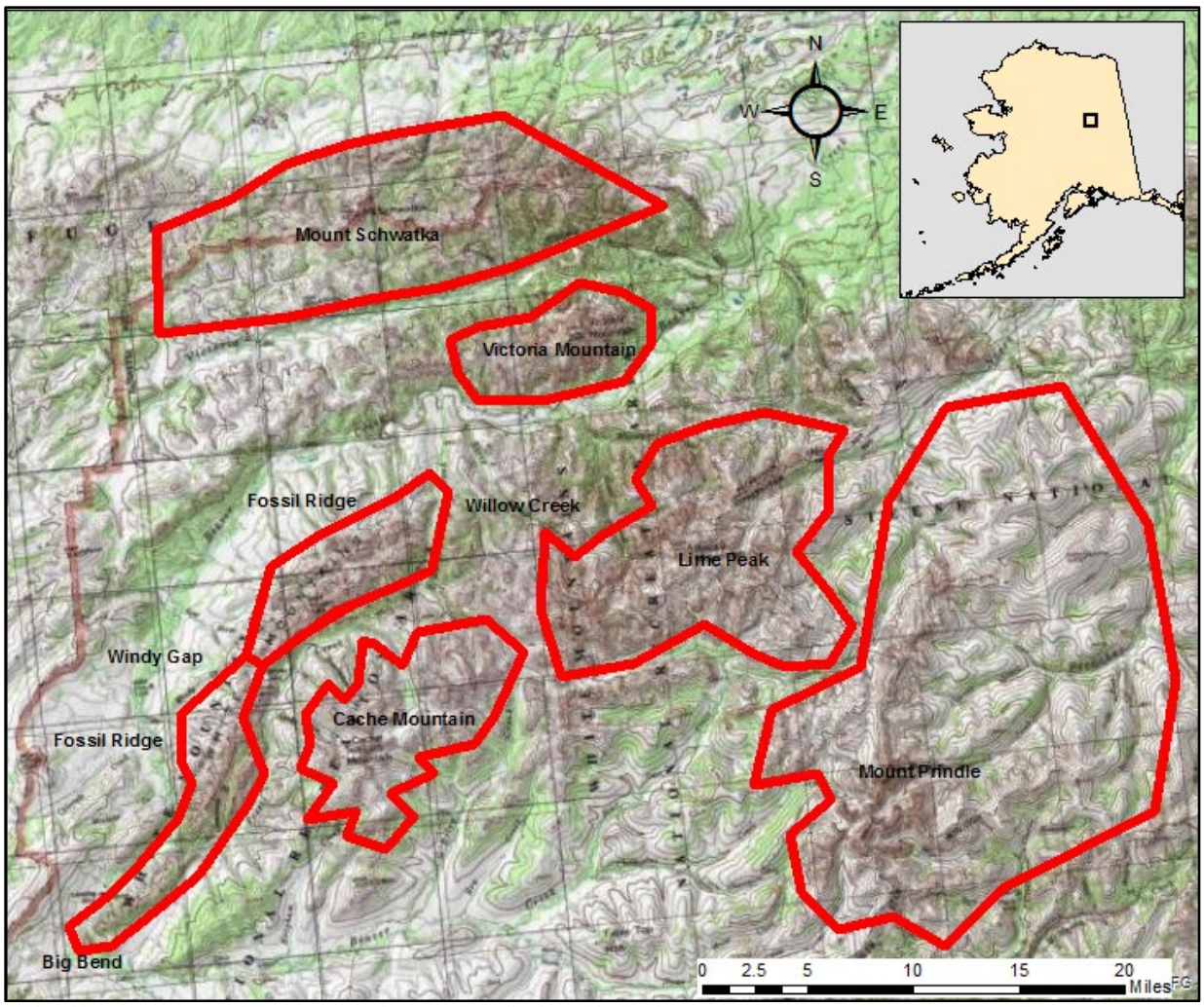
Population abundance (minimum count) and composition surveys were attempted annually in the White Mountains during RY16–RY20 in areas known to contain the majority of Dall sheep habitat (Fig. 1). All surveys were flown in a small fixed-wing aircraft and were flown during late June through early August when snow cover in the alpine is typically at or near its lowest level.

Survey crews consisted of a pilot and an observer seated behind the pilot. All pilots were experienced with Dall sheep surveys, while observer experience levels varied. The flight path and technique varied by pilot-observer team, but all available sheep habitat, including alpine and subalpine habitat, was covered by a low-level (≤500 ft above ground level) survey at 60–80 mph. When sheep were observed, the group size and composition were recorded. Composition was defined by the following categories: ewe or ewe-like (includes yearlings of both sexes and rams of ¼ curl or less), lamb, sublegal ram (<full curl but >¼ curl ram), and legal (≥full-curl ram or both horns broken).

Results and Discussion

The population of Dall sheep in the White Mountains has been surveyed periodically since 1970. Survey techniques used and areas covered were standardized in 1999 to include the 7 areas depicted in Fig. 1. Since 1999, the same areas have been searched during each survey except when poor weather prohibited searching an area. All survey areas were searched in 2016, 2017, 2018, and 2020, but no survey was conducted during 2019 because a large wildfire in the area created poor visibility and poor flying conditions. In the past 5 years (RY16–RY20) the minimum count ranged from 240 (2020) to 323 (2017; Table 1). The mean minimum population count during RY16–RY20 was 276 sheep (95% CI = 218–334), which was a decrease from the RY11–RY15 minimum count of 418 sheep (95% CI = 406–430). Not only has the overall number of sheep decreased, but each demographic group also decreased since RY11–RY15.

The Dall sheep population declines in the White Mountains are likely similar to other Dall sheep populations around Alaska and appear to be driven by longer winters persisting into the spring (Rattenbury et al. 2018), more frequent and longer icing conditions (Van de Kerk et al. 2020), and deeper snow (Cosgrove et al. 2021).



Produced by ADF&G, 2018 using ArcGIS™ software (Esri, Redlands, California); base map source: ADFG.

Figure 1. Aerial survey areas (in red) for Dall sheep in the White Mountains, Alaska.

Recommendations for Activity 1.1

Continue to conduct annual surveys to monitor the total number of Dall sheep and changes in demographics.

Table 1. Dall sheep composition counts, White Mountains, Alaska, regulatory years 2016–2020.

Month	Year	Ewe-like[a]	Lambs	Lambs: 100 ewe-like[a]	Rams			Rams: 100 ewes	Total sheep count
					Legal[b]	Sublegal	Total		
July	2016	162	20	12	23	54	77	48	259
July	2017	175	80	46	7	61	68	39	323
July	2018	167	30	18	16	43	59	35	256
–	2019[c]	–	–	–	–	–	–	–	–
July	2020	166	25	15	10	39	49	30	240
Average	2011–2015	244 (234–254)	55 (49–61)	23 (21–25)	16 (14–18)	103 (97–109)	118 (113–123)	50 (48–52)	418 (406–430)
Average	2016–2020	168 (167–169)	39 (30–48)	23 (17–29)	14 (10–18)	49 (46–52)	63 (60–66)	38 (36–40)	276 (272–280)

Note: Values inside parentheses indicate a 95% confidence interval.

[a] "Ewe-like" includes ewes, yearlings of both sexes, and rams of ¼ curl or less.

[b] Includes rams that are ≥full curl or rams with both horns broken.

[c] No survey was conducted in 2019 due to a large wildfire and poor flying conditions.

2. Mortality-Harvest Monitoring and Regulations

ACTIVITY 2.1. Monitor and analyze harvest data (Objective M1).

Data Needs

Harvest data are necessary to determine whether the management objective (M1) has been achieved.

Methods

Annual harvest was estimated from mandatory harvest reports and horn-sealing data. Successful hunters were required to have the horns sealed within 30 days of the date of kill by authorized ADF&G staff. During the sealing process, a uniquely numbered aluminum plug was placed in the horn, the sheep was aged, a broken determination (both, 1, or neither horn) was made, and measurements (including total length and base circumference of horn) were taken. If timely harvest reports were not received, hunters who provided contact information received a reminder email and/or letter.

Season and Bag Limit

The sheep hunting season for both resident and nonresident hunters during RY16–RY20 was 10 August–20 September. The bag limit was 1 ram with either a full-curl or larger horn, both horns broken, or at least 8-years old. This regulation has been in place since RY87. A youth-only season was added during RY16 for 1–5 August for both resident and nonresident youth hunters.

Results and Discussion

Harvest by Hunters-Trappers

Average annual hunter success (18% during RY11–RY15 and 21% during RY16–RY20) and hunter effort (47 hunters during RY11–RY15 and 40 hunters during RY16–RY20) have remained relatively unchanged over the past decade (Table 2). The sheep hunting area in the White Mountains is difficult to access and the number of hunters is generally limited by accessibility.

The full-curl harvest strategy allows for maximum opportunity to hunt Dall sheep in the White Mountains. Because this is a relatively hands-off management approach, the associated cost is minimal (Whitten 2001).

Hunter Residency and Success

The mean annual success rate during RY16–RY20 was 21% which is nearly identical to the previous 5-year period (RY11—RY15; Table 2). Hunters pursuing Dall sheep in the White Mountains are predominately residents of Alaska; there have never been more than 3 nonresident hunters in a single season.

Harvest Chronology

The majority of Dall sheep harvest in the White Mountains occurs early in the season. The average date of harvest for RY16–RY20 ranged from the opening day (10 August) in 2018 to 21 August in 2019 (Table 3).

Transport Methods

During the previous period (RY11–RY15), most of the successful hunters used airplanes, but during RY16–RY20 the number of successful hunters using ATVs appears to be increasing (Table 3).

Alaska Board of Game Actions and Emergency Orders

During RY16 the Board of Game made two changes to Dall sheep hunting in Alaska that affected the White Mountains. First, a youth-only season was established during 1–5 August for resident youth hunters (11–17 years of age) when accompanied by a licensed, resident hunter 21 years of age and older; and for nonresident, youth hunters when the youth is accompanied by an adult resident parent, stepparent, or legal guardian of the child. Second, the bag limit for youth and adult nonresident hunters was changed from 1 ram with full curl horn or larger to 1 ram with full curl horn or larger every 4 years.

Recommendations for Activity 2.1

Continue to monitor harvest by sealing records and harvest ticket reports.

3. Habitat Assessment-Enhancement

No habitat assessment or enhancement activities were conducted during RY16–RY20 and no activities are recommended for RY21–RY25.

Table 2. White Mountain Dall sheep hunter residency and success, regulatory years 2011–2020, Alaska.

	Successful hunters			Unsuccessful hunters			Total	
Regulatory year	Resident	Nonresident	Total	Resident	Nonresident	Total	Hunters	% Success
2016	12	1	13	33	2	35	48	27%
2017	5	1	6	36	0	36	42	14%
2018	7	0	7	34	2	36	43	16%
2019	6	0	6	20	0	20	26	23%
2020	9	0	9	30	1	31	40	23%
2011–2015 Average	7 (5–9)	1 (0–2)	8 (6–10)	38 (26–50)	1 (0–3)	39 (28–50)	47 (37–57)	18% (10–26)
2016–2020 Average	8 (5–11)	0 (0–1)	8 (4–12)	31 (23–39)	1 (0–2)	32 (24–40)	40 (30–50)	21% (14–28)

Note: Values within parentheses represent a 95% confidence interval.

Table 3. White Mountains Dall sheep harvest characteristics and transportation methods uses by successful hunters, regulatory years 2016–2020, Alaska.

		Mean					Percent transportation used by successful hunters					
Regulatory year	*n*	Age[a]	Broken	Length[b]	Base[c]	Harvest date	Airplane	ATV[d]	Boat	Highway vehicle	Horse	ORV[e]
2011	7	9	73%	34.1	13.3	24 Aug	55	18	27	0	0	0
2012	8	9	25%	34.3	13.6	14 Aug	50	50	0	0	0	0
2013	6	8	20%	34.7	13.0	14 Aug	60	20	20	0	0	0
2014	8	8	50%	31.4	13.4	17 Aug	75	0	13	0	13	0
2015	11	8	40%	32.9	13.4	17 Aug	30	60	0	10	0	0
2016	13	7	38%	32.1	13.1	19 Aug	31	23	38	8	0	0
2017	6	9	33%	34.0	13.3	12 Aug	0	80	20	0	0	0
2018	7	9	43%	29.7	13.4	10 Aug	71	0	29	0	0	0
2019	6	8	17%	34.2	13.0	21 Aug	0	80	20	0	0	0
2020	9	11	11%	34.8	12.9	12 Aug	44	44	11	0	0	0

[a] Mean age of harvested ram in years.
[b] Mean length of the longest horn of harvested rams in inches.
[c] Mean circumference of horns from harvested rams in inches.
[d] All-terrain vehicle.
[e] Off-road vehicle.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

No nonregulatory management problems or needs were identified during this reporting period.

Data Recording and Archiving

- Dall sheep survey form is archived in ADF&G's Wildlife Information Network (WinfoNet) under Data Archive (folder Fairbanks Area Office).
- Harvest data will be stored in WinfoNet (http://winfonet.alaska.gov/index.cfm) and archived in WinfoNet under Harvest Information.
- All electronic files such as survey memoranda, reports, survey data, and maps will be located on the Fairbanks server (S:\Fairbanks Area\Operational Planning\Sheep\White Mountains). All hard copy data sheets, paper files, and relevant documentation are stored in the file cabinet in the assistant area wildlife biologist's office.
- In addition, electronic copies of survey memoranda, survey data, and maps will be stored in the WinfoNet Data Archive. Project Title: Fairbank Area Office. Primary Region: Region III.

Agreements

None.

Permitting

None.

Conclusions and Management Recommendations

The management goal (G1) to maintain a harvestable population of Dall sheep within the White Mountains was met during RY16–RY20. Aerial surveys were conducted during 4 of the 5 years of the report period (RY16–RY20) and showed the minimum population to be above 250 sheep. Therefore, the management objective (M1) of maintaining the opportunity to harvest full-curl Dall sheep rams from a population of at least 250 sheep was met. Note that the goal to manage for a minimum of 250 Dall sheep is an arbitrary number chosen to satisfy hunters while in the field. By continuing to manage Dall sheep under the full-curl strategy (M1), we have no biological concern if the population of Dall sheep falls below this 250 sheep threshold.

The RY21–RY25 management objective will continue as written, but as the population of Dall sheep declines and approaches this threshold, no further management action is likely needed to correct the decline. The current decline in Dall sheep numbers was likely a result of a series of longer-than-normal winters and we expect that a stretch of winters with favorable sheep survival conditions will reverse the trend. However, further study is necessary to better understand the driving factors associated with changes in Dall sheep populations.

There is concern that with a warming environment in Alaska we may be witnessing a paradigm shift in Dall sheep densities. The Arctic is warming at twice the rate of lower latitudes, and

temperatures are predicted to rise 3–6°C by 2080 (Callaghan et al. 2004, Olsen et al. 2011). Further, there is evidence for increased shrubification in the alpine with warm temperatures which would decrease the amount of suitable habitat for Dall sheep (Dial et al. 2016) leading to decreased carrying capacity and lower densities in many ranges. We will continue to monitor the Dall sheep population in the White Mountains to determine if further management action is necessary.

II. Project Review and RY21–RY25 Plan

Review of Management Direction

MANAGEMENT DIRECTION

The RY16–RY20 management direction, goal, and objectives for the White Mountains are appropriate to continue in RY21–RY25.

GOALS

The goal for the RY21–RY25 reporting period will be as follows:

G1. Maintain a harvestable population of Dall sheep in the White Mountains.

CODIFIED OBJECTIVES

No new codified objectives are anticipated for RY21–RY25.

Amounts Reasonably Necessary for Subsistence Uses

The Alaska Board of Game (BOG, board) has not made a customary and traditional use finding for the White Mountains Dall sheep population in Units 20B or 20F. The BOG made a negative customary and traditional use finding in Unit 25C.

Intensive Management

No Dall sheep populations are identified for intensive management under 5 AAC 92.106.

MANAGEMENT OBJECTIVES

M1. Maintain the opportunity to harvest full-curl rams from a population of at least 250 Dall sheep.

The primary purpose of this management objective is to provide for the maximum opportunity to harvest Dall sheep while focusing the harvest on mature rams. This strategy has proven to be a cost-effective approach to allow harvest without impacting the production of lambs and recruitment of young sheep (Whitten 2001). This strategy is extremely conservative biologically and there is no lower population threshold that would trigger a change in management. The management objective of 250 Dall sheep is important for hunter satisfaction but if the population dips below that number no further management action will be necessary.

REVIEW OF MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Monitor population abundance (minimum count) and composition (objective M1).

Data Needs

No change from RY16–RY20 reporting period. Minimum count population data and composition estimates will be used to 1) inform the public of population status and trends, 2) for general long-term monitoring of the population, and 3) to evaluate G1 and M1.

Methods

Aerial survey methods will be the same as those described for RY16–RY20.

2. Mortality-Harvest Monitoring

ACTIVITY 2.1. Monitor and analyze harvest data (Objective M1).

Data Needs

No change from RY16–RY20 reporting period. Harvest data area necessary to assess whether management objective M1 has been achieved.

Methods

Harvest data will be collected, archived, and analyzed via the same methods described for RY16–RY20.

3. Habitat Assessment-Enhancement

No habitat assessment or enhancement activities are planned for RY21–RY25.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

No nonregulatory management problems or needs are identified for RY21–RY25.

Data Recording and Archiving

- The Dall sheep survey form is archived in ADF&G's Wildlife Information Network (WinfoNet) under Data Archive (folder Fairbanks Area Office).
- Harvest data will be stored in WinfoNet (http://winfonet.alaska.gov/index.cfm) and archived in WinfoNet under Harvest Information.
- All electronic files such as survey memoranda, reports, survey data, and maps will be located on the Fairbanks server (S:\Fairbanks Area\Operational Planning\Sheep\White Mountains). All hard copy data sheets, paper files, and relevant documentation will be stored in the file cabinet in the assistant area wildlife biologist's office.
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Agreements

None.

Permitting

None.

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