



Standard Operating Procedure (SOP) 2: Data collection, Version 1.0

Vehicle Management Plan Monitoring Protocol

Denali National Park and Preserve

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The main Narrative for the Protocol for Monitoring related to the Vehicle Management Plan is available from the NPS Integrated Resource Management Applications (IRMA) Data Store: (<https://irma.nps.gov/DataStore/Reference/Profile/2258362>).

SOP 2 – Data Collection

Version 1.0 (December 2018)

Revision History Log:

Previous Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

Add rows as needed for each change or set of changes associated with each version.

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SOP 2.0 – Introduction

SOP 2 – Data Collection covers techniques and equipment used and all aspects of data collection for monitoring seven indicators established in the Vehicle Management Plan (VMP). Road Ecology Program (REP) staff collects data using several protocols: Ride Observe and Record (ROAR) from a concessionaire bus, NPS Observations (NPSO) from a government vehicle, and six International Road Dynamics Inc. Traffic Recording System traffic counters along the Denali Park Road. During the road regulatory year (RRY), ROAR occurs nearly every day and NPSO occurs once or twice weekly. Data are also collected daily by concessionaire bus drivers and dispatch and by Interpretation staff at the Savage Check Station (SCS).

SOP 2.1 – Park Observer (PO)

SOP 2.1.1 – Prepare application

Prepare Park Observer (PO) for the incoming year of data collection. Most aspects of PO will carry over directly from the previous year but minor revisions to the code will be necessary every year.

PO is written in JSON. Open PO using an editor (e.g. Atom, notepad++, etc.). Run any edits through an online validator (e.g. <http://jsonlint.com>). The following instructions and code line references are based on Atom and the 2018 version of PO code.

1. Open last year's version of PO
(`"...Protocols\DataCollection\ROAR\ParkObserver\Protocols\ROAR_YYYY.obsprot"`).
2. File > Save As – rename the file with the current year.
3. LINE 4 replace the "name" year with the current year.
4. LINE 6 update "date" with the current date.
5. LINE 7 edit "description" if necessary.
6. LINE 26 edit item list of observers. This controls the drop down selection for observers to select their name. This will change annually.
7. Add or remove any updates to the fields and attributes that plan to be collected in the observation year.
8. Test each feature with dummy data around headquarters prior to data collection.

It is safest to make all changes to PO for a given year prior to data collection. Once PO files are processed and a FGDB created, the schema is defined and changes to PO will render future uploads of data incompatible (appending new Park Observer zip (POZ) files to the ROAR FGDB will error). The nature of the change will determine if a schema change is necessary or not. Some changes can be handled within ArcMap if (e.g. domain changes) but this should be avoided with pre-planning. If a change is necessary that does cause a change to schema, there will be two FGDBs, one pre- and post-schema change, which will have to be incorporated after the season.

SOP 2.1.1 – Prepare Definition Library

PO data values are stored as indexed lists. Meaning, animals, bear, sheep, wolf is stored in the data as 0, 1, 2. During the data management process, a script is run that, among other things, creates a lookup table between values (e.g. wolf) and indices (e.g. 2) so that when looking at the data in the Arc environment, the analyst will see 'wolf', which is more meaningful than '2'. However, upon export from ArcMap to Excel, these data will display by index. Thus, within Excel we must create our own lookup tables.

1. Open the previous year's definition library
(ROAR_park_observer_protocol_definition_library_YYYY.xlsx) in
...Protocols\DataCollection\ROAR
2. Save As > rename for current year. Use this file as a model to reflect code edits implemented in the steps above.

SOP 2.2 – Ride Observe and Record (ROAR)

SOP 2.2.1 – Pre Trip

The Road Ecology crew lead schedules staff to ride Visitor Transit System (VTS) shuttle buses so that the times and destinations scheduled reflect the VTS schedule, which varies throughout the regulatory year due to demand.

Remember to bring: iPad, iPad charge cord, portable external battery, rangefinder, binoculars, bus pass, food, water, and clothing layers. Arrive at the Denali Bus Depot (DBD) 20 minutes prior to bus departure time and check in with the bus expeditor to get on the bus you are scheduled for. Turn on the iPad and open the Park Observer app to allow it to gather GPS signal.

SOP 2.2.2 – iPad Setup

Use the Park Observer app to collect data on the following observations along the Park Road: Trip Introduction, Wildlife Stops, Wildlife No Stops, Rest Stops, Hiker Stops, Biker Stops, Parked Vehicles, and Other Stops.

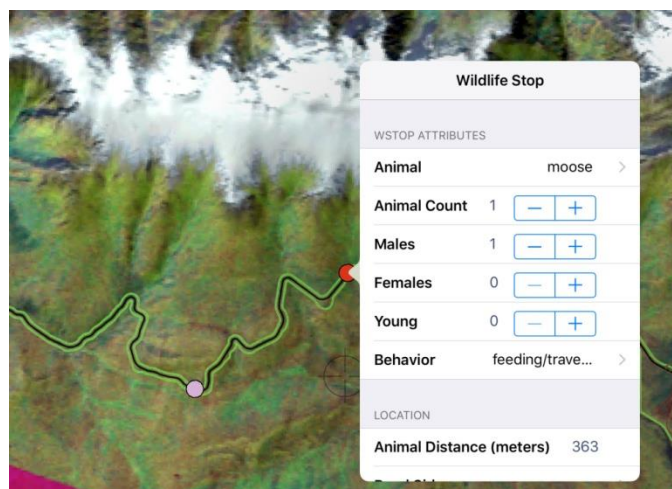


Figure 1. A screenshot of a Wildlife Stop observation on the Park Observer App.

Turn on the iPad and open the Park Observer App. Begin a new survey:

1. Tap “Select Survey.”
2. Tap on the + and choose “ROAR_YYYY” from the Survey list (where YYYY is the current year).
3. Rename the survey: Tap “Edit” and tap on the survey name.
4. Rename: ##–MMDDHH (where ## is your iPad number, followed by Month, Day, Hour of survey start time, using 24Hr).
5. Tap “Done” and then tap your newly named survey to open it.

If you get off your outbound bus and take a different bus back to headquarters (HQ), or you are on a multi-day trip, you must save your survey (see instructions under “To Save Data”) and start a new survey when you get onto the next bus by following the above steps again.

Tap the two play buttons on the toolbar next to survey name to start the GPS tracklog.

Trip Introduction:

1. Create Unique ID – ##–MMDDHH (where ## is the iPad number, then Month, Day, Hour in 24-hour format – should match your survey name)
2. Observer – drop down. If you are a volunteer (VIP), put your name in the comments.
3. Weather – drop down. Weather will change but select the best description of what you see now. You can comment later if a change in weather causes a relevant change in observations.
4. Trip Type – drop down.
5. Destination – drop down. Choose roundtrip if you are going to stay on the same bus both directions. Otherwise, select the direction of your trip (westbound or eastbound). E.g. if you go to Eielson, go on a hike, take a different bus back to HQ all on the same day, you will have a westbound survey on Bus X in the morning and an eastbound survey on Bus Y in the afternoon (which you will create later in the afternoon).
6. Bus ID – number on side of bus.
7. Driver – name of bus driver.
8. Comments

SOP 2.2.3 – Wildlife Stop

Record at all stops the bus makes to view wildlife, including when the bus does not come to a full stop such as following wildlife slowly along the road. If the stop includes multiple species, record each species separately (see Appendix). If the bus stops at more than one location for the same wildlife, record as separate stops.

1. Animal – drop down.

2. Animal Count – tap plus (+) or minus (–) to record the number of individuals.
3. Males – tap + or – to record number
4. Females – tap + or – to record number
5. Young – tap + or – to record number
6. Behavior – drop down. For a group, record what most in the group are doing.
7. Animal Distance – fill in distance in meters from the bus to the individual or group. For a group, record the closest individual. If on the road, record 0 m. If >1000 m, record as 1000.
8. Road Side – drop down: north or south. If directly on road, record the side the animal moved to as your vehicle passed.
9. Milepost – Leave this blank unless your iPad loses GPS signal, then estimate your location on the road to the nearest tenth of a mile.
10. Vehicles Present – During the period of maximum number of vehicles present, record the number of vehicles by type (SOP 1). Include your vehicle if you are in a bus. Do not include buses more than 0.5 road miles away.

SOP 2.2.4 – Wildlife No Stop

Record when you see wildlife but the bus does not stop (do not alert the driver to what you see). Record when a passenger sees wildlife, asks the driver to stop, and they do not. Record all information you can as you pass the animal. Estimate the distance from the road by eye because the rangefinder is not accurate while moving.

SOP 2.2.5 – Rest Stop

Record two observations, first when your bus arrives and second when your bus is about to depart. Record the number of vehicles at the stop by vehicle type, including your vehicle if you are on a bus. To prevent bias in results, do not record your GOV if you are traveling the road for the purpose of collecting data on crowding conditions.

1. Rest Stop – drop down.
2. Vehicles Present – Do not count maintenance vehicles parked behind the restrooms at Tek or Toklat. Include permit type when practicable.

SOP 2.2.6 – Hiker Stop

Record when a bus stops to pick up a hiker, stops to tell hikers the bus is full, or proceeds past hikers obviously trying to get picked up.

1. # of Day Hikers – record number of day hikers
2. # of Overnight Hikers (estimated by their gear/pack size) – record number of overnight hikers
3. Picked Up? – drop down.

4. Driver asked wait time – drop down. If the driver did not ask or you missed the answer, ask the hiker(s) how long they waited.
5. Wait Time – drop down.
6. Hiker direction – drop down.

SOP 2.2.7 – Biker Stop

Record when you see bikers.

1. # of Bikers – record number of bikers
2. Travel Direction – drop down.

SOP 2.2.8 – Parked Vehicles

Record when you see parked vehicles.

1. Type of Vehicle – drop down.
2. Permit Type – drop down.
3. Vehicle Name – drop down.
4. Hiker Group Nearby – record number of hikers and side of road

SOP 2.2.9 – Other Stop

Record other stops that do not fit into the above. Remember: Use the Hiker Stop feature for picking up hikers not at scheduled bus stops (i.e. campgrounds).

1. Stop Reason – drop down.
2. # Pax Picked Up – tap + or – to record number of individuals.
3. # Pax Dropped Off – tap + or – to record number of individuals.
4. Vehicles Present – Maximum number of vehicles at the stop.

SOP 2.2.10 – End of Trip

Once the survey is complete (either at the end of a round-trip, or at the end of a one-way leg), save the data by tapping both pause buttons in the bottom toolbar to stop collecting.

To collect more data (i.e. begin another survey), follow the procedure outlined above in ROAR iPad Setup. This will: (1) exit you from your previous survey and (2) start a new survey. If you do not follow this procedure you will continue recording within your completed survey and risk overwriting data.

Share your data with iTunes so we can transfer it from the iPad to the computer for processing. You do not need Wi-Fi or an internet connection to do this. This process saves your survey to a location within the iPad that is retrieved by iTunes once connected to a computer. In your list of surveys, tap the share button next to the survey you need to share, and then select “Share Survey with iTunes”. The share button looks like a rectangle with an upward-pointing arrow coming out of it. If you have multiple surveys to share, each must be shared individually. Once you have shared your data, do not delete your survey. You can close out of Park Observer.

Recharge your iPad before surveying for a second day. The iPad battery will only last one survey at a time. When finished ROARing for the week, return all equipment to the office for data processing (SOP 3).

SOP 2.3 – NPS Observations (NPSO) Data Collection

SOP 2.3.1 – Pre Trip

Before fieldwork, consult the latest sampling matrix (Figure 2) to see what hour blocks need to be sampled and schedule your start times appropriately. Observations will be recorded in the matrix by observer's initials, date, and time. For example: 06/09/18 14:02 TAB. Aim for at least three observations per block in each sub-season.

NPSO Sampling Matrix						
OTHER TASKS	Year:	2018	Season:	Peak	Season Dates:	6/14-8/1
Check Traffic Counters						
		6-9	9-12	12-15	15-18	18-22
Trail Counters? - Savage		Leave 30-60 minutes early if so				
	21.6	Sheep Gap				
Tek 28	26	Viewscape				
Tek Gate	30	Tek Rest				
Sable	37.6	Sheep Gap				
Toklat	53.5	Toklat Rest				
Do at same time	52.8	Sheep Gap				
	55	Viewscape				
	60.6	Sheep Gap				
Stony	62	Viewscape				
	66	Eielson Rest				
Do at same time	68	Viewscape				
	68.5	Sheep Gap				
Grassy						
Bring:	☐ NPS Observation protocol ☐ ROAR protocol ☐ traffic counter binder and manual ☐ radio ☐ data sheets ☐ iPad & charger ☐ traffic counter batteries ☐ Garmin GPS ☐ laptop, charger & charging cord ☐ binos & rangefinder ☐ jump drive ☐ extra traffic counter					

T:\ResMgmt\Road_Ecology\Protocols\DataCollection\NPSObs\NPSO_sampling_matrix_2018.xlsx

Figure 2. The sampling matrix used to monitor VMP indicators during five time periods on the Denali Park Road (Alaska, USA). The time periods are used to ensure stratified and fine-scale sample distribution across days.

Remember all required equipment: laptop, charging cord, paper datasheets, iPad, charge cord, portable battery, binoculars, rangefinder, traffic counter binder, traffic counter batteries, traffic counter USB drive, screwdriver, umbrella, safety vest, park radio and extra batteries, cabin keys and water if needed. Ensure the computer has the appropriate Excel files set up for the season.

SOP 2.3.2 – Rest Stops

Park in an unobtrusive spot at the rest stop with a clear view of the parking lot: at the eastern end of the toilets near the entrance at Teklanika, at the northern end of the toilets near the

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entrance at Toklat (or off the road above the rest stop on busy days), and along the rock retaining wall with other government vehicles at Eielson.

Open the blank NPSO Excel datasheet on the field laptop and select the Rest Stop worksheet (Figure 3).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1	Site	Date	Hour	Min1	Min2	StartTime	EndTime	Tour	VTS	Lodge Bus	GOV	POV	HE	RM	Bus Total	Total	Vehicle Arrival	Vehicle Exit	Comments	Visibility	Weather	Observer	Source				
2	Tek	6/28/2015	9	46	48	9:46	10:06	2							2	2	154, 120568			Okay	Rainy	William Clark	File				
3	Tek	6/28/2015	9	48	50	9:46	10:06	3							3	3	120566			Okay	Rainy	William Clark					
4	Tek	6/28/2015	9	50	52	9:46	10:06	3							3	3				Okay	Rainy	William Clark					
5	Tek	6/28/2015	9	52	54	9:46	10:06	3							3	3				Okay	Rainy	William Clark					
6	Tek	6/28/2015	9	54	56	9:46	10:06	3							3	3	246888 (hybrid)	154, 120568		Okay	Rainy	William Clark					
7	Tek	6/28/2015	9	56	58	9:46	10:06	3							3	3	120561			Okay	Rainy	William Clark					
8	Tek	6/28/2015	9	58	60	9:46	10:06	3							3	3				Okay	Rainy	William Clark					
9	Tek	6/28/2015	10	0	2	9:46	10:06	3					1		3	4			F permit	Okay	Rainy	William Clark					
10	Tek	6/28/2015	10	2	4	9:46	10:06	3							3	3			246888, 120566	Okay	Rainy	William Clark					
11	Tek	6/28/2015	10	4	6	9:46	10:06	3							3	3			120561	Okay	Rainy	William Clark					
12	Site	Date	Hour	Min1	Min2	StartTime	EndTime	Tour	VTS	Lodge Bus	GOV	POV	HE	RM	Bus Total	Total	Vehicle Arrival	Vehicle Exit	Comments	Visibility	Weather	Observer					
13	0	1/0/1900	0	0	2	0:00	0:20								0	0				0	0	0	T\ResMgn				
14	0	1/0/1900	0	2	4	0:00	0:20								0	0				0	0	0	T\ResMgn				
15	0	1/0/1900	0	4	6	0:00	0:20								0	0				0	0	0	T\ResMgn				
16	0	1/0/1900	0	6	8	0:00	0:20								0	0				0	0	0	T\ResMgn				
17	0	1/0/1900	0	8	10	0:00	0:20								0	0				0	0	0	T\ResMgn				
18	0	1/0/1900	0	10	12	0:00	0:20								0	0				0	0	0	T\ResMgn				
19	0	1/0/1900	0	12	14	0:00	0:20								0	0				0	0	0	T\ResMgn				
20	0	1/0/1900	0	14	16	0:00	0:20								0	0				0	0	0	T\ResMgn				
21	0	1/0/1900	0	16	18	0:00	0:20								0	0				0	0	0	T\ResMgn				
22	0	1/0/1900	0	18	20	0:00	0:20								0	0				0	0	0	T\ResMgn				
23			0	0	2		0:20								0	0							T\ResMgn				

Figure 3. The Rest Stop worksheet in the blank NPSO datasheet.

1. Fill in Site, Date, StartTime, Visibility, Weather and Observer into the first row. Gray cells are automatically populated or calculated based on your entries.
2. Start observations on even minutes only.
3. Rest Stops are monitored for a total of 20 minutes and observations are collected every two minutes during that 20-minute observation period. During each 2-minute interval record the maximum number of vehicles parked at the same time in the rest stop within the same 2-minute interval.

At the end of monitoring, save the worksheet before proceeding to your next monitoring location. The same rest stop may be monitored in the same day, but not during back to back hours on the same day.

SOP 2.3.3 – Viewscapes

The VMP identified four scenic viewscapes to use to monitor the quality of visitor experience. Monitoring will be conducted at the following locations (Appendix):

- Mile 26: Teklanika River. East end point is at corner, west end point is where vehicles first appear along the straightaway; length is 0.9 miles.
- Mile 55: Highway Pass with view of Denali. East end point at mile 55.1 corner, west end point is where vehicles first appear in view after corner; length is 0.9 miles.
- Mile 62: Stony Dome. This is Denali's iconic viewscape and goes from a traffic sign below Stony Dome just east of the first creek crossing, west to where vehicles first come into view; length is 1.1 miles.
- Mile 68: Grassy Pass. East end point is at sign just west of curve, west end point is where the road jogs at the bottom of a small hill before a long straightaway; length is 1.1 miles.

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In Excel, select the "Viewscape" worksheet (Figure 4). The first few rows of data (purple-filled) are examples only. Several cells will only accept values from drop-down menus or defined ranges to assure data quality.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
	Location	Date	Hour	Min1	Min2	StartTime	EndTime	Tour	VTS	Lodge Bus	GOV	POV	HE	RM	Bus Total	Total	Vehicle Arrival	Vehicle Exit	Comments	Visibility	Weather	Observer	Source				
1	Mile 26	9/3/2015	8	56	58	8:56	9:16								0	0				Great	Cloudy	Denise Coleman	File				
2	Mile 26	9/3/2015	8	58	60	8:56	9:16	1				1			1	2	120573	120573		Great	Cloudy	Denise Coleman					
3	Mile 26	9/3/2015	9	0	2	8:56	9:16								0	0				Great	Cloudy	Denise Coleman					
4	Mile 26	9/3/2015	9	2	4	8:56	9:16		1						1	1	289			Great	Cloudy	Denise Coleman					
5	Mile 26	9/3/2015	9	4	6	8:56	9:16	1				1			1	2		289	pov tek cg rv	Great	Cloudy	Denise Coleman					
6	Mile 26	9/3/2015	9	6	8	8:56	9:16								0	0				Great	Cloudy	Denise Coleman					
7	Mile 26	9/3/2015	9	8	10	8:56	9:16	1							1	1	533	533		Great	Cloudy	Denise Coleman					
8	Mile 26	9/3/2015	9	10	12	8:56	9:16			1					1	1	DBL	DBL		Great	Cloudy	Denise Coleman					
9	Mile 26	9/3/2015	9	12	14	8:56	9:16					1			0	1			O permit	Great	Cloudy	Denise Coleman					
10	Mile 26	9/3/2015	9	14	16	8:56	9:16	1				1			1	2	120572	120572		Great	Cloudy	Denise Coleman					
11	Location	Date	Hour	Min1	Min2	StartTime	EndTime	Tour	VTS	Lodge Bus	GOV	POV	HE	RM	Bus Total	Total	Vehicle Arrival	Vehicle Exit	Comments	Visibility	Weather	Observer	Source				
12	0	0	0	0	2	0:00	0:20								0	0				0	0	0	T:\ResMgm				
13	0	1/0/1900	0	2	4	0:00	0:20								0	0				0	0	0	T:\ResMgm				
14	0	1/0/1900	0	4	6	0:00	0:20								0	0				0	0	0	T:\ResMgm				
15	0	1/0/1900	0	6	8	0:00	0:20								0	0				0	0	0	T:\ResMgm				
16	0	1/0/1900	0	8	10	0:00	0:20								0	0				0	0	0	T:\ResMgm				
17	0	1/0/1900	0	10	12	0:00	0:20								0	0				0	0	0	T:\ResMgm				
18	0	1/0/1900	0	12	14	0:00	0:20								0	0				0	0	0	T:\ResMgm				
19	0	1/0/1900	0	14	16	0:00	0:20								0	0				0	0	0	T:\ResMgm				
20	0	1/0/1900	0	16	18	0:00	0:20								0	0				0	0	0	T:\ResMgm				
21	0	1/0/1900	0	18	20	0:00	0:20								0	0				0	0	0	T:\ResMgm				
22	0	1/0/1900	0	0	2	0:00	0:20								0	0				0	0	0	T:\ResMgm				

Figure 4. The Viewscape Worksheet in the blank NPSO datasheet.

1. Fill in Location, Date, StartTime, Visibility, Weather and Observer into the first row. The next ten rows will automatically fill. Gray cells are automatically populated or calculated based on your entries.
2. Start observations on even minutes only.
3. Viewscapes are monitored for a 20-minute period and observations are collected every two minutes within that 20-minute period. During each 2-minute interval record the maximum number of vehicles that are visible at the same time within the viewscape. Keep track of each vehicle by type. Record the composition of vehicles at the first instance of the maximum for the 2-minute interval. If the composition of the maximum number of vehicles changes within the same 2-minute interval do not change the composition in the data.
4. In the Comments column, record any hiker groups that are visible on or off the road anywhere within your view as you observe the viewscape. When possible record an identifier of vehicles, bus number or name, or license plate (GOV) in the comments; note the permit type for POVs. These data are used to validate traffic counter and GPS data (in years it is used) and to inform the traffic model. This is lower priority than keeping track of the arrival of vehicles in the viewscape.

At the end of monitoring, save the worksheet before proceeding to your next monitoring location. The same viewscape may be monitored in the same day, but not during successive hours on the same day.

SOP 2.3.4 –Sheep Gaps

The VMP identified five locations important for the movement of sheep and other wildlife (Appendix):

- Mile 21.6: Near Hogan Creek between Primrose and the low ridge south of the road.

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- Mile 37.6: East side of Sable Pass near Igloo Creek between Cathedral and Sable Mountains.
- Mile 52.8: East of Toklat Rest Stop between Polychrome and Divide Mountain.
- Mile 60.6: Near Stony Creek between mountains east of Stony Hill and Gravel Mountain.
- Mile 68.5: West of the EVC at Grassy Pass.

In Excel, select the "SheepGap" worksheet (Figure 5). The first few rows of data (purple-filled) are examples only. Several cells will only accept values from drop-down menus or defined ranges to assure data quality.

	A	B	E	F	H	I	J	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AD
	Mile Observed	Date	StartTime	End Time	Time	Interval	Gap Time	Kantishna-bound					Headquarters-bound					GAP	Total West	Total East	Total Vehicles	Comments	Observer	Source File
								West Tour	West VTS	West Lodge	West GOV	West POV	East Tour	East VTS	East Lodge	East GOV	East POV							
3	37.6	8/12/2016	9:37:16	10:05:30	9:39:01	0:01:45	1						1						1	0	1	"O" permit	Bridget Borg	
4	37.6	8/12/2016	9:37:16	10:05:30	9:44:15	0:05:27	5							1					0	1	1	153	Bridget Borg	
5	37.6	8/12/2016	9:37:16	10:05:30	9:49:42	0:01:38	1	1											1	0	1	351	Bridget Borg	
5	37.6	8/12/2016	9:37:16	10:05:30	9:51:20	0:00:04	0								1				0	1	1	Camp Denali	Bridget Borg	
7	37.6	8/12/2016	9:37:16	10:05:30	9:51:24	0:00:49	0								1				0	1	1	Kingfisher	Bridget Borg	
8	37.6	8/12/2016	9:37:16	10:05:30	10:04:33	0:13:17	13								1			Y	0	1	1	Kantishna roadhouse	Bridget Borg	
	Site	Date	StartTime	End Time	Time	Interval	Gap Length	West Tour	West VTS	West Lodge	West GOV	West POV	East Tour	East VTS	East Lodge	East GOV	East POV	GAP	Total West	Total East	Total Vehicles	Comments	Observer	
1		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn
2		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn
3		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn
4		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn
5		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn
6		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn
7		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn
8		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn
9		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn
0		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn
1		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn
2		1/0/1900	0:00:00			#VALUE!	#VALUE!												0	0	0			T:\ResMgn

Figure 5. The Sheep Gap worksheet in the blank NPSO datasheet.

1. Fill in Site, Date, StartTime, and Observer in the first row.
2. When a vehicle crosses the sheep gap reference point, enter "1" into the cell corresponding to the vehicle's direction and type and press enter.
3. When possible record an identifier of the vehicle: bus number or name, license plate (GOV), or permit type (POV). This data can be used to validate traffic counters and to inform the traffic model. This is lower priority than keeping track of the arrival of vehicles in step 2.
4. The time between vehicle arrivals (i.e. gap time) is automatically calculated when you enter data in step 2. Monitoring is complete when either:
 - a. you have observed a 10-minute gap in traffic AND either you have waited up to an additional ten minutes OR until the next car arrives OR
 - b. you have monitored for 60 minutes. At the end of monitoring, enter a "Y" or "N" in column R (GAP). This will cause the End Time (column D) to automatically fill.
 - c. Save the document before proceeding to your next monitoring location.
5. When a 10-minute gap is achieved, continue observing the site until the next vehicle arrives (and record it) or until 20 total minutes have passed with no vehicle. When the next car arrives, or at 20 minutes, enter "Y" into column R to end the observation. The reason we remain at the site until the next vehicle or 20 minutes is to get a better sense of the true gap length (in minutes).

The same sheep gap may be monitored in the same day but not during successive hours on the same day. When you start a new location, simply enter the new data starting in the row below the previous observation.

SOP 2.4 – Traffic Counters

SOP 2.4.1 – Setup

Upon road opening, install TRS counters at the following locations along the park road.

Table 1 Traffic Counter Site IDs, References, and Locations along the Denali Park Road.

Site ID	Site Reference	Location
000000020491	TEK28	East of Tek Rest Stop
000000020497	SABLE	West of Sable Pass
000000020494	TOKLAT	West of Toklat Road Camp
000000020496	STONEY	Stony Flats
000000020493	GRASSY NEW	Grassy Pass
000000020090	TEKGATEB	West of Tek Gate
000000022635	SAVAGE	West of SCS

To maintain site indexing in the Road Reporter software, it is critical that the correct counter is deployed at the correct site. Each counter is labeled with the corresponding site name. We collect data at all sites, but Tek28 and Savage are not used for the nighttime traffic standard.

At each location, pass TRS wiring harness through wall of security box and connect to D port of TRS. Insert TRS into security box.

To set up the counter (do when deployed):

1. Open lid and turn unit ON.
2. Press F3 for SYSTEM menu.
3. Press 1 for TIME menu.
4. Set time (using 24 hour clock, i.e 13:54:00) by using number pad, press Y to access date.
5. Set date by using number pad (YY/MM/DD), when finished, press F4 CHNG to save and exit.
6. Press 2 for BAUD menu.
7. Press 7 to select 9600 baud rate (this is the download rate if using a laptop to retrieve data).
8. Press F4 CHNG to save and exit.
9. Press 4 for BATT menu, record voltage level in traffic counter log, press N to exit.
10. Press 8 for CONFIG menu, press 1 to select METRIC (notice an asterisk appear next to METRIC, indicating that it has been selected).
11. Press F4 to save and exit.

12. Press N to exit to main menu.

To program counter for collection (do when deployed):

1. Press F2 for PROGRAM menu.
2. Press 1 for MODE, press 1 to select VOL, press F4 to save and exit.
3. Press 2 for LAYOUT: enter 02 to select 2 lanes, press Y to scroll to LANE.
4. Set lane 1 to E by scrolling with the F2 and F3 keys, press Y to select SENSORS.
(Important: at DENA, every counter will have lane 1 set to East, and lane 2 set to W to standardize collection.)
5. Select $\rightarrow \square \leftarrow$ by scrolling with the F2 and F3 keys ($\rightarrow \square \leftarrow$ denotes a two lane directional count).
6. Press Y to select SPACING, use numeric key to enter 05.0 (TEK GATE), or 08.0 (for SABLE, TOKLAT, GRASSY).
7. Press Y to scroll back to LANES, press Y again to select DIR.
8. Press F1 to scroll to lane 2.
9. Set lane 2 to W by scrolling with the F2 and F3 keys.
10. Press F4 for CHNG to save and exit.
11. In the end, you should have this setup:

LANES: 02 LANE: 01 DIR: E SENSORS: $\rightarrow \square \leftarrow$ (ALL) SPACING: 05.0
--

LANES: 02 LANE: 02 DIR: W SENSORS: $\rightarrow \square \leftarrow$ (ALL) SPACING: 05.0
--

12. Press 4 to select INTRVL menu, press 7 to select 10 minute intervals (except Grassy Counter, which collects in 1 minute intervals), press F4 CHNG to save and exit.
13. Press 5 to select LOCATION, enter site name (e.g TEK GATE) using numeric key pad, press F4 to save and exit.

SOP 2.4.2 – Traffic Counter Maintenance

During NPSO, you will also tend to the traffic counters. TRS counters have an operating life of about 2–3 weeks with existing batteries and solar panels. It is necessary to change batteries every two weeks. A fully charged battery will read around 6.4 V and must not drop lower than around 5.0 V or permanent damage to the battery may occur. Always change out the battery if charge is at 6.0 V or less.

Early during the field season, check that the traffic counters are recording data accurately by downloading the data to a flash drive. During each NPSO patrol, ensure that each traffic counter reads "REC" for record. Counters are tricky and can stop recording without user input. At the end of the season, download all data to a new flash drive to be uploaded into Road Reporter Software. Make sure all data is retained on the traffic counter by choosing not to delete the data when prompted (see below).

To start collection (do once deployed and after each battery change):

1. From main menu, press F2 for PROGRAM.
2. Press 3 to select START.
3. Press F1 to select NOW to begin counting now, press F1 again to select CONT for continuous counting.

4. Press F4 CHNG to save and exit.
5. "SET" will appear in the bottom of the main menu, after a few moments "REC" will appear indicating the unit has begun counting vehicles.
6. Press F1 MONITOR.
7. Test the counter to ensure collection by waiting for an east and west bound vehicle to pass over the loops, or by driving across the loops. East bound traffic should register in lane 1 and west bound traffic should register in lane 2. If vehicles are not registering or are being counted in the wrong lane, refer to the troubleshooting section of the TRS manual.
8. After verifying collection (east bound traffic in lane 1, west bound traffic in lane 2), close lid and lock security box. The display will power down automatically.
9. Make any additional notes in the counter log.

To record voltage:

1. Open counter lid and press F2 to wake up display (counter should be in REC mode).
2. Check battery voltage by pressing F3 for SYSTEM, and 4 for BATT.
3. Record voltage in counter log.
4. Exit to main menu by pressing N twice. If battery voltage is at or below 6.0, stop collection and change the battery. Otherwise, allow counter to continue collecting.

To change battery:

1. Turn unit off.
2. Remove the four Phillips head screws securing display panel to unit.
3. Gently remove display and set aside. Be careful not to damage fragile circuitry on back of display panel.
4. Loosen but do not remove two Phillips head screws securing battery in place.
5. Replace battery with fresh battery and replace all screws – take care not to pinch wires or apply pressure to display panel.
6. Turn power back on, check new voltage level and record in counter log.
7. Press F3 for SYSTEM, press 3 for DIAG, press 5 for LOOPS.
8. Allow a few minutes for the unit to tune the loops (numbers will stop changing when done). The loops must be tuned every time the batteries are replaced.
9. Exit to main menu by pressing N twice.
10. Restart collection.

To retrieve data (do once early in the season, and once to download all data at the end of the regulatory year):

1. Stop collection by pressing F2 for PROGRAM and 8 for STOP.
2. Press Y when prompted with "ARE YOU SURE Y/N".
3. Navigate back to main menu by pressing N.
4. Insert flash drive into USB port.
5. After a moment, RETRIEVE will appear in display, press F1 to download files.
6. Select "NEW" to download files that have not been previously downloaded or "ALL" to download all files at the end of the season.
7. Press Y when prompted with "ARE YOU SURE Y/N".
8. After files have transferred, remove flash drive.
9. DO NOT delete internal memory of TRS, these data serve as an additional back up.

SOP 2.4.3 – End of NPSO Rove

Upon return from NPSO, charge all traffic counter batteries and return to metal cabinet. Cycle through the batteries throughout the season to extend the life of the batteries.

After the RRY, stop collection and remove all traffic counters from the Park Road and return them to the office for data retrieval. Bring bamboo stakes to each site to mark the location of the counter. This is to avoid a snowplow hitting the counter boxes in the spring.

SOP 2.5 – Concessionaire Data

Each day, Joint Venture (JV) Dispatch produces an Excel file of the planned bus routes for the day, called the Daily Dispatch Sheet (DDS). As bus numbers, drivers, or planned routes change throughout the day, the dispatcher will mark up a hard copy of the spreadsheet with the changes. At the end of the day, the hard copy with hand-written edits is scanned as a .pdf and is a Daily Dispatch Report (DDR) of the actual bus routes for the day. Both the DDS and the DDR are emailed to the Road Ecology program manager and crew lead.

Download the DDR and DDS and put in the following locations:

- *T:\ResMgmt\Road Ecology\Data\VV Bus Reports\XXXX_DD_spreadsheets*
- *T:\ResMgmt\Road Ecology\Data\VV Bus Reports\XXXX_DDR_pdfs*

Bus drivers collect data on every VTS trip. These Driver Manifest datasheets record passenger pick-ups, drop-offs, and wait times. Dispatchers at the EVC also collect data on passenger wait times at the visitor center. This hiker data is compiled by JV throughout the season and shared with the Road Ecology Program at the end of the regulatory year.

SOP 2.6 – Savage Check Station

Denali Interpretation staff occupies the Savage Check Station (SCS) during the busiest hours of the day, and collects data for each vehicle that passes through. After check station hours, every vehicle that passes through is required to self-report.

For bus traffic:

1. Fill in the date, SCS open and close times, and the names of those staffing the SCS
2. For each bus that passes through the check station, fill in the bus number, bus type, destination, number of passengers (do not include the driver or employees), number of overnight passengers, and if the bus is training (Figure 6)
3. Fill in any comments

Version 1.0 Denali National Park and Preserve – Vehicle Management Plan (VMP)
Monitoring Protocol Standard Operating Procedure (SOP) 2: Data collection

BUS		SAVAGE CHECK STATION 2018 ROAD TRAFFIC STATISTICS						
Date: _____		Check Station Open Time: _____						
Names: _____		Check Station Close time: _____						
Initials Data collector	Time Use military time	JV Bus # (for tan and green buses) or Permit # (for Kantishna Lodge buses)	Bus Type D = DNHT T = TWT E = KE S = VTS (incl disco) C = Camper N = NF/CD K = KRH B = DBL *collect voucher O = Other (explain in comments)	T R A N S I T I O N ? 'X' for yes	Farthest Destination T = Teklanika P = Polychrome O = Toklat S = Stony E = Etelson W = Wonder Lake K = Kantishna X = Don't know (Explain in comments)	Number of Passengers Do not include driver	Number of Overnight Passengers For KANTISHNA buses ONLY Do not include driver or employees traveling on buses	Comments: Examples: Rescue Training Sweeper Igloo spare MSLC 100 AK Geo DEC

Figure 6 The Savage Check Station bus datasheet

For non-bus traffic:

1. Fill in the date, SCS open and close times, and the names of those staffing the SCS
2. For each non-bus vehicle that passes through the check station, fill in the appropriate non-bus datasheet (Appendix)
 - Each non-bus datasheet is colored to match the appropriate permit

Appendix

Wildlife Classifications

Bear:

Male: Large with no cubs, but mostly undistinguishable unless anatomy is visible.

Female: Generally identified when accompanied by cubs, otherwise difficult to distinguish.

Young: Smaller than adults; will travel with mother for first two years.

Caribou:

Male: Can be larger than females (not decipherable unless in close proximity); antlers present starting in March through late fall, appear large, thick, with wide flattened areas toward tops and front

Female: Relatively smaller than males; antlers are thin and short compared to males and no flattened areas

Young: Relatively smaller than adults; antlers may be present, but will be small.

Wolf:

Male: Undistinguishable unless anatomy is seen.

Female: Undistinguishable unless anatomy is seen.

Young: Smaller than full size adults for first summer.

Moose:

Male: Large animals (up to 1200 lbs); presence of antlers (starting in spring); pronounced skin (waddle) hanging from chin

Female: Smaller in relation to males; antlerless; less pronounced skin under chin

Young: Smaller than adults; reddish brown, uniform coloring; usually seen with adult female for first year.

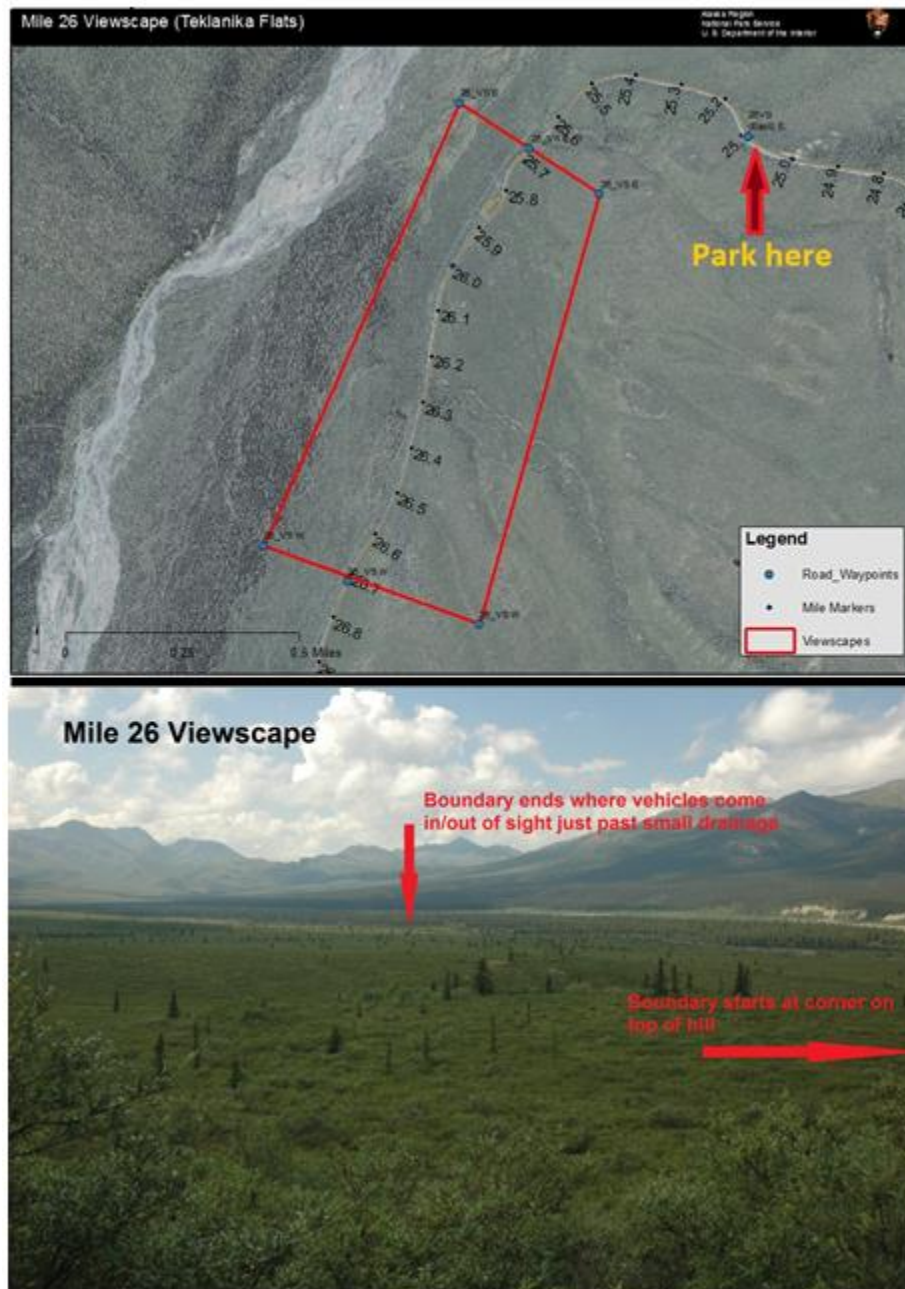
Sheep:

Male: Large (200–250 lbs); curved thick horns – the more complete curl (e.g. half curl, $\frac{3}{4}$ curl, full curl). Generally in single-sex bands during summer.

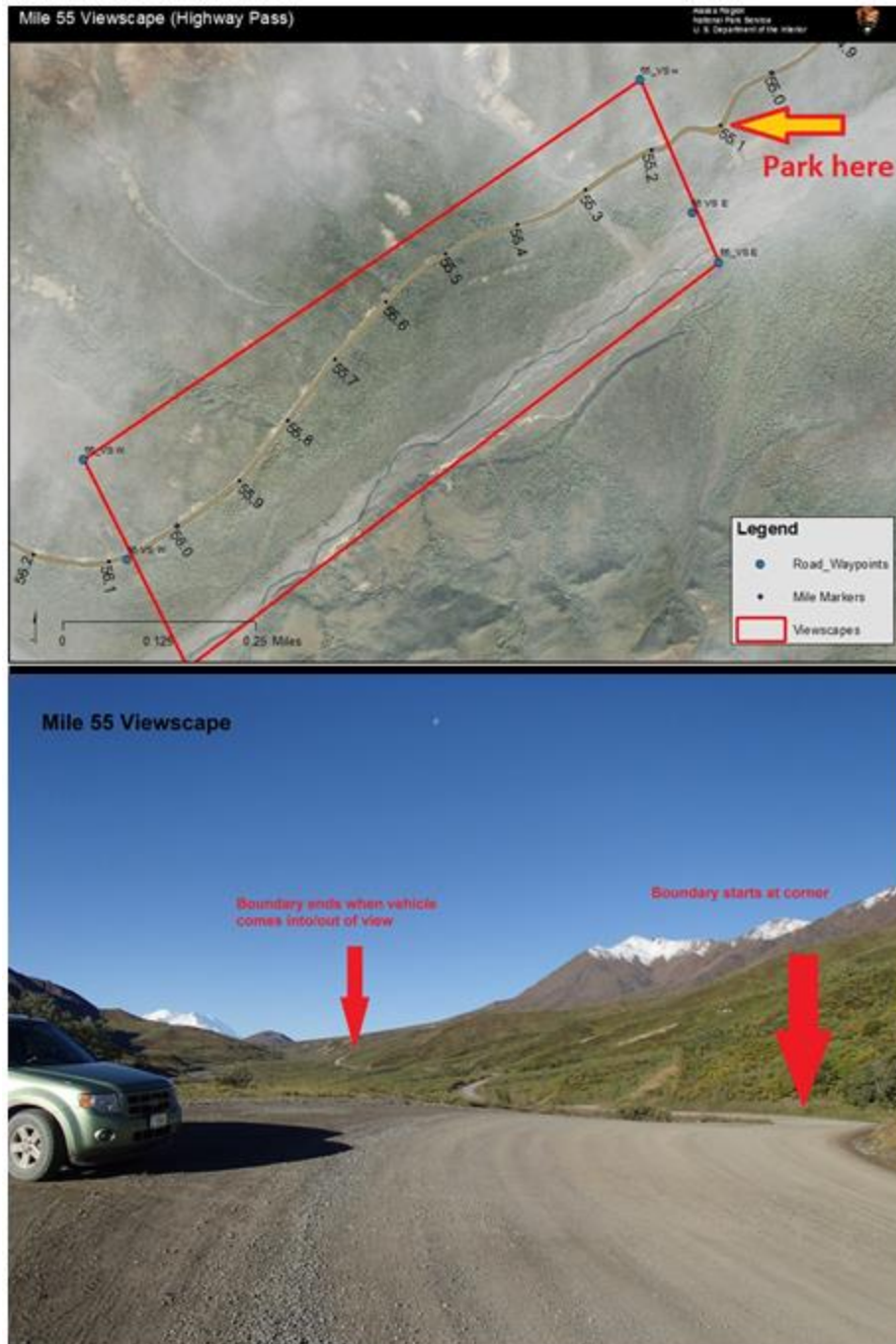
Female: Smaller than males (100–150lbs); shorter, thinner horns with a slight curve. Females, lambs, and yearlings generally band together in summer. Adult rams rarely occur with “nursery groups”.

Young: Relatively smaller than their adult counterparts, varying size of horns. Yearling males and females are difficult to distinguish from adult females from a distance.

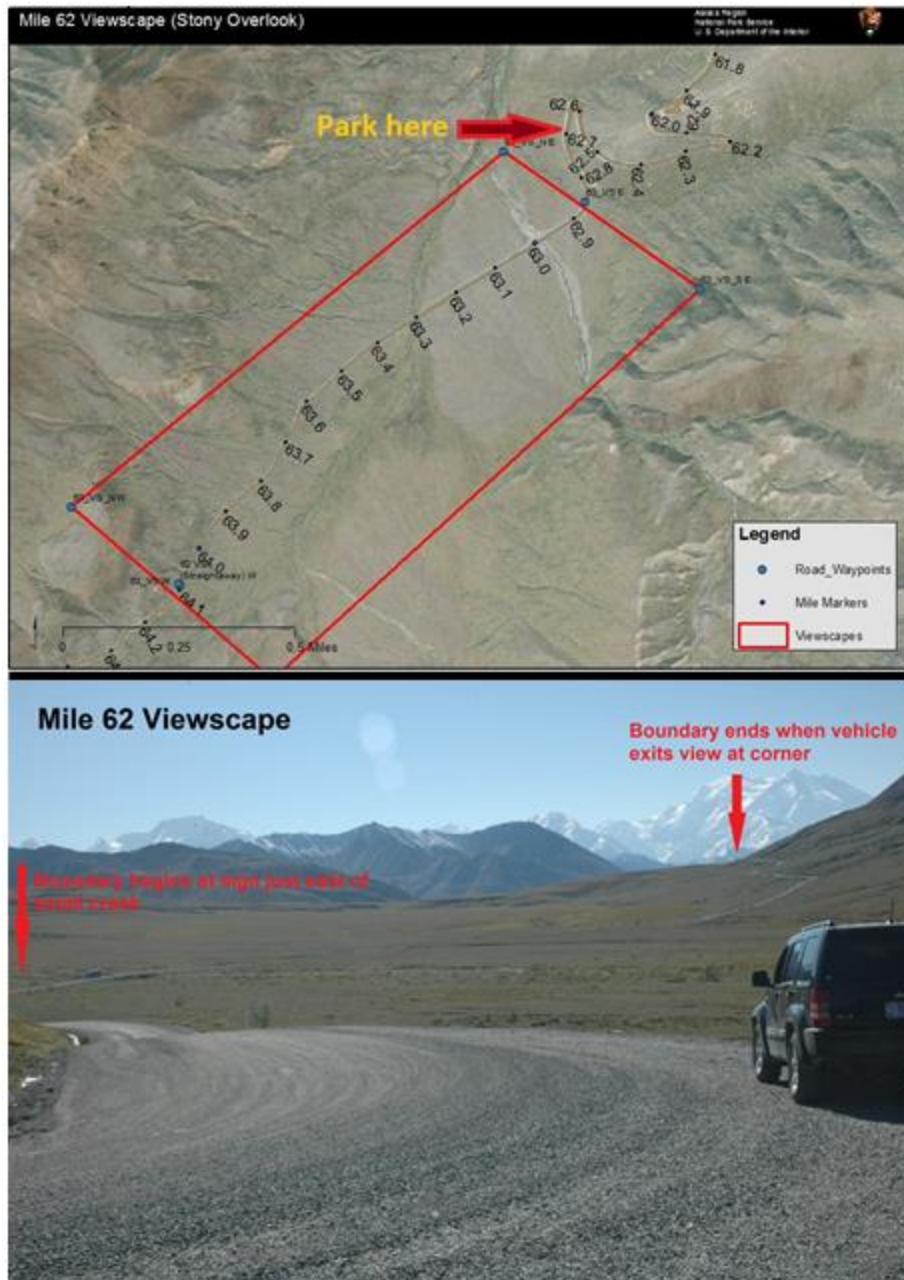
Viewscope Locations



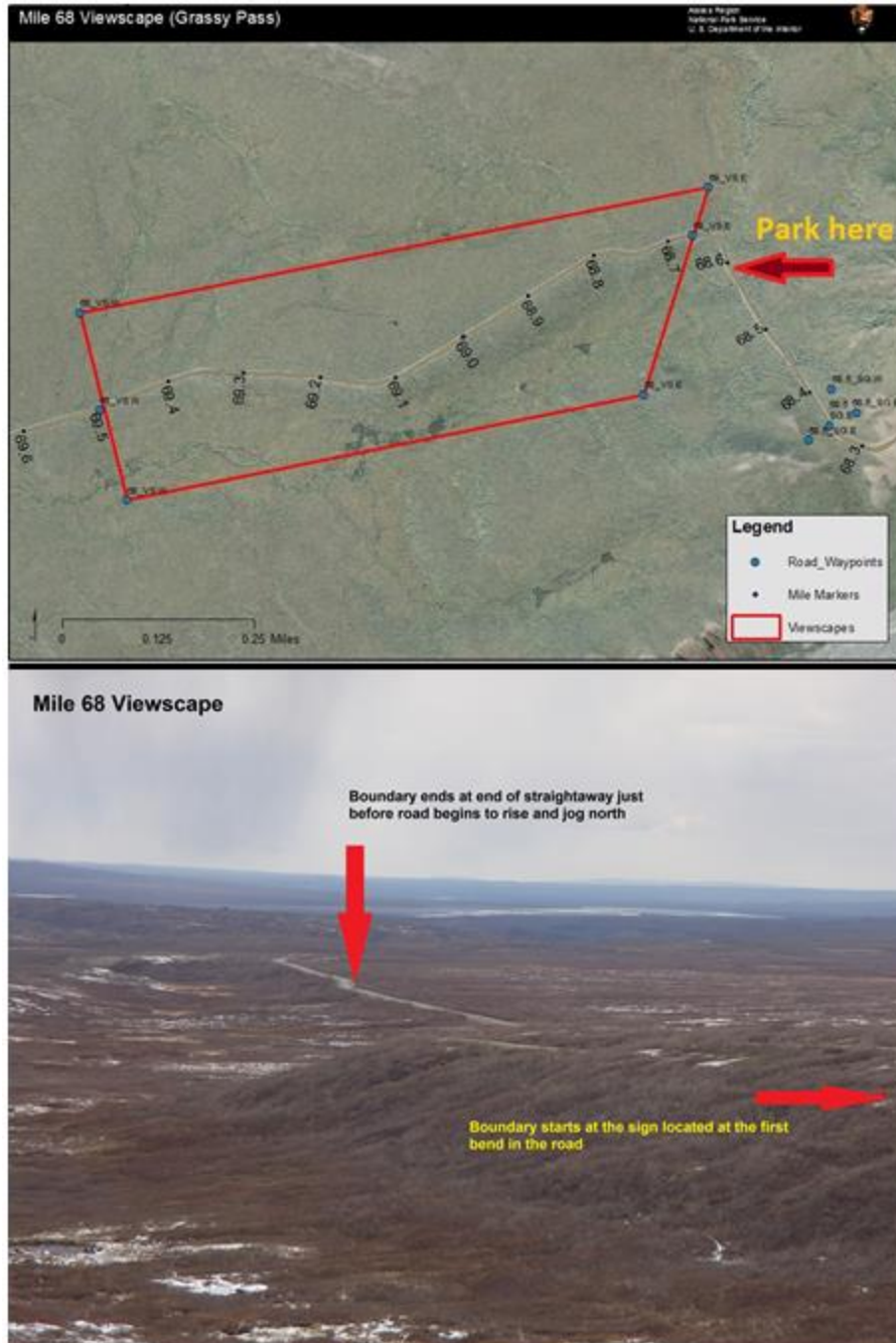
Appendix Figure 1. Aerial photo and image of mile 26 viewscape monitoring site.



Appendix Figure 2. Aerial photo and image of mile 55 viewscape monitoring site.

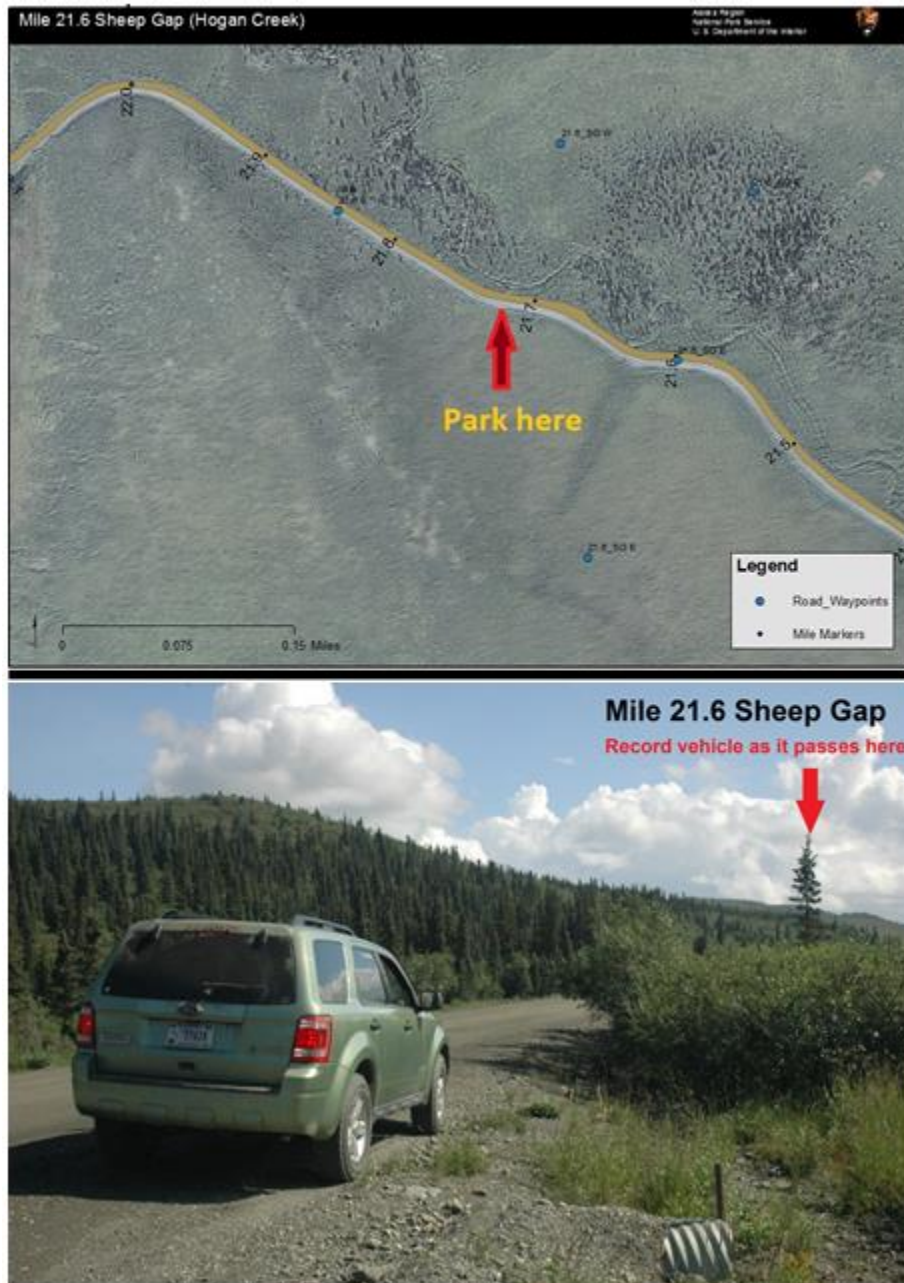


Appendix Figure 3. Aerial photo and image of mile 62 viewscape monitoring site.



Appendix Figure 4. Aerial photo and image of mile 68 viewscape monitoring site.

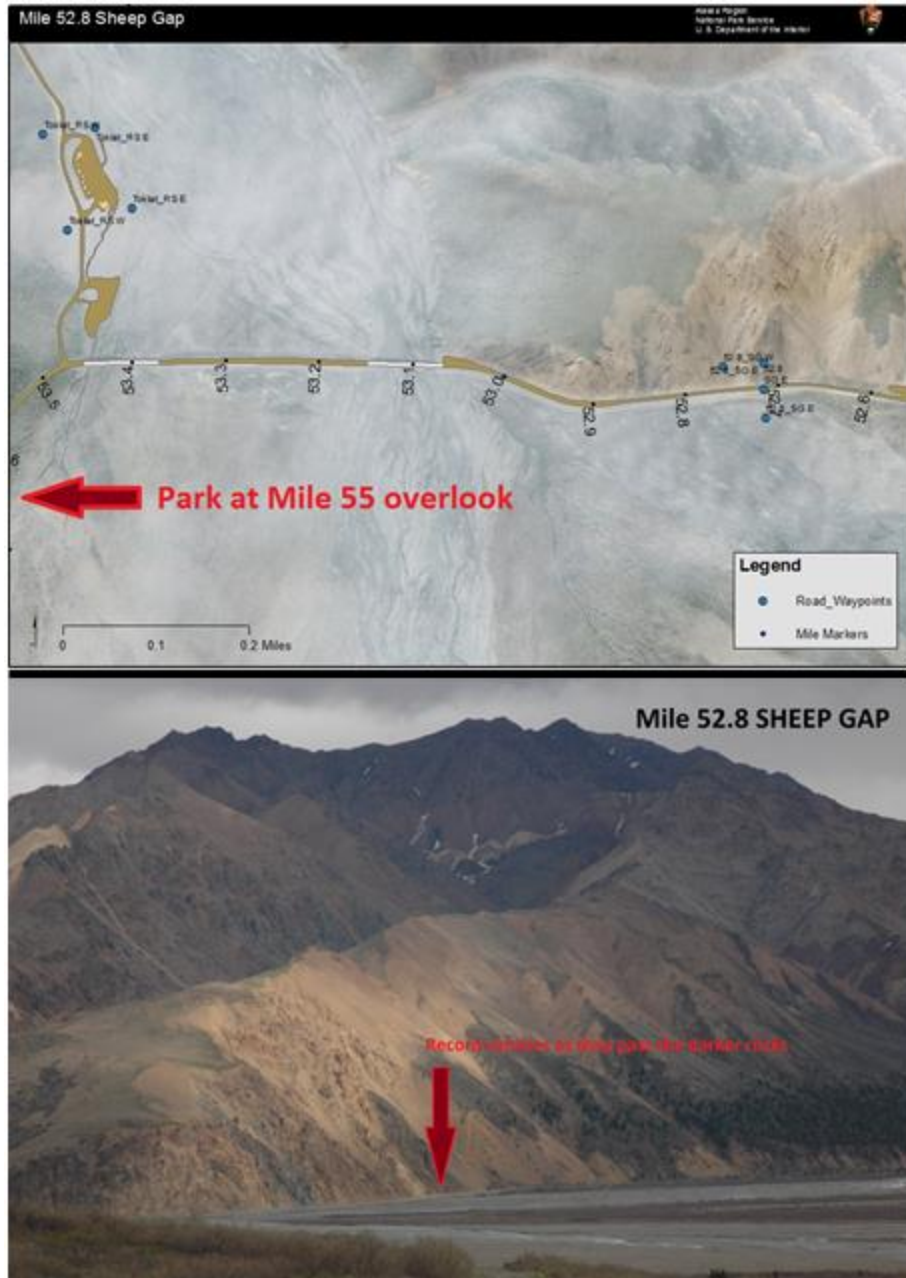
Sheep Gap Locations



Appendix Figure 5. Aerial photo and image of mile 21.6 sheep gap monitoring site.



Appendix Figure 6. Aerial photo and image of mile 37.6 sheep gap monitoring site.



Appendix Figure 7. Aerial photo and image of mile 52.8 sheep gap monitoring site.



Appendix Figure 8. Aerial photo and image of mile 60.6 sheep gap monitoring site.



Appendix Figure 9. Aerial photo and image of mile 68.5 sheep gap monitoring site.

Savage Check Station Non-Bus Datasheets

NON-BUS							
NPS Vehicles (N)							
2018 ROAD TRAFFIC STATISTICS							
Date	Initials Data Collector	Time Military Time	Work Group Division A = Administration C = Concessions I = Interpretation BU = Maintenance B&U MR = Maintenance Roads MT = Maintenance Trails MS = Maintenance Support R = Resources G = Visitor Resource Protection S = Superintendent's Office P = Planning	# of People	Farthest Destination M = Primrose T = Teklanika P = Polychrome O = Toklat S = Stony E = Eielson W = Wonder Lake K = Kantishna X = Don't know	Driver's Last Name	Trip Purpose (ex: road ecology, CG program, clean SSTs, road grading, road patrol, fam trip)

Appendix Figure 10. NPS vehicle SCS Datasheet.

NON-BUS						
PROPHO or COMMERCIAL FILMING (O)						
2018 ROAD TRAFFIC STATISTICS						
Date	Initials Data Collector	Time Military Time	# of People	Farthest Destination M = Primrose T = Teklanika P = Polychrome O = Toklat S = Stony E = Eielson W = Wonder Lake K = Kantishna X = Don't know	Driver's Last Name	Trip Purpose (ex: photography or commercial filming)

Appendix Figure 11. Professional photographer (PROPHO) and commercial filming SCS Datasheet.

NON-BUS						
RIGHT OF WAY (W)						
2018 ROAD TRAFFIC STATISTICS						
Date	Initials Data Collector	Time Military Time	# of People	Farthest Destination K = Kantishna (mile 88-92)	Permit #	Driver's Last Name
				K		
				K		

Appendix Figure 12. Right-of-Way (ROW) vehicle SCS Datasheet.

NON-BUS

ACCESSIBILITY (P)

Date	Initials Data Collector	Time Military Time	# of People	Farthest Destination M = Primrose T = Teklanika P = Polychrome O = Toklat S = Stony E = Eielson W = Wonder Lake K = Kantishna X = Don't know	Driver's Last Name	Trip Purpose (Ex: sightseeing)

Appendix Figure 13. Accessibility vehicle SCS Datasheet.

NON-BUS

**TEKLANIKA CAMPING (V)
or CYCLIST (C)**
2018 ROAD TRAFFIC STATISTICS

Date	Initials Data Collector	Time Military Time	Camping (V) or Cycling? (C)	If Tek Campers: Do they have a Tek Pass (bus ticket)? 'X' for yes	# of People	Farthest Destination M = Primrose T = Teklanika P = Polychrome O = Toklat S = Stony E = Eielson W = Wonder Lake K = Kantishna X = Don't know

Checklist for TEK Campers

RVs:

- Fresh water full?
- Black and grey water empty?

Everyone:

- Only one trip out to TEK and one trip to leave the park.
- No driving past TEK.
- Do not pass a bus with double flashing lights (wait for indication from driver)
- Food for 3 nights?
- Firewood?
- CG Site tag? *required
- "Tek Pass" (bus ticket)?
 *not required
- Dogs? Must be on leash (allowed in the campground and on the road only). Please clean up after them. Do not leave pet food outside.

Appendix Figure 14. Teklanika camper and cyclist SCS Datasheet.

NON-BUS

EMPLOYEE RESIDENT (R)

2018 ROAD TRAFFIC STATISTICS

Date	Initials Data Collector	Time Military Time	# of People	Farthest Destination T = Teklanika P = Polychrome O = Toklat E = Eielson W = Wonder Lake K = Kantishna X = Don't know	Driver's Last Name	Permit Holder's Last Name (may not be the same as driver's name)	Trip Purpose ("rtw" or "rtt" = return to work / duty, or "visiting" = guest of employee, etc)

Appendix Figure 15. Employee resident access SCS Datasheet.

NON-BUS

NPS APPROVED (B)

2018 ROAD TRAFFIC STATISTICS

Date	Initials Data Collector	Time Military Time	Category J = JV R = Researcher E = MSLC O = Other *describe in trip purpose	# of People	Farthest Destination M = Primrose T = Teklanika P = Polychrome O = Toklat S = Stony E = Eielson W = Wonder Lake K = Kantishna X = Don't know	Driver's Last Name	Trip Purpose

Appendix Figure 16. NPS approved SCS Datasheet.

NON-BUS

NPS CONTRACTOR (G)

2018 ROAD TRAFFIC STATISTICS

Date	Initials Data Collector	Time Military Time	# of People	Farthest Destination M = Primrose T = Teklanika P = Polychrome O = Toklat S = Stony E = Eielson W = Wonder Lake K = Kantishna X = Don't know	Driver's Last Name	Company or Affiliation	Trip Purpose (Ex: construction, fueling, return to work, etc)

Appendix Figure 17. NPS contractor SCS Datasheet.