

ATTACHMENT 1

Uinta Sheep Capability and Stocking Rates

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John Carter, Yellowstone to Uintas Connection

July 2018

Some Examples of Conditions



Alpine Ground Cover (Red Knob Pass) at 12,300'



**Looking into East Fork Black's
Fork from Red Knob – Sheep
Graze These Slopes up to
12,000' and more**



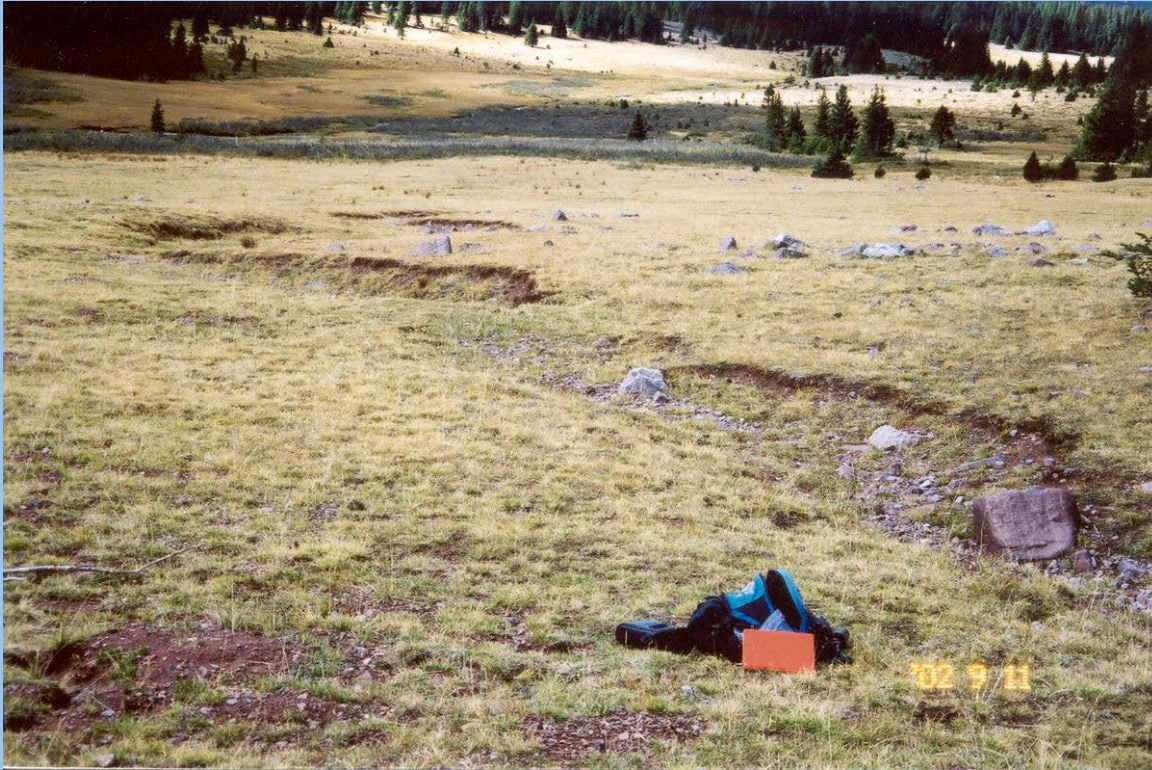
Upper Lake Fork Grazed by Sheep Trailed thru WFBF/EFBF? across Red Knob Pass



East Fork Black's Fork – Steep Slopes Grazed



EFBF Upper Basin – note barren uplands, braided stream channel



East Fork Black's Fork - Active Headcuts





Middle Fork Beaver Creek Ungrazed - Healing Headcuts



Scouring, sediment in East Fork Black's Fork



EFBF Upper Basin – note barren upland slopes, stream bank damage

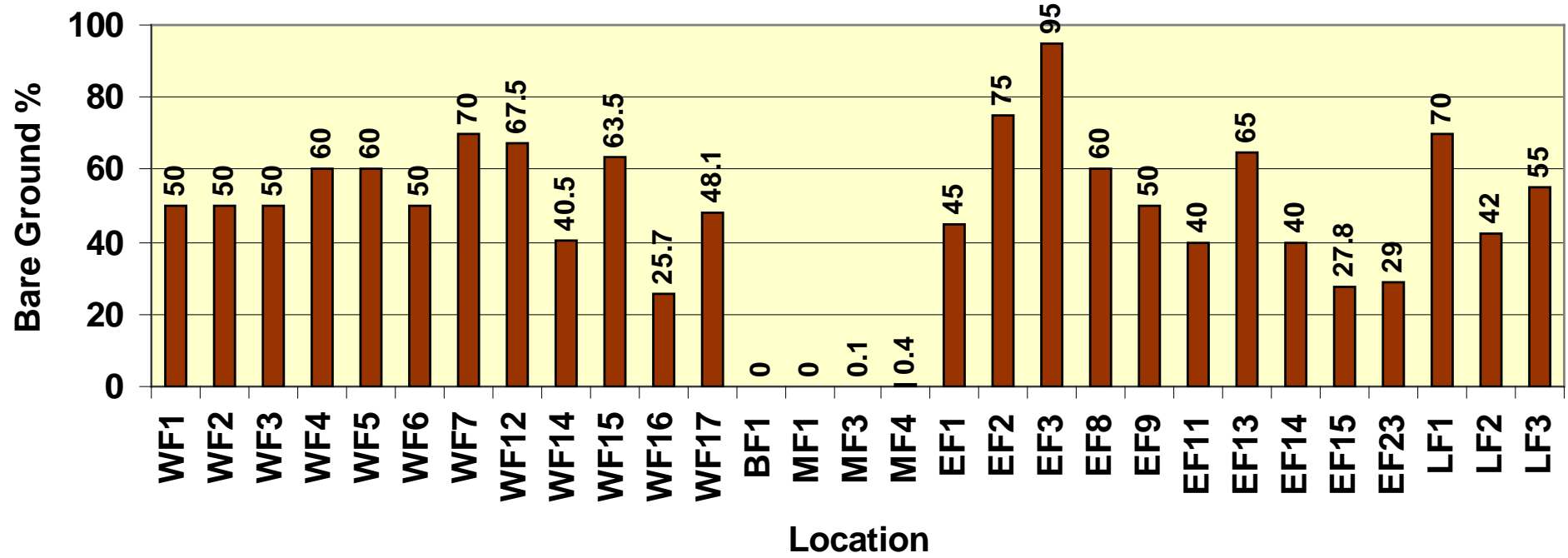


WFBF – Lake EJOD rapidly filling with sediment from eroding uplands.. Note deltas of sediment coming off grazed uplands..Mont Lewis described this effect in 1970 report.



Small Stream in WFBF on left, similar stream on right in closed watershed...

Bare Ground % at Transects and Ocular Photopoints Uinta Wilderness



Mont Lewis 1970

- **Graze on slopes <20%**
- **Utilization 30%**
- **Bare ground <30%**
- **Wetlands not preferred**
- **Scattered suitable areas a problem**

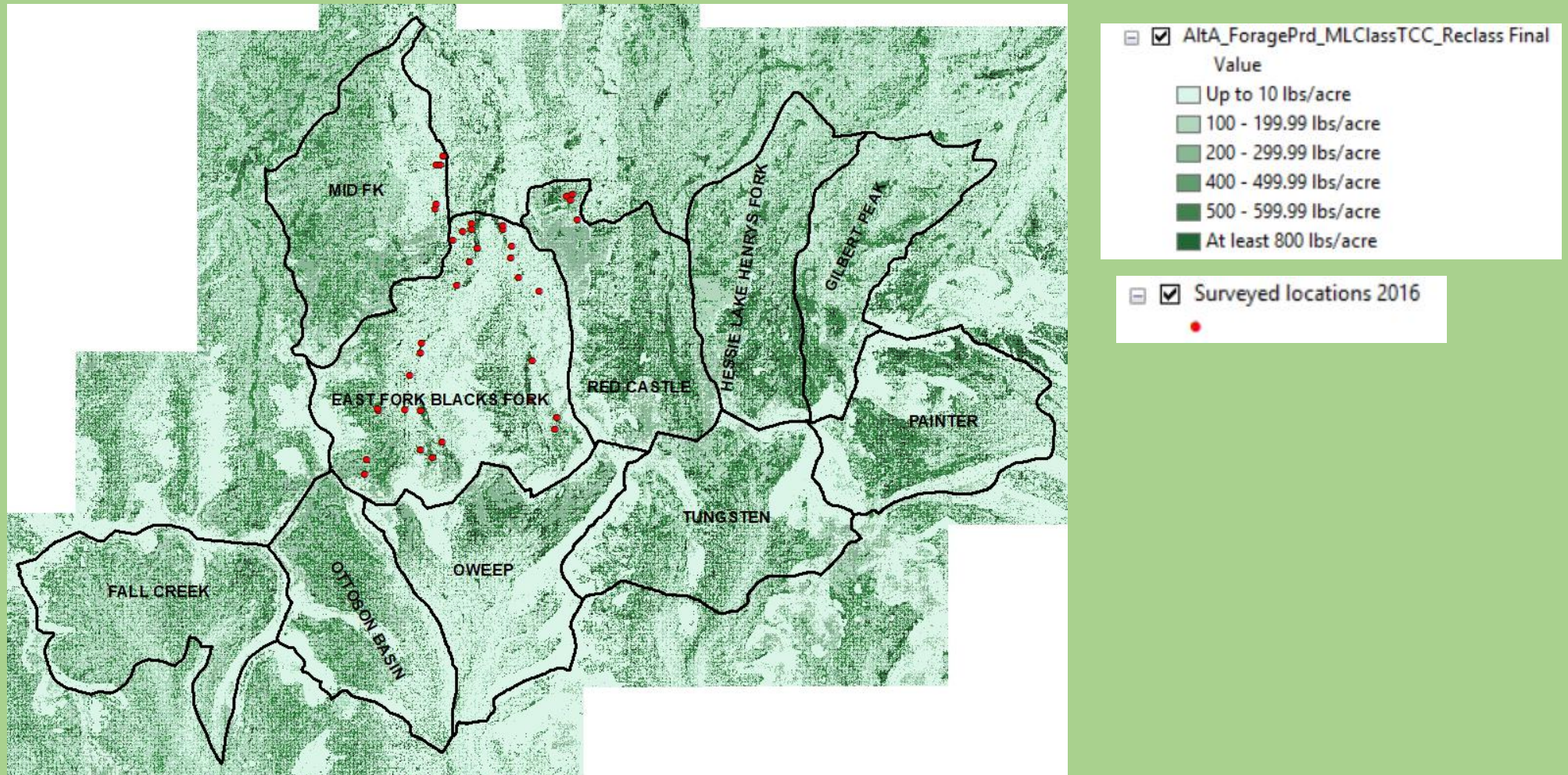
Stocking Rate Factors

- Ewe/lambs forage consumption 9.9 lb/day or 301 lb/month (based on 125 lb ewe, 80 – 90 lb lambs 1964 R4 Range Analysis Hbk). Note Rambouillet ewes 200 lbs, rams 300. Current USDA weights 132 at slaughter.
- Utilization Rate 30% (Holechek et al recommend 20% during growing season or poor condition, while Lewis recommended 30%).
- Average forage production 294 lb/capable acre (included wetland samples. Would be 211 lb without. 1960's data average 240 lb/acre.

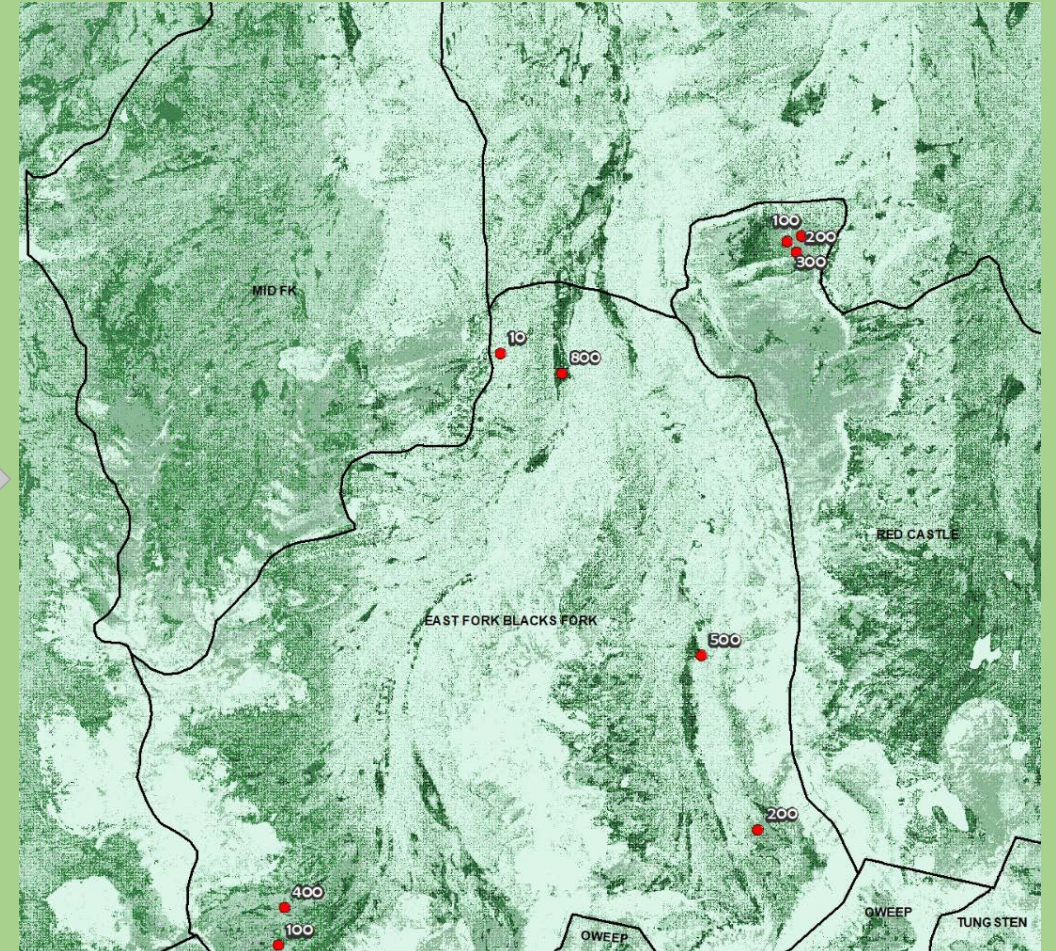
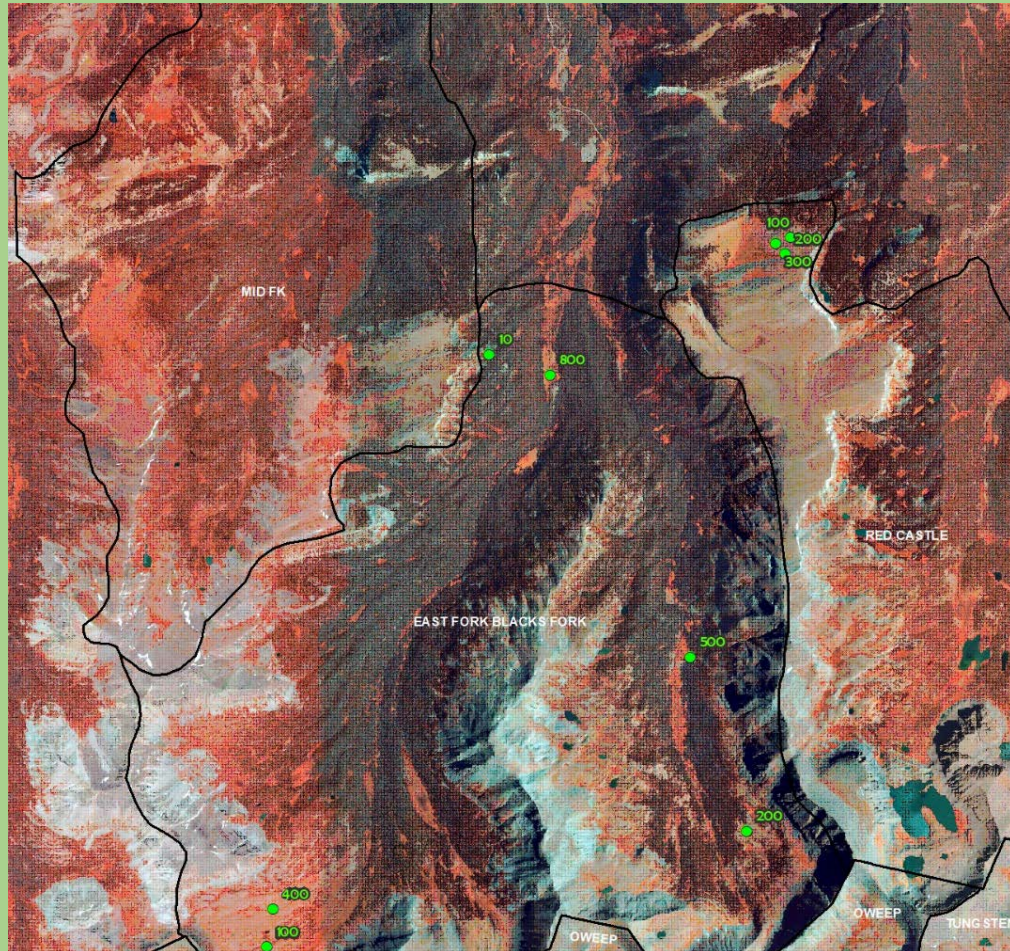
Alternative A

- **Alternative A:** In this alternative, grazing capability is estimated by using a forage production model developed by Wild Utah Project that integrates data collected in 2016 with NAIP-based aerial imagery and an evaluation of USFS grazing capability criteria.
- **Grazing Capability Criteria:**
 - Areas capable of grazing are:
 - < 45 % slope
 - Have a minimum forage production of 200 lbs/acre
 - Areas without dense timber, rock, or other physical barriers
 - Ground cover greater than 60%

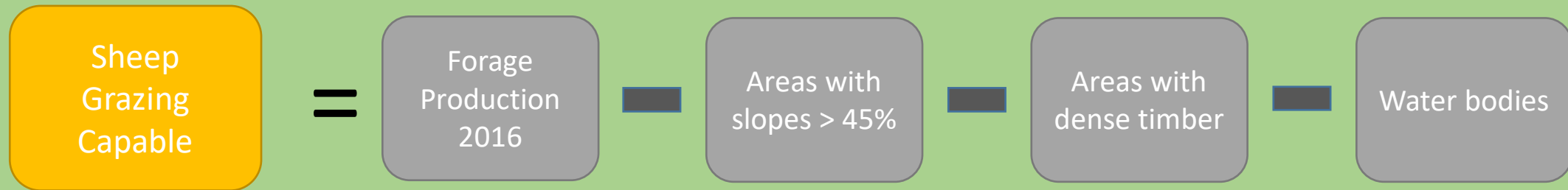
Extent and distribution of forage production model developed by Wild Utah Project



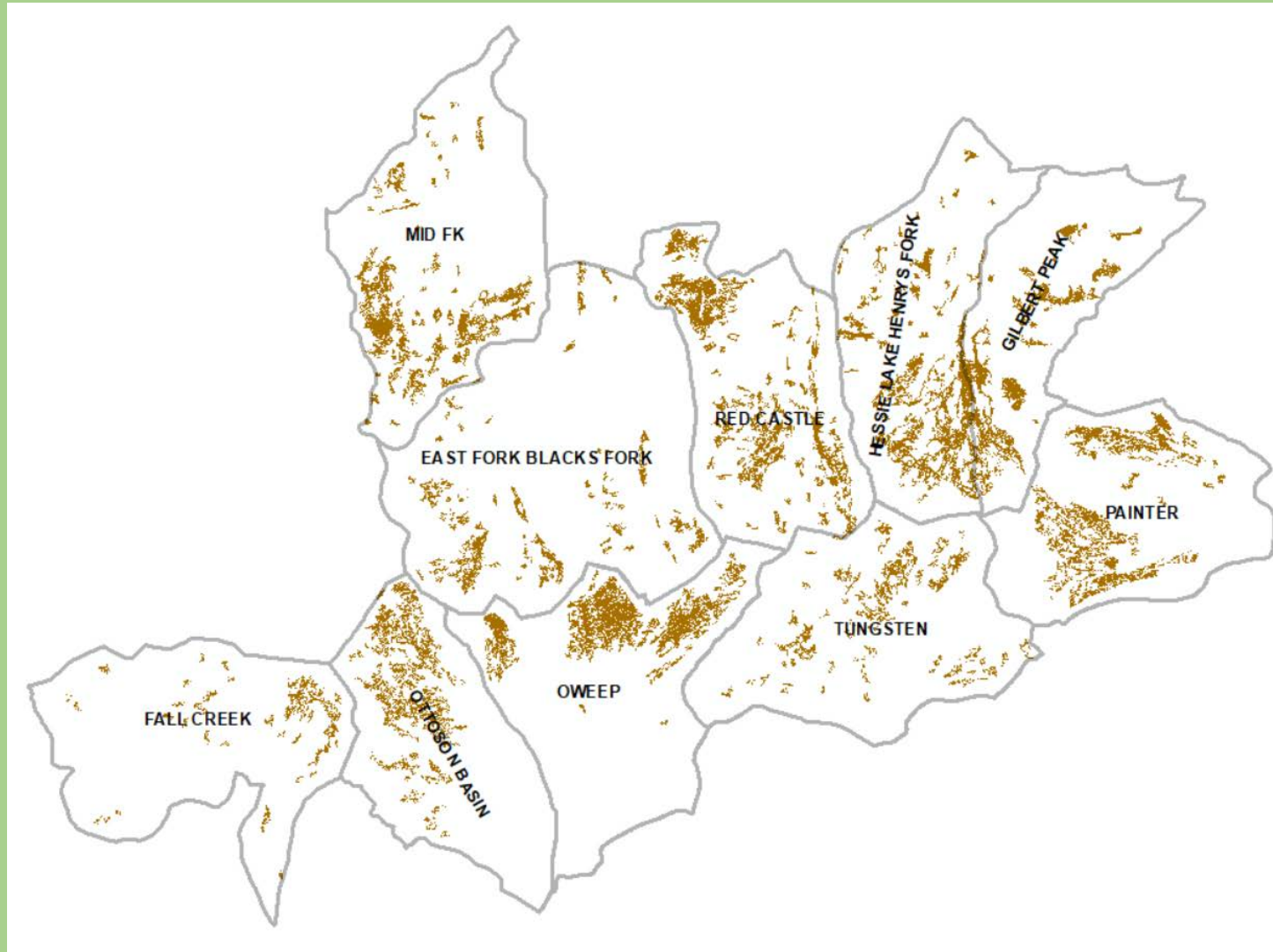
Forage production derived from aerial imagery and collected data in the field



Alternative A.1: Grazing capability GIS model

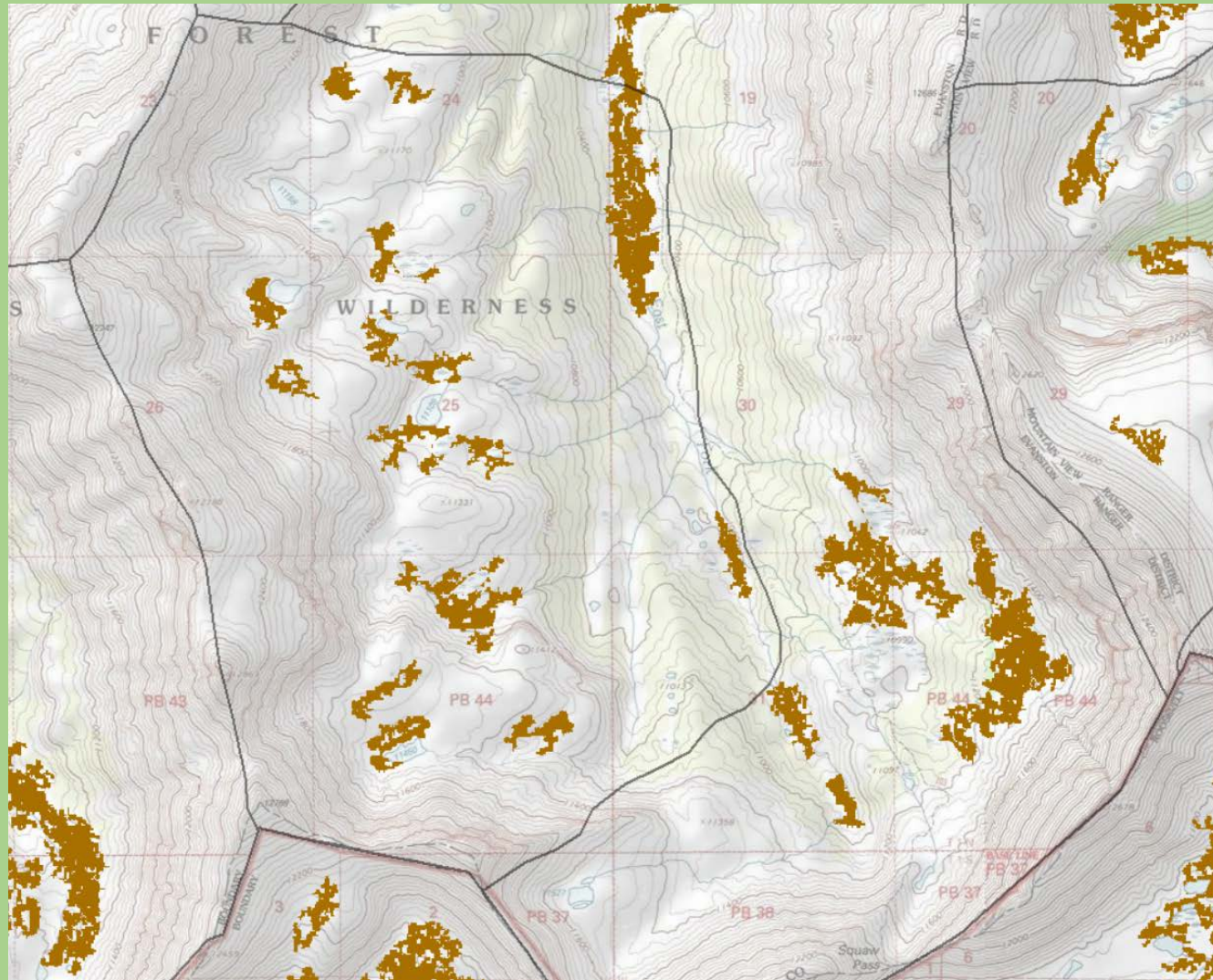


GIS Results: Alternative A.1



Total acres in Alternative
A.1 = **14,727**

GIS Results: Alternative A.1 (close-up)



GIS Results: Alternative A.1

Grazing capable acres

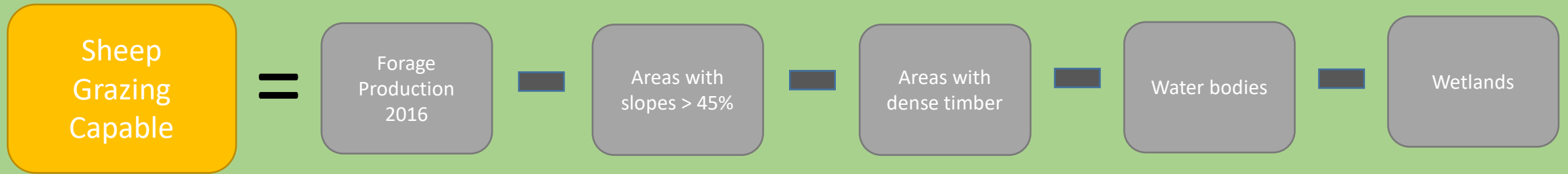
| Allotment | National Forest | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK | Uinta-Wasatch-Cache National Forest | 1126.77 |
| GILBERT PEAK | Uinta-Wasatch-Cache National Forest | 1324.44 |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 1905.74 |
| MID FK | Uinta-Wasatch-Cache National Forest | 1711.09 |
| RED CASTLE | Uinta-Wasatch-Cache National Forest | 2167.79 |
| FALL CREEK | Ashley National Forest | 513.97 |
| OTTOSON BASIN | Ashley National Forest | 1401.96 |
| OWEEP | Ashley National Forest | 1887.58 |
| PAINTER | Ashley National Forest | 1656.45 |
| TUNGSTEN | Ashley National Forest | 1031.32 |
| | TOTAL ACRES | 14,727.13 |

GIS Results: Alternative A.1

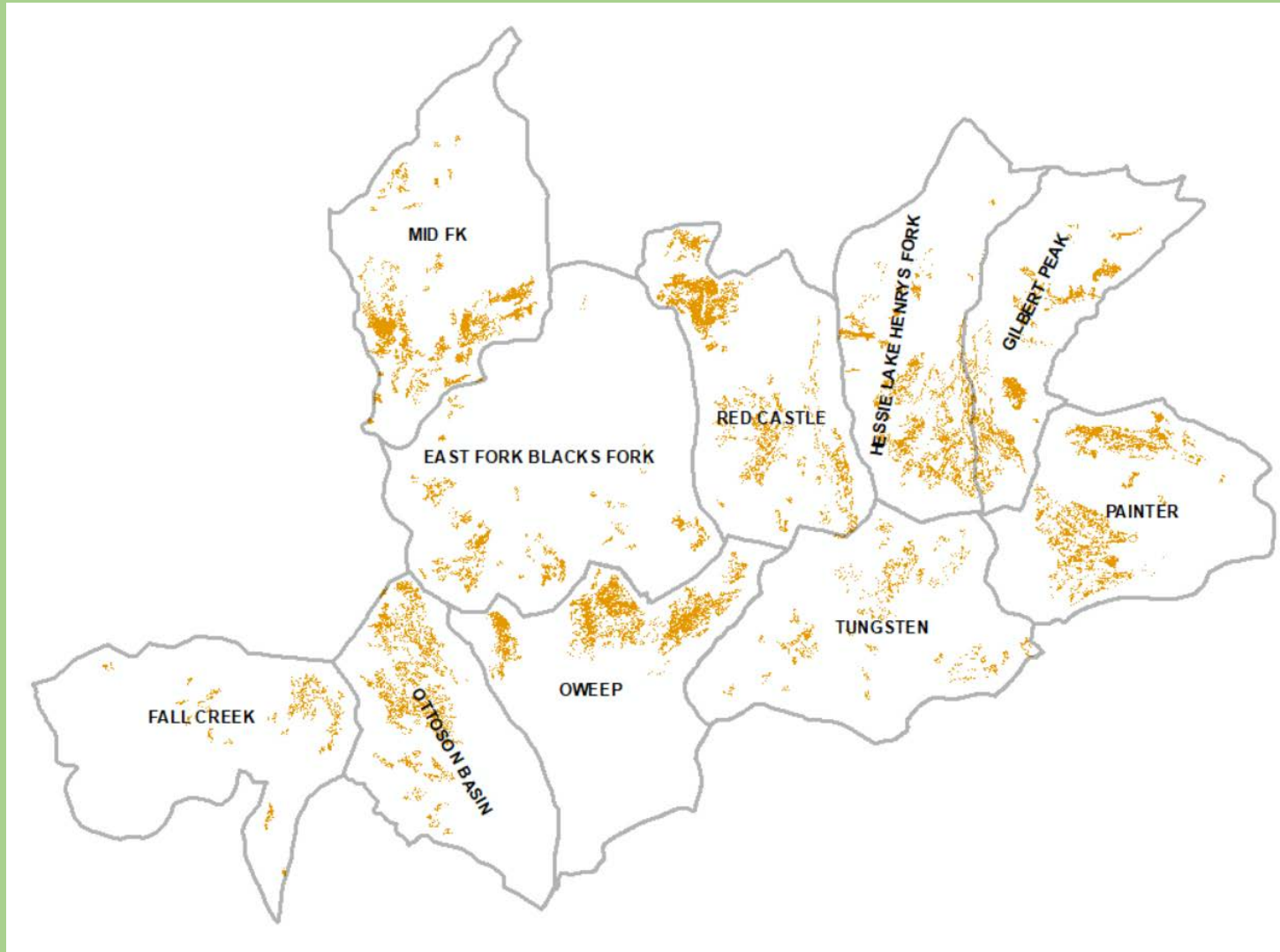
Grazing stocking rates

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative A1 | | | | | | | |
| Grand Total | 14727 | | | | | | |
| EAST FORK BLACKS FORK | 1126 | 294 | 331044 | 99313 | 301 | 1350 | 0.24 |
| FALL CREEK | 514 | 294 | 151116 | 45335 | 301 | 1100 | 0.14 |
| GILBERT PEAK | 1324 | 294 | 389256 | 116777 | 301 | 1400 | 0.28 |
| HESSIE LAKE HENRYS FORK | 1905 | 294 | 560070 | 168021 | 301 | 1400 | 0.40 |
| MID FK | 1711 | 294 | 503034 | 150910 | 301 | 1200 | 0.42 |
| OTTOSON BASIN | 1401 | 294 | 411894 | 123568 | 301 | 1300 | 0.32 |
| OWEED | 1887 | 294 | 554778 | 166433 | 301 | 1400 | 0.39 |
| PAINTER | 1656 | 294 | 486864 | 146059 | 301 | 1200 | 0.40 |
| RED CASTLE | 2167 | 294 | 637098 | 191129 | 301 | 1300 | 0.49 |
| TUNGSTEN | 1031 | 294 | 303114 | 90934 | 301 | 1200 | 0.25 |

Alternative A.2: GIS model

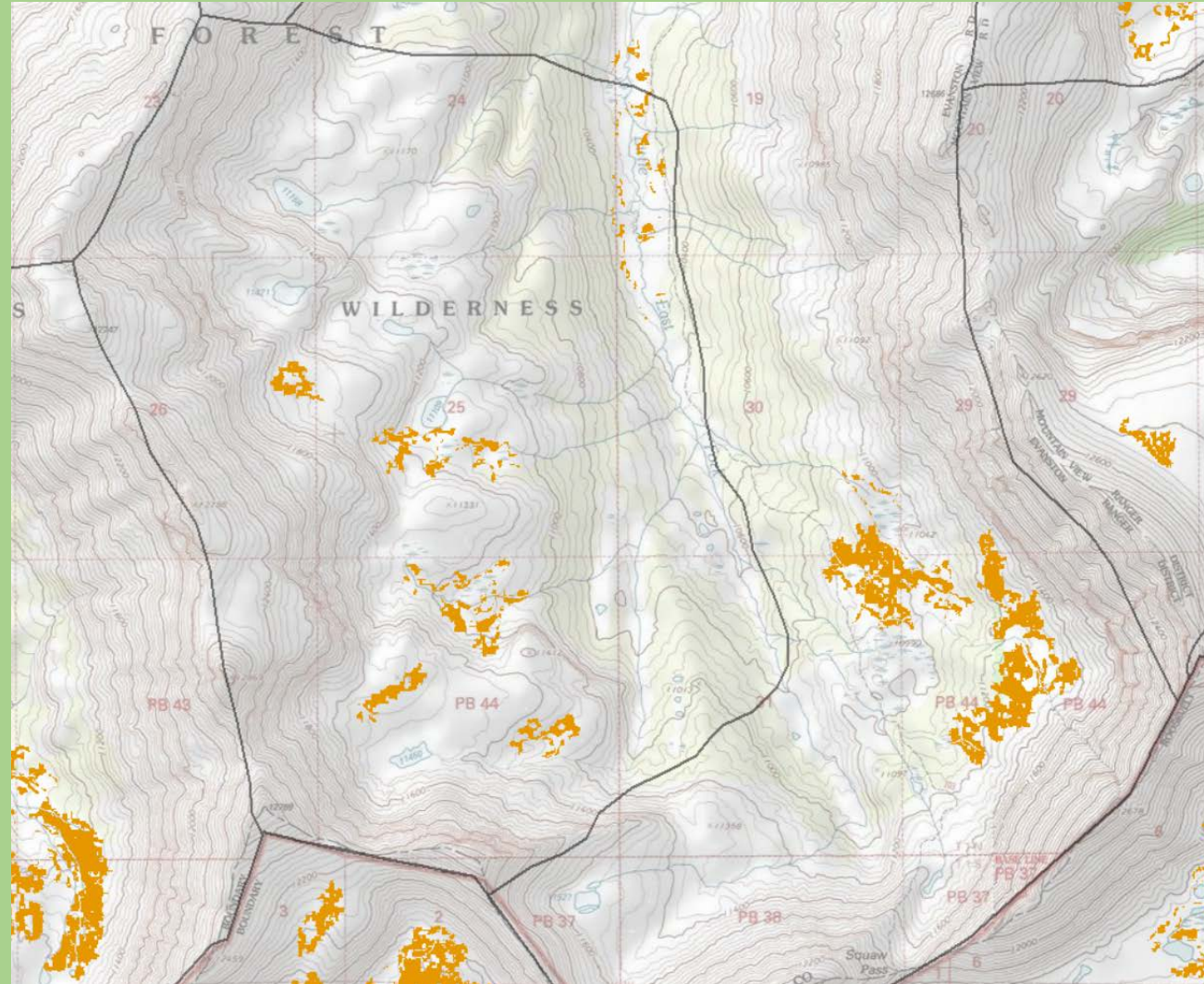


GIS Results: Alternative A.2



Total acres in Alternative
A.2 = **9,684**

GIS Results: Alternative A.2 (close-up)



GIS Results: Alternative A.2

Grazing capable acres

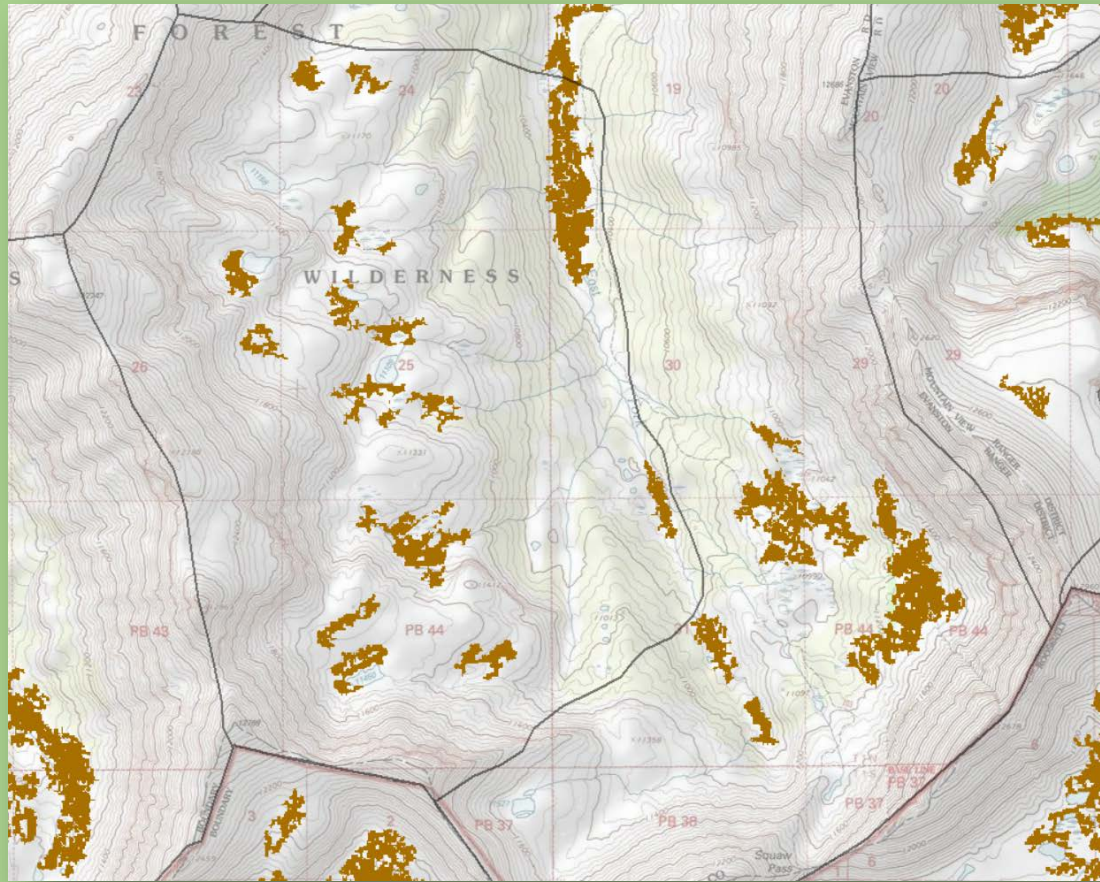
| Allotment | National Forest | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK | Uinta-Wasatch-Cache National Forest | 612.96 |
| GILBERT PEAK | Uinta-Wasatch-Cache National Forest | 846.03 |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 1102.71 |
| MID FK | Uinta-Wasatch-Cache National Forest | 1196.75 |
| RED CASTLE | Uinta-Wasatch-Cache National Forest | 1449.20 |
| FALL CREEK | Ashley National Forest | 319.32 |
| OTTOSON BASIN | Ashley National Forest | 1098.64 |
| OWEEP | Ashley National Forest | 1345.76 |
| PAINTER | Ashley National Forest | 1186.43 |
| TUNGSTEN | Ashley National Forest | 526.71 |
| | TOTAL ACRES | 9,684.50 |

GIS Results: Alternative A.2

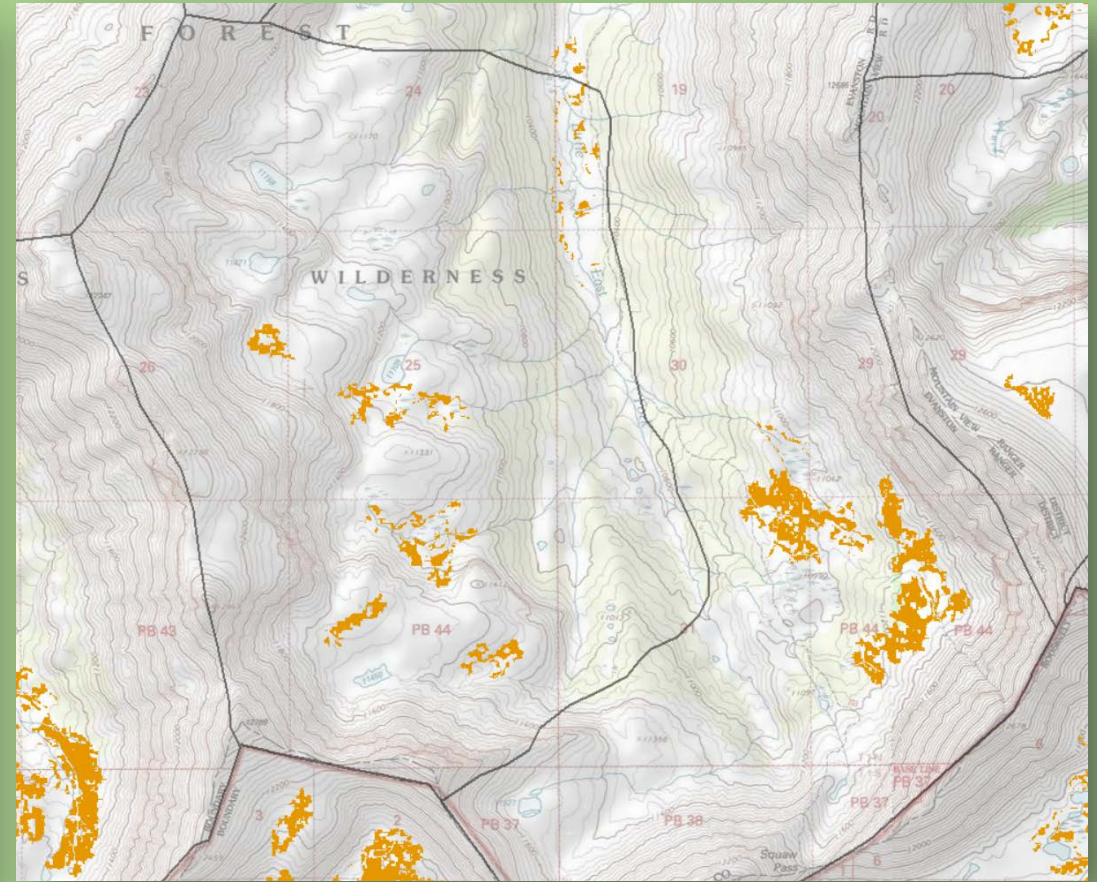
Grazing stocking rates

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative A2 | | | | | | | |
| Grand Total | 9685 | | | | | | |
| EAST FORK BLACKS FORK | 613 | 294 | 180222 | 54066.6 | 301 | 1350 | 0.13 |
| FALL CREEK | 319 | 294 | 93786 | 28135.8 | 301 | 1100 | 0.08 |
| GILBERT PEAK | 846 | 294 | 248724 | 74617.2 | 301 | 1400 | 0.18 |
| HESSIE LAKE HENRYS FORK | 1103 | 294 | 324282 | 97284.6 | 301 | 1400 | 0.23 |
| MID FK | 1197 | 294 | 351918 | 105575.4 | 301 | 1200 | 0.29 |
| OTTOSON BASIN | 1099 | 294 | 323106 | 96931.8 | 301 | 1300 | 0.25 |
| OWEEP | 1346 | 294 | 395724 | 118717.2 | 301 | 1400 | 0.28 |
| PAINTER | 1186 | 294 | 348684 | 104605.2 | 301 | 1200 | 0.29 |
| RED CASTLE | 1449 | 294 | 426006 | 127801.8 | 301 | 1300 | 0.33 |
| TUNGSTEN | 527 | 294 | 154938 | 46481.4 | 301 | 1200 | 0.13 |

GIS Results: Comparison between A.1 and A.2 (close-up)



A.1



A.2

GIS Results: Comparison between A.1 and A.2 (acres)

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative A1 | | | | | | | |
| Grand Total | 14727 | | | | | | |
| EAST FORK BLACKS FORK | 1126 | 294 | 331044 | 99313 | 301 | 1350 | 0.24 |
| FALL CREEK | 514 | 294 | 151116 | 45335 | 301 | 1100 | 0.14 |
| GILBERT PEAK | 1324 | 294 | 389256 | 116777 | 301 | 1400 | 0.28 |
| HESSIE LAKE HENRYS FORK | 1905 | 294 | 560070 | 168021 | 301 | 1400 | 0.40 |
| MID FK | 1711 | 294 | 503034 | 150910 | 301 | 1200 | 0.42 |
| OTTOSON BASIN | 1401 | 294 | 411894 | 123568 | 301 | 1300 | 0.32 |
| OWEEP | 1887 | 294 | 554778 | 166433 | 301 | 1400 | 0.39 |
| PAINTER | 1656 | 294 | 486864 | 146059 | 301 | 1200 | 0.40 |
| RED CASTLE | 2167 | 294 | 637098 | 191129 | 301 | 1300 | 0.49 |
| TUNGSTEN | 1031 | 294 | 303114 | 90934 | 301 | 1200 | 0.25 |

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative A2 | | | | | | | |
| Grand Total | 9685 | | | | | | |
| EAST FORK BLACKS FORK | 613 | 294 | 180222 | 54066.6 | 301 | 1350 | 0.13 |
| FALL CREEK | 319 | 294 | 93786 | 28135.8 | 301 | 1100 | 0.08 |
| GILBERT PEAK | 846 | 294 | 248724 | 74617.2 | 301 | 1400 | 0.18 |
| HESSIE LAKE HENRYS FORK | 1103 | 294 | 324282 | 97284.6 | 301 | 1400 | 0.23 |
| MID FK | 1197 | 294 | 351918 | 105575.4 | 301 | 1200 | 0.29 |
| OTTOSON BASIN | 1099 | 294 | 323106 | 96931.8 | 301 | 1300 | 0.25 |
| OWEEP | 1346 | 294 | 395724 | 118717.2 | 301 | 1400 | 0.28 |
| PAINTER | 1186 | 294 | 348684 | 104605.2 | 301 | 1200 | 0.29 |
| RED CASTLE | 1449 | 294 | 426006 | 127801.8 | 301 | 1300 | 0.33 |
| TUNGSTEN | 527 | 294 | 154938 | 46481.4 | 301 | 1200 | 0.13 |

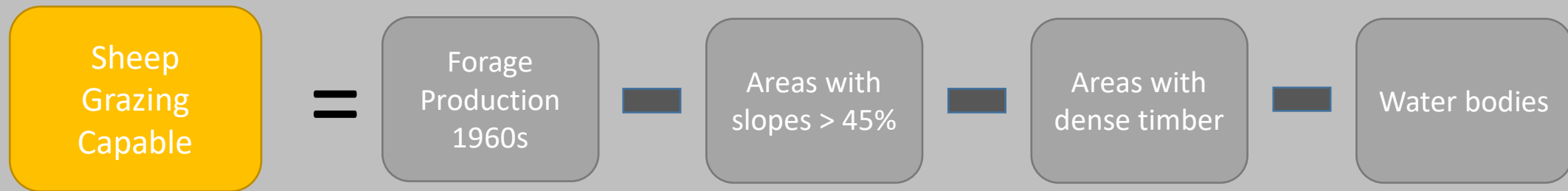
Alternative B

- **Alternative B: grazing capability is derived from the forage production (digitized) data that was collected back in the 1960s and implementation of the USFS grazing capability criteria.**
- **Grazing Capability Criteria:**
 - **Areas capable of grazing are:**
 - **< 45 % slope**
 - **Have a minimum forage production of 200 lbs/acre**
 - **Areas without dense timber, rock, or other physical barriers**
 - **Ground cover greater than 60%**

Original extent and distribution of forage production data from 1960



Alternative B.1: GIS model



GIS Results: Alternative B.1



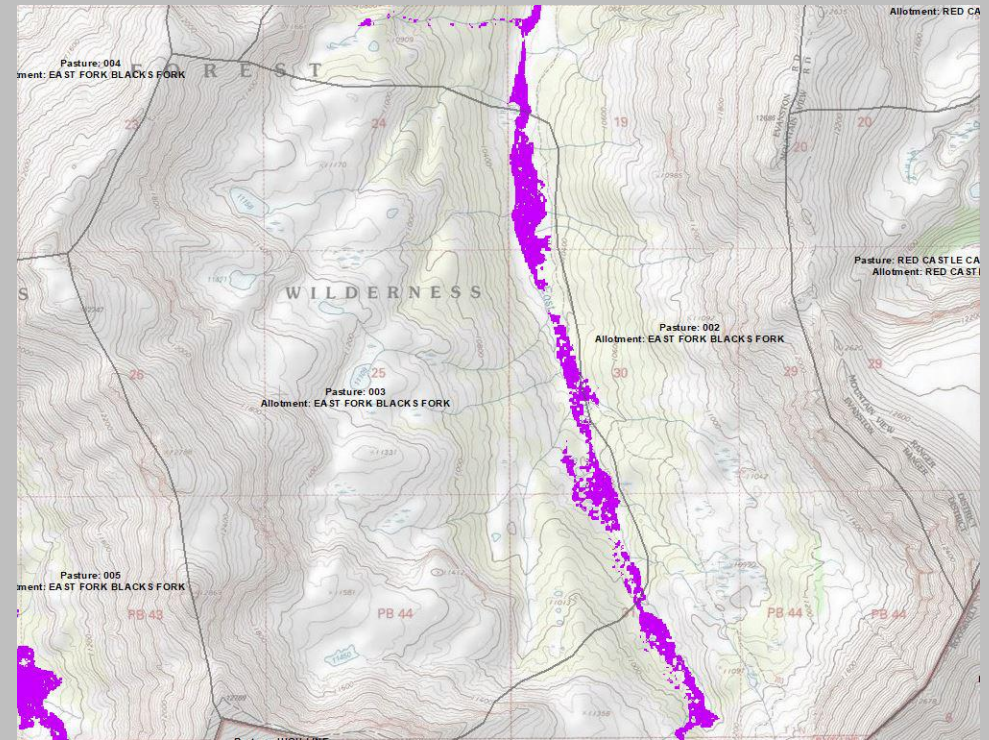
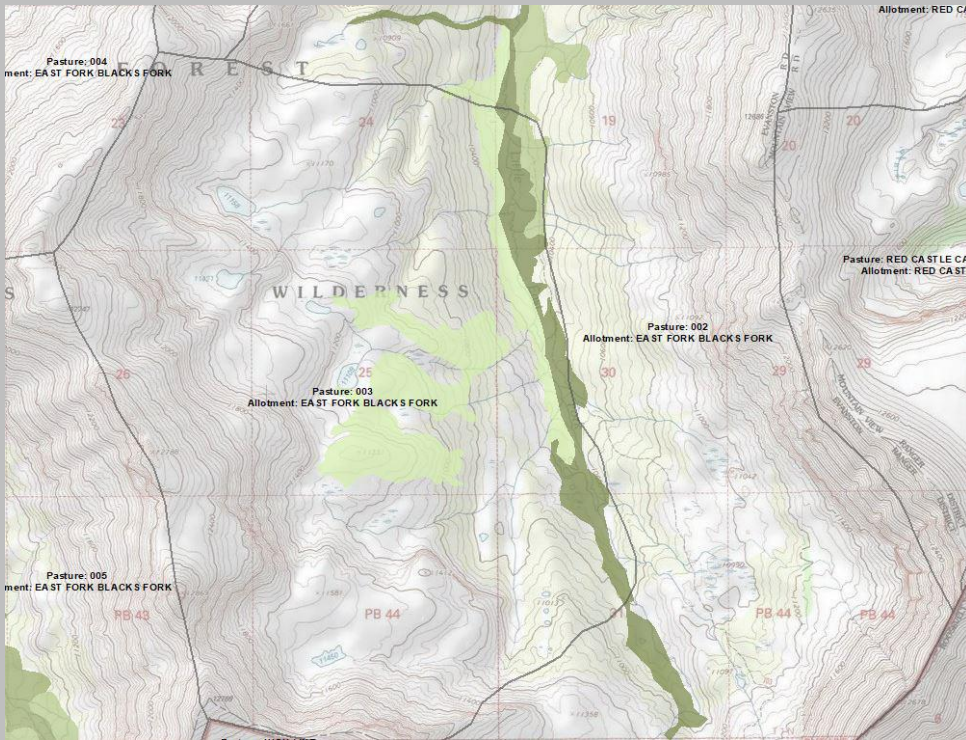
Total acres in Alternative
B.1 = **4,485**

GIS Results: Alternative B.1

BEFORE

Forage production -> capable

AFTER



GIS Results: Alternative B.1

Grazing capable acres

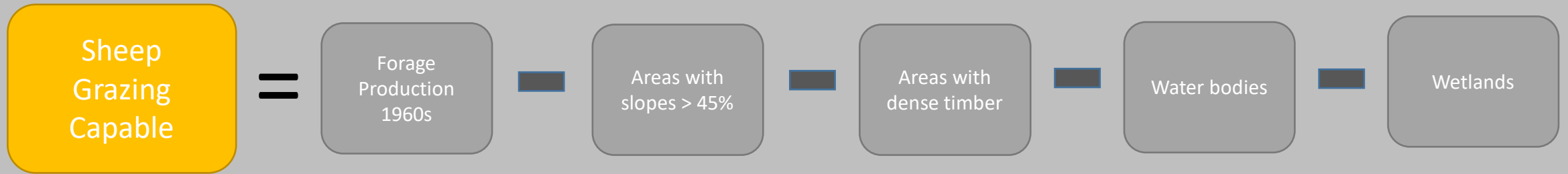
| Allotment | National Forest | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK | Uinta-Wasatch-Cache National Forest | 580.01 |
| GILBERT PEAK | Uinta-Wasatch-Cache National Forest | 577.14 |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 180.17 |
| MID FK | Uinta-Wasatch-Cache National Forest | 1009.25 |
| RED CASTLE | Uinta-Wasatch-Cache National Forest | 843.75 |
| FALL CREEK | Ashley National Forest | 869.93 |
| OTTOSON BASIN | Ashley National Forest | 24.42 |
| OWEEP | Ashley National Forest | 15.57 |
| PAINTER | Ashley National Forest | 384.82 |
| TUNGSTEN | Ashley National Forest | 0 |
| | TOTAL ACRES | 4,485.06 |

GIS Results: Alternative B.1

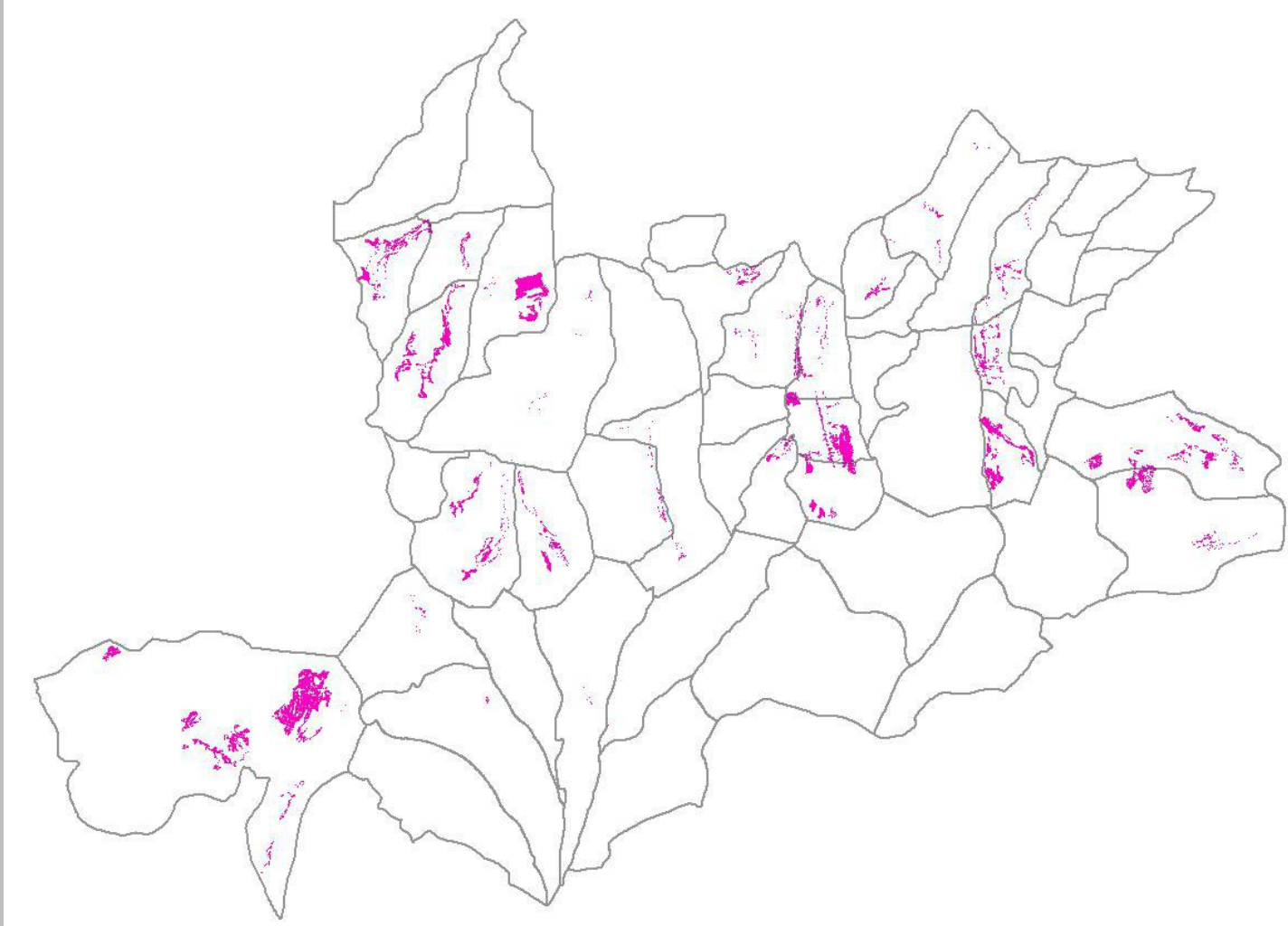
Grazing stocking rates

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|--------------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative B1 | | | | | | | |
| Grand Total | 4485 | | | | | | |
| EAST FORK BLACKS FORK | 580 | 294 | 170520 | 51156 | 301 | 1350 | 0.13 |
| FALL CREEK | 870 | 294 | 255780 | 76734 | 301 | 1100 | 0.23 |
| GILBERT PEAK | 577 | 294 | 169638 | 50891.4 | 301 | 1400 | 0.12 |
| HESSIE LAKE HENRYS FORK | 180 | 294 | 52920 | 15876 | 301 | 1400 | 0.04 |
| MID FK | 1009 | 294 | 296646 | 88993.8 | 301 | 1200 | 0.25 |
| OTTOSON BASIN | 24 | 294 | 7056 | 2116.8 | 301 | 1300 | 0.01 |
| OWEEP | 16 | 294 | 4704 | 1411.2 | 301 | 1400 | 0.00 |
| PAINTER | 385 | 294 | 113190 | 33957 | 301 | 1200 | 0.09 |
| RED CASTLE | 855 | 294 | 251370 | 75411 | 301 | 1300 | 0.19 |
| TUNGSTEN | 0 | 294 | 0 | 0 | 301 | 1200 | 0.00 |

Alternative B.2: GIS model



GIS Results: Alternative B.2



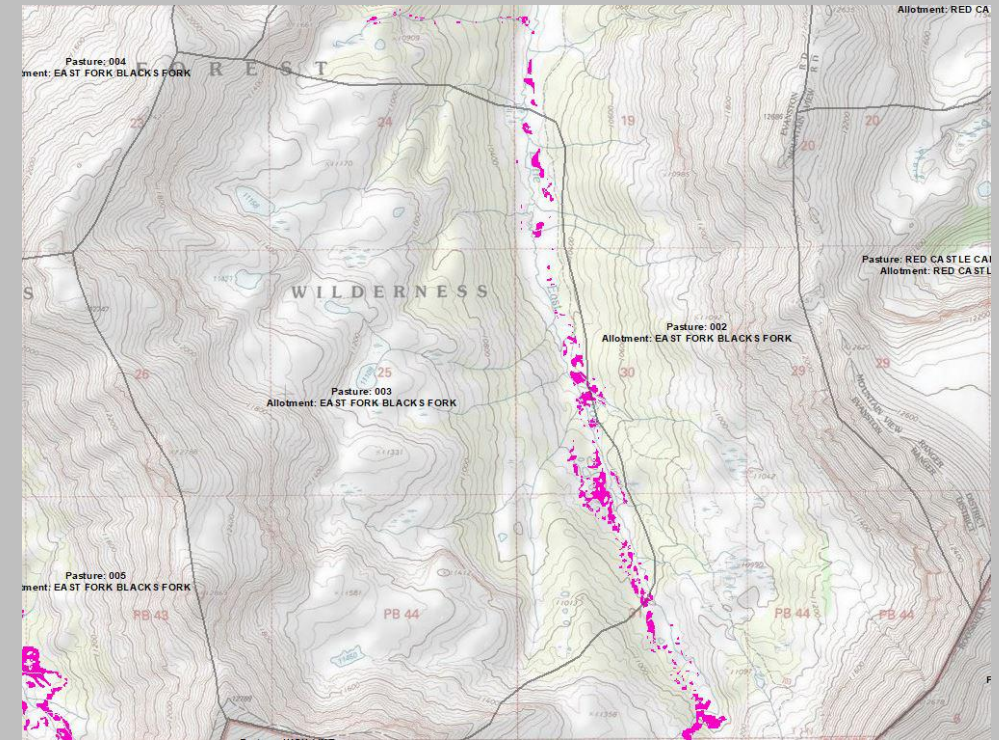
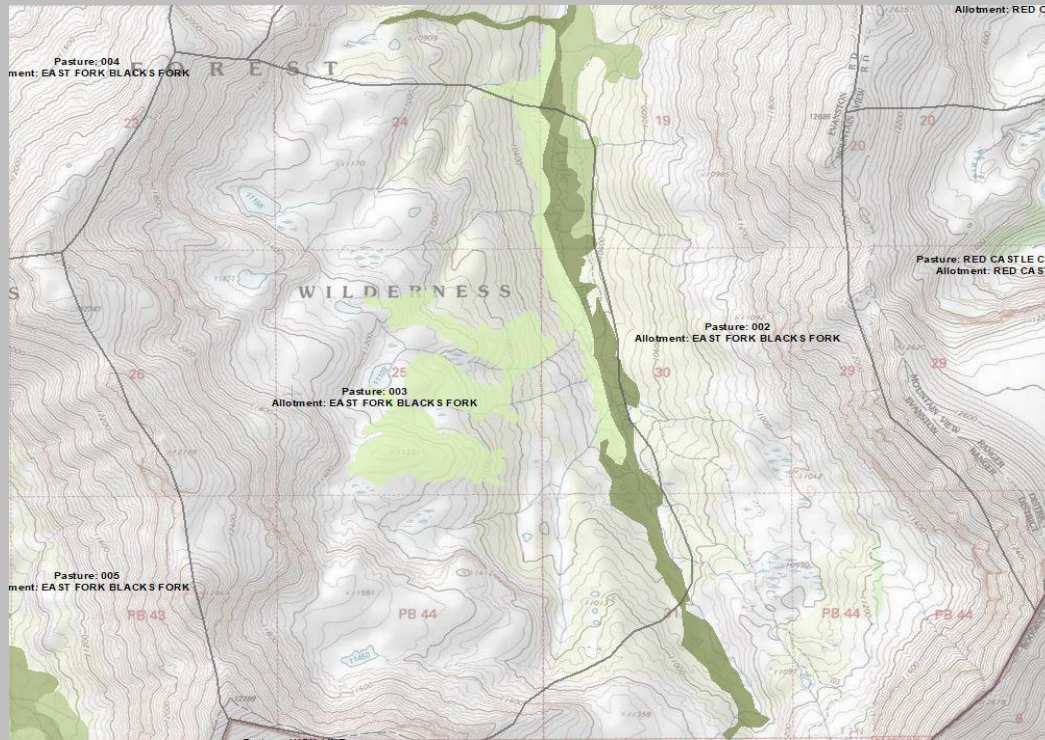
Total acres in Alternative
B.2 = **2,888**

GIS Results: Alternative B.2

BEFORE

Forage production -> capable

AFTER



GIS Results: Alternative B.2

Grazing capable acres

| Allotment | National Forest | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK | Uinta-Wasatch-Cache National Forest | 262.92 |
| GILBERT PEAK | Uinta-Wasatch-Cache National Forest | 354.74 |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 55.80 |
| MID FK | Uinta-Wasatch-Cache National Forest | 634.63 |
| RED CASTLE | Uinta-Wasatch-Cache National Forest | 510.21 |
| FALL CREEK | Ashley National Forest | 734.38 |
| OTTOSON BASIN | Ashley National Forest | 13.81 |
| OWEEP | Ashley National Forest | 4.26 |
| PAINTER | Ashley National Forest | 317.96 |
| TUNGSTEN | Ashley National Forest | 0 |
| | TOTAL ACRES | 2,888.69 |

GIS Results: Alternative B.2

Grazing stocking rates

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative B2 | | | | | | | |
| Grand Total | 2889 | | | | | | |
| EAST FORK BLACKS FORK | 263 | 294 | 77322 | 23196.6 | 301 | 1350 | 0.06 |
| FALL CREEK | 734 | 294 | 215796 | 64738.8 | 301 | 1100 | 0.20 |
| GILBERT PEAK | 355 | 294 | 104370 | 31311 | 301 | 1400 | 0.07 |
| HESSIE LAKE HENRYS FORK | 56 | 294 | 16464 | 4939.2 | 301 | 1400 | 0.01 |
| MID FK | 634 | 294 | 186396 | 55918.8 | 301 | 1200 | 0.15 |
| OTTOSON BASIN | 14 | 294 | 4116 | 1234.8 | 301 | 1300 | 0.00 |
| OWEEP | 4 | 294 | 1176 | 352.8 | 301 | 1400 | 0.00 |
| PAINTER | 317 | 294 | 93198 | 27959.4 | 301 | 1200 | 0.08 |
| RED CASTLE | 510 | 294 | 149940 | 44982 | 301 | 1300 | 0.11 |
| TUNGSTEN | 0 | 294 | 0 | 0 | 301 | 1200 | 0.00 |

GIS Results: Comparison between B.1 and B.2 (acres)

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative B1 | | | | | | | |
| Grand Total | 4485 | | | | | | |
| EAST FORK BLACKS FORK | 580 | 294 | 170520 | 51156 | 301 | 1350 | 0.13 |
| FALL CREEK | 870 | 294 | 255780 | 76734 | 301 | 1100 | 0.23 |
| GILBERT PEAK | 577 | 294 | 169638 | 50891.4 | 301 | 1400 | 0.12 |
| HESSIE LAKE HENRYS FORK | 180 | 294 | 52920 | 15876 | 301 | 1400 | 0.04 |
| MID FK | 1009 | 294 | 296646 | 88993.8 | 301 | 1200 | 0.25 |
| OTTOSON BASIN | 24 | 294 | 7056 | 2116.8 | 301 | 1300 | 0.01 |
| OWEED | 16 | 294 | 4704 | 1411.2 | 301 | 1400 | 0.00 |
| PAINTER | 385 | 294 | 113190 | 33957 | 301 | 1200 | 0.09 |
| RED CASTLE | 855 | 294 | 251370 | 75411 | 301 | 1300 | 0.19 |
| TUNGSTEN | 0 | 294 | 0 | 0 | 301 | 1200 | 0.00 |

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative B2 | | | | | | | |
| Grand Total | 2889 | | | | | | |
| EAST FORK BLACKS FORK | 263 | 294 | 77322 | 23196.6 | 301 | 1350 | 0.06 |
| FALL CREEK | 734 | 294 | 215796 | 64738.8 | 301 | 1100 | 0.20 |
| GILBERT PEAK | 355 | 294 | 104370 | 31311 | 301 | 1400 | 0.07 |
| HESSIE LAKE HENRYS FORK | 56 | 294 | 16464 | 4939.2 | 301 | 1400 | 0.01 |
| MID FK | 634 | 294 | 186396 | 55918.8 | 301 | 1200 | 0.15 |
| OTTOSON BASIN | 14 | 294 | 4116 | 1234.8 | 301 | 1300 | 0.00 |
| OWEED | 4 | 294 | 1176 | 352.8 | 301 | 1400 | 0.00 |
| PAINTER | 317 | 294 | 93198 | 27959.4 | 301 | 1200 | 0.08 |
| RED CASTLE | 510 | 294 | 149940 | 44982 | 301 | 1300 | 0.11 |
| TUNGSTEN | 0 | 294 | 0 | 0 | 301 | 1200 | 0.00 |

Alternative C

- **Alternative C correspond to an evaluation of the grazing capability layer by USFS against the criteria for capability also proposed by USFS**
- **Grazing Capability Criteria:**
 - **Areas capable of grazing are:**
 - **< 45 % slope**
 - **Have a minimum forage production of 200 lbs/acre**
 - **Areas without dense timber, rock, or other physical barriers**
 - **Ground cover greater than 60%**

Assumption about the USFS Capability Dataset

Given that the provided dataset does not provide specific values for forage production and ground cover we made the following assumptions:

- Forage production in polygons classified as capable is at least 200 lbs/acre
- Ground cover is at least 60%

Original extent and distribution of capable lands according to USFS

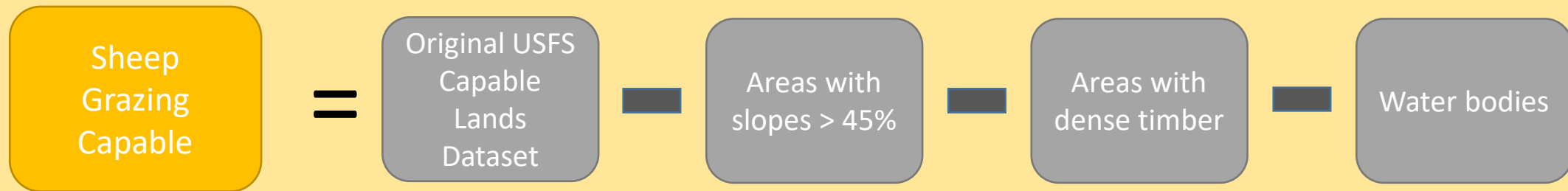


Total acres of USFS capable areas = **57,399**

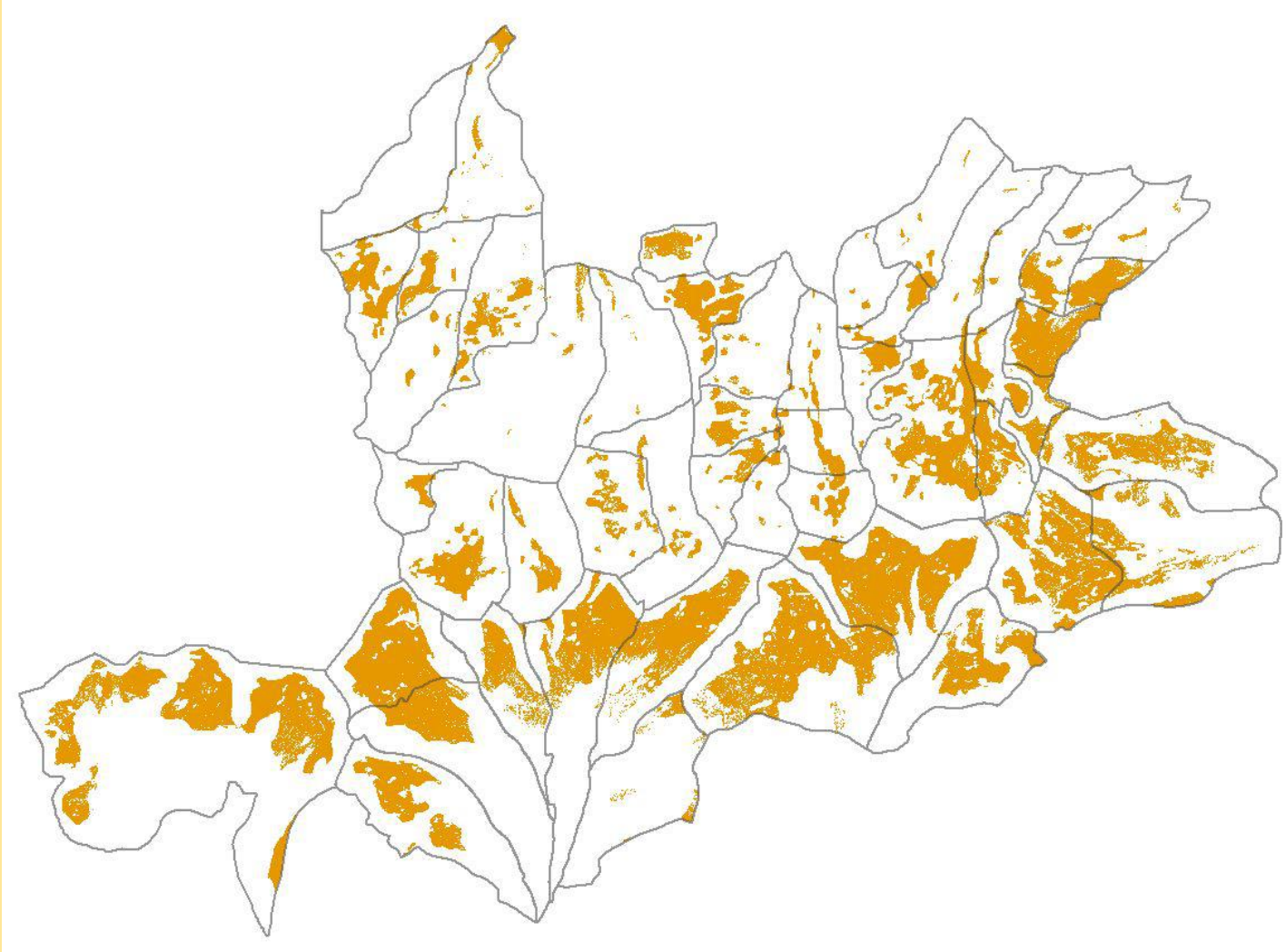
Estimated capable acres by allotment

| Allotment | National Forest | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK | Uinta-Wasatch-Cache National Forest | 2496.03 |
| GILBERT PEAK | Uinta-Wasatch-Cache National Forest | 3954.12 |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 2838.68 |
| MID FK | Uinta-Wasatch-Cache National Forest | 2090.37 |
| RED CASTLE | Uinta-Wasatch-Cache National Forest | 2873.79 |
| FALL CREEK | Ashley National Forest | 5604.55 |
| OTTOSON BASIN | Ashley National Forest | 6103.67 |
| OWEEP | Ashley National Forest | 8582.39 |
| PAINTER | Ashley National Forest | 7657.22 |
| TUNGSTEN | Ashley National Forest | 15198.88 |
| | TOTAL ACRES | 57,399.72 |

Alternative C.1: GIS model



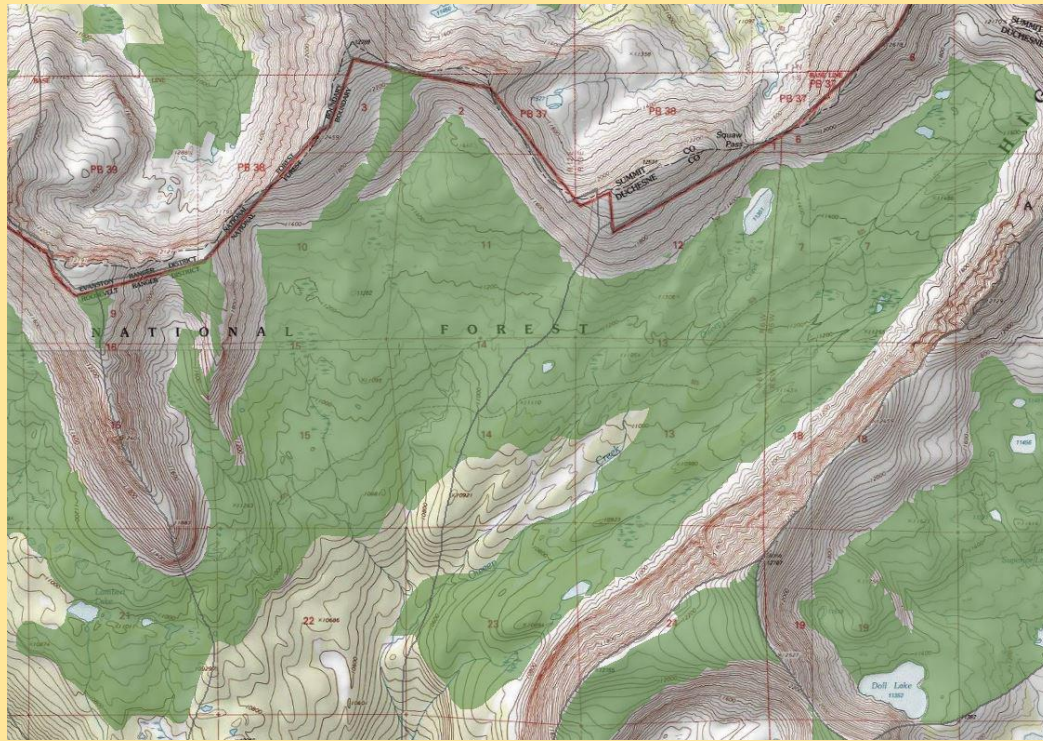
GIS Results: Alternative C.1



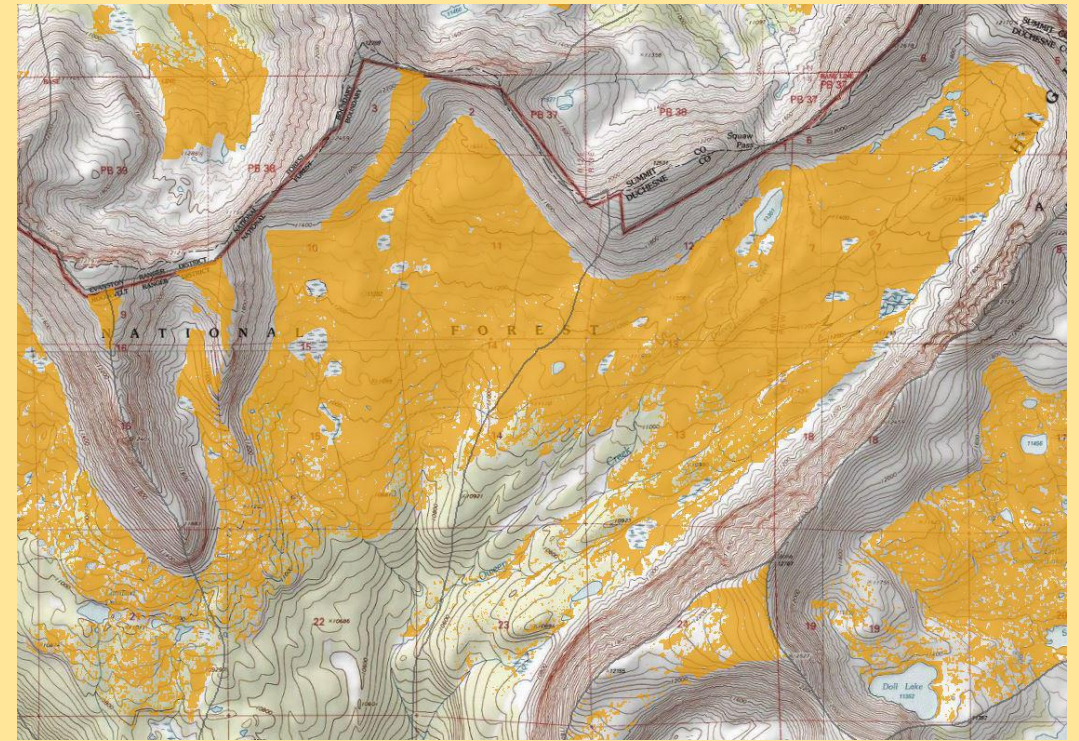
Total acres in Alternative
C.1 = **36,965**

GIS Results: Alternative C.1

BEFORE



AFTER



GIS Results: Alternative C.1

Grazing capable acres

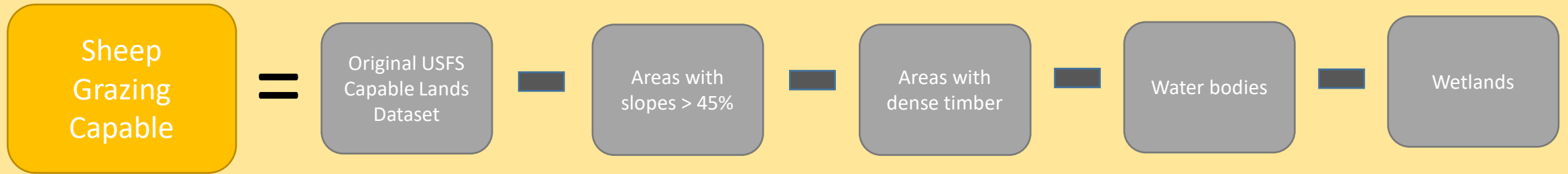
| Allotment | National Forest | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK | Uinta-Wasatch-Cache National Forest | 2008.97 |
| GILBERT PEAK | Uinta-Wasatch-Cache National Forest | 3529.52 |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 2560.48 |
| MID FK | Uinta-Wasatch-Cache National Forest | 1826.14 |
| RED CASTLE | Uinta-Wasatch-Cache National Forest | 2546.87 |
| FALL CREEK | Ashley National Forest | 4072.34 |
| OTTOSON BASIN | Ashley National Forest | 4039.04 |
| OWEEP | Ashley National Forest | 4483.14 |
| PAINTER | Ashley National Forest | 4431.90 |
| TUNGSTEN | Ashley National Forest | 7197.16 |
| | TOTAL ACRES | 36,695.57 |

GIS Results: Alternative C.1

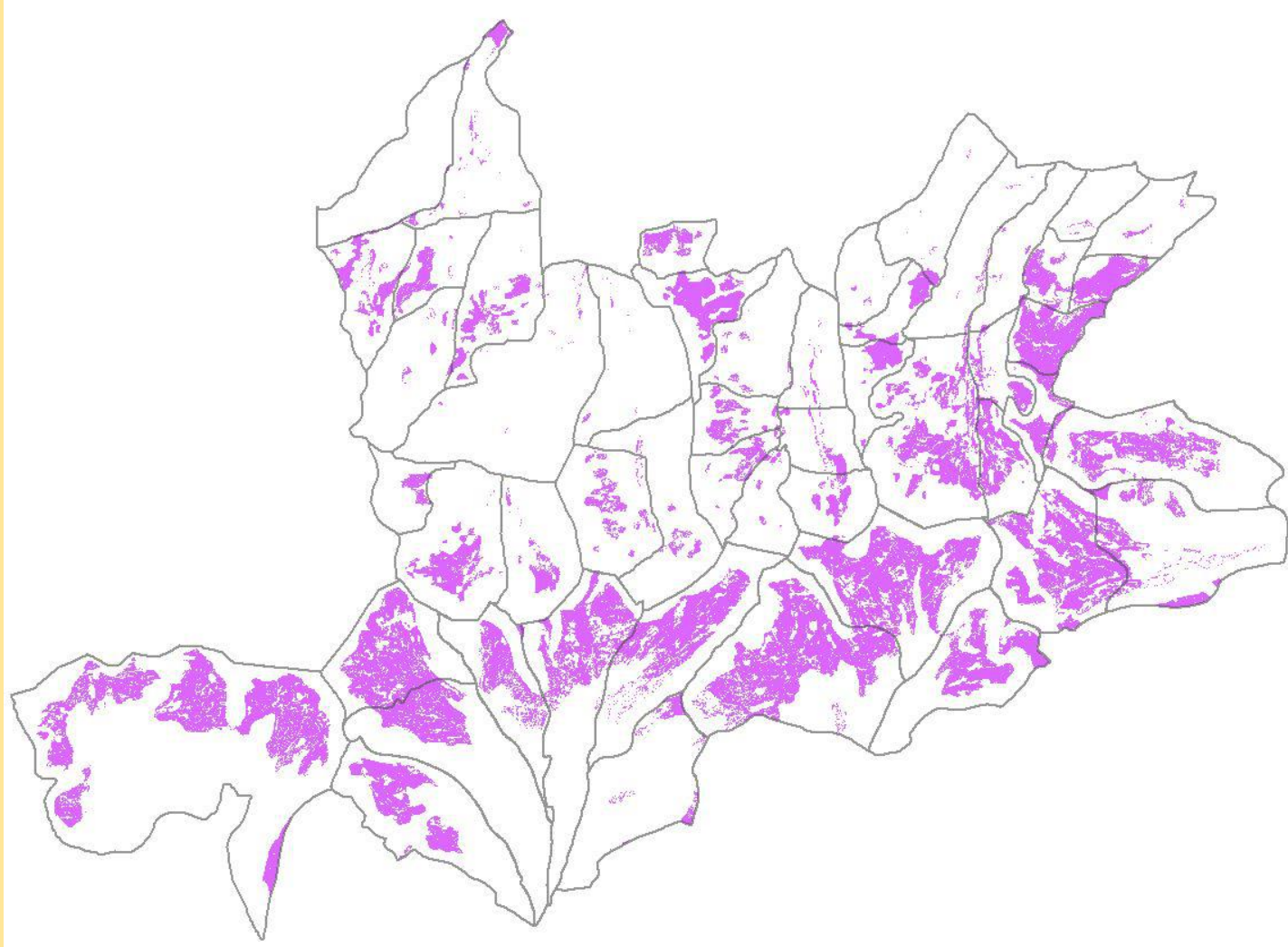
Grazing stocking rates

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|--------------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative C1 | | | | | | | |
| Grand Total | 36696 | | | | | | |
| EAST FORK BLACKS FORK | 2009 | 294 | 590646 | 177193.8 | 301 | 1350 | 0.44 |
| FALL CREEK | 4072 | 294 | 1197168 | 359150.4 | 301 | 1100 | 1.08 |
| GILBERT PEAK | 3530 | 294 | 1037820 | 311346 | 301 | 1400 | 0.74 |
| HESSIE LAKE HENRYS FORK | 2560 | 294 | 752640 | 225792 | 301 | 1400 | 0.54 |
| MID FK | 1826 | 294 | 536844 | 161053.2 | 301 | 1200 | 0.45 |
| OTTOSON BASIN | 4039 | 294 | 1187466 | 356239.8 | 301 | 1300 | 0.91 |
| OWEEP | 4483 | 294 | 1318002 | 395400.6 | 301 | 1400 | 0.94 |
| PAINTER | 4432 | 294 | 1303008 | 390902.4 | 301 | 1200 | 1.08 |
| RED CASTLE | 2546 | 294 | 748524 | 224557.2 | 301 | 1300 | 0.57 |
| TUNGSTEN | 7197 | 294 | 2115918 | 634775.4 | 301 | 1200 | 1.76 |

Alternative C.2: GIS model



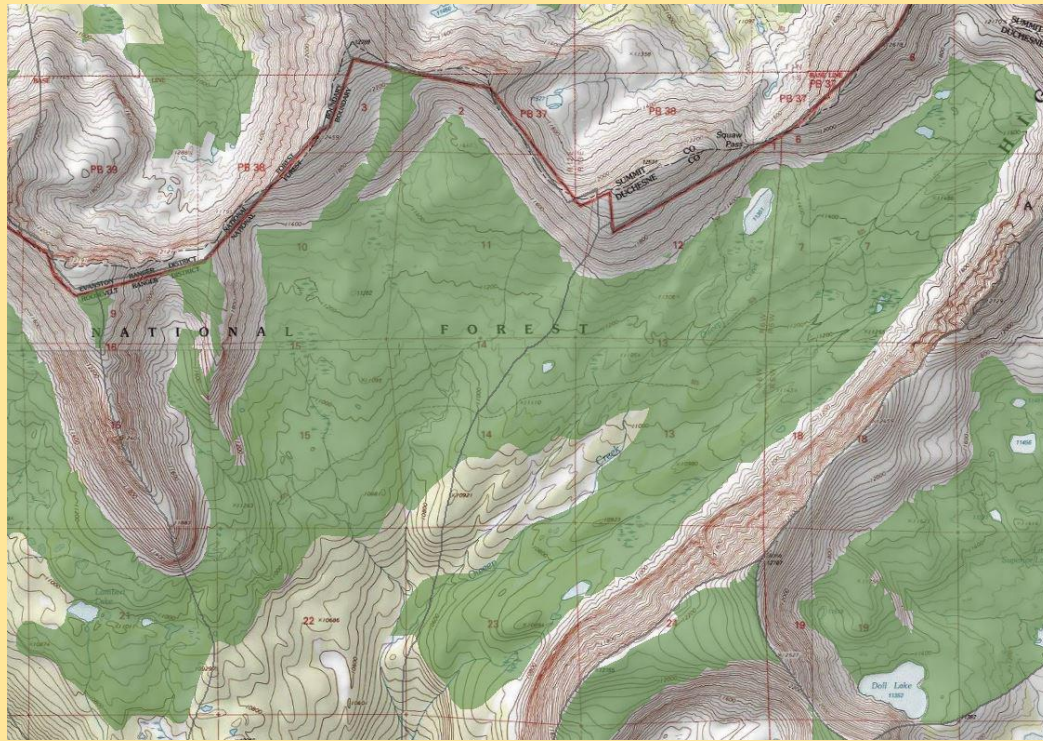
GIS Results: Alternative C.2



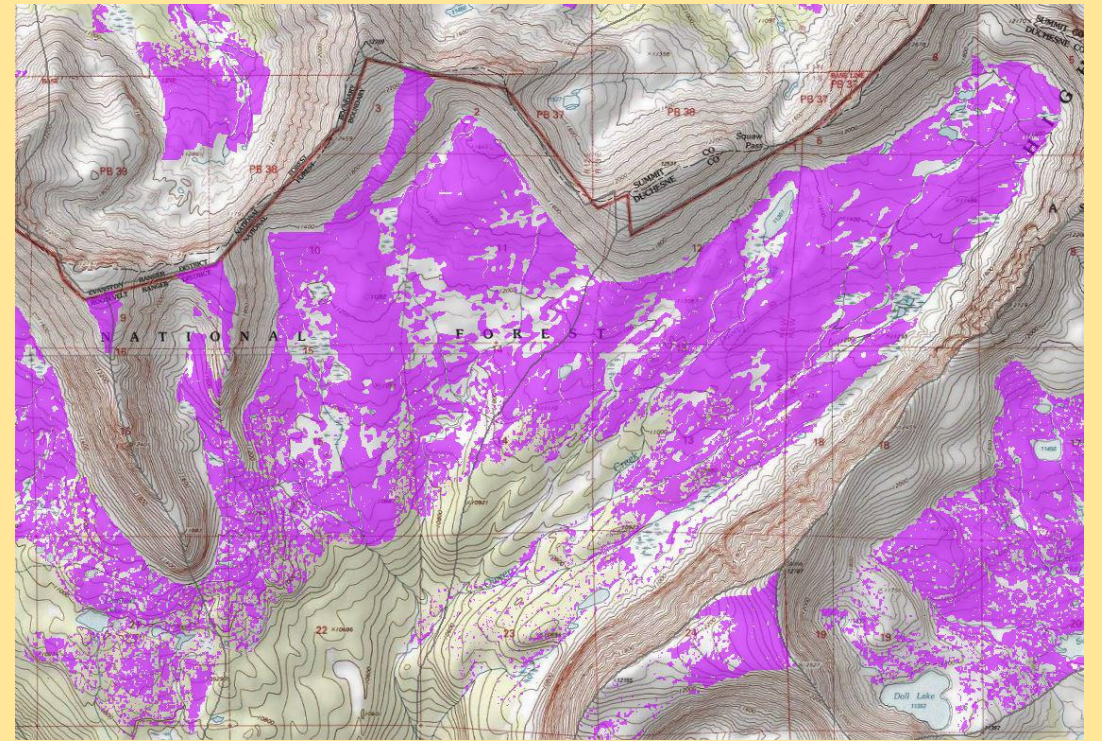
Total acres in Alternative
C.2 = **31,384**

GIS Results: Alternative C.2

BEFORE



AFTER



GIS Results: Alternative C.2

Grazing capable acres

| Allotment | National Forest | Acres (subtotal) |
|-------------------------|-------------------------------------|------------------|
| EAST FORK BLACKS FORK | Uinta-Wasatch-Cache National Forest | 1486.01 |
| GILBERT PEAK | Uinta-Wasatch-Cache National Forest | 3056.67 |
| HESSIE LAKE HENRYS FORK | Uinta-Wasatch-Cache National Forest | 2033.28 |
| MID FK | Uinta-Wasatch-Cache National Forest | 1429.04 |
| RED CASTLE | Uinta-Wasatch-Cache National Forest | 2080.51 |
| FALL CREEK | Ashley National Forest | 3652.04 |
| OTTOSON BASIN | Ashley National Forest | 3580.17 |
| OWEEP | Ashley National Forest | 3797.85 |
| PAINTER | Ashley National Forest | 3875.04 |
| TUNGSTEN | Ashley National Forest | 6393.87 |
| | TOTAL ACRES | 31,384.50 |

GIS Results: Alternative C.2

Grazing stocking rates

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative C2 | | | | | | | |
| Grand Total | | | | | | | |
| EAST FORK BLACKS FORK | 1486 | 294 | 436888 | 131066 | 301 | 1350 | 0.32 |
| FALL CREEK | 3652 | 294 | 1073699 | 322110 | 301 | 1100 | 0.97 |
| GILBERT PEAK | 3057 | 294 | 898662 | 269599 | 301 | 1400 | 0.64 |
| HESSIE LAKE HENRYS FORK | 2033 | 294 | 597785 | 179336 | 301 | 1400 | 0.43 |
| MID FK | 1429 | 294 | 420139 | 126042 | 301 | 1200 | 0.35 |
| OTTOSON BASIN | 3580 | 294 | 1052570 | 315771 | 301 | 1300 | 0.81 |
| OWEEP | 3798 | 294 | 1116567 | 334970 | 301 | 1400 | 0.79 |
| PAINTER | 3875 | 294 | 1139263 | 341779 | 301 | 1200 | 0.95 |
| RED CASTLE | 2081 | 294 | 611671 | 183501 | 301 | 1300 | 0.47 |
| TUNGSTEN | 6394 | 294 | 1879799 | 563940 | 301 | 1200 | 1.56 |

GIS Results: Comparison between C.1 and C.2 (acres)

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative C1 | | | | | | | |
| Grand Total | 36696 | | | | | | |
| EAST FORK BLACKS FORK | 2009 | 294 | 590646 | 177193.8 | 301 | 1350 | 0.44 |
| FALL CREEK | 4072 | 294 | 1197168 | 359150.4 | 301 | 1100 | 1.08 |
| GILBERT PEAK | 3530 | 294 | 1037820 | 311346 | 301 | 1400 | 0.74 |
| HESSIE LAKE HENRYS FORK | 2560 | 294 | 752640 | 225792 | 301 | 1400 | 0.54 |
| MID FK | 1826 | 294 | 536844 | 161053.2 | 301 | 1200 | 0.45 |
| OTTOSON BASIN | 4039 | 294 | 1187466 | 356239.8 | 301 | 1300 | 0.91 |
| OWEED | 4483 | 294 | 1318002 | 395400.6 | 301 | 1400 | 0.94 |
| PAINTER | 4432 | 294 | 1303008 | 390902.4 | 301 | 1200 | 1.08 |
| RED CASTLE | 2546 | 294 | 748524 | 224557.2 | 301 | 1300 | 0.57 |
| TUNGSTEN | 7197 | 294 | 2115918 | 634775.4 | 301 | 1200 | 1.76 |

| Allotment | Capable Acres | Avg Forage Production 2016 lb/acre | Total Forage Production lb/acre | Available Forage at 30% Use | Forage Consumption Ewe + 2 lambs as Permitted lb/month | Permitted Ewe/Lamb pairs | Months in Allotment for Permitted Numbers |
|-------------------------|---------------|------------------------------------|---------------------------------|-----------------------------|--|--------------------------|---|
| Alternative C2 | | | | | | | |
| Grand Total | | | | | | | |
| EAST FORK BLACKS FORK | 1486 | 294 | 436888 | 131066 | 301 | 1350 | 0.32 |
| FALL CREEK | 3652 | 294 | 1073699 | 322110 | 301 | 1100 | 0.97 |
| GILBERT PEAK | 3057 | 294 | 898662 | 269599 | 301 | 1400 | 0.64 |
| HESSIE LAKE HENRYS FORK | 2033 | 294 | 597785 | 179336 | 301 | 1400 | 0.43 |
| MID FK | 1429 | 294 | 420139 | 126042 | 301 | 1200 | 0.35 |
| OTTOSON BASIN | 3580 | 294 | 1052570 | 315771 | 301 | 1300 | 0.81 |
| OWEED | 3798 | 294 | 1116567 | 334970 | 301 | 1400 | 0.79 |
| PAINTER | 3875 | 294 | 1139263 | 341779 | 301 | 1200 | 0.95 |
| RED CASTLE | 2081 | 294 | 611671 | 183501 | 301 | 1300 | 0.47 |
| TUNGSTEN | 6394 | 294 | 1879799 | 563940 | 301 | 1200 | 1.56 |

ATTACHMENT 2

Forage Production

1960s vs. 2016

Datasets Description

2016

Forage Production Lbs/Acre – Summary

| Min. | 1st Qu. | Median | Mean | 3rd Qu. | Max. |
|------|--------------|---------------|--------|---------|---------|
| 0.00 | <u>49.01</u> | <u>166.40</u> | 294.10 | 442.10 | 1431.00 |

sd(ppa)– standard deviation for forage production lbs/acre
[1] 338.7322

Sampled sites per soil type

summary(fprodsites\$MUSYM)

| | | | | | | | | | |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 202 | NS104 | NS222 | NS223 | NS225 | NS482 | NS501 | NS503 | NS525 | NS531 |
| 1 | 6 | 7 | 2 | 8 | 2 | 4 | 1 | 3 | 6 |

Randomly selected vs. USFS sites

summary(fprodsites\$SiteType)

| | |
|--------|------|
| Random | USFS |
| 17 | 23 |

1960s

> summary(ppa2)

| Min. | 1st Qu. | Median | Mean | 3rd Qu. | Max. |
|------|---------|--------|-------|---------|-------|
| 32.0 | 127.0 | 206.0 | 240.1 | 346.0 | 615.0 |

> sd(ppa2)

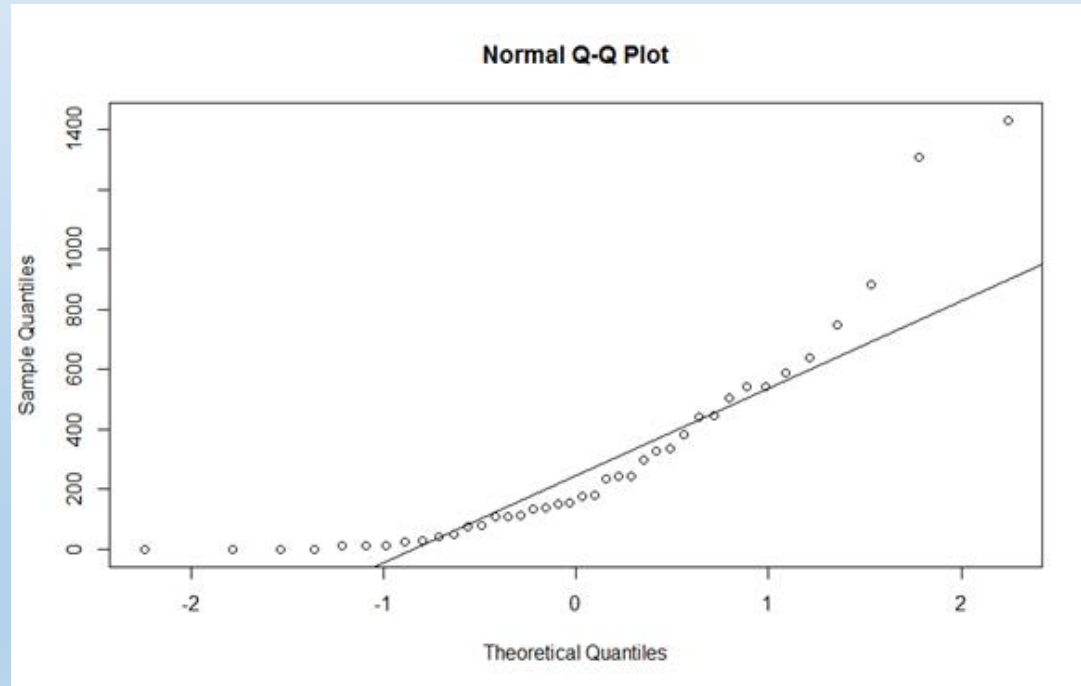
[1] 136.788
|

> summary(fprodsites2\$MUSYM)

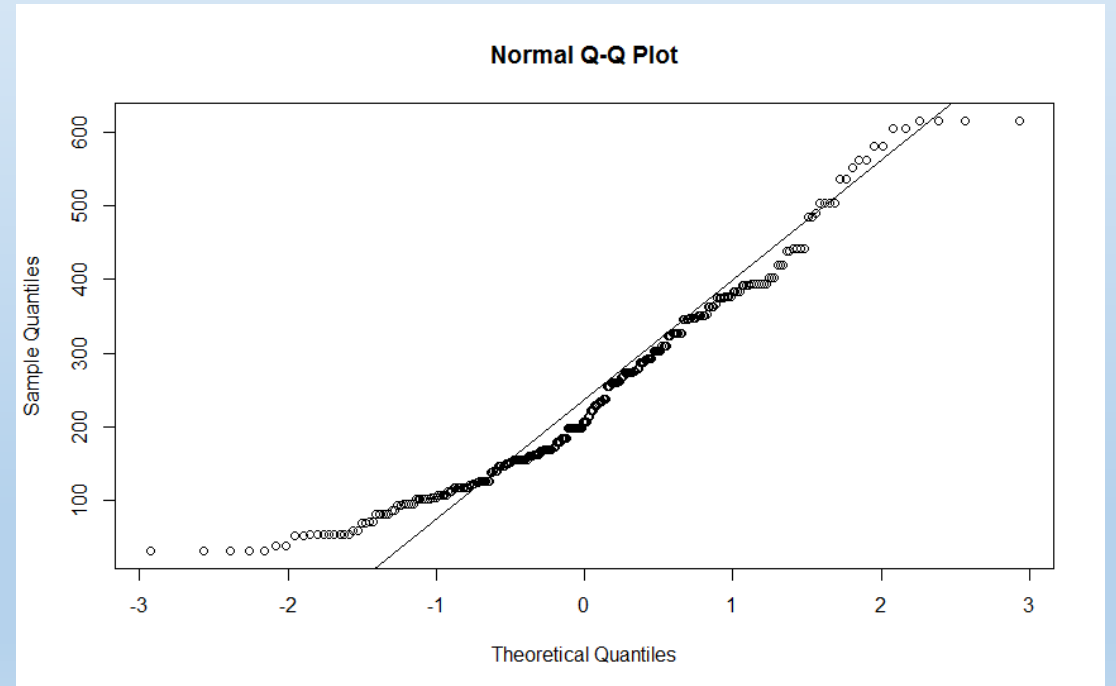
| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 202 | 351 | NS102 | NS104 | NS205 | NS222 | NS223 | NS225 | NS310 | NS312 | NS350 | NS482 | NS483 |
| NS484 | NS501 | NS502 | NS503 | NS520 | NS525 | NS531 | | | | | | |
| 6 | 6 | 1 | 31 | 14 | 35 | 24 | 9 | 2 | 1 | 6 | 1 | 1 |
| 1 | 27 | 44 | 3 | 4 | 36 | 4 | | | | | | |

QQ Plots

2016

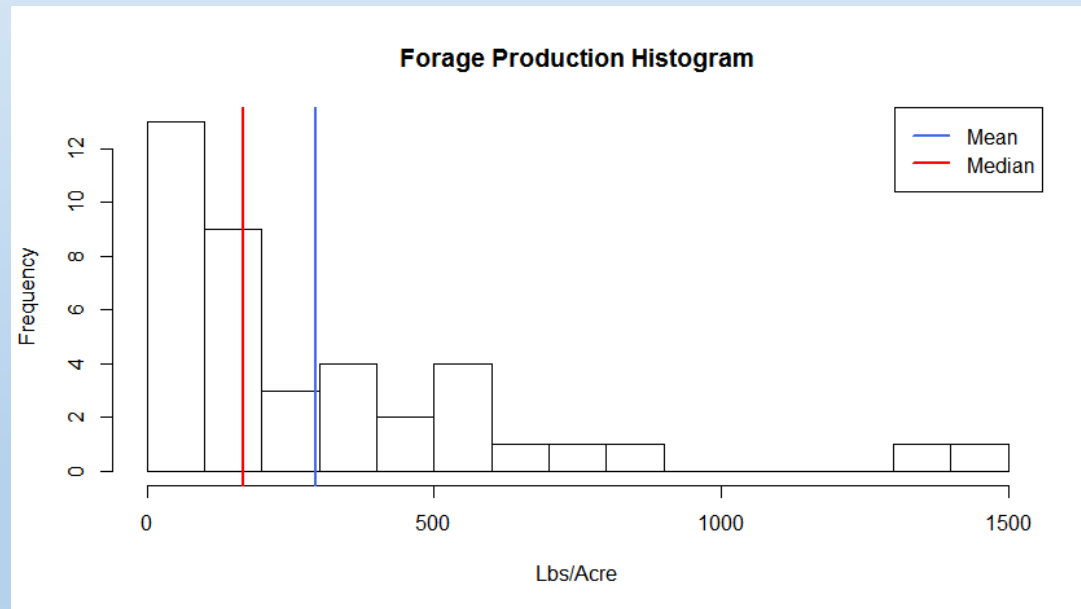


1960s

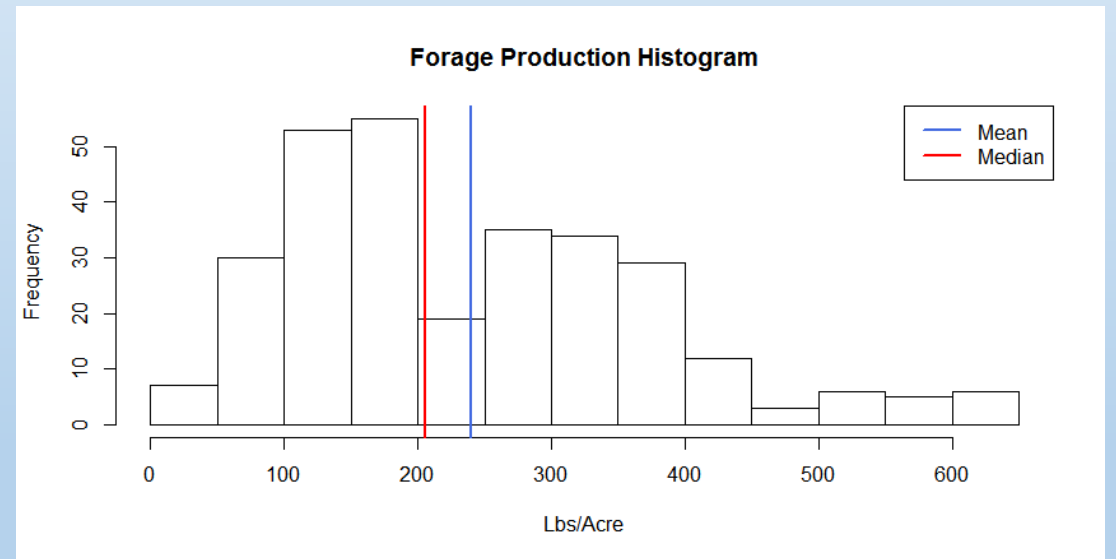


Histograms

2016

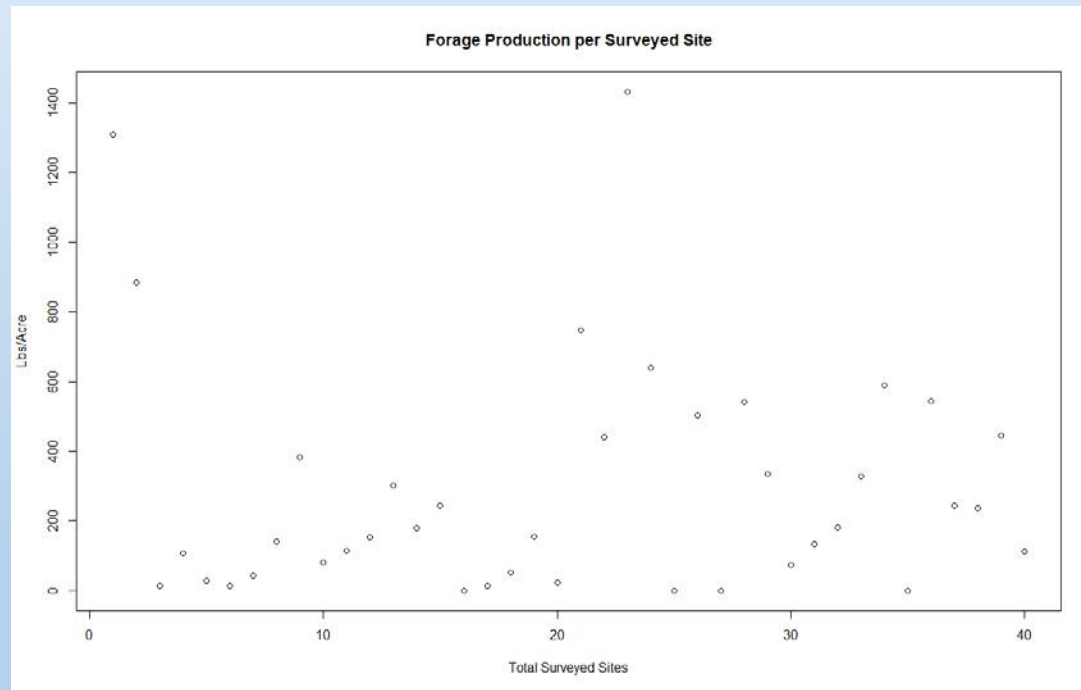


1960s

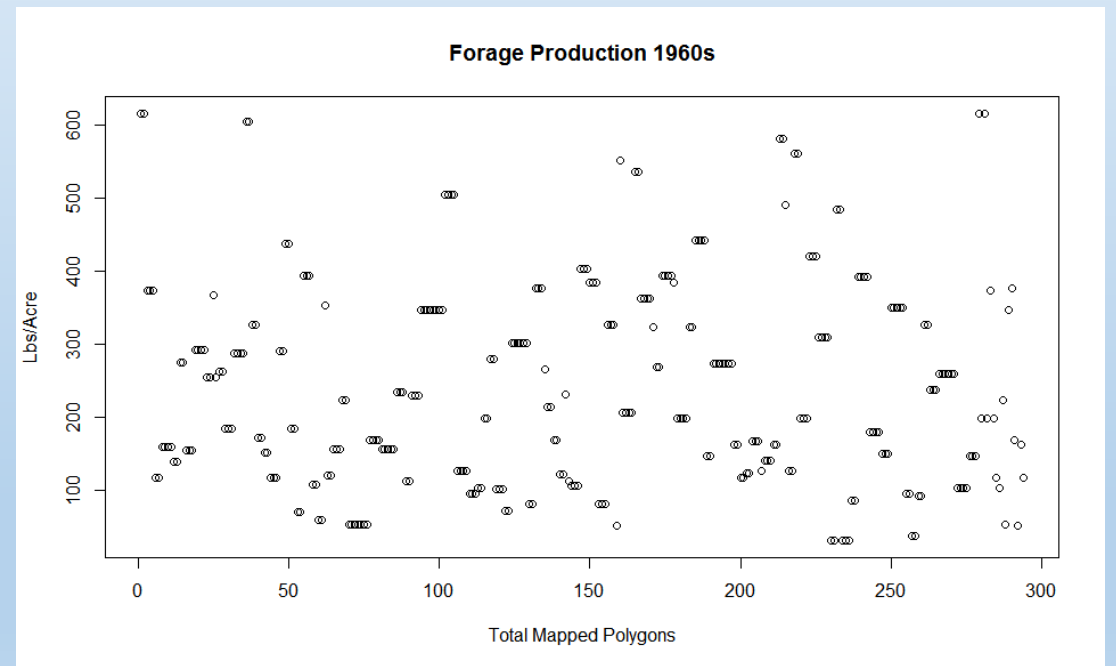


Plots

2016

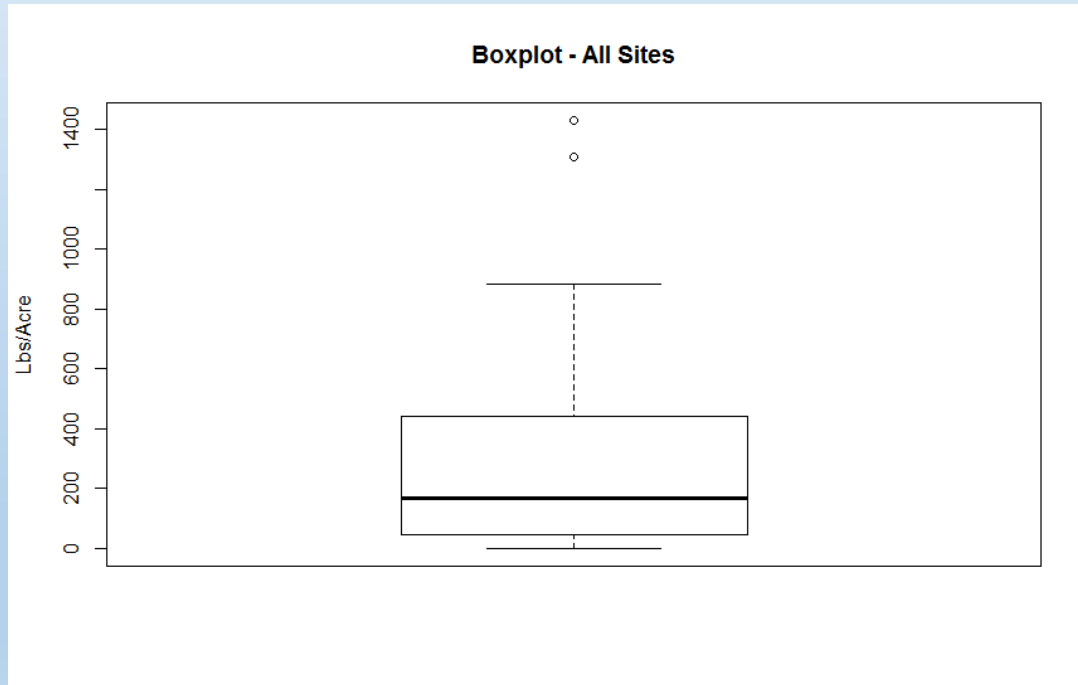


1960s

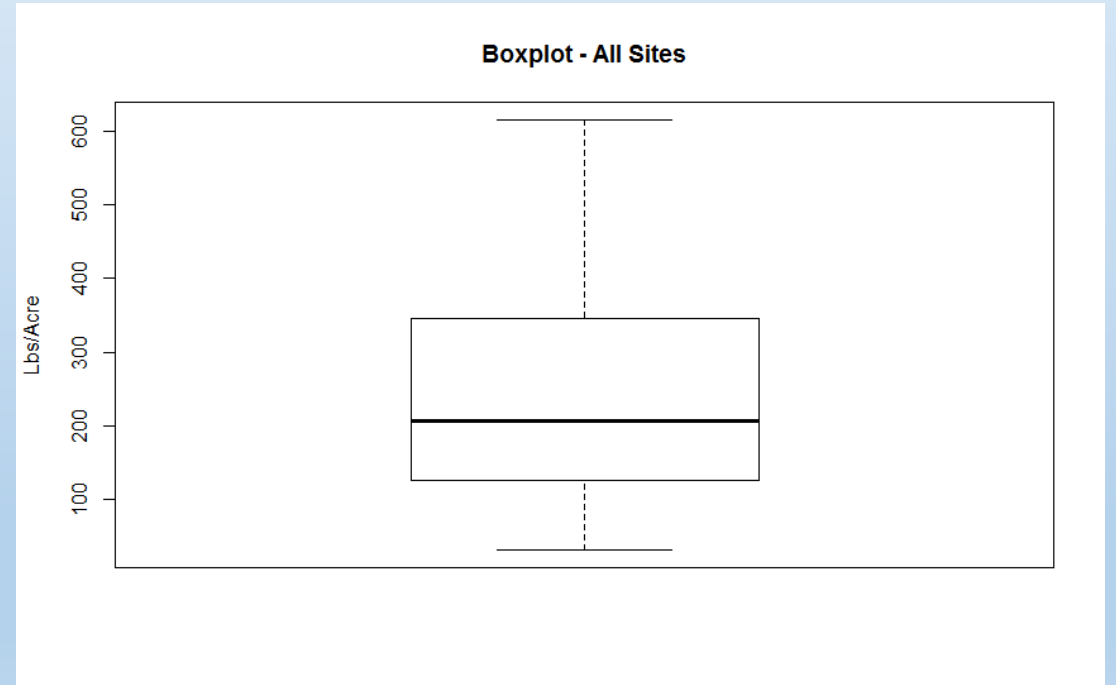


Box plots – all sites

2016

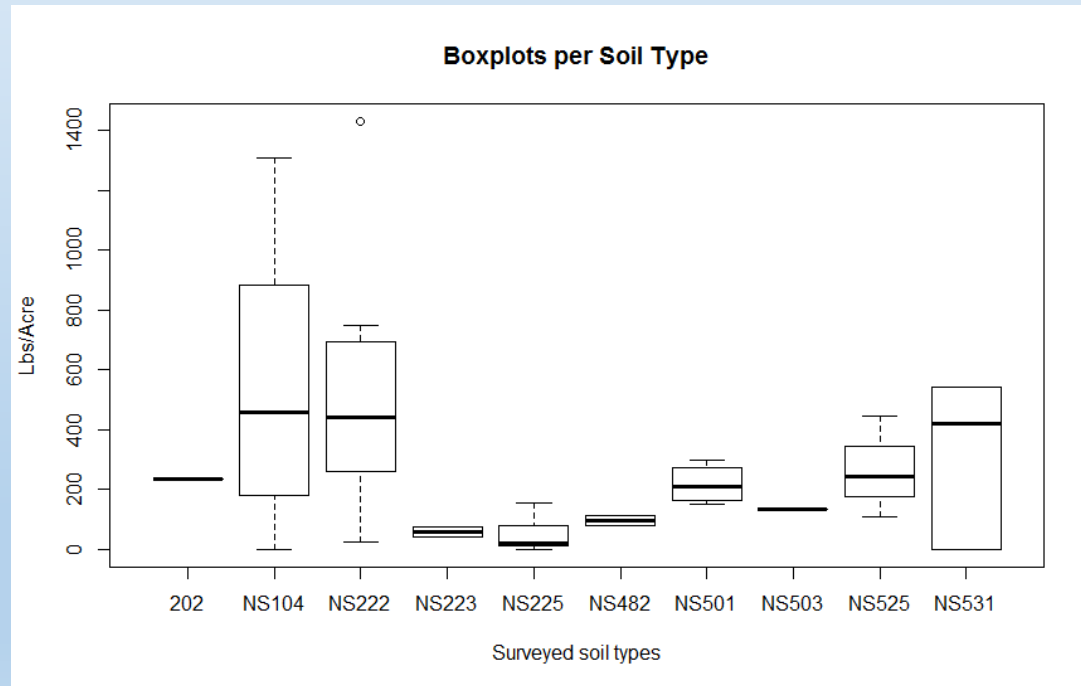


1960s

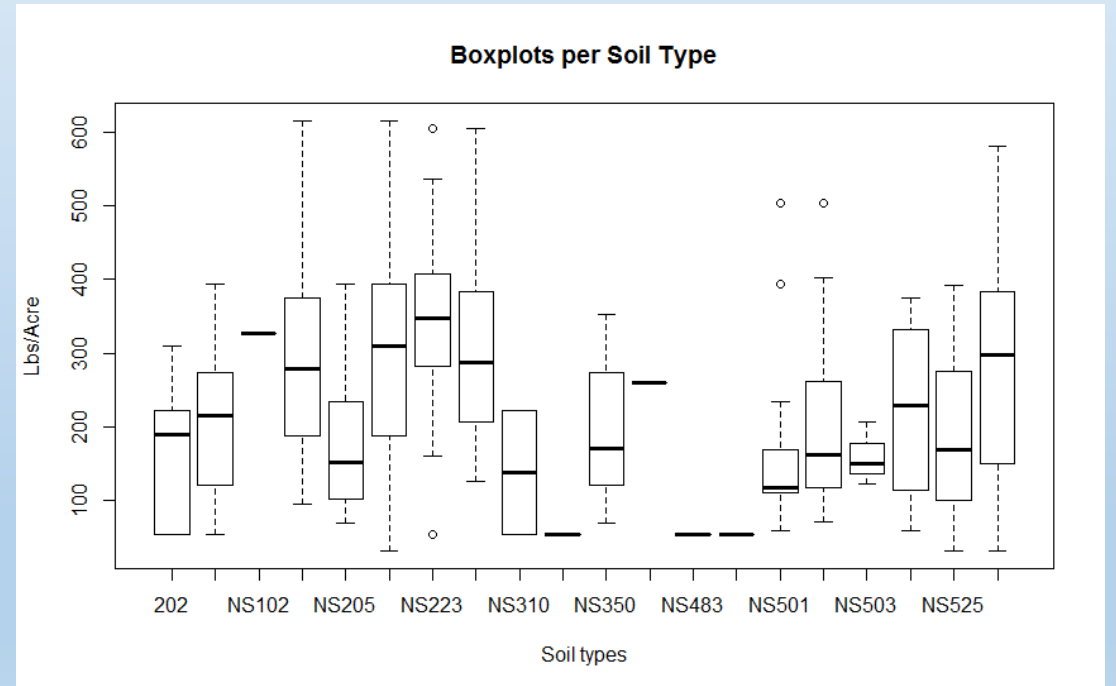


Box plots per soil type

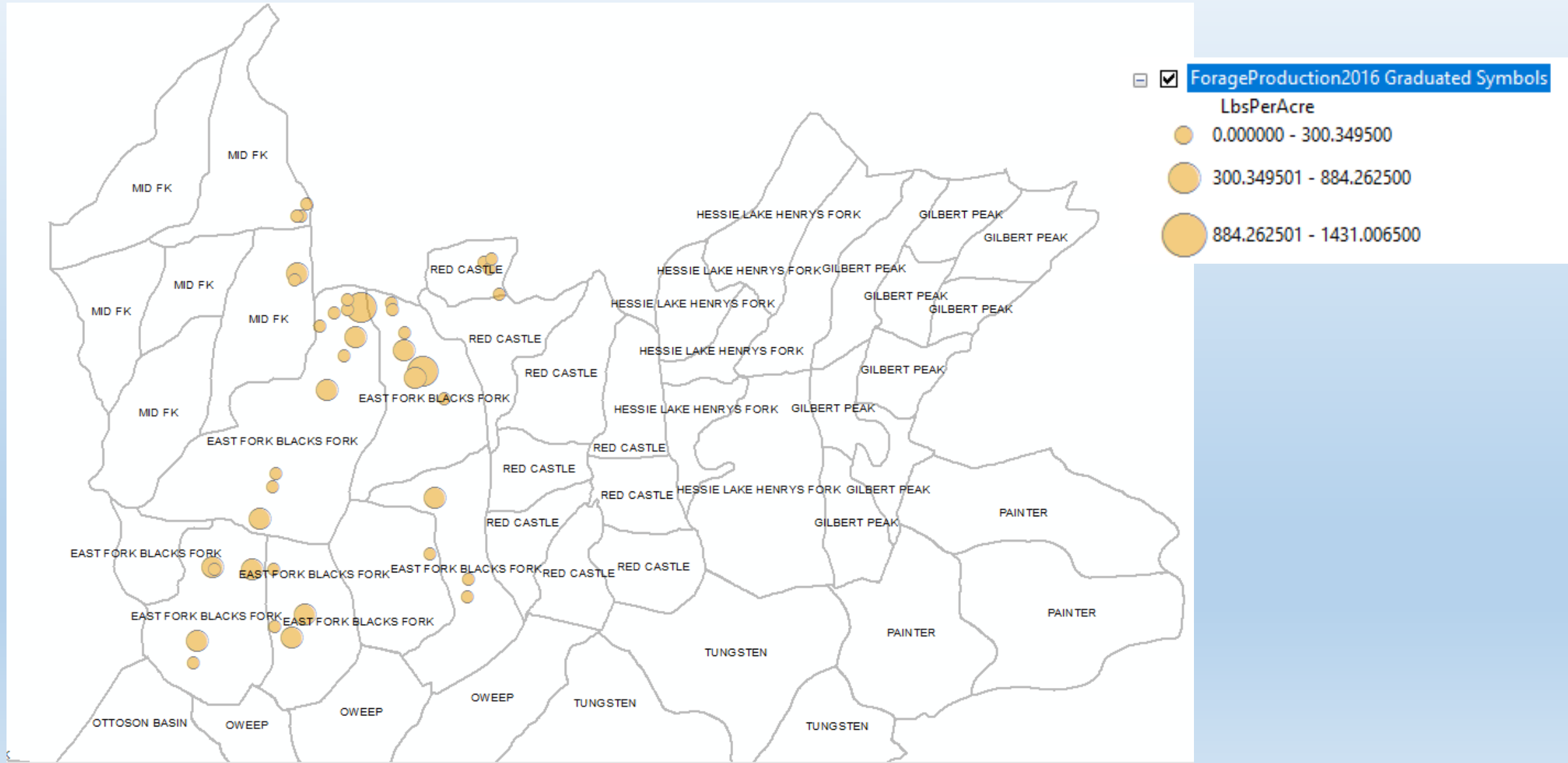
2016



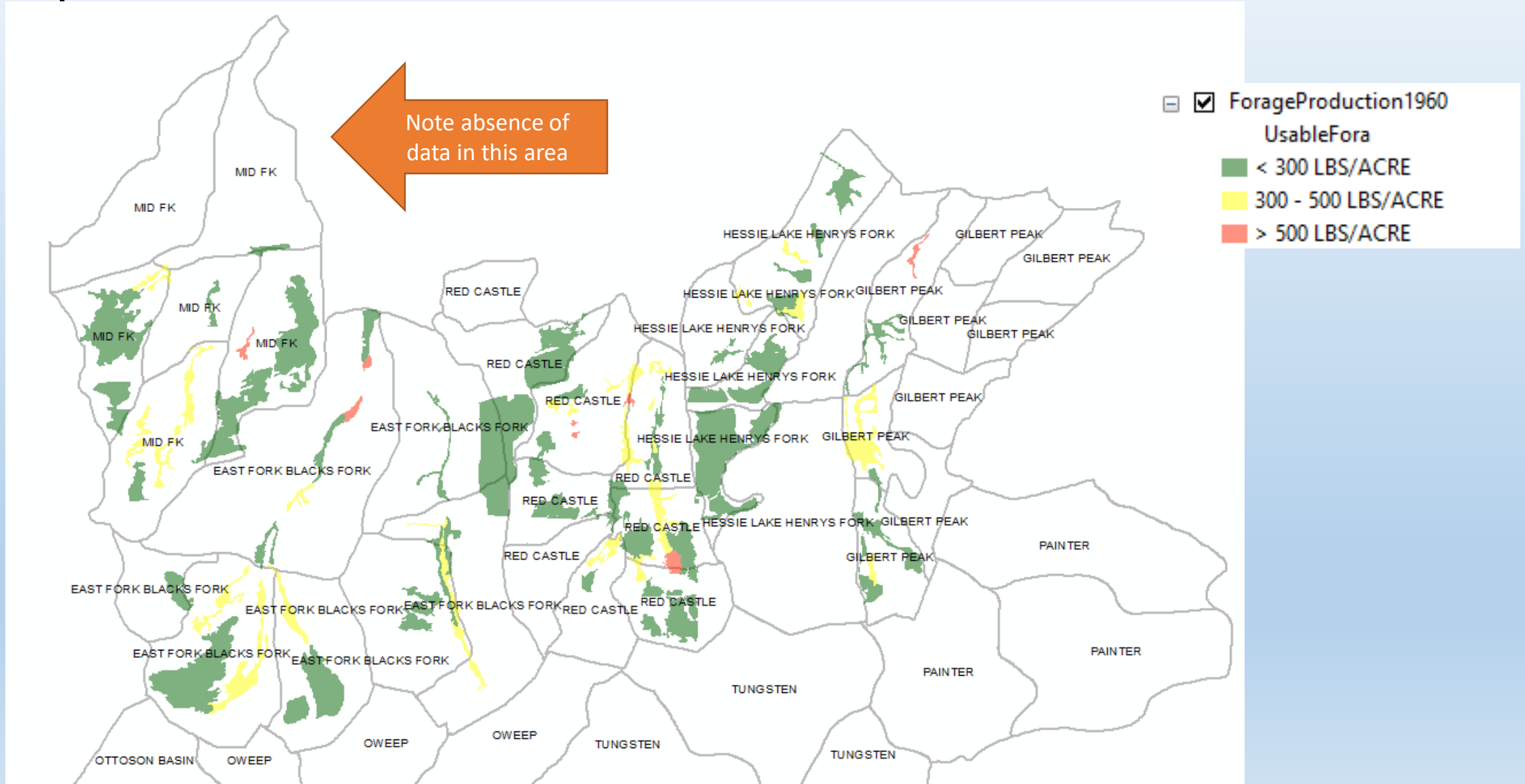
1960s



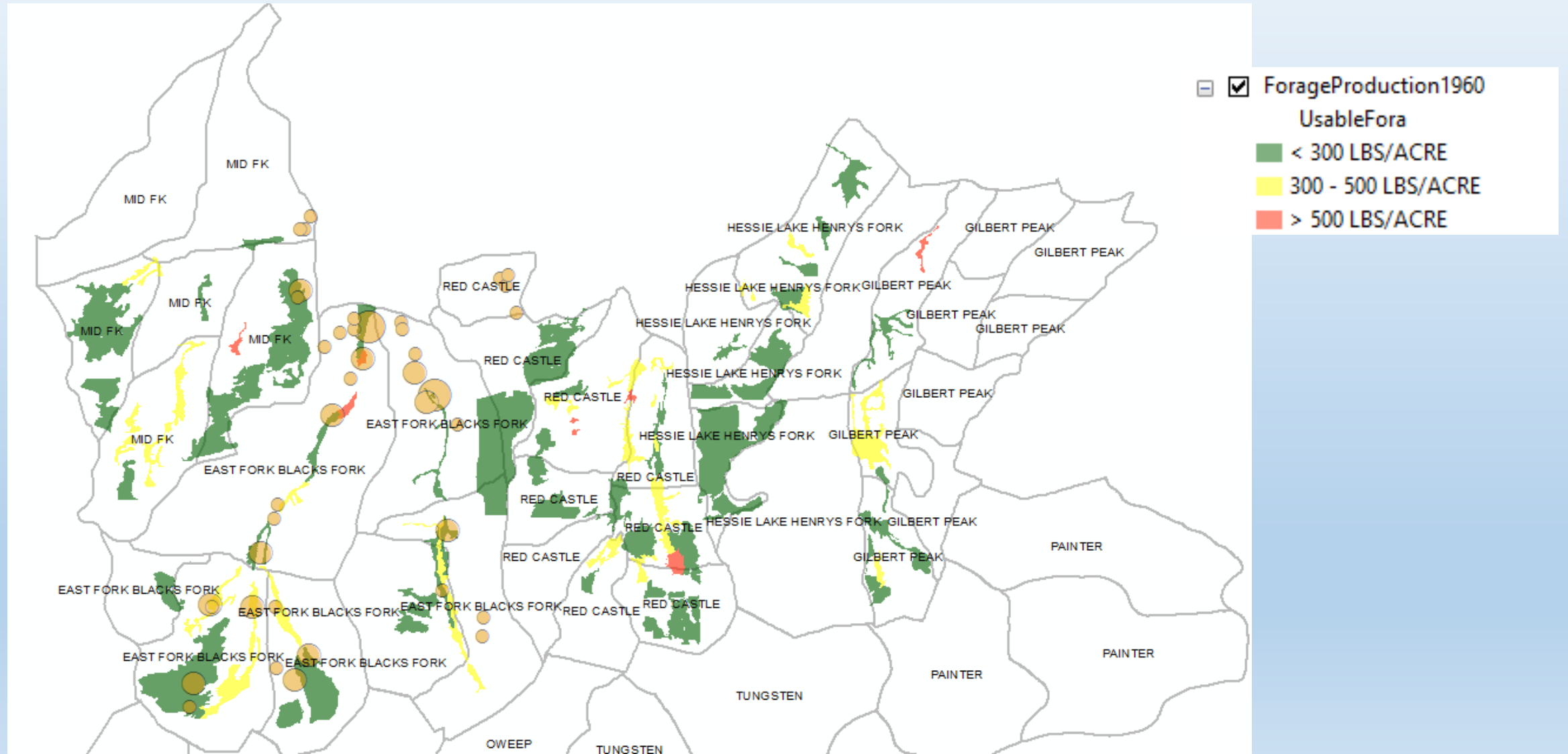
Spatial extent of 2016 data



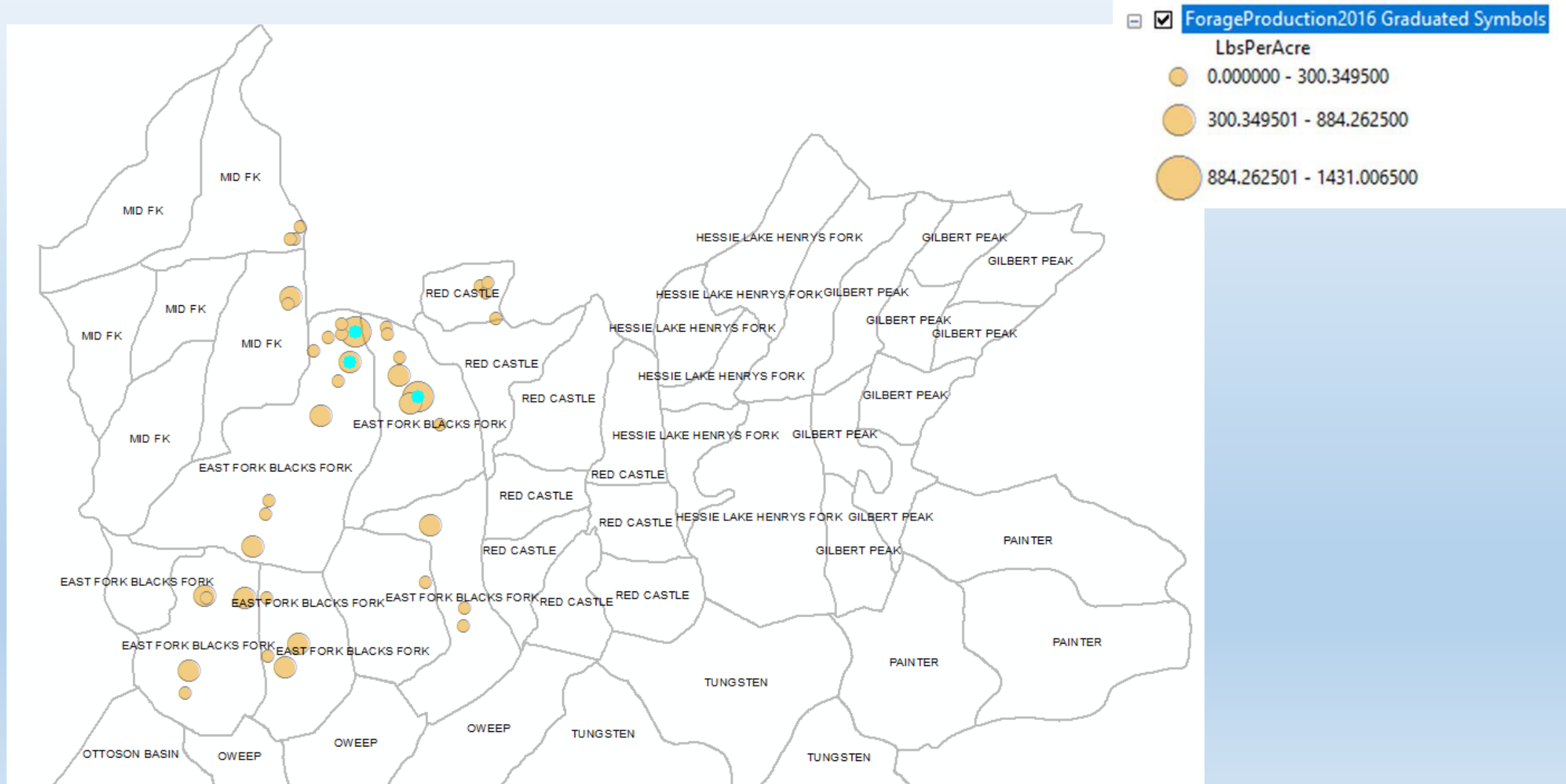
Spatial extent of 1960s data



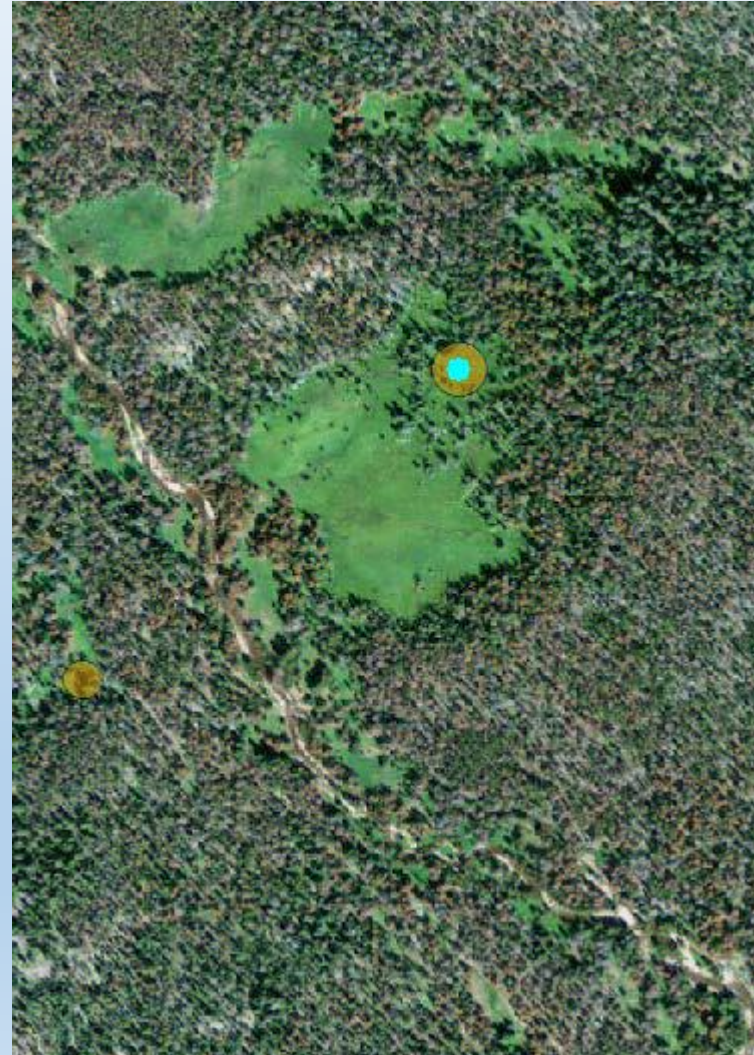
Overlay 2016 data and 1960s data



Location of outliers in 2016



Location of outliers in 2016 (close up)



Current extent and location of sheep and cattle grazing capable areas (USFS)

