WILDFIRE

Fire Detection Camera Site Suitability Analysis

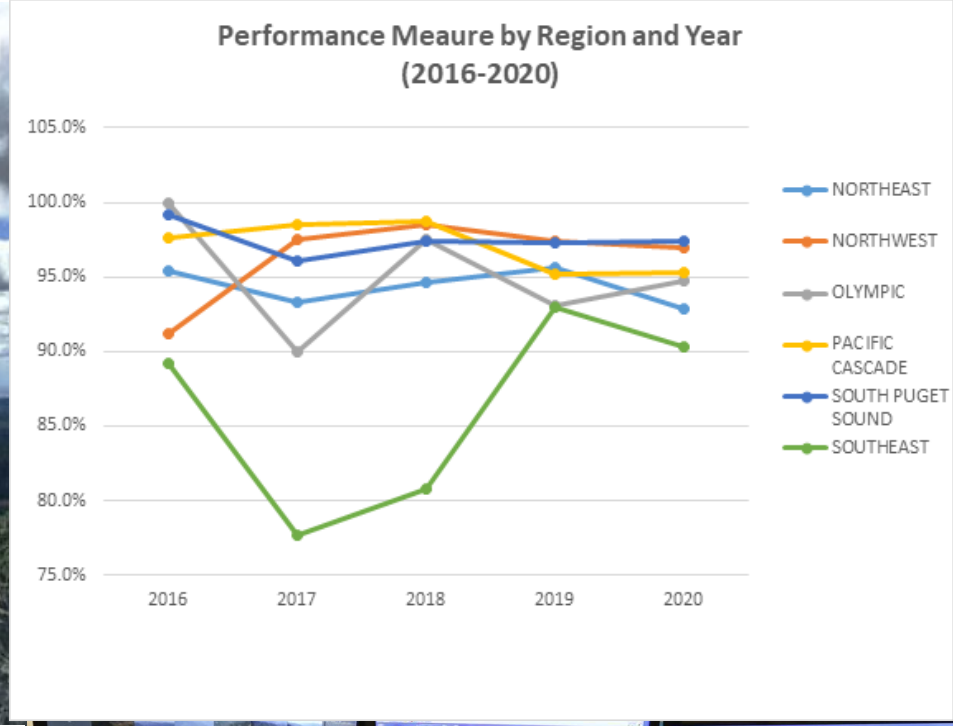
Kirk Davis & Angie Lane

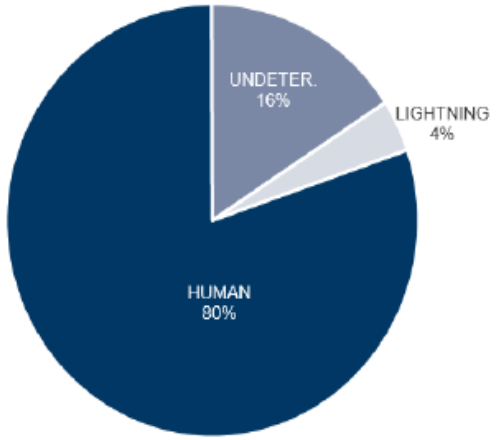
Things to cover

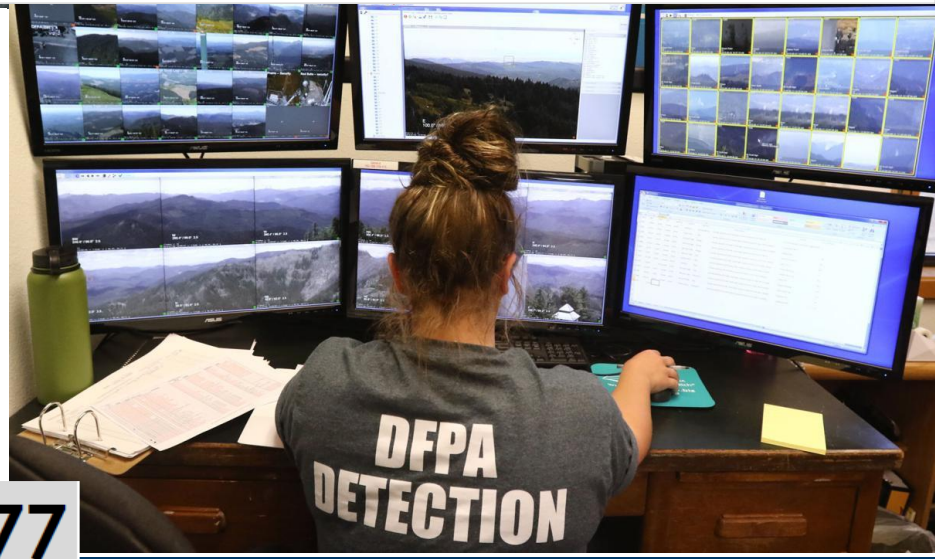
- Background
- Fire Camera Site Suitability Analysis
  - General Approach
  - Methods
- Results and Outputs
  - Statewide Overview
  - Zoomed In With Variable Examples
- Next Steps
- Questions
  - Discussion about whatever your curious about!

Background

- Management tool:
  - Early detection/early response
  - Using technology to meet performance measure and legislative intent (RCW 76.04.167 and RCW 76.04.750)
- Identify criteria for finding suitable sites
- Conduct analysis, scope project
- Refine site locations based on Region review of study







1,002	680	195	1,877
CLASSIFIED FIRES	FALSE ALARMS	OTHER AGENCY ASSISTS	TOTAL RESPSONSES

Background - continued

We already have a camera up at the Aeneas Lookout

Installed in 2019

Scan QR Code to check it out:

Fire Camera Site Suitability Analysis

GENERAL APPROACH

Use GIS to identify, analyze, and rank existing DNR radio/communication sites throughout the State which might be suitable for fire detection cameras based on a variety of wildfire-relevant factors

Fire Camera Site Suitability Analysis

GENERAL APPROACH

1

2

3

4

Use GIS to identify, analyze, and rank existing DNR radio/communication sites throughout the State which might be suitable for fire detection cameras based on a variety of wildfire-relevant factors

Fire Camera Site Suitability Analysis

GENERAL APPROACH

- Repeatable, analytical, transparent process
- Visual result (*everyone loves maps*)
- Objective look at the whole state

Fire Camera Site Suitability Analysis

GENERAL APPROACH

147 potential sites

2

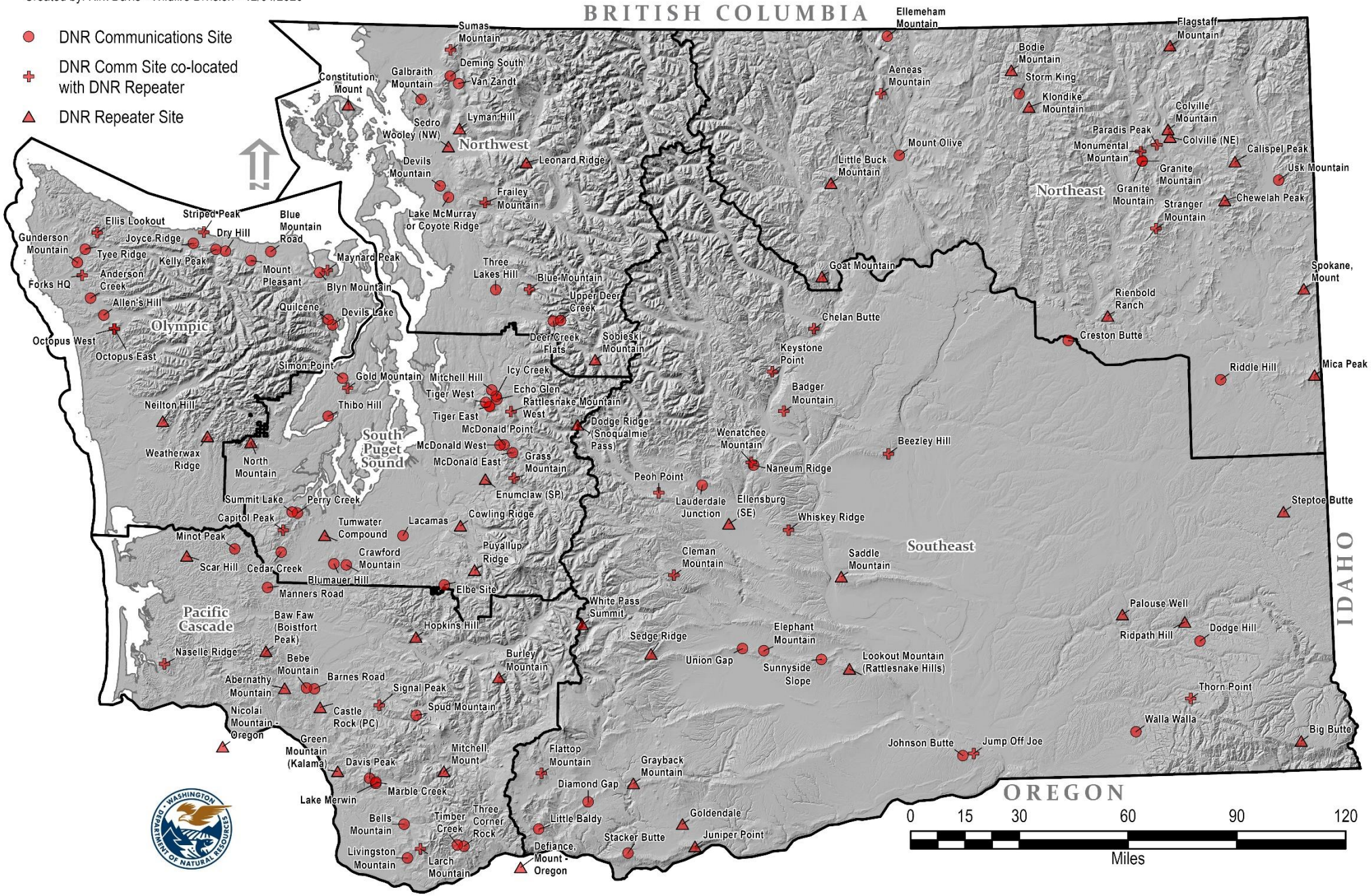
Use GIS to identify, analyze, and rank existing DNR radio/communication sites throughout the State which might be suitable for fire detection cameras based on a variety of wildfire-relevant factors

- Use existing tower locations
- Involved gathering, cleaning data from radio program and communications staff

2

Potential Fire Camera Site Locations

Fire Camera Site Suitability Analysis
Created by: Kirk Davis - Wildfire Division - 12/04/2020



147 potential sites

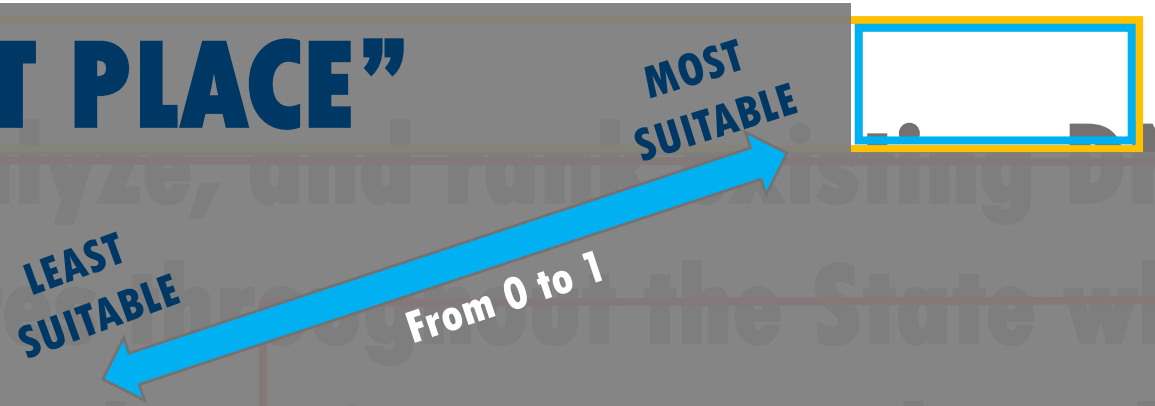
Fire Camera Site Suitability Analysis

GENERAL APPROACH – POTENTIAL LOCATIONS

Fire Camera Site Suitability Analysis

GENERAL APPROACH

"FIND THE BEST PLACE"



3

- Site suitability analysis = weight linear combination
- Uncertainty exists for every site, ranking allows other options

3

Fire Camera Site Suitability Analysis

GENERAL APPROACH

- We looked at quantifiable variables *around the fire camera sites:
  - Fire Occurrence (last 10yrs) (counts)
  - DNR Jurisdiction (acres)
  - Burn Probability (averages)
  - Wildland Urban Interface - WUI (acres)

4

*[Within viewshed and 20 mile buffer of the potential site]

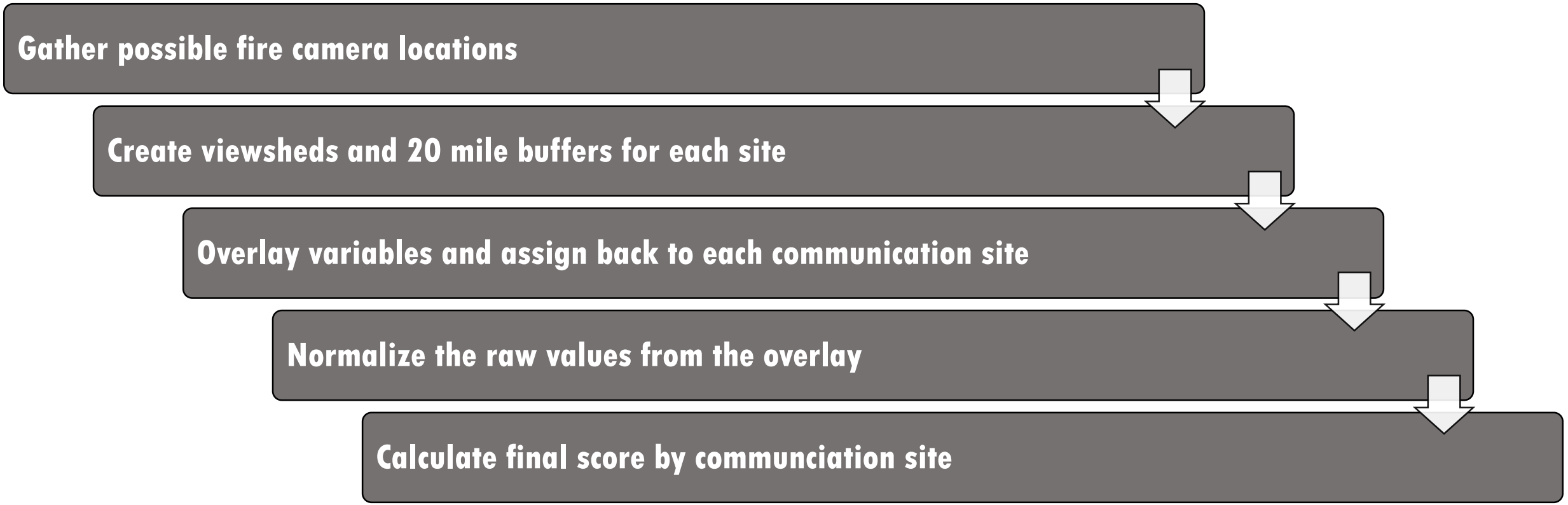
Fire Camera Site Suitability Analysis

GENERAL APPROACH

Use GIS to identify, analyze, and rank existing DNR radio/communication sites throughout the State which might be suitable for fire detection cameras based on a variety of wildfire-relevant factors

Fire Camera Site Suitability Analysis

METHODS



Potential Fire Camera Site Locations

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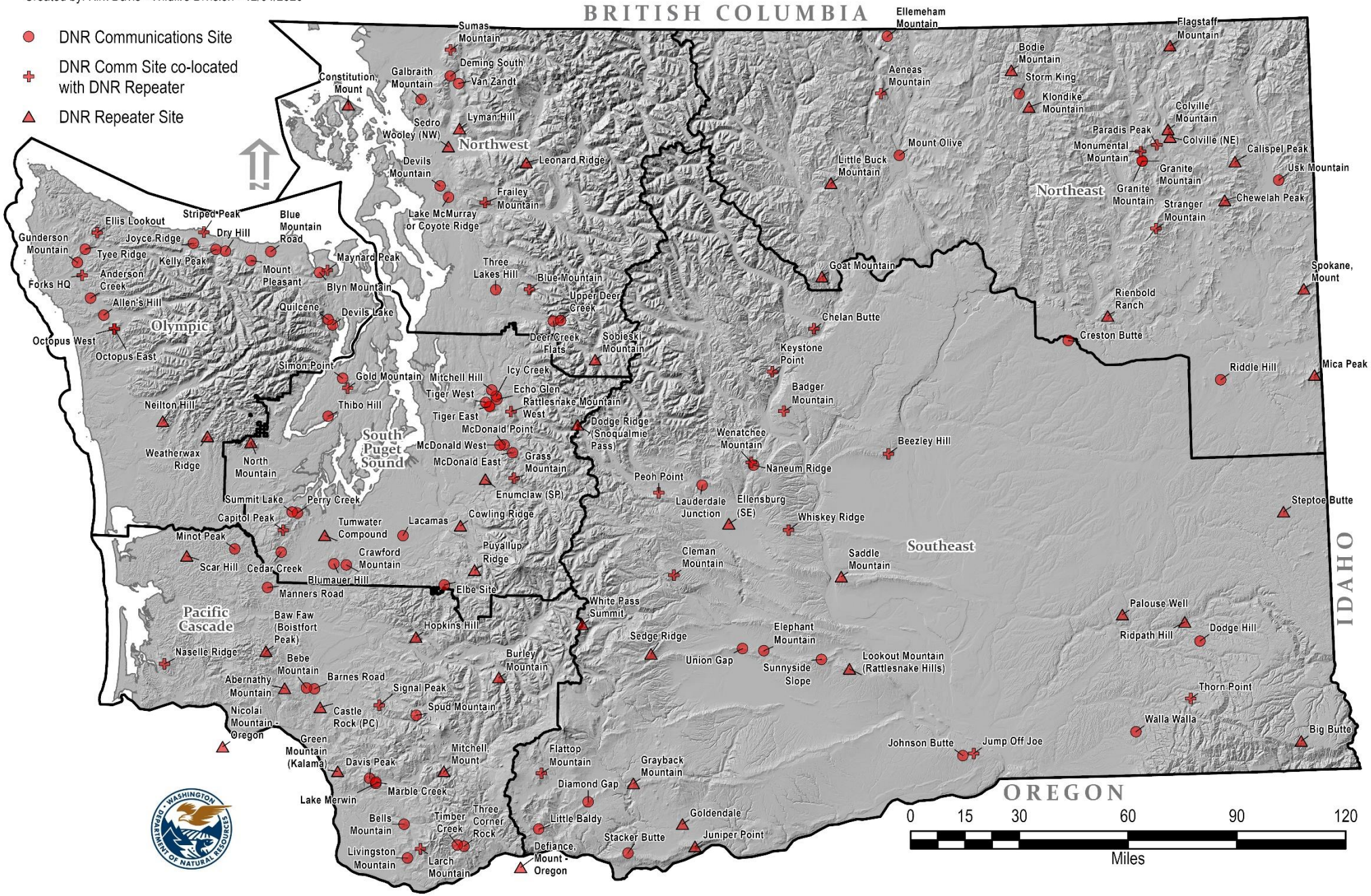


Fire Camera Site Suitability Analysis

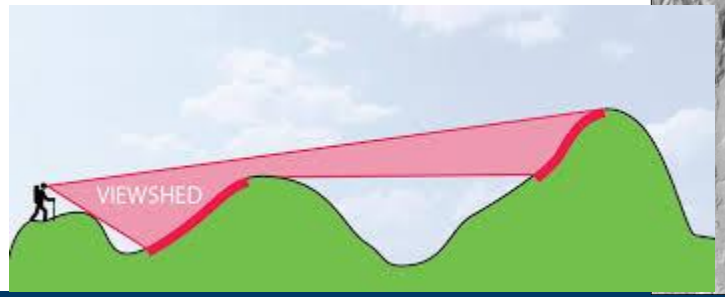
METHODS– GATHER CAMERA LOCATIONS

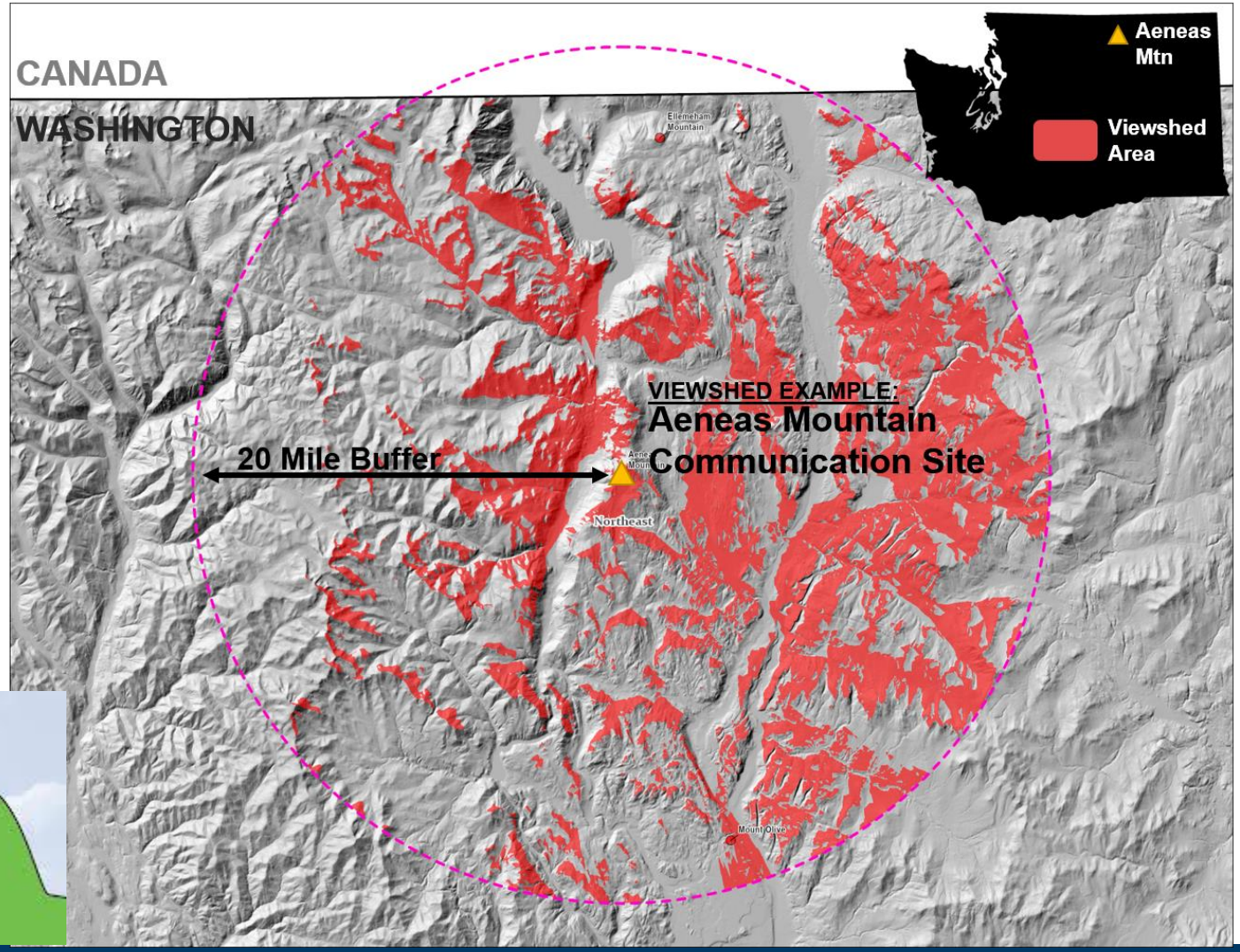
147 potential sites

Fire Camera Site Suitability Analysis

METHODS – CREATE VIEWSHEDS

- **Viewsheds were created for every site**
- **ASSUMPTIONS:**
  - 100ft elevation
  - 20 mile max visible distance





Fire Camera Site Suitability Analysis

METHODS – CALCULATE VALUES VIA OVERLAY & NORMALIZE

- **Viewsheds used to intersect all other variables**

  - We looked at quantifiable variables *around the fire camera sites:
    - Fire Occurrence (last 10yrs) (counts)
    - DNR Jurisdiction (acres)
    - Burn Probability (averages)
    - Wildland Urban Interface - WUI (acres)

- **Summarized values for viewshed and 20 mile buffer**
- **Assign values back to the potential site, normalize to 0-1**

Fire Camera Site Suitability Analysis

METHODS – FINAL SCORES

- **Calculate final scores with weightings**

Variable	Visible (Viewshed) Weighting	20 Mile Buffer Weighting
DNR Protection Area	0.2	0.1
EIRS Fire Counts	0.2	0.1
Burn Probability	0.05	0.1
WUI Area	0.05	0.1
Total Visible Area (viewshed)	0.1	n/a

Table 1: Variable weightings in the weighted combination

- **Each normalized variable is multiplied with its weight, summed together**
- **Weights add up to 1, suitability score is the direct output**
- **Natural breaks create 5 classes from VERY LOW to VERY HIGH**

Results and Outputs

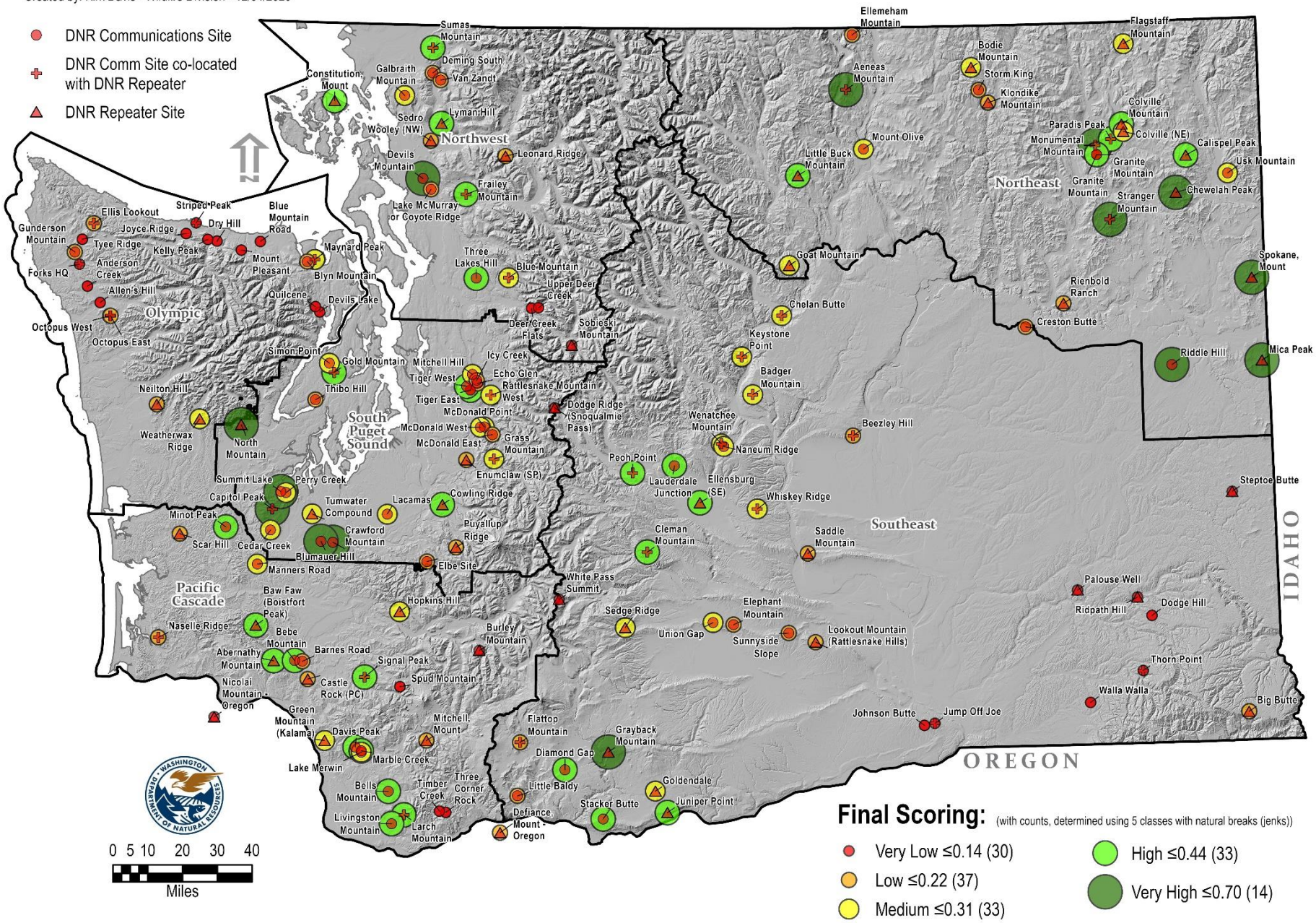
- Final Map showing the scoring statewide
- Report with raw data for analysis
- Upon review of the results:
  - Subset of sites were selected for review ~ 20 sites
  - Detailed maps were created for each of the subset of sites

Suitability Score	Total Number of Sites	Min Value – Max Value Groupings (determined by Natural Breaks Method)	
VERY LOW	30	0.045871704	0.141975932
LOW	37	0.155925114	0.224109059
MEDIUM	33	0.229274956	0.316995032
HIGH	33	0.323923161	0.44434284
VERY HIGH	14	0.460812293	0.701153929

Table 2: Suitability Score Totals for the WA State

Potential Fire Camera Site Locations - Site Suitability Results

Fire Camera Site Suitability Analysis
Created by: Kirk Davis - Wildfire Division - 12/04/2020



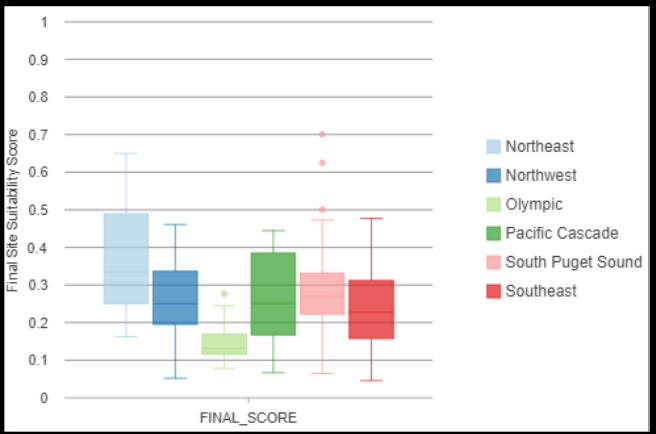
Final Scoring: (with counts, determined using 5 classes with natural breaks (jenks))

- Very Low ≤0.14 (30)
- Low ≤0.22 (37)
- Medium ≤0.31 (33)
- High ≤0.44 (33)
- Very High ≤0.70 (14)

Results and Outputs

STATEWIDE RESULTS MAP

- Average site suitability score was 0.26 for all sites – MEDIUM
- Average viewshed size was 170,000 acres (21% of the 20 miles buffer)
- Ridpath Hill scored the lowest
- Capitol Peak scored the highest



Potential Fire Camera Site Locations - Site Suitability Results

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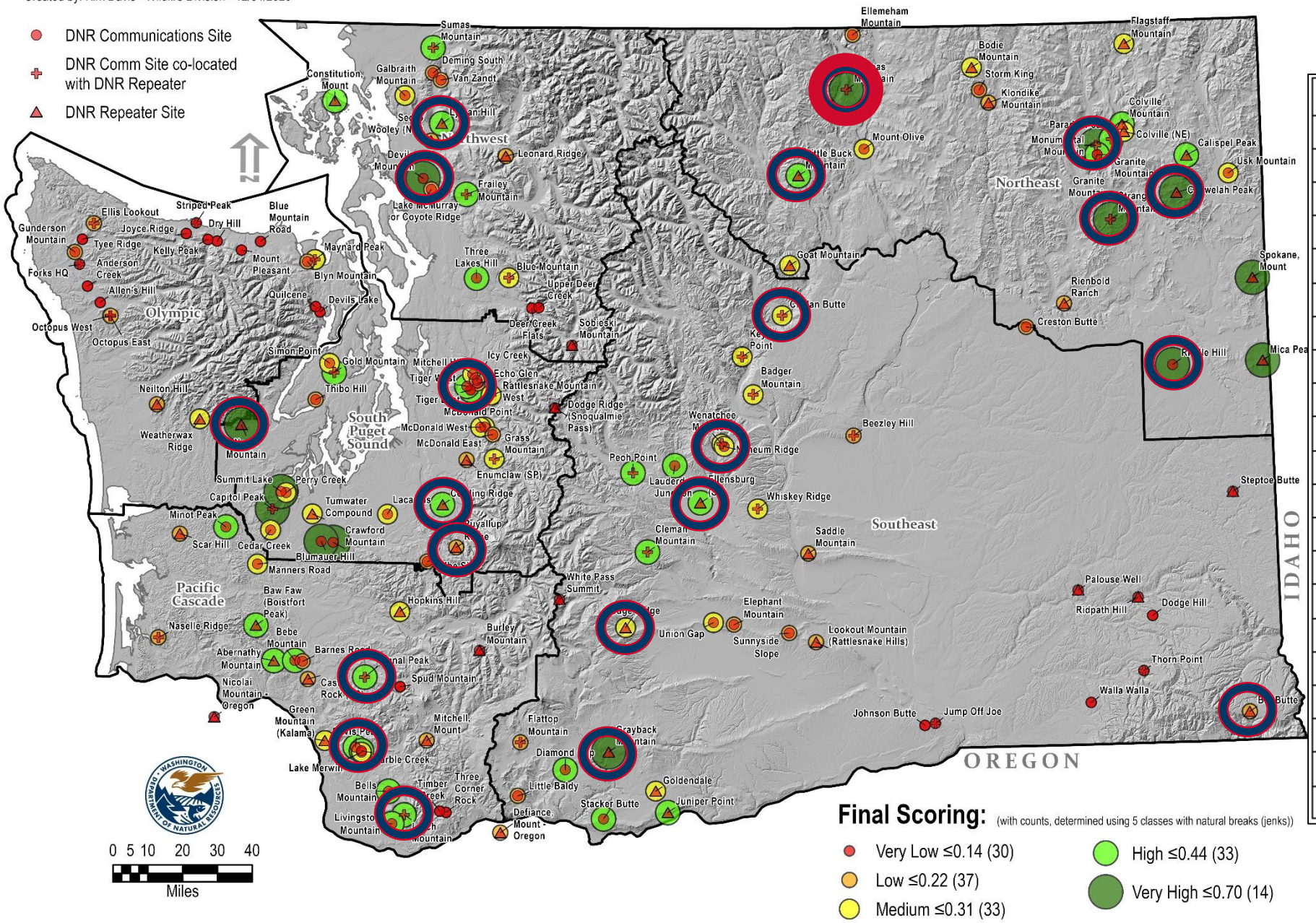

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- Very Low ≤0.14 (30)
- Low ≤0.22 (37)
- Medium ≤0.31 (33)
- High ≤0.44 (33)
- Very High ≤0.70 (14)

= SELECTED

= EXISTING

Site Name	Region
Aeneas Mountain	NE
Stranger Mountain	NE
Chelan Butte	SE
Davis Peak	PC
Devils Mountain	NW
Larch Mountain	PC
Monumental Mountain	NE
Naneum Ridge*	SE
Riddle Hill	NE
Signal Peak	PC
Tiger West	SPS
Big Butte	SE
Chewelah Peak	NE
Cowling Ridge	SPS
Ellensburg (SE HQ)	SE
Grayback Mountain	SE
Little Buck Mountain	NE
Lyman Hill	NW
North Mountain	SPS
Puyallup Ridge*	SPS
Sedge Ridge	SE

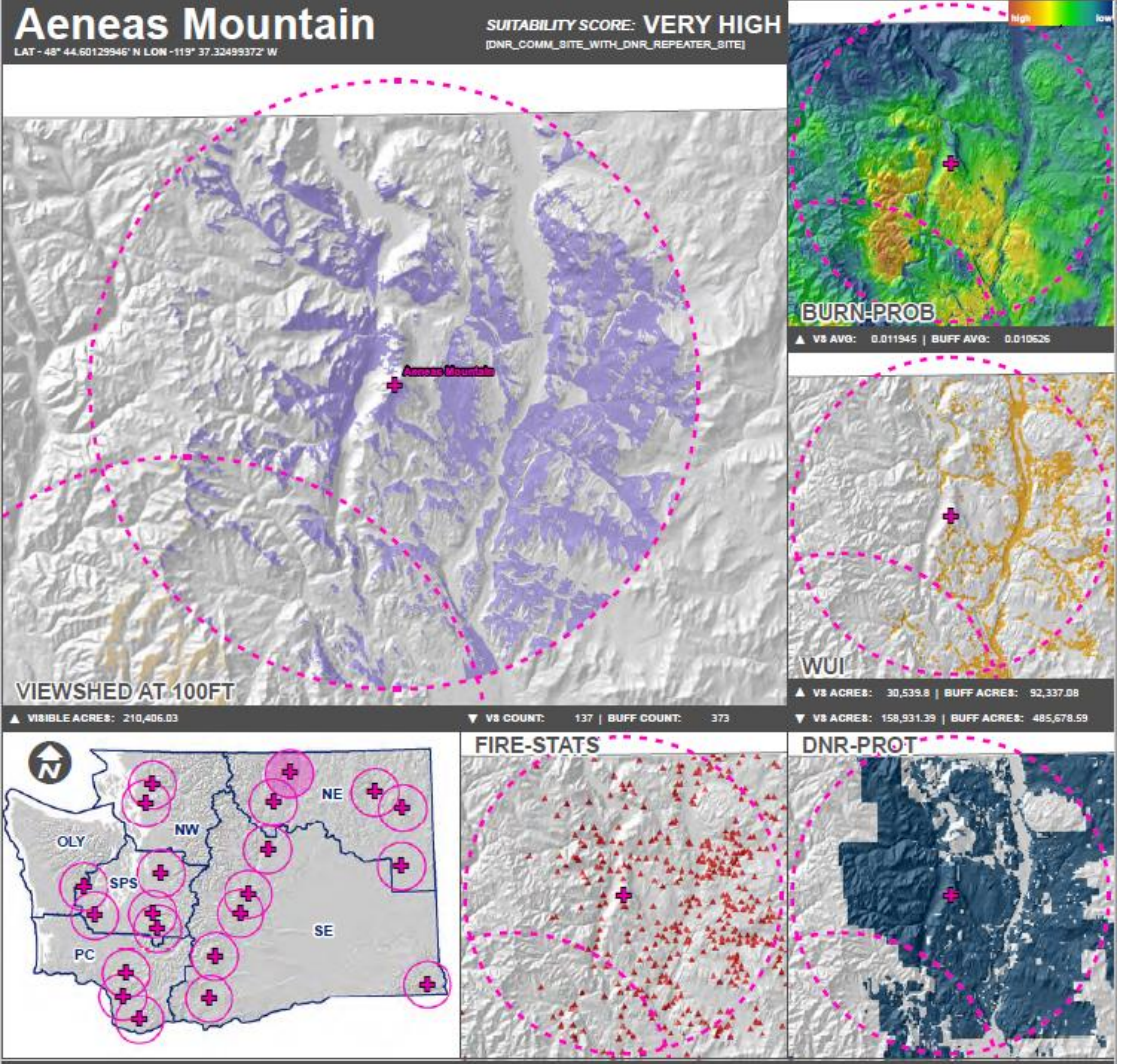
Results and Outputs

STATEWIDE RESULTS MAP - SELECTIONS

Results and Outputs

DETAILED MAP EXAMPLES – Aeneas Mountain & Chelan Butte

Detailed maps exist for all selected sites



Additional information for **Aeneas Mountain** provided by DNR Staff information:

POWER: Commercial	**COMMENTS:** Additional, WSU owned 80 ft self support tower on site
INTERNET: Yes, NCI Datacom	
TOWER TYPE: Self support lattice, Fire Lookout	**FEASIBILITY REMARKS:** Yes, already has camera
TOWER HEIGHT: 55ft	
LANDOWNER: DNR	**RESPONSE RECEIVED:** YES

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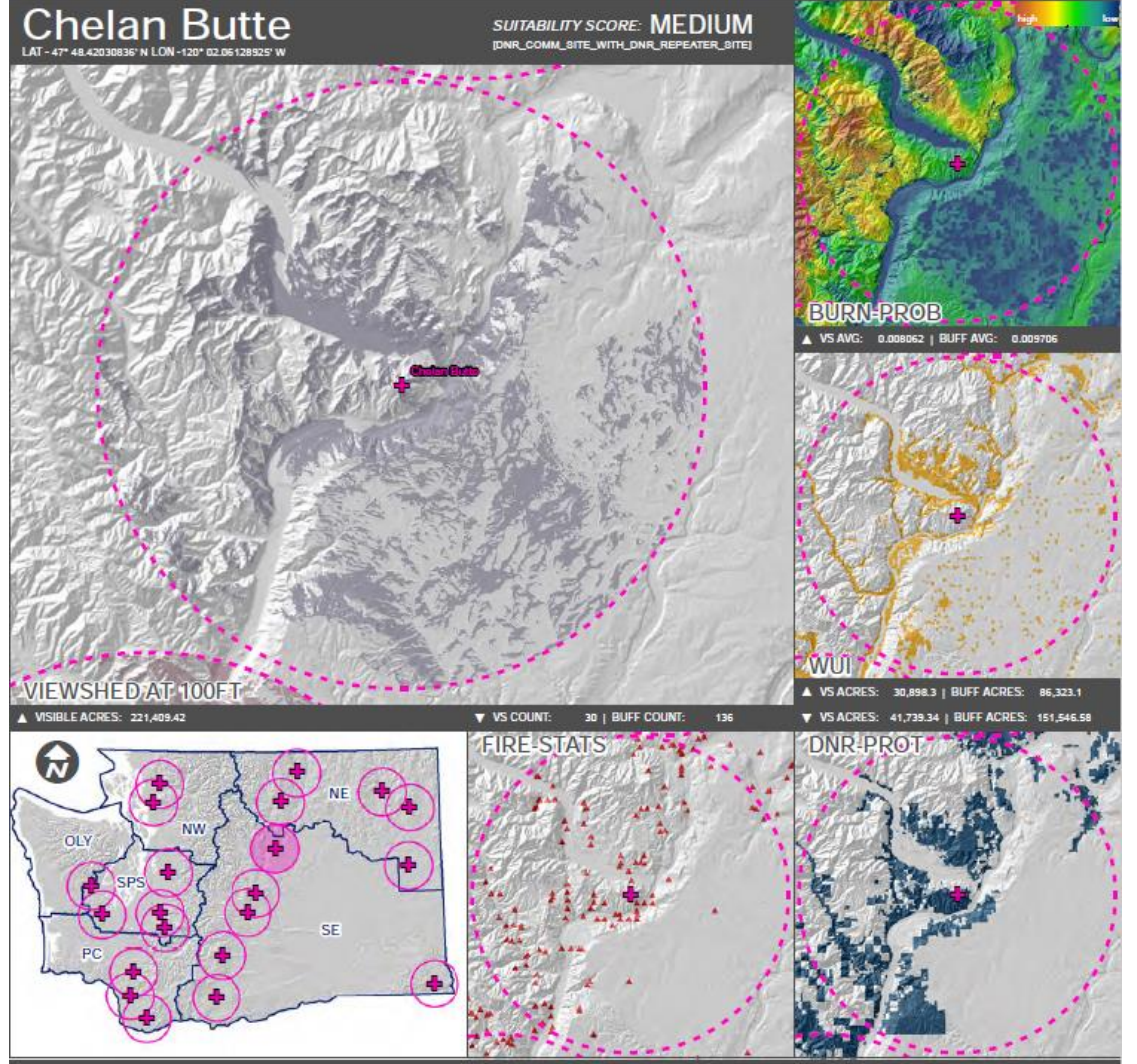

Additional information for **Chelan Butte** provided by DNR Staff information:

POWER: Commercial and Generator	COMMENTS: Chelan Butte has its own DNR building and tower, currently maxed out with paying tenants. Raised questions about how to authorize and make an agreement. Likes the idea, but hard to address the agreement issues.
INTERNET: No, but LTE installable	
TOWER TYPE: Microflect	FEASIBILITY REMARKS: Yes, cameras are up on other towers. You can see forever up there.
TOWER HEIGHT: 140ft	
LANDOWNER: DNR	RESPONSE RECEIVED: YES

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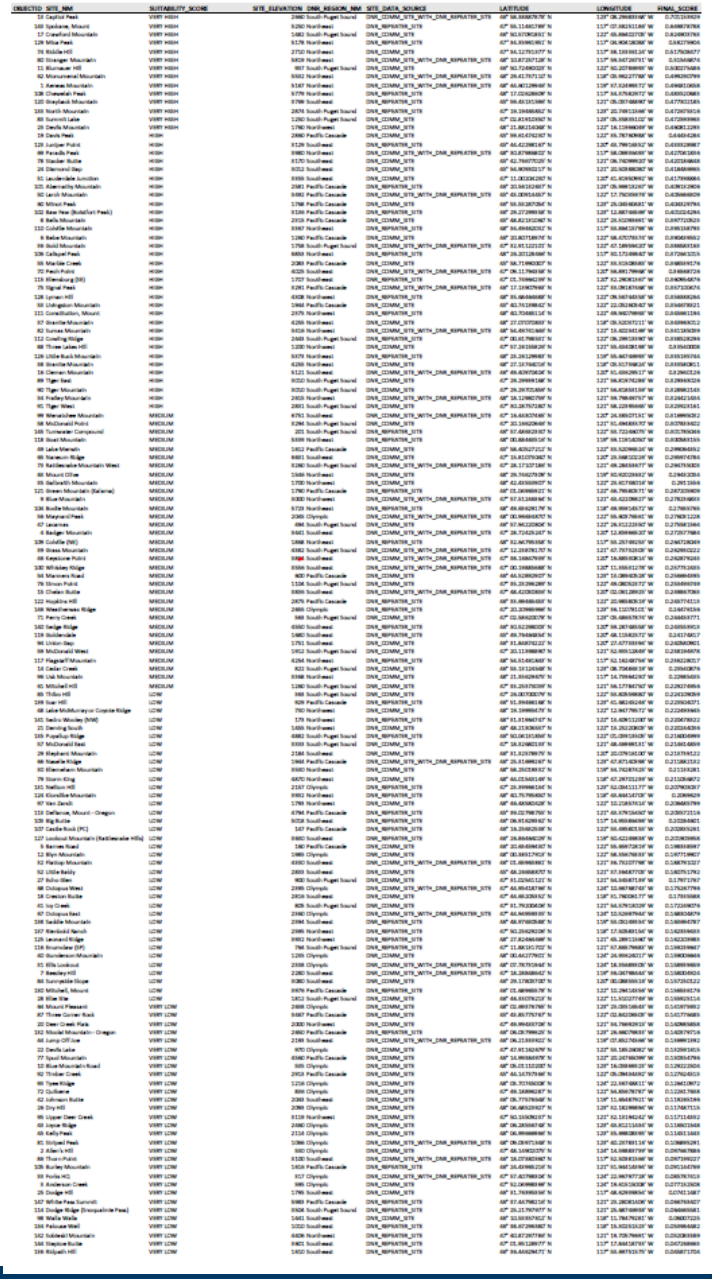
Results and Outputs

- **Data exists for all 174 sites…**

OBJECTID	SITE_NM	SUITABILITY_SCORE	SITE_ELEVATION	DNR_REGION_NM	SITE_DATA_SOURCE	LATITUDE	LONGITUDE	FINAL_SCORE
13	Capitol Peak	VERY HIGH	2660	South Puget Sound	DNR_COMM_SITE_WITH_DNR_REPEATER_SITE	46° 58.38887878' N	123° 08.29683368' W	0.701153929
143	Spokane, Mount	VERY HIGH	5250	Northeast	DNR_REPEATER_SITE	47° 55.11461789' N	117° 07.38251186' W	0.649878788
17	Crawford Mountain	VERY HIGH	1482	South Puget Sound	DNR_COMM_SITE	46° 50.57091851' N	122° 45.86402705' W	0.624903763
129	Mica Peak	VERY HIGH	5178	Northeast	DNR_REPEATER_SITE	47° 34.35961951' N	117° 04.90418088' W	0.58275904
74	Riddle Hill	VERY HIGH	2710	Northeast	DNR_COMM_SITE	47° 34.12731377' N	117° 38.13336124' W	0.517508477
80	Stranger Mountain	VERY HIGH	5819	Northeast	DNR_COMM_SITE_WITH_DNR_REPEATER_SITE	48° 10.87257128' N	117° 59.34726731' W	0.51546874
11	Blumauer Hill	VERY HIGH	937	South Puget Sound	DNR_COMM_SITE	46° 50.72490023' N	122° 50.20786993' W	0.500275486
62	Monumenal Mountain	VERY HIGH	5532	Northeast	DNR_COMM_SITE_WITH_DNR_REPEATER_SITE	48° 29.41737110' N	118° 03.96227788' W	0.499290799
1	Aeneas Mountain	VERY HIGH	5167	Northeast	DNR_COMM_SITE_WITH_DNR_REPEATER_SITE	48° 44.60129946' N	119° 37.32499372' W	0.494810458
108	Chewelah Peak	VERY HIGH	5779	Northeast	DNR_REPEATER_SITE	48° 17.02628609' N	117° 34.37582972' W	0.483520683
120	Grayback Mountain	VERY HIGH	3769	Southeast	DNR_REPEATER_SITE	45° 59.45131596' N	121° 05.03748890' W	0.477302185
133	North Mountain	VERY HIGH	2874	South Puget Sound	DNR_REPEATER_SITE	47° 19.19465852' N	123° 20.74911566' W	0.472675316
83	Summit Lake	VERY HIGH	1250	South Puget Sound	DNR_COMM_SITE	47° 02.81910350' N	123° 05.35835102' W	0.472593963
23	Devils Mountain	VERY HIGH	1760	Northwest	DNR_COMM_SITE	48° 21.88214048' N	122° 16.11966049' W	0.460812293
19	Davis Peak	HIGH	2860	Pacific Cascade	DNR_COMM_SITE	45° 59.61474230' N	122° 35.78760988' W	0.44434284
123	Juniper Point	HIGH	3129	Southeast	DNR_REPEATER_SITE	45° 44.42298167' N	120° 43.79916352' W	0.433328987
69	Paradis Peak	HIGH	3980	Northeast	DNR_COMM_SITE_WITH_DNR_REPEATER_SITE	48° 30.87986802' N	117° 58.06936493' W	0.427041836
78	Stacker Butte	HIGH	3170	Southeast	DNR_COMM_SITE	45° 42.76677025' N	121° 06.74099920' W	0.420186848
24	Diamond Gap	HIGH	3012	Southeast	DNR_COMM_SITE	45° 54.90930217' N	121° 20.50388080' W	0.418486965
51	Lauderdale Junction	HIGH	3355	Southeast	DNR_COMM_SITE	47° 11.00204230' N	120° 41.61950992' W	0.417398884
101	Abernathy Mountain	HIGH	2581	Pacific Cascade	DNR_REPEATER_SITE	46° 20.56132637' N	123° 05.96913267' W	0.409132906
50	Larch Mountain	HIGH	3492	Pacific Cascade	DNR_COMM_SITE_WITH_DNR_REPEATER_SITE	45° 43.00914457' N	122° 17.75035976' W	0.405666309
60	Minot Peak	HIGH	1768	Pacific Cascade	DNR_COMM_SITE	46° 53.53287054' N	123° 25.04560481' W	0.404329794
102	Baw Faw (Boistfort Peak)	HIGH	3136	Pacific Cascade	DNR_REPEATER_SITE	46° 29.27299358' N	123° 12.88746569' W	0.401024294
8	Bells Mountain	HIGH	2315	Pacific Cascade	DNR_COMM_SITE	45° 48.82131060' N	122° 23.51093691' W	0.397720523
110	Colville Mountain	HIGH	3367	Northeast	DNR_REPEATER_SITE	48° 34.49462032' N	117° 53.86415798' W	0.395158793
6	Bebe Mountain	HIGH	1260	Pacific Cascade	DNR_COMM_SITE	46° 20.80718974' N	122° 58.47073574' W	0.390439552
36	Gold Mountain	HIGH	1758	South Puget Sound	DNR_COMM_SITE_WITH_DNR_REPEATER_SITE	47° 32.91122101' N	122° 47.18959420' W	0.386583163
106	Calispel Peak	HIGH	6853	Northeast	DNR_REPEATER_SITE	48° 26.20128466' N	117° 30.17249840' W	0.372641015
55	Marble Creek	HIGH	2083	Pacific Cascade	DNR_COMM_SITE	45° 58.71990007' N	122° 33.51508585' W	0.368539176
70	Peoh Point	HIGH	4025	Southeast	DNR_COMM_SITE_WITH_DNR_REPEATER_SITE	47° 09.11794358' N	120° 56.89179968' W	0.36568726
115	Ellensburg (SE)	HIGH	1707	Southeast	DNR_REPEATER_SITE	47° 01.74964239' N	120° 32.29081367' W	0.360954876
75	Signal Peak	HIGH	3291	Pacific Cascade	DNR_COMM_SITE_WITH_DNR_REPEATER_SITE	46° 17.13907963' N	122° 33.09187468' W	0.357100474
128	Lyman Hill	HIGH	4308	Northwest	DNR_REPEATER_SITE	48° 35.68464688' N	122° 09.56744358' W	0.356388264
53	Livingston Mountain	HIGH	1944	Pacific Cascade	DNR_COMM_SITE	45° 40.74139842' N	122° 22.05260340' W	0.354678321
111	Constitution, Mount	HIGH	2375	Northwest	DNR_REPEATER_SITE	48° 40.70465114' N	122° 49.94076963' W	0.345661194
37	Granite Mountain	HIGH	4255	Northeast	DNR_COMM_SITE	48° 27.07070833' N	118° 03.52037211' W	0.343963012
82	Sumas Mountain	HIGH	3416	Northwest	DNR_COMM_SITE_WITH_DNR_REPEATER_SITE	48° 54.49741646' N	122° 13.40234169' W	0.341185039
112	Cowling Ridge	HIGH	2443	South Puget Sound	DNR_REPEATER_SITE	47° 00.61798531' N	122° 06.29913390' W	0.338528296
88	Three Lakes Hill	HIGH	1200	Northwest	DNR_COMM_SITE	47° 57.26155826' N	121° 55.43408198' W	0.33540008
126	Little Buck Mountain	HIGH	5373	Northeast	DNR_REPEATER_SITE	48° 23.26129983' N	119° 55.64746993' W	0.335195744



Next Steps

- Seek pilot project
- Prepare Issue Paper
  - Scope potential center locations and determine staffing needs
  - Identify barriers
  - Prepare budget for Phase 1 (20 cameras)
  - Conduct market research
- Prepare project proposal in order to seek funding
- Phased project based on priority sites – cant do all, but can phase in sites as additional funding comes available

OTHER CAMERAS

FTS360 Overwatch Cameras

Aeneas Camera

WILDFIRE

Questions?