



United States Department of Agriculture

USDA Forest Service, Alaska Region

Cordova Ranger District Existing Vegetation Map

Kim Homan, Cody Dangerfield & Dustin Wittwer



Forest Service – Alaska Region November 2022

Cordova Ranger District Existing Vegetation Map



Partnerships

Forest Service Partners

- Alaska Regional Office
- Chugach National Forest
- Geospatial Technology and Applications Center
- Forest Inventory and Analysis (FIA)

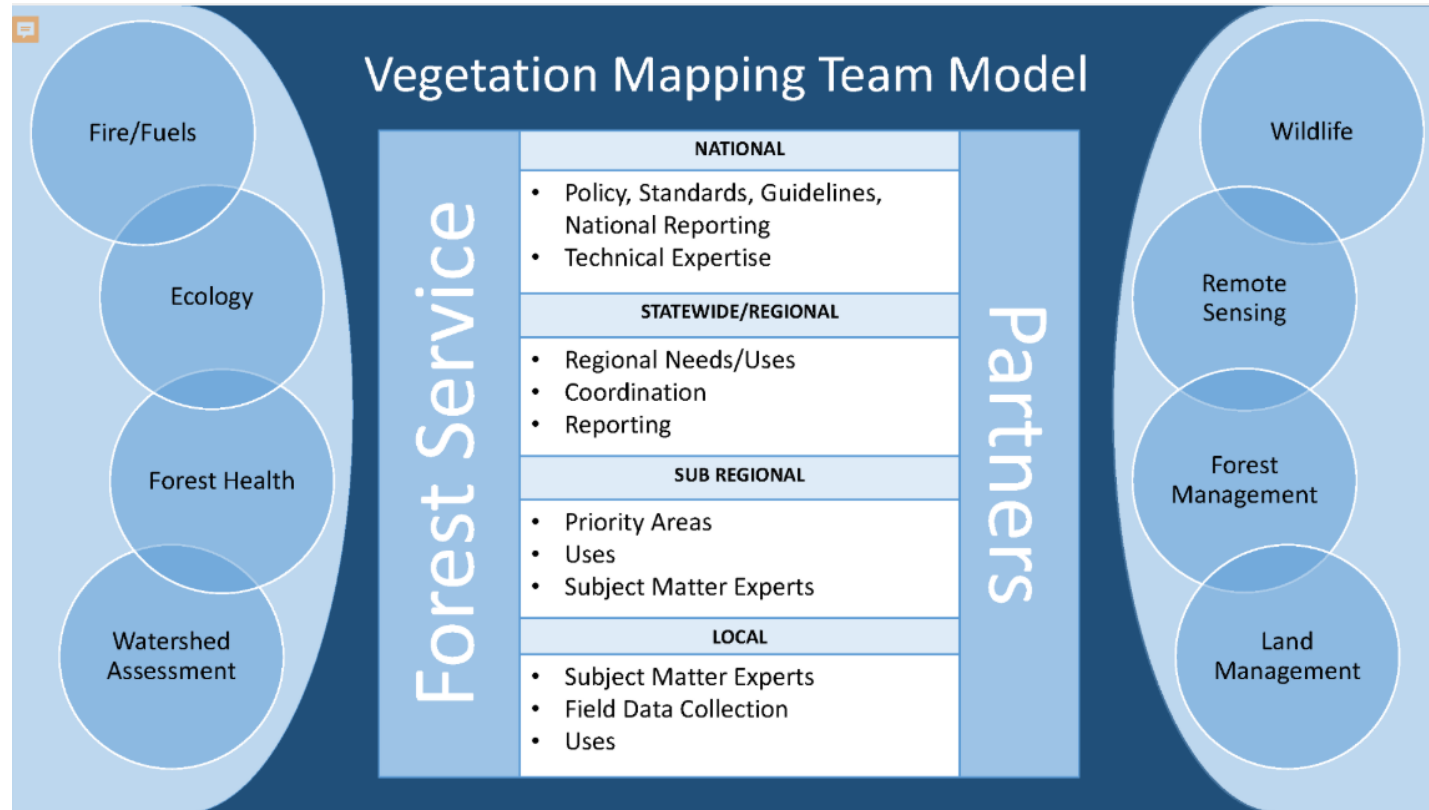
External Partners

- Ducks Unlimited
- State of Alaska, ADF&G
- Eyak Corporation
- Tatitlek Corporation



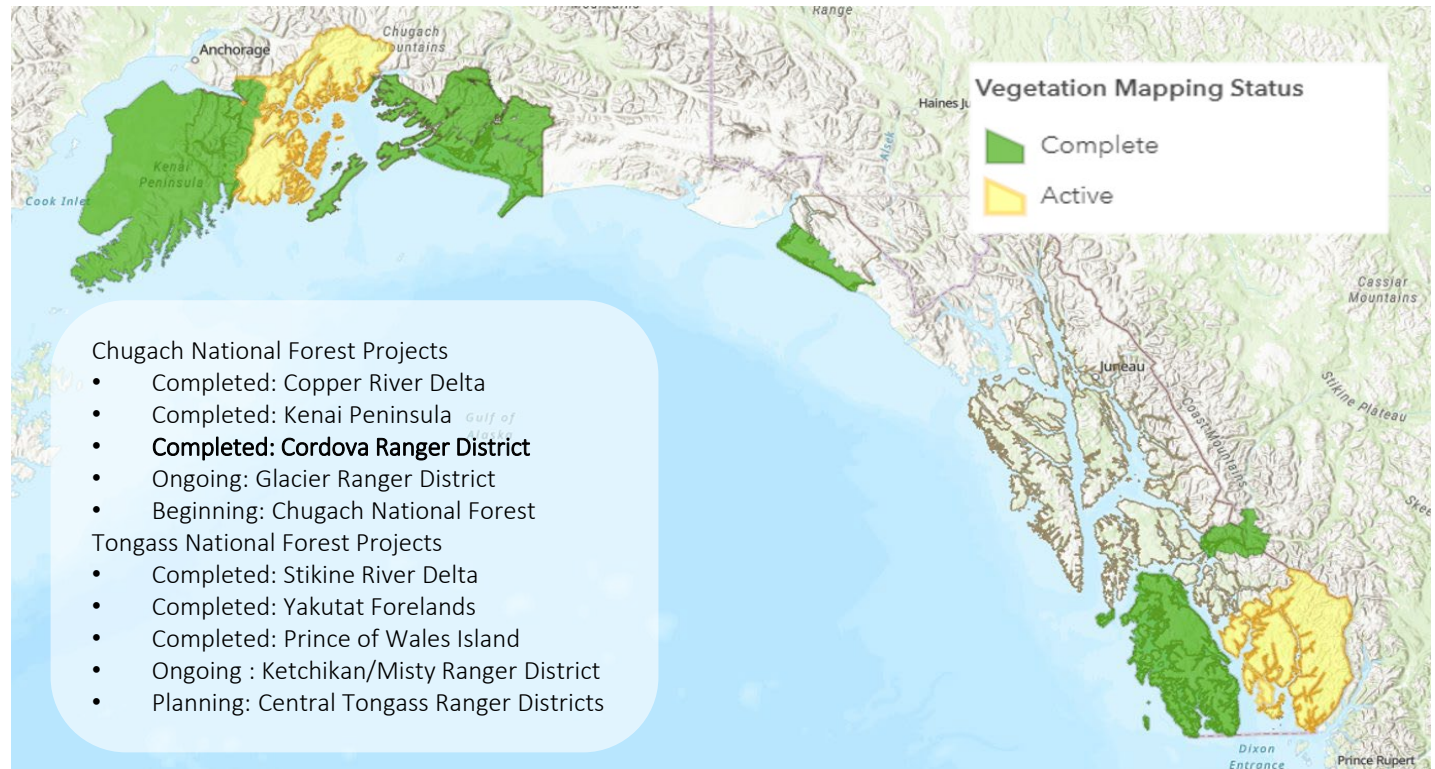
Cordova Ranger District Existing Vegetation Map

Team Model



Regional Vegetation Map Status

Up Next ...



Cordova Ranger District Vegetation Map



For more information

[Cordova StoryMap](https://storymaps.arcgis.com/stories/c573e89f9bef425eae6ced845dbc389a)

<https://storymaps.arcgis.com/stories/c573e89f9bef425eae6ced845dbc389a>

[Alaska Region Vegetation & Ecology Program web page](https://www.fs.usda.gov/detail/r10/plants-animals/?cid=STELPRD3814838)

<https://www.fs.usda.gov/detail/r10/plants-animals/?cid=STELPRD3814838>

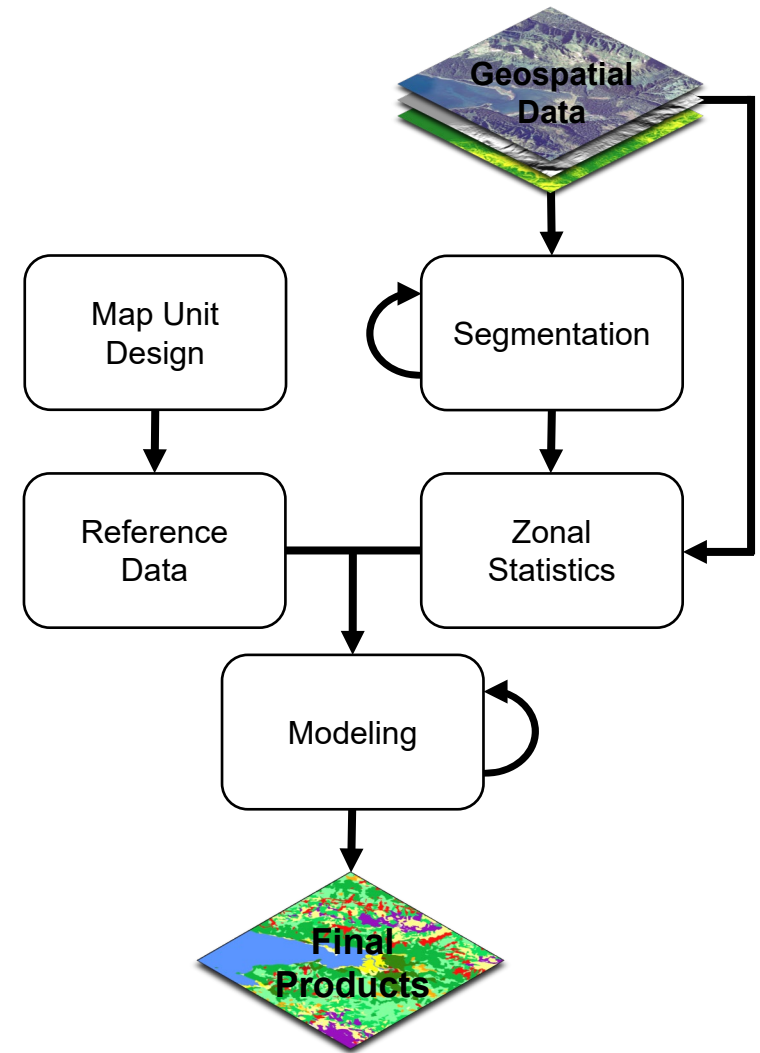
Kim Homan, Kim.Homan@usda.gov

Dustin Wittwer, Dustin.Wittwer@usda.gov

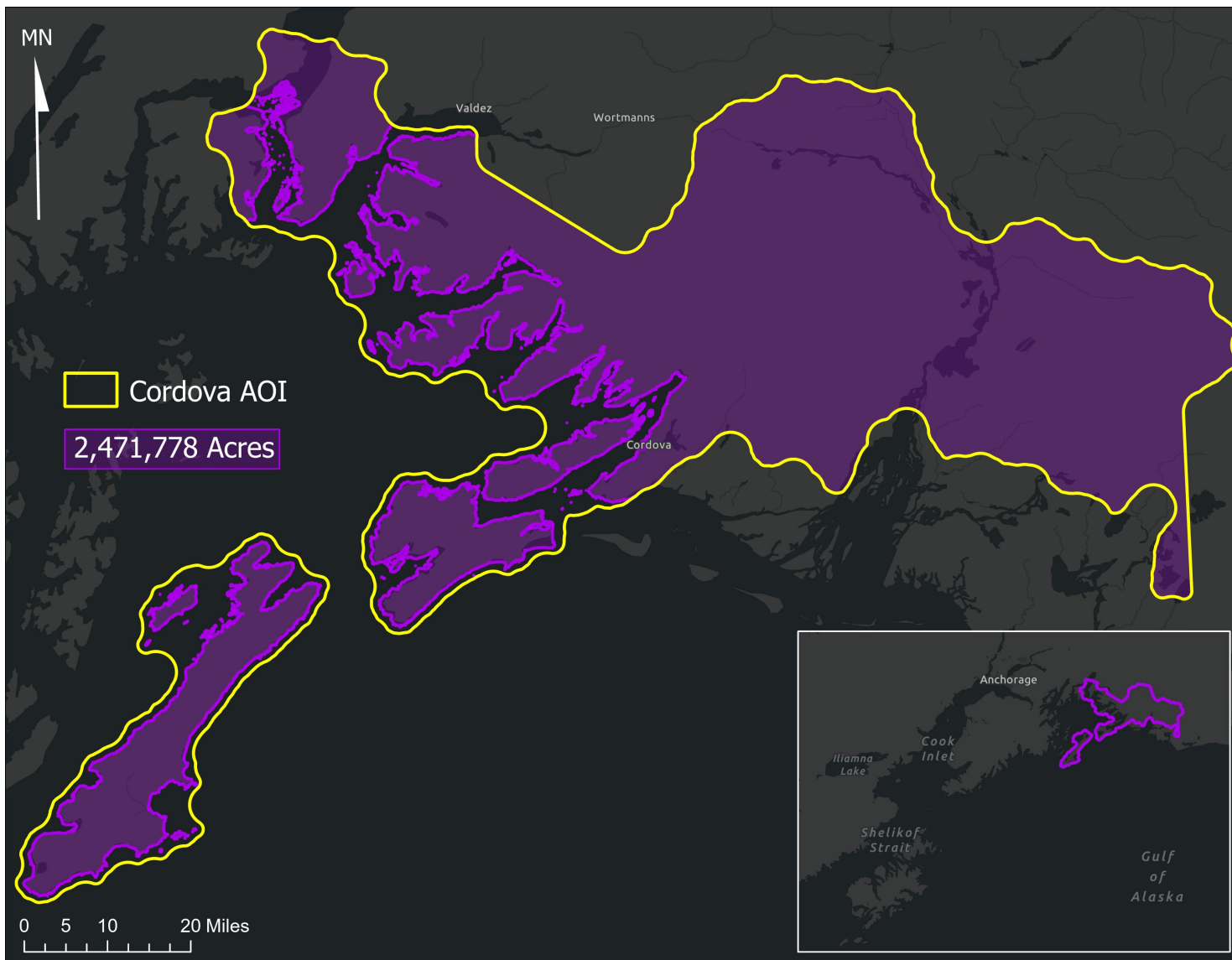
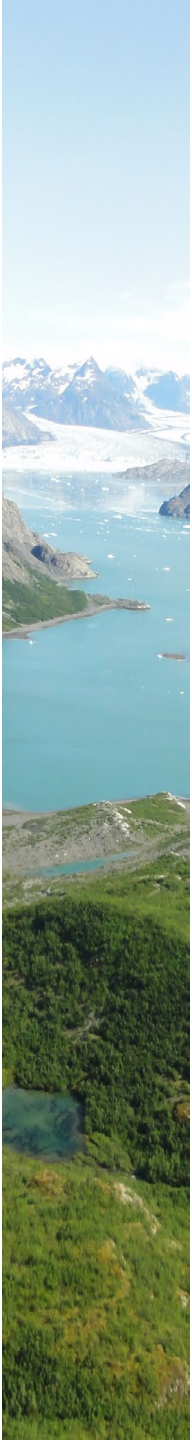
Cody Dangerfield, Cody.Dangerfield@usda.gov

Overview

- Map Unit Design
- Geospatial Data
- Segmentation
 - Zonal Statistics
- Reference Data Collection
- Modeling
- Final Map Products
- Accuracy Assessment



Cordova Existing Vegetation Map Project



Cordova Vegetation Type Classes

Map Group	Vegetation Type
Needleleaf Forest	Sitka Spruce Hemlock Hemlock-Sitka Spruce Hemlock-Yellow Cedar Dwarf Mountain Hemlock Forested Peatland
Broadleaf Forest	Black Cottonwood
Mixed Forest	Sitka Spruce-Black Cottonwood
Tall Shrub	Alder Alder-Willow
Low Shrub	Sweetgale
Dwarf Shrub	Ericaceous Dwarf Shrub
Herbaceous	Sedge Peatland Aquatic Herbaceous Wet Herbaceous Mesic Herbaceous Dry Herbaceous
Non Vegetated	Sparse Vegetation Barren Water Snow/Ice Developed

Cordova Tree Canopy Cover

- Tree canopy cover was modeled continuously
 - Values depict absolute tree cover from 10-100%

Tree Canopy Cover Classes

Woodland (10-24%)

Open (25-59%)

Closed (60-100%)

Cordova Tree Size

- Defined as the plurality diameter class forming the uppermost canopy layer

Tree Size Classes
TS1 (0-4.9" DBH)
TS2 (5-8.9" DBH)
TS3 (9-20.9" DBH)
TS4 (≥ 21 " DBH)

Cordova Tall Shrub Canopy Cover

- Tall shrub canopy cover was modeled continuously
 - Shrubs taller than 1.5 m in height
 - Values depict absolute tall shrub cover from 9-100%

Tall Shrub Canopy Cover Classes

Sparse (9-24%)

Open (25-59%)

Closed (60-100%)

Geospatial Data

Chugach Resource Imagery (2010)

- 60cm resolution
- 4 bands
- NDVI
- PCA

MAXAR Imagery (2010-2020)

- 50cm resolution
- 4 bands
- NDVI
- PCA

SPOT 5 (2011-2015)

- 2.5m resolution
- 4 bands
- NDVI
- PCA

Landsat 8 (2013-2018)

- 30m resolution
- Spring, summer, fall mosaics
- 6 bands
- NDVI
- NDMI
- Tasseled Cap Transformation

Sentinel 2 (2020)

- 10m & 20m resolution
- 9 bands
- NDVI
- NDMI
- PCA

Sentinel 1 (2020)

- 10m resolution
- 6 bands

IfSAR (2010-2014)

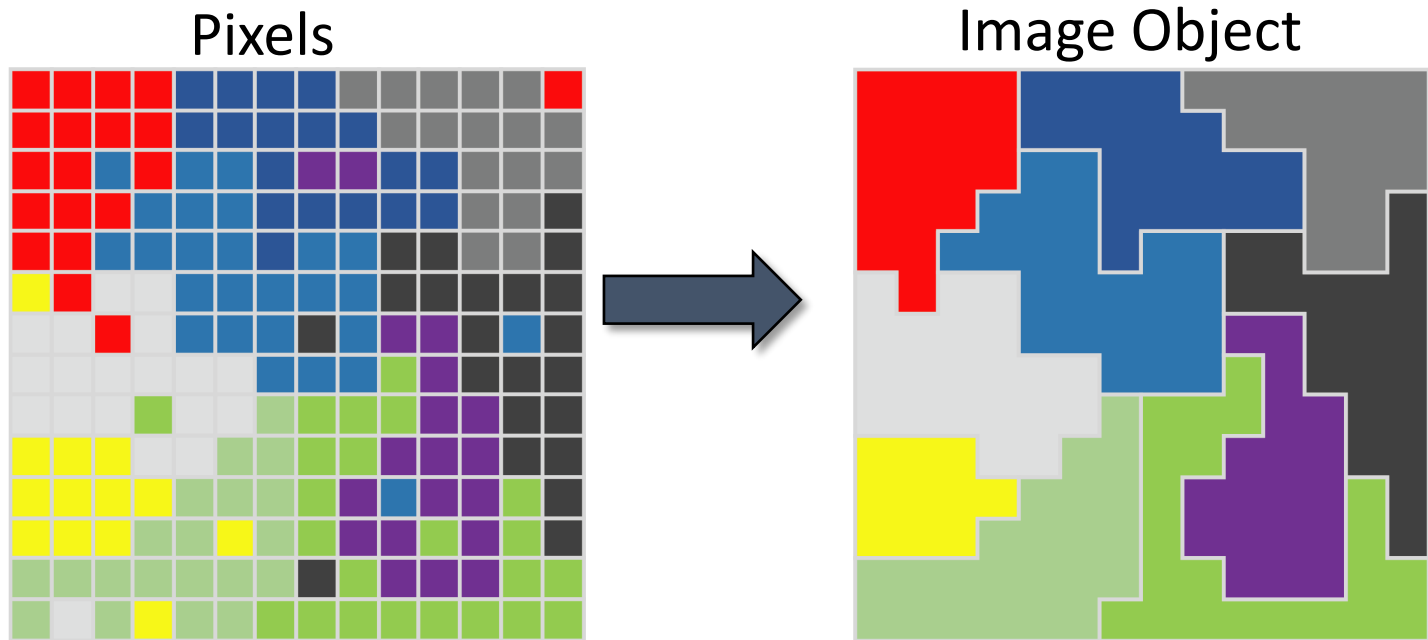
- 5m resolution
- DTM
- CHM
- Derivatives

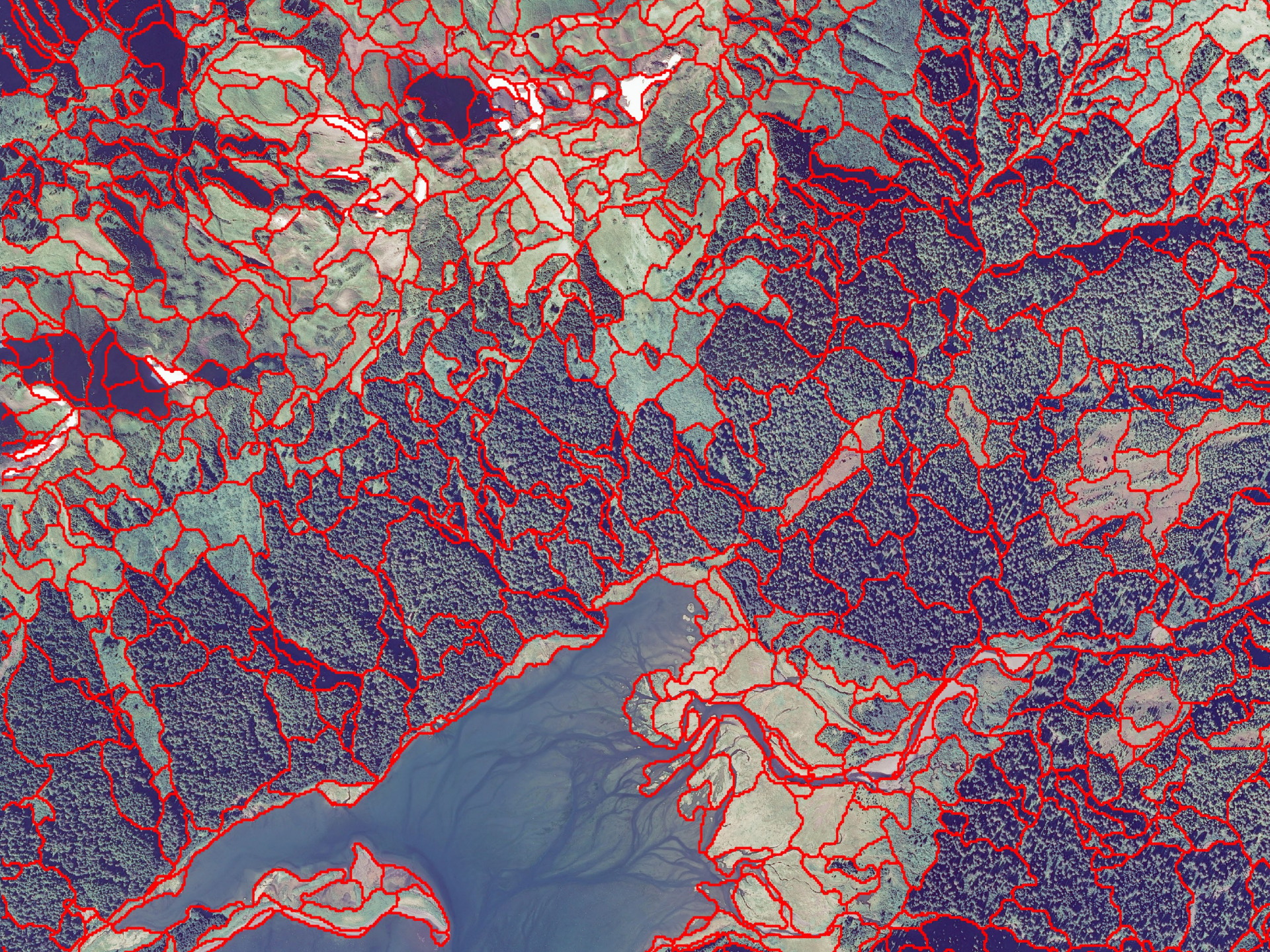
Climate (30-yr avg)

- 1km resolution
- Continentality
- Temperature
- Precipitation
- Relative Humidity
- Shortwave Radiation

Segmentation

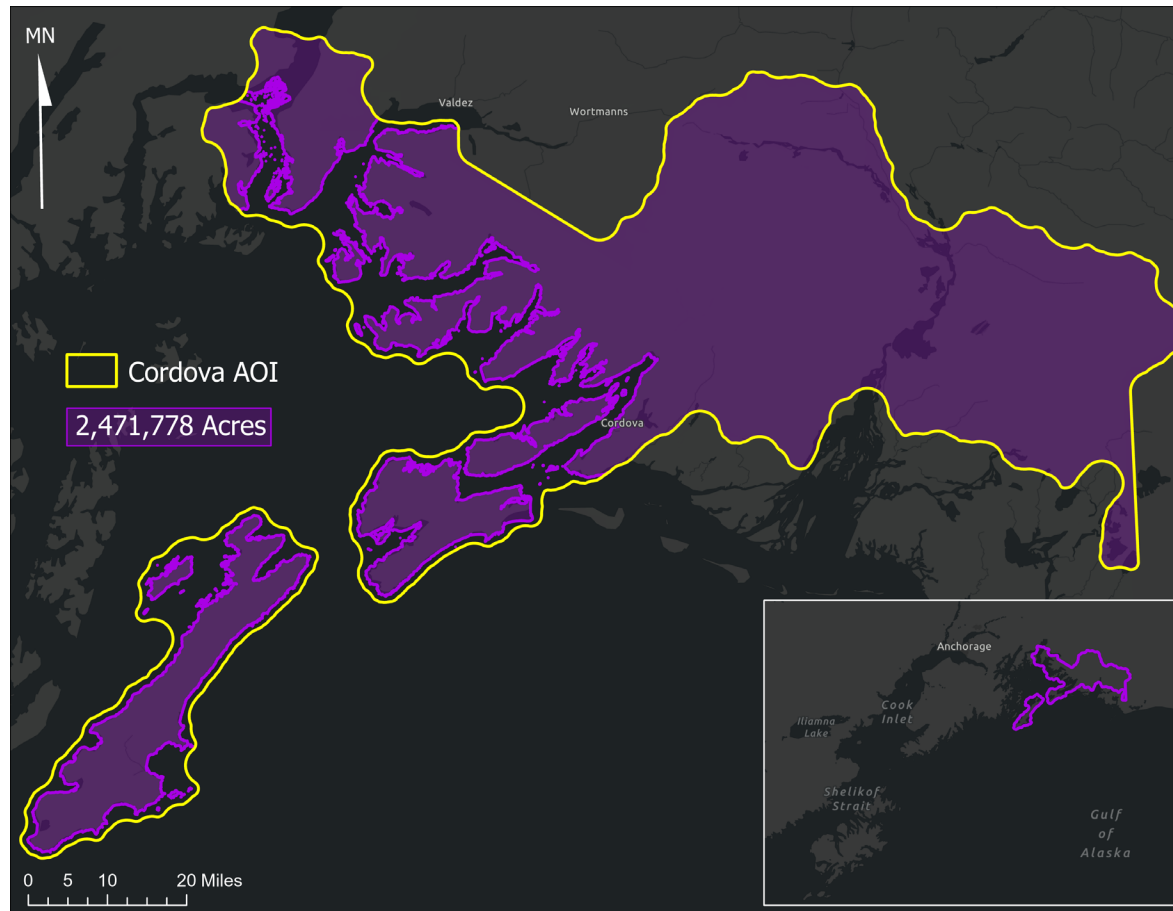
- Group pixels into homogenous patches of vegetation
 - Segments/Mapping Polygons
- Fundamental unit for modeling





Segmentation Summary

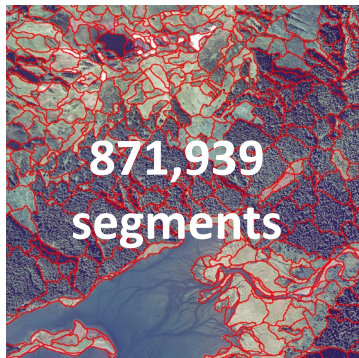
- 871,939 segments
- *median area = 1.6 acres*
- *mean area = 3.4 acres*
- *minimum area = 0.25 acres*



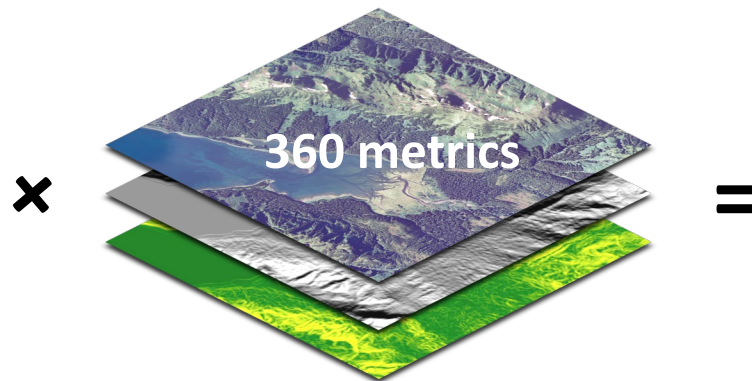
Zonal Statistics

- Geospatial layers are summarized to segments using different statistics.
- 360 metrics (mean, median, std, etc.) for 871,939 segments

Segments

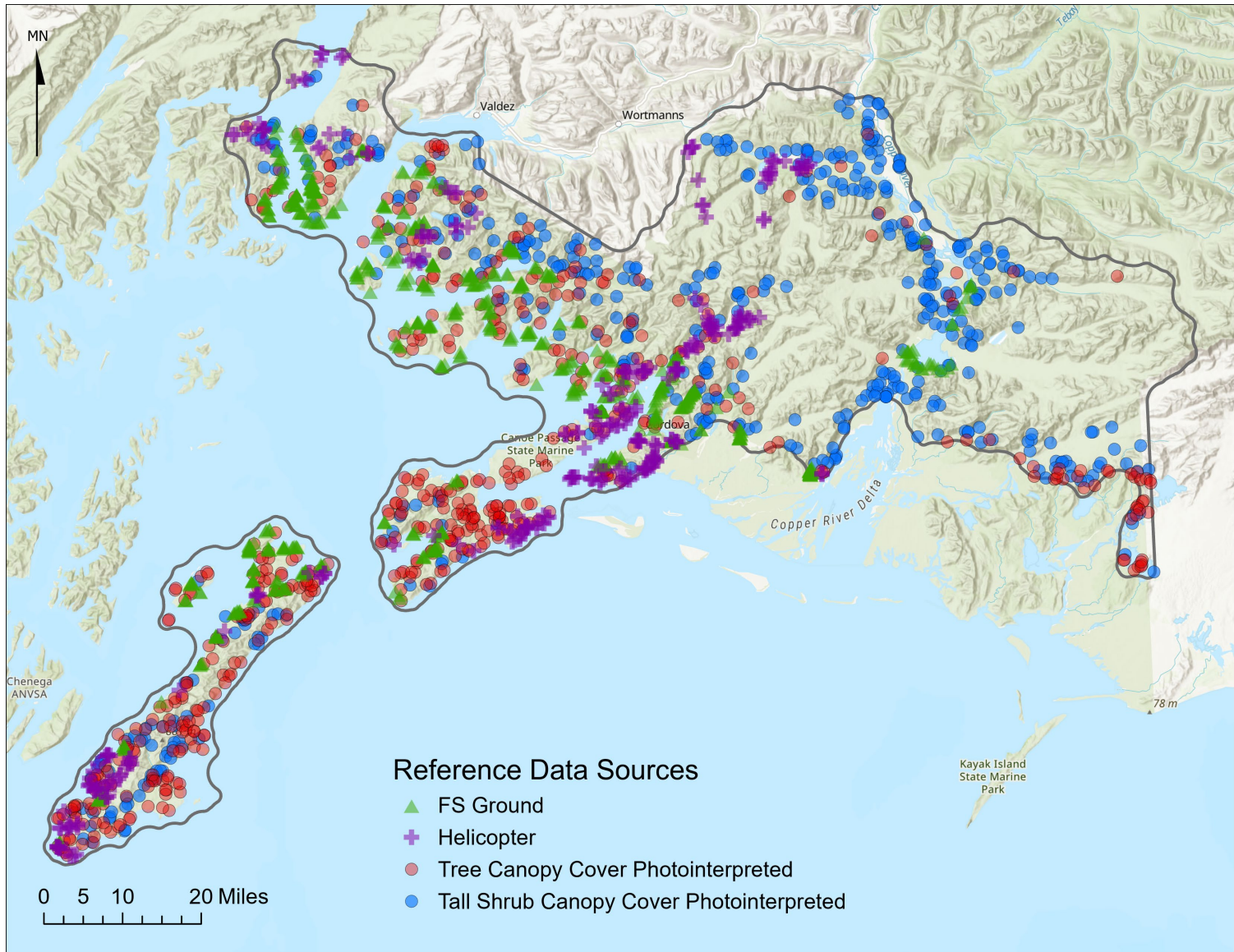


Geospatial Layers

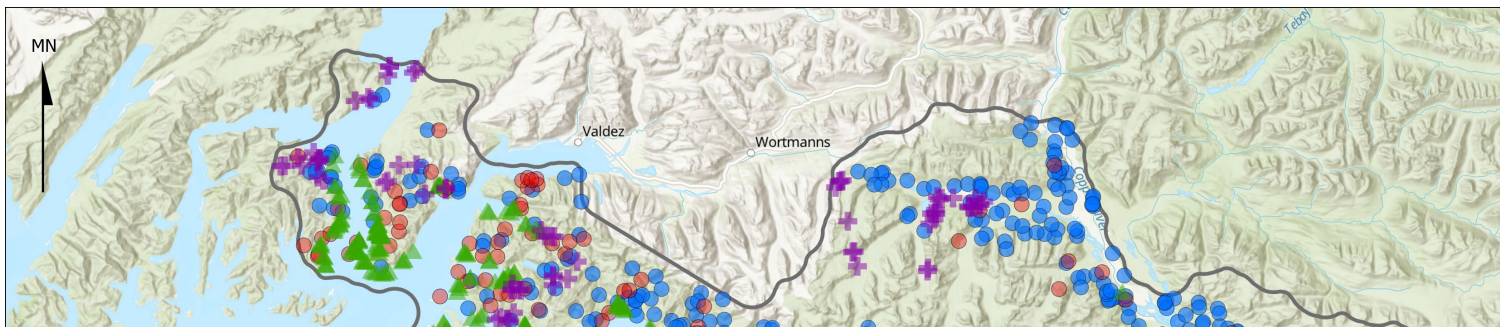


313,898,040
BIG DATA

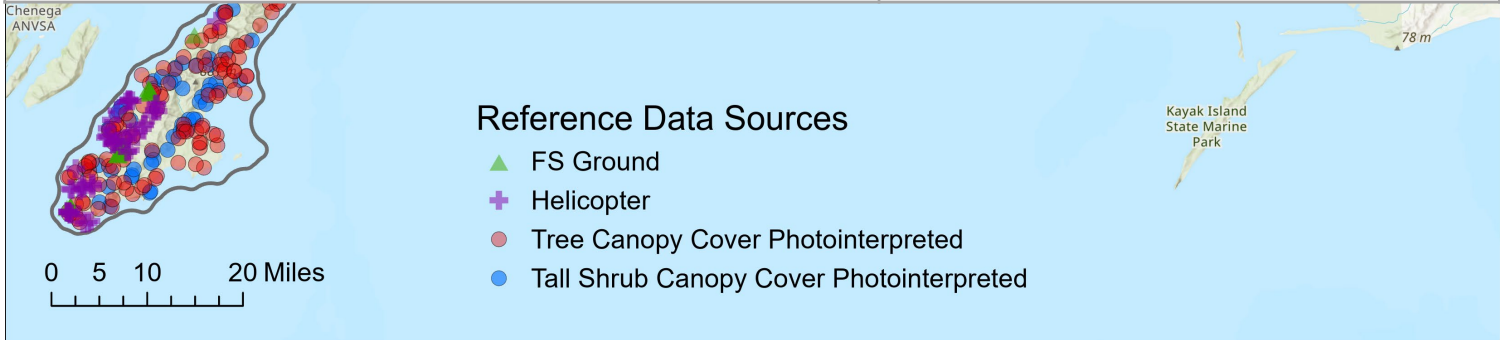
Reference Data



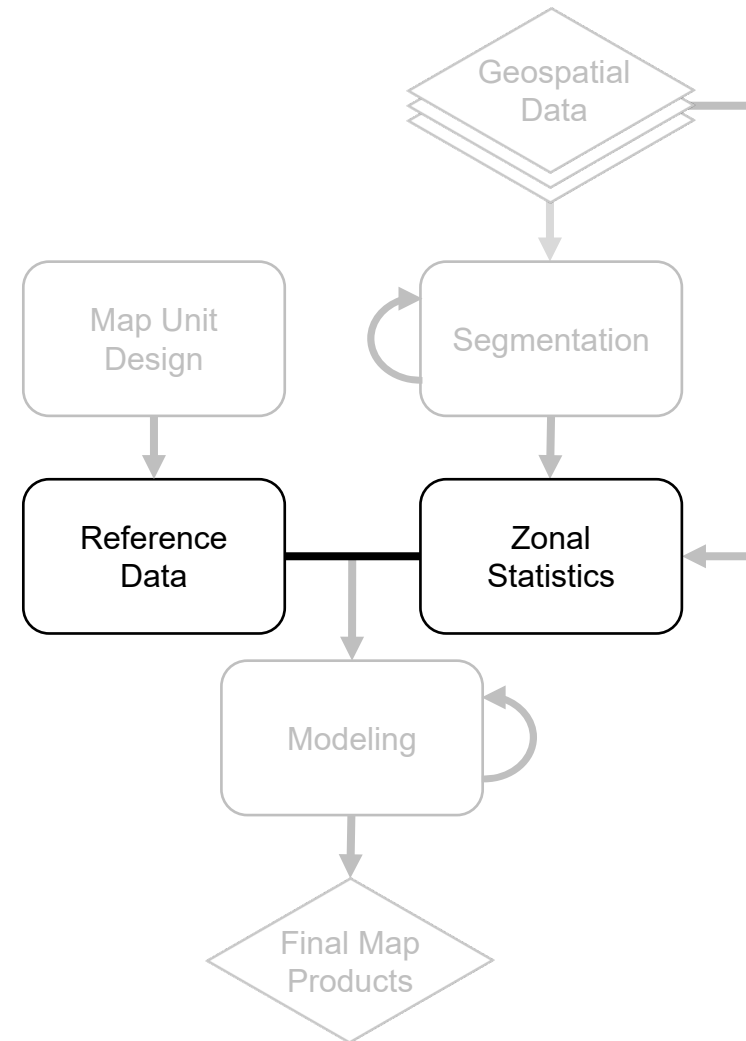
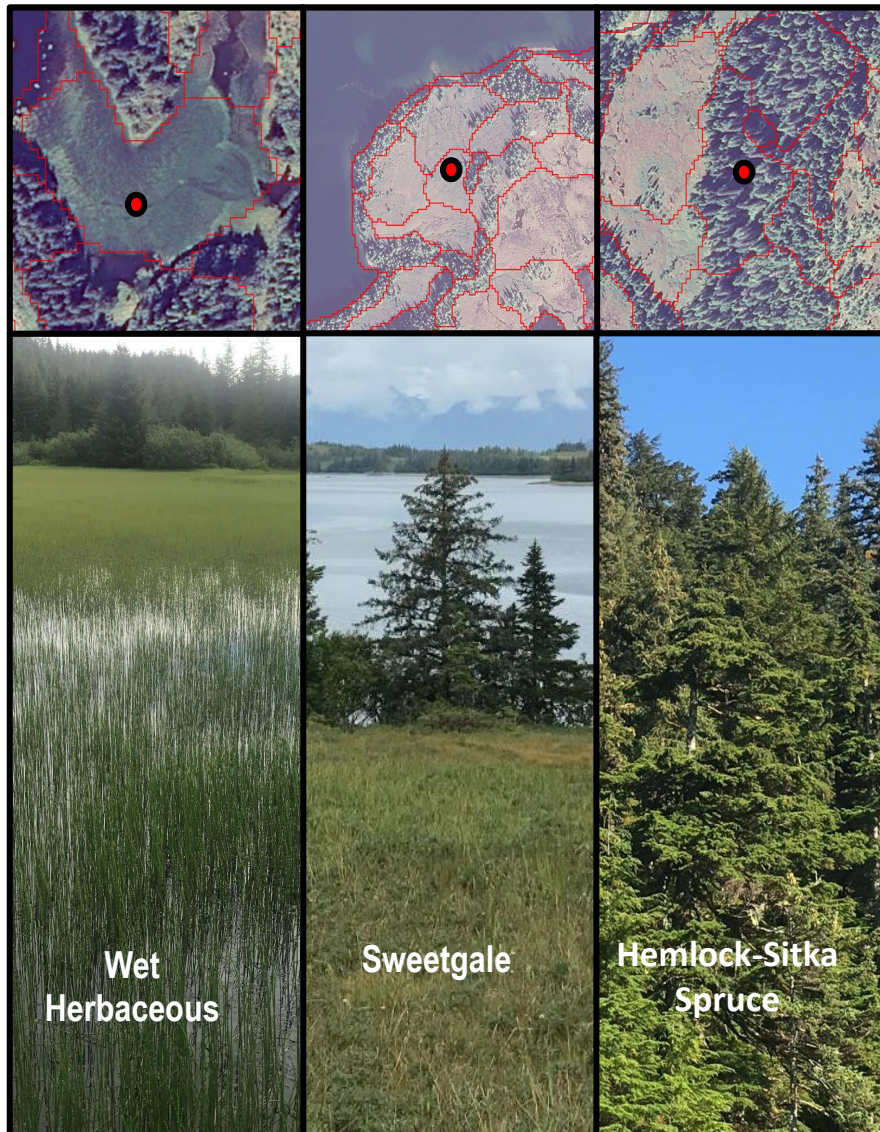
Reference Data



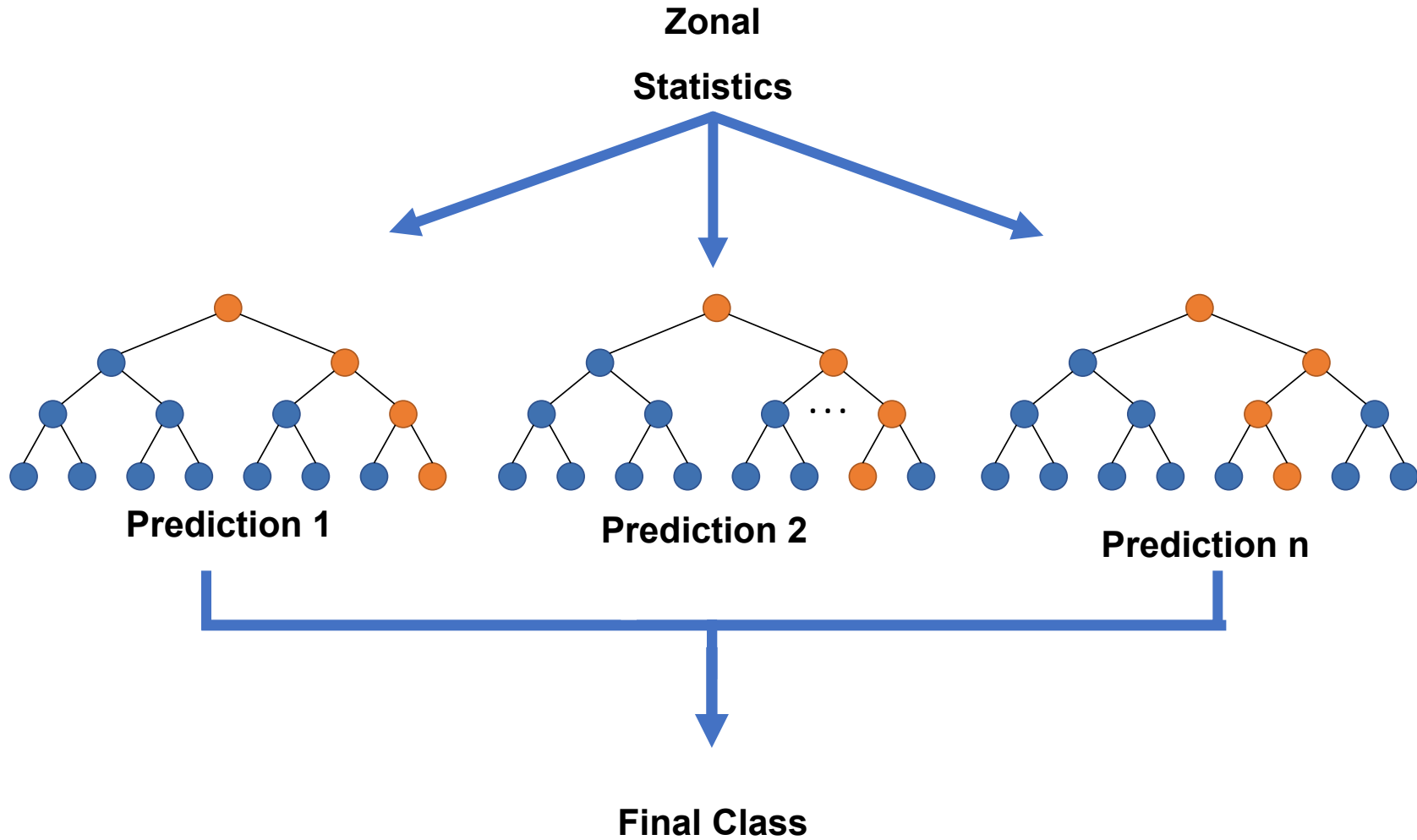
Reference Data Source	Number of Reference Sites
Ground	674
Helicopter	298
Tree Canopy Cover Photointerpreted	500
Tall Shrub Canopy Cover Photointerpreted	500
Total	2,005



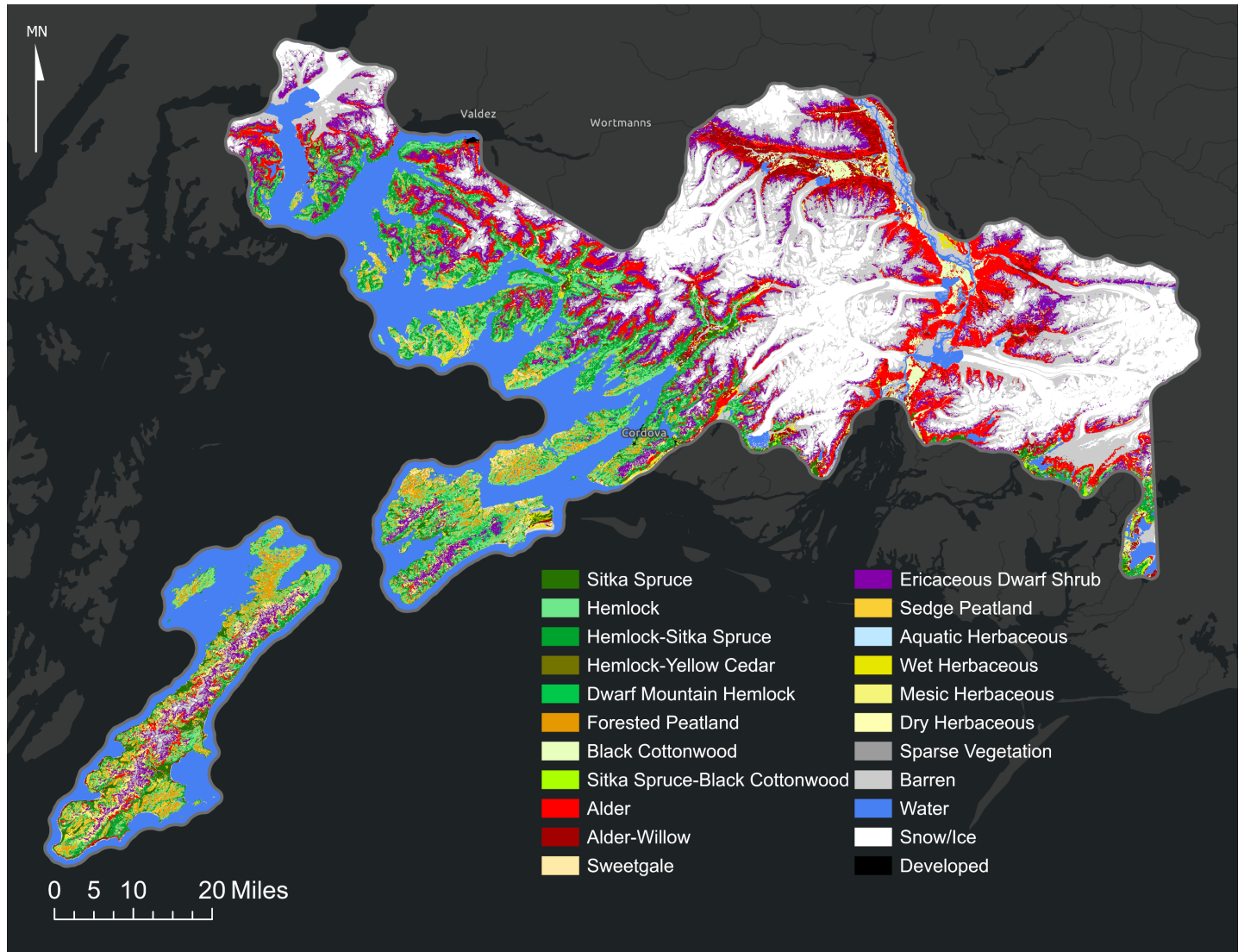
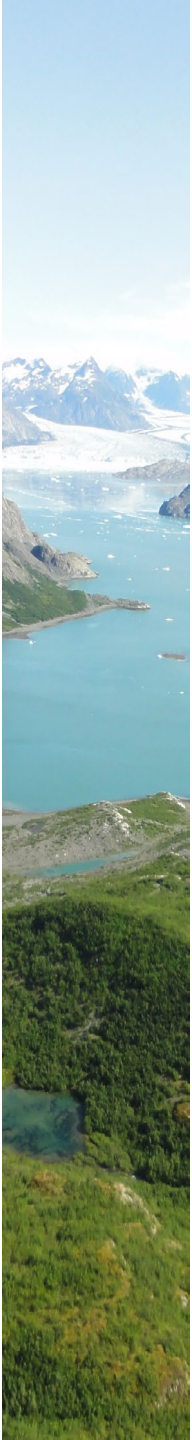
Reference Data



Random Forest



Vegetation Type



Vegetation Type

Map Group	Vegetation Type	Acres	Percent of Vegetated Area
Needleleaf Forest	Sitka Spruce	34,267	2.63%
	Hemlock	204,853	15.72%
	Hemlock-Sitka Spruce	151,643	11.64%
	Hemlock-Yellow Cedar	280	0.02%
	Dwarf Mountain Hemlock	66,538	5.11%
	Forested Peatland	67,467	5.18%
Broadleaf Forest	Black Cottonwood	34,025	2.61%
Mixed Forest	Sitka Spruce-Black Cottonwood	6,827	0.52%
Tall Shrub	Alder	248,552	19.07%
	Alder-Willow	83,124	6.38%
Low Shrub	Sweetgale	19,244	1.48%
Dwarf Shrub	Ericaceous Dwarf Shrub	252,663	19.39%
Herbaceous	Sedge Peatland	38,309	2.94%
	Aquatic Herbaceous	1,895	0.15%
	Wet Herbaceous	19,212	1.47%
	Mesic Herbaceous	71,091	5.45%
	Dry Herbaceous	3,278	0.25%
TOTAL VEGETATED AREA		1,309,911	
Other	Developed	1,482	--
	Barren	490,423	
	Sparse Vegetation	52,729	
	Snow/Ice	560,205	
	Water	595,020	

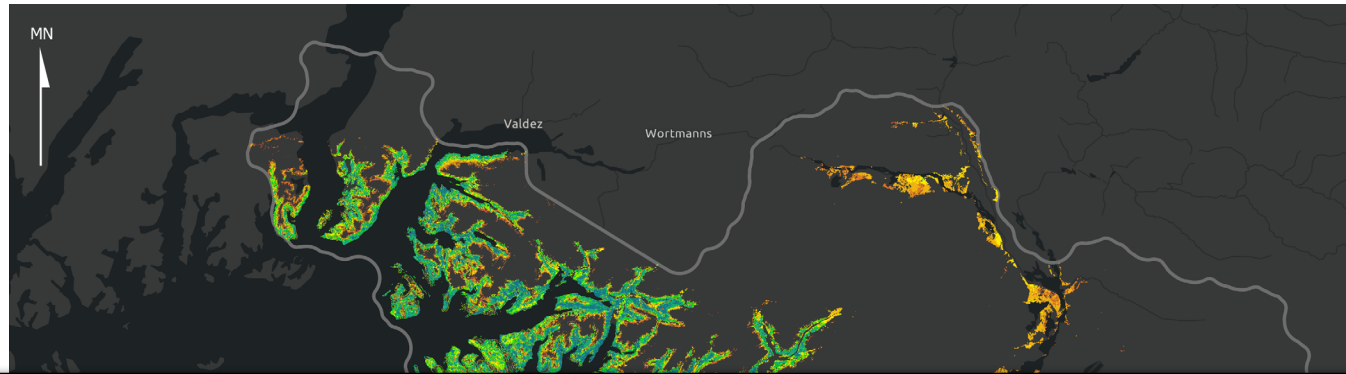
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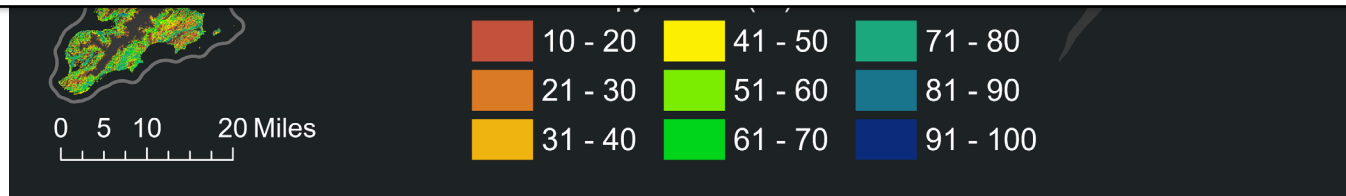
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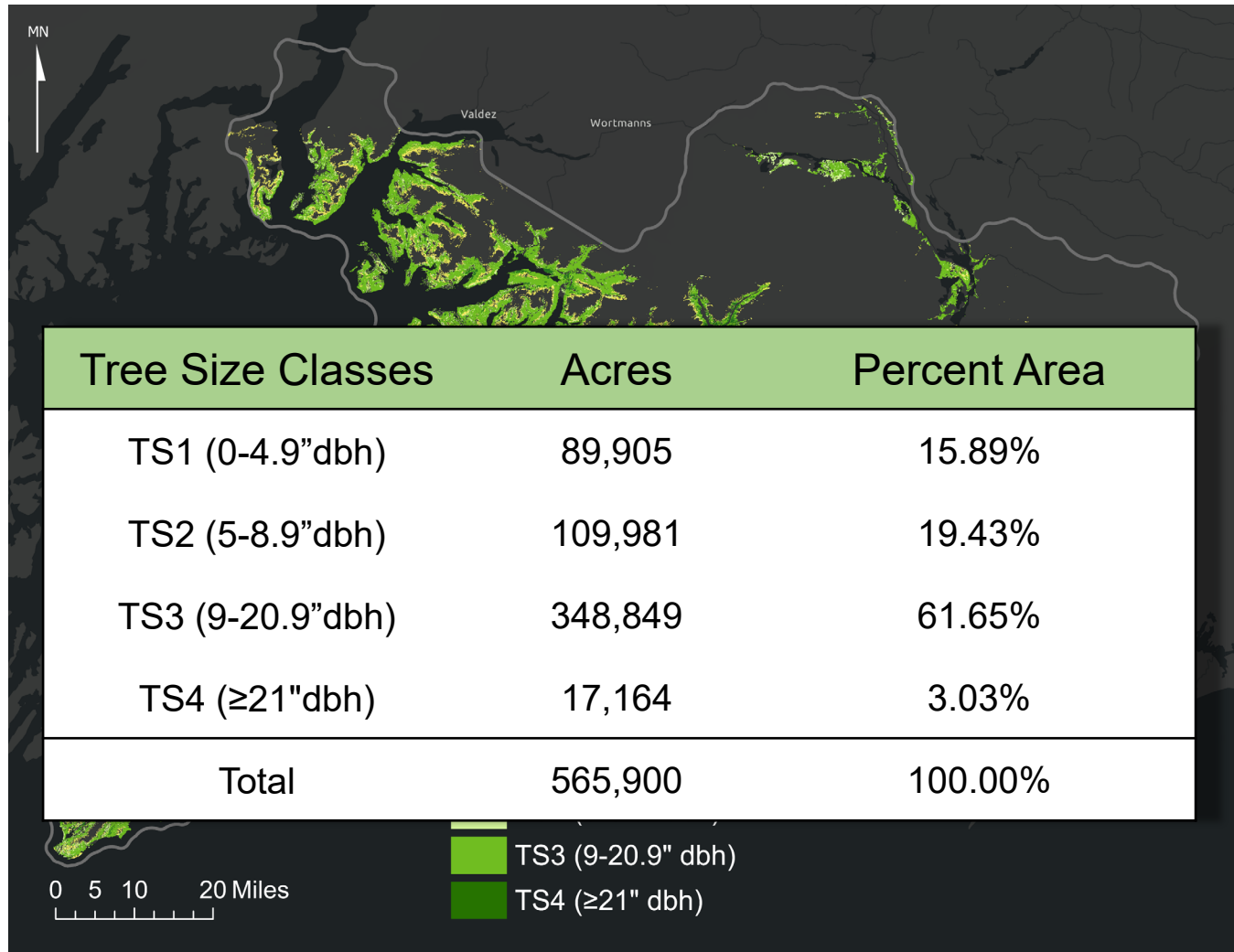
Tree Canopy Cover



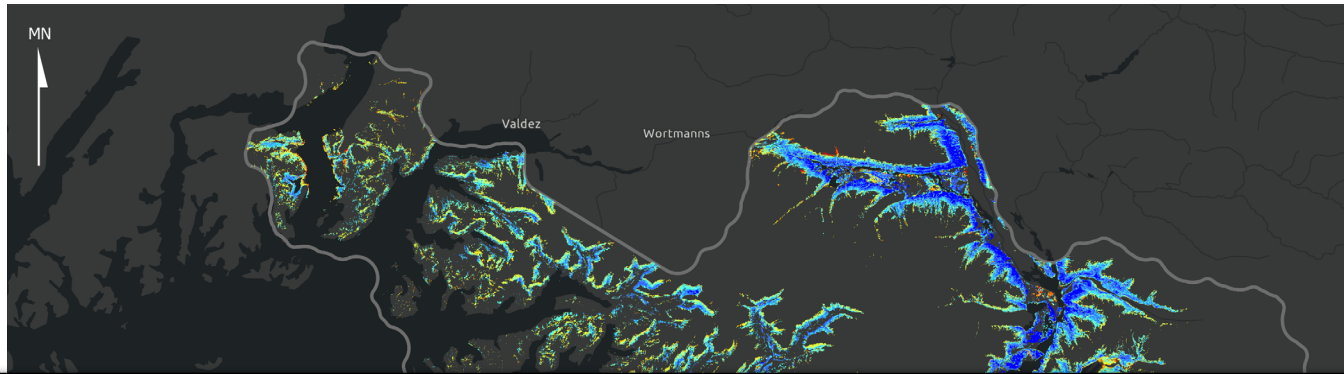
Tree Canopy Cover Classes	Acres	Percent Area
Woodland (10-24%)	53,068	8.86%
Open (25-59%)	239,951	42.23%
Closed (60-100%)	272,881	48.91%
Total	565,900	100%



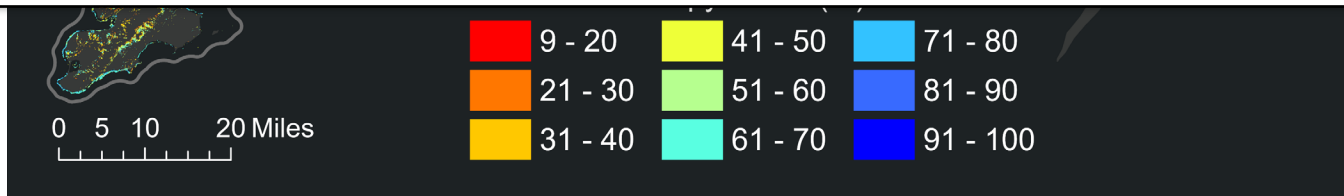
Tree Size



Tall Shrub Canopy Cover



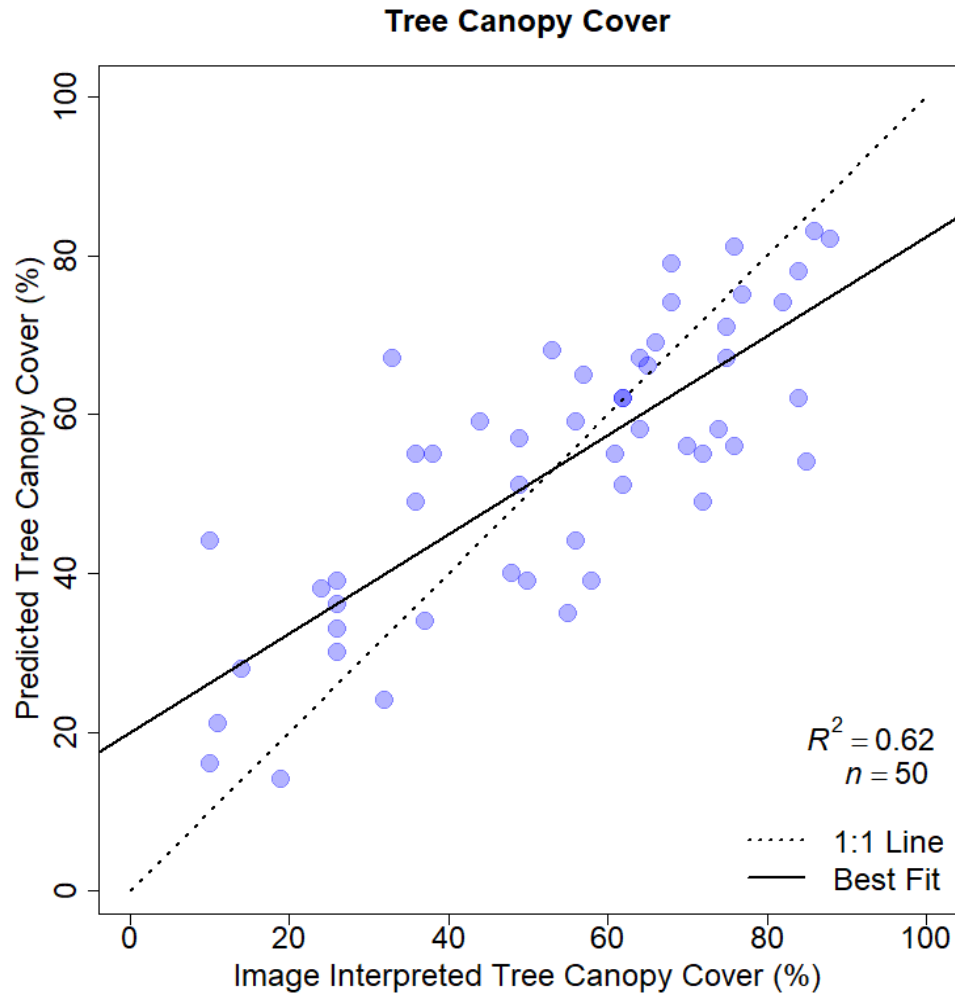
Tall Shrub Canopy Cover Classes	Acres	Percent Area
Sparse (9-24%)	2,628	0.79%
Open (25-59%)	111,312	33.56%
Closed (60-100%)	217,737	65.65%
Total	331,677	100%



Vegetation Type Accuracy Assessment

Primary Call Accuracy Assessment		Reference Data																				User's Accuracy	Commission Error	
		SS	H	H-SS	DMH	FP	BC	SS-BC	A	A-W	SG	EDS	SP	AHB	WHB	MHB	DHB	SV	BR	WA	S/I			DEV
Map Data	SS	18	1	7	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58%	42%
	H	1	21	6	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	68%	32%
	H-SS	0	3	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90%	10%
	DMH	2	4	1	20	2	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	65%	35%
	FP	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100%	0%
	BC	0	0	0	0	0	28	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	90%	10%
	SS-BC	1	0	0	0	0	6	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77%	23%
	A	0	1	0	4	0	0	0	44	5	0	1	0	0	0	2	0	1	0	0	0	0	76%	24%
	A-W	0	0	0	0	0	0	1	16	12	0	1	0	0	0	0	0	0	0	1	0	0	39%	61%
	SG	0	0	0	0	4	0	0	0	1	17	0	5	0	1	0	0	0	0	0	0	0	61%	39%
	EDS	0	0	0	1	0	0	0	1	0	0	24	0	0	0	2	0	1	0	0	1	0	80%	20%
	SP	0	0	0	0	9	0	0	0	0	1	0	20	0	0	0	0	0	0	0	0	0	67%	33%
	AHB	1	0	0	0	0	0	0	0	1	0	0	0	15	2	1	0	0	0	1	0	0	71%	29%
	WHB	1	0	0	0	0	0	0	2	1	0	0	0	1	16	0	1	6	1	0	0	0	55%	45%
	MHB	0	0	0	2	0	0	0	2	0	0	14	1	0	0	10	0	2	0	0	0	0	32%	68%
	DHB	1	0	0	0	0	0	0	4	6	0	0	0	0	0	2	14	1	0	0	0	0	50%	50%
	SV	0	0	0	0	0	0	0	1	0	0	7	0	0	0	1	0	14	5	1	4	0	42%	58%
	BR	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	27	0	3	0	82%	18%
WA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	33	0	0	97%	3%	
S/I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	100%	0%	
DEV	1	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	25	83%	17%	
Producer's Accuracy		67%	70%	63%	71%	65%	82%	85%	56%	44%	94%	49%	77%	94%	80%	56%	93%	56%	79%	92%	79%	100%	Kappa	0.69
Omission Error		33%	30%	37%	29%	35%	18%	15%	44%	56%	6%	51%	23%	6%	20%	44%	7%	44%	21%	8%	21%	0%	Overall Accuracy	71%
																						Area-Weighted Accuracy	83%	

Tree Canopy Cover Validation

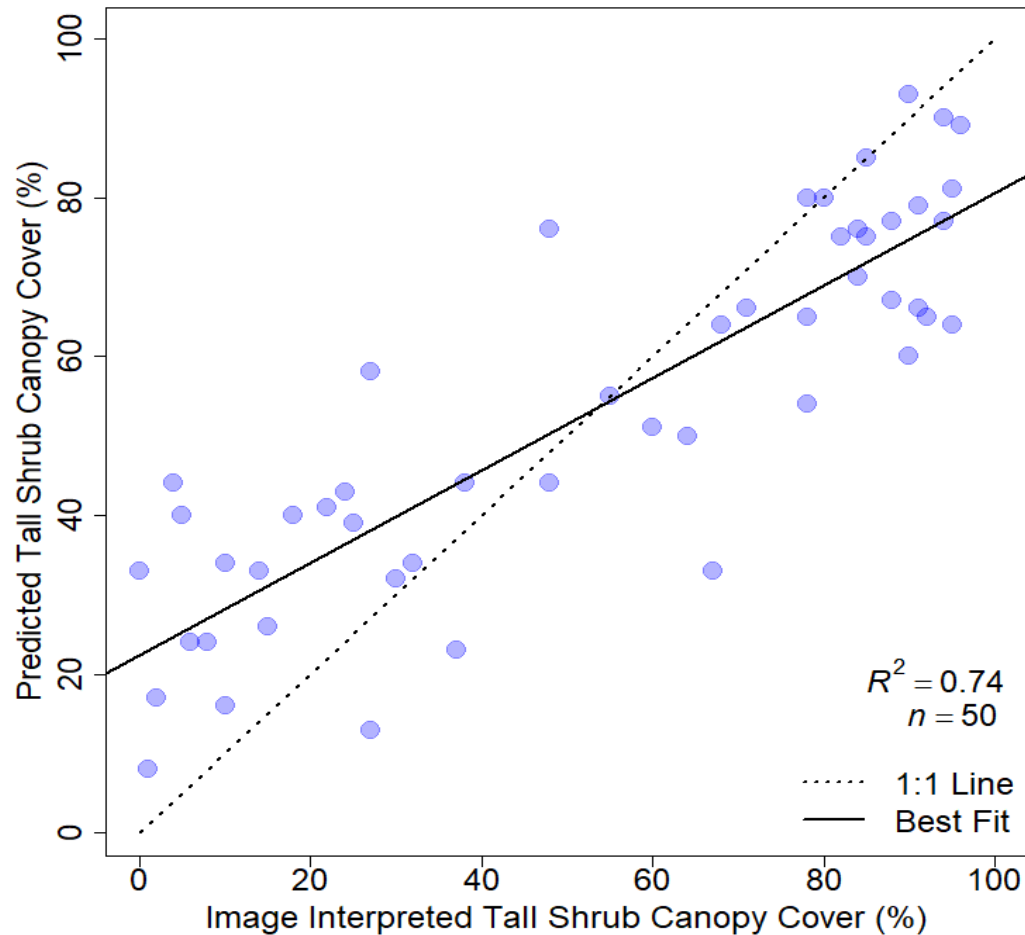


Tree Size Accuracy Assessment

Tree Size Class		Reference Data				User's Accuracy	Commission Error
		TS1 (0-4.9" dbh)	TS2 (5-8.9" dbh)	TS3 (9-20.9" dbh)	TS4 (>21" dbh)		
Map Data	TS1 (0-4.9" dbh)	9	1	0	0	90%	10%
	TS2 (5-8.9" dbh)	0	7	0	0	100%	0%
	TS3 (9-20.9" dbh)	1	2	10	5	56%	44%
	TS4 (>21" dbh)	0	0	0	5	100%	0%
Producer's Accuracy		90%	70%	100%	50%	Kappa	0.7
Omission Error		10%	30%	0%	50%	Overall Accuracy	78%
						Area-Weighted Accuracy	71%

Tall Shrub Canopy Cover Validation

Tall Shrub Canopy Cover





Cordova Ranger District Vegetation Map

Chugach National Forest

United States Department of Agriculture - Forest Service

November 8, 2022

Story Map



[What was mapped?](#)

[Background & Partnership](#)

[Methods & Planning](#)

[Geospatial Data](#)

[Modeling Units](#)

[Reference Data](#)



<https://storymaps.arcgis.com/stories/c573e89f9bef425eae6ced845dbc389a>

[Vegetation Modeling](#)

[Final Data and Report](#)

[Data Viewer](#)

[Credits](#)

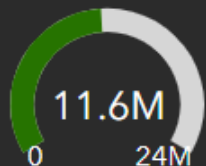
Region 10 Imagery Refresh Status: Target Product: 30cm, 4-band, Stereo and Ortho Imagery

Status and Target Year Based on Anticipated Funding

USFS Regional Imagery Refresh – Status
Partnership support from NRCS & USGS
100% funded in 2022, 11.6M acres collected
4-band, 30cm, Ortho and Stereo Pairs

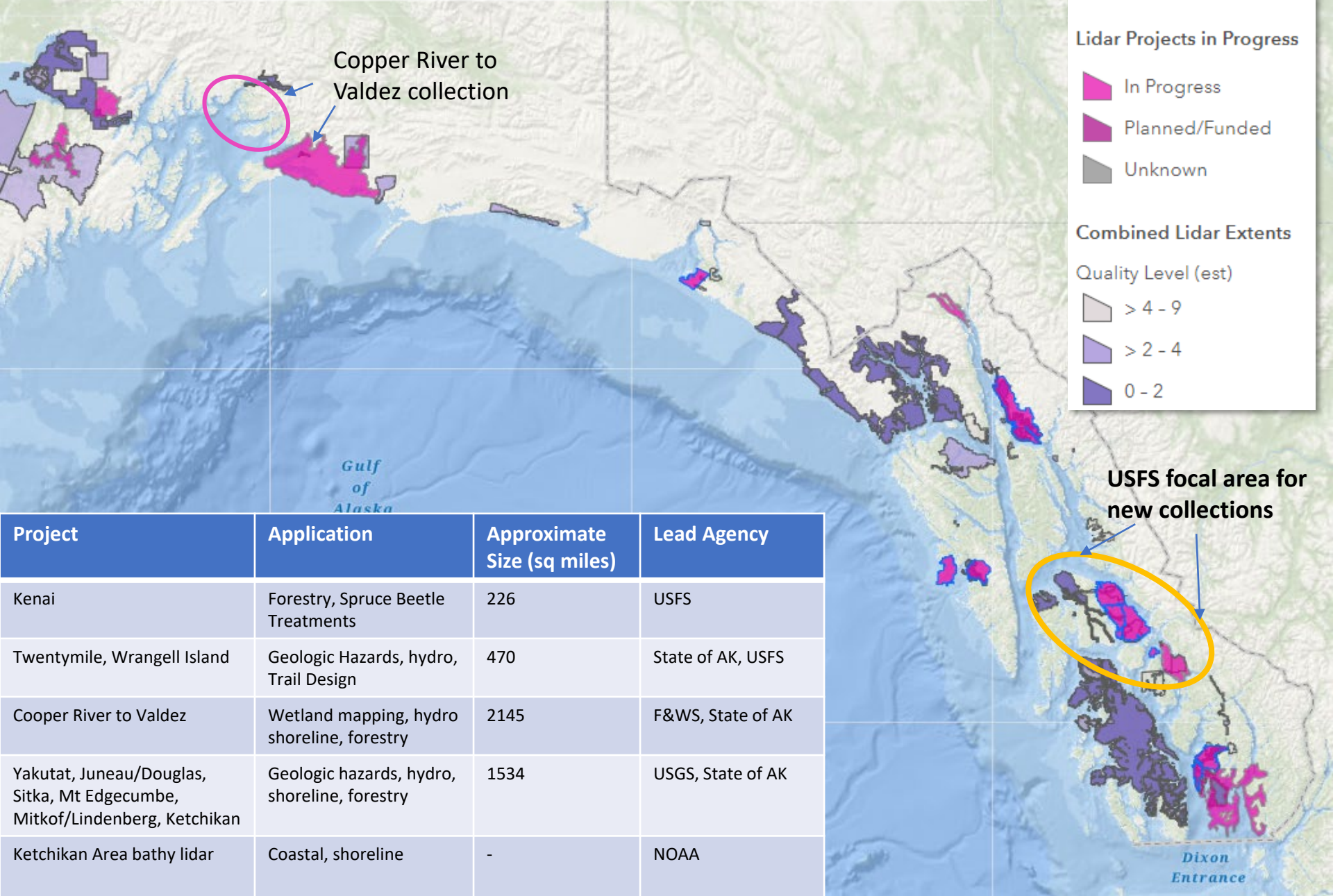


Acres Acquired & Delivered



FS image services
State of AK Imagery Portal: soon

Lidar status and activity in Southeast AK



Project	Application	Approximate Size (sq miles)	Lead Agency
Kenai	Forestry, Spruce Beetle Treatments	226	USFS
Twentymile, Wrangell Island	Geologic Hazards, hydro, Trail Design	470	State of AK, USFS
Cooper River to Valdez	Wetland mapping, hydro shoreline, forestry	2145	F&WS, State of AK
Yakutat, Juneau/Douglas, Sitka, Mt Edgecumbe, Mitkof/Lindenberg, Ketchikan	Geologic hazards, hydro, shoreline, forestry	1534	USGS, State of AK
Ketchikan Area bathy lidar	Coastal, shoreline	-	NOAA

Questions?

