
Lassen Volcanic National Park Comparative Mapping Project

Methodology and Initial Results -Preliminary-

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Lassen Volcanic National Park





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07/05/2008 20:27



Develop and Evaluate Two Map Data Sets

- **Project was initiated in 2006 under the management of USGS Fort Collins Science Center and funded by DOI National Vegetation Inventory Program.**
- **Two RS teams developed two map data sets**
 - Photo Interpretation (PI) Map
 - Image Classification (IC) Map
- **Determine the accuracy of each data set**
- **Evaluate and compare the data sets**



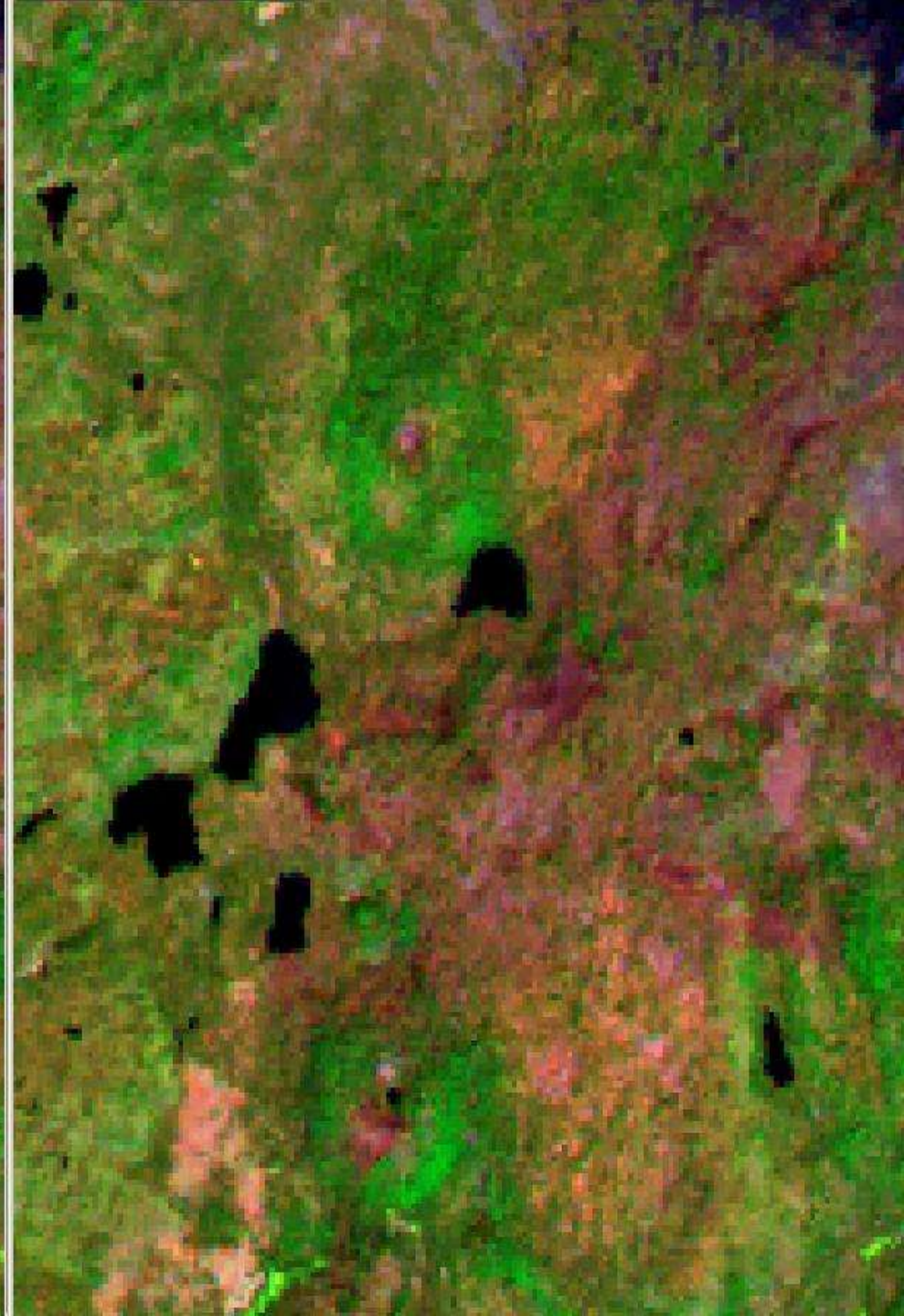
Project Guidelines

- **DOI National Vegetation Inventory Program – NPS Guidelines**
 - Map National Vegetation Classification System (NVCS) Associations (types) developed by a new Vegetation Classification
 - Same Minimum Mapping Unit (MMU) for both maps
 - 0.5 hectares
 - Could be less for ‘park special’ features



Project Methodology

- **Prepare Landsat 5 ETM imagery**
 - Illumination correction
 - Stratification for use in field data collection efforts



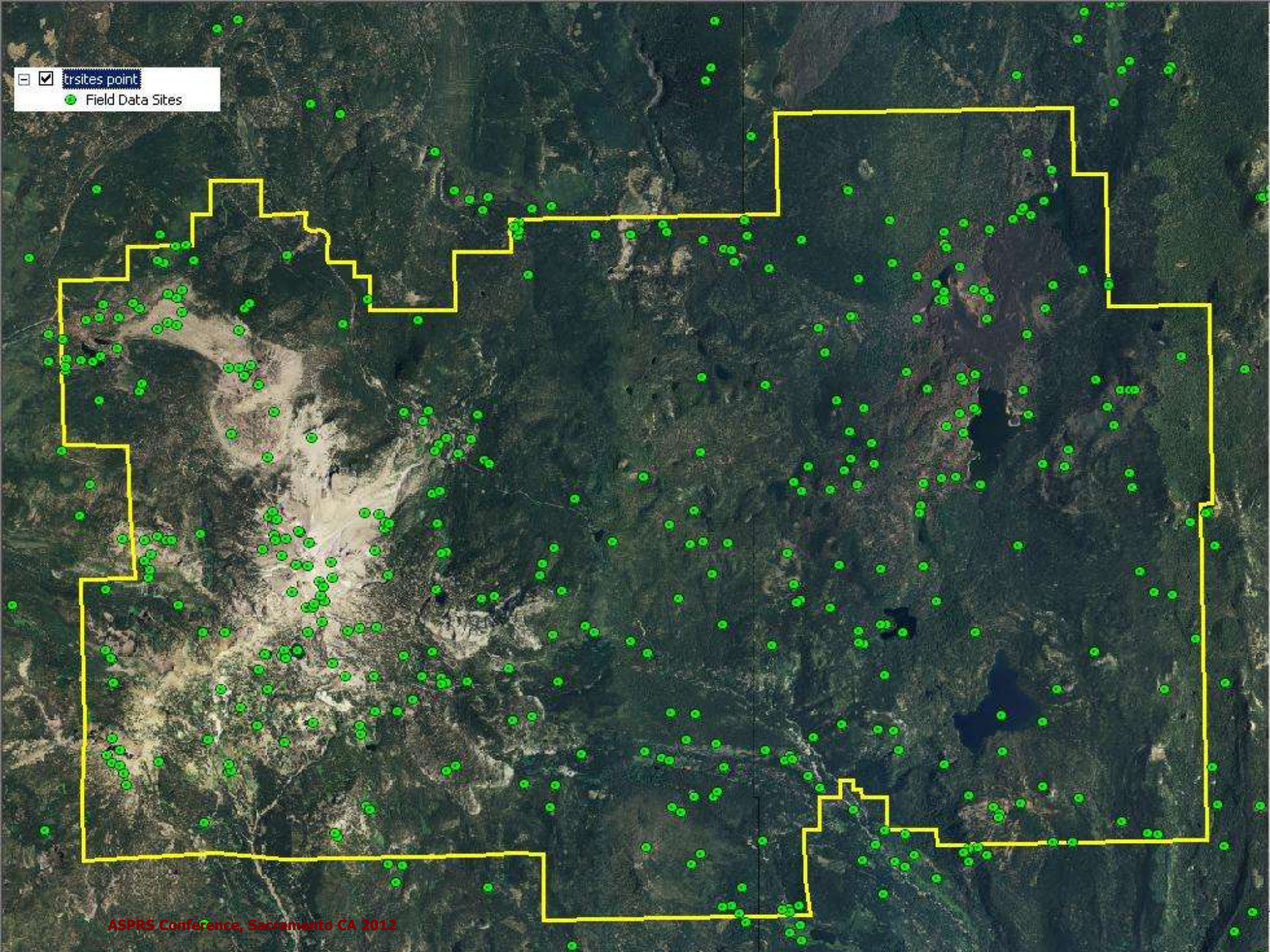


Project Methodology

- **Prepare Landsat 5 ETM imagery**
- **Field cover (training) data set development**
 - Identify candidate field sites for cover data estimation
 - Estimate vegetation/landscape feature cover values at the selected sites



trsites point
 Field Data Sites



Training Field Data Collection

- **Extensive Field Data Collection efforts**
 - Vegetation/Image classification field sampling efforts
 - 444 field sites
 - *394 line-point transects*
 - *50 ocular samples*
 - Photo-interpreter field reconnaissance efforts
 - 10 days of additional field work
 - *All ocular cover estimates*



Bird's-eye Cover Estimates By Species

Percent Cover Summary for Bird's-eye Layer:

Site/Polygon Id: 83001

Dbh Size Class:	> 5.95"	>11.95"	>17.95"	>29.95"	Tree Cover	Non-Tree Cover	Total Cover
	<= 5.95"	<=11.95"	<=17.95"	<=29.95"			
Species							
West white pine	4.0	0.0	0.0	0.0	4.0		4.0
Red fir	4.0	8.0	16.0	22.0	50.0		50.0
Mtn hemlock	2.0	0.0	0.0	0.0	2.0		2.0
BarSoil						4.0	4.0
BarSGTA						9.0	9.0
FWD						6.0	6.0
Litter/Duff						25.0	25.0
Totals	10.0	8.0	16.0	22.0	56.0	44.0	100.0

Tree Cover Composition Summary for Bird's-eye Layer 56.0 Cover:

Dbh Size Class:	> 5.95"	>11.95"	>17.95"	>29.95"	All Sizes
	<= 5.95"	<=11.95"	<=17.95"	<=29.95"	
Species					
West white pine	7.1	0.0	0.0	0.0	7.1
Red fir	7.1	14.3	28.6	39.3	89.3
Mtn hemlock	3.6	0.0	0.0	0.0	3.6
Totals	17.9	14.3	28.6	39.3	100.0

Percent conifer composition= 100.0

Percent hardwood composition= 0.0

Most common specie is Red fir with 89.3 percent cover composition



Bird's-eye QMD and TPA By Species

Quadratic Mean DBH and TPA Summary for Bird's-eye Layer:
Weighted by Cover

Dbh Size Class:	> 5.95"	>11.95"	>17.95"	>29.95"	All
	<= 5.95"	<=11.95"	<=17.95"	<=29.95"	Sizes
Species					
West white pine	3.0"	0.0"	0.0"	0.0"	3.0"
cov_wt	4.0	0.0	0.0	0.0	4.0
tpa	299.9	0.0	0.0	0.0	299.9
Red fir	1.5"	8.3"	14.0"	22.5"	17.2"
cov_wt	4.0	8.0	16.0	22.0	50.0
tpa	246.5	90.6	129.2	37.3	503.6
Mtn hemlock	0.0"	0.0"	0.0"	0.0"	0.0"
cov_wt	2.0	0.0	0.0	0.0	2.0
tpa	123.2	0.0	0.0	0.0	123.2
-----	-----	-----	-----	-----	-----
Conifer	2.1"	8.3"	14.0"	22.5"	16.3"
cov_wt	10.0	8.0	16.0	22.0	56.0
tpa	669.6	90.6	129.2	37.3	926.7
-----	-----	-----	-----	-----	-----
All Species	2.1"	8.3"	14.0"	22.5"	16.3"
cov_wt	10.0	8.0	16.0	22.0	56.0
tpa	669.6	90.6	129.2	37.3	926.7



Total Cover Estimates By Species

Percent Cover Summary for All Layers:

Site/Polygon Id: 83001

Dbh Size Class:	> 5.95"	>11.95"	>17.95"	>29.95"	Tree Cover	Non-Tree Cover	Total Cover
	<= 5.95"	<=11.95"	<=17.95"	<=29.95"			
Species							
West white pine	4.0	0.0	0.0	0.0	4.0		4.0
Red fir	8.0	14.0	18.0	22.0	62.0		62.0
Mtn hemlock	4.0	2.0	2.0	0.0	8.0		8.0
BarSoil						4.0	4.0
BarSGTA						9.0	9.0
FWD						20.0	20.0
Litter/Duff						67.0	67.0

Traces:

CARMUA, CALUMB, CHIMEN, Penstemon sp

Totals	16.0	16.0	20.0	22.0	0.0	74.0	100.0	174.0
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Tree Cover Composition Summary for All Layers 74.0 Cover:

Dbh Size Class:	> 5.95"	>11.95"	>17.95"	>29.95"	All Sizes
	<= 5.95"	<=11.95"	<=17.95"	<=29.95"	
Species					
West white pine	5.4	0.0	0.0	0.0	5.4
Red fir	10.8	18.9	24.3	29.7	83.8
Mtn hemlock	5.4	2.7	2.7	0.0	10.8
Totals	21.6	21.6	27.0	29.7	100.0

Percent conifer composition= 100.0

Percent hardwood composition= 0.0

Most common specie is Red fir with 83.8 percent cover composition



Ground Surface Characteristics

Percent Cover Summary for Surface Condition Layer:

Site/Polygon Id: 83001

Number of Sites/Pixels: 1

Species	Dbh Size Class:				Tree Cover	Non-Tree Cover	Total Cover
	> 5.95" <= 5.95"	>11.95" <=11.95"	>17.95" <=17.95"	>29.95" <=29.95"			
BarSoil						4.0	4.0
BarSGTA						9.0	9.0
FWD						20.0	20.0
Litter/Duff						67.0	67.0
Totals	0.0	0.0	0.0	0.0	0.0	100.0	100.0

FireMon Sample Count Averages:

FWD 1 hour =	8.3	CWD DC1 =	0.00	Soil Profile Depth =	0.50"
FWD 10 hour =	6.7	CWD DC2 =	0.30	Percent Litter =	48.00
FWD 100 hour =	2.0	CWD DC3 =	0.70		
		CWD DC4 =	0.30		
		CWD DC5 =	0.00		

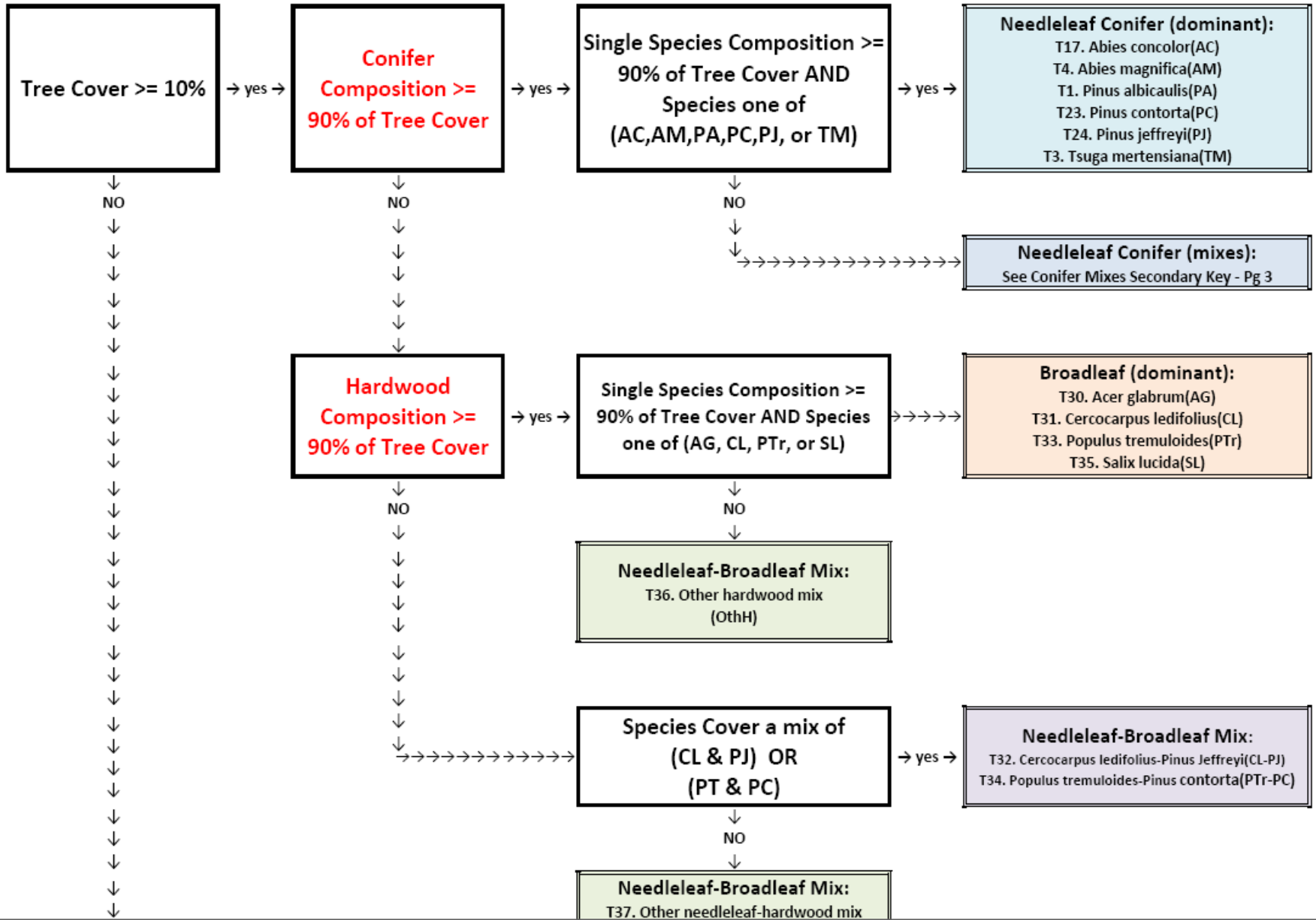


Project Methodology

- Prepare Landsat 5 ETM imagery
- Field cover data set development
- Perform Vegetation Classification
 - Ordination and twin-span analysis
 - Develop Key and associated rules



LAVO Land Cover Alliance/Assoc. - Primary Key



The following table shows all species and associated features in this association and gives percent frequency, average percent cover, and range (minimum and maximum) in cover for the plots in which they occur.

Detailed Alliance	Bird's-Eye Frequency	Bird's-Eye Average Cover	Bird's-Eye Minimum Cover	Bird's-Eye Maximum Cover	Total Frequency (%)	Total Average Cover	Total Minimum Cover	Total Maximum Cover
Species	(%)							
Tsuga mertensiana	100	12.8	8	16	100	14.1	8	22
Pinus albicaulis	100	9.3	2	15	100	9.8	2	15
Total tree		22.1				23.9		
Total shrub		0				0		
Lupinus obtusilobus	87.5	25	10	43	87.5	25.3	10	43
Polygonum davisiae	87.5	6.4	1	10	87.5	6.4	1	10
Carex species	25	1.5	2	10.2	25	1.5	2	10.2
Other Graminoids	37.5	0.8	1	3.1	37.5	0.8	1	3.1
Eriogonum marifolium	25	0.6	2	3.1	37.5	0.6	2	3.1
Calyptridium umbellatum	12.5	0.5	4	4	12.5	0.5	4	4
Carex leptalea	12.5	0.5	4.1	4.1	12.5	0.8	6.1	6.1
Carex stramineiformis	12.5	0.3	2	2	12.5	0.3	2	2
Arabis species	12.5	0.1	1	1	12.5	0.1	1	1
Aster integrifolius	12.5	0.1	1	1	12.5	0.1	1	1
Castilleja species	P	T	T	T	12.5	T	T	T
Elymus Elymoides	P	T	T	T	12.5	T	T	T
Monardella odoratissima	P	T	T	T	12.5	T	T	T
Penstemon species	P	T	T	T	12.5	T	T	T
Polygonum shastense	P	T	T	T	12.5	T	T	T
Viola species	P	T	T	T	12.5	T	T	T
Total herbaceous		35.8				36.4		
Lichen	12.5	0.3	2	2	12.5	0.3	2	2
Total nonvascular		0.3				0.3		
Fine Gravelly Soil	87.5	12.3	9	20.4	87.5	18.3	9	58
Bare Rock	100	25.1	6	50	100	28.6	8	50
Bare Soil	25	1.8	2	12	25	3	4.1	20
Gravel	12.5	0.3	2	2	12.5	0.8	6.1	6.1
Fine Woody Debris	25	0.5	2	2	25	0.6	2	3.1
Litter	87.5	2	1	6	87.5	10.9	1	34
Total other		42				62.2		
Totals		100				146		

Image Processing - Discrete Classification

- Uses maximum-likelihood classifier
- Spectral data are developed for each individual field site
- Groups/clusters spectral training data based on J-M distances of individual sites
- Identifies good and “bad” confusion between sites
- Maintains our ability to access each training area as a class in the resulting classification map
- Resulting classification maps have hundred’s of classes



Bad Confusion:

Trsite_id:	90113	22016	PC:tree/AcEl:forb pd	16	28	100	0	0	24	48	0	104	6	6125	
Training Set	Confused trsite_id	J-M Dist	Iso Class	Calculated Class	Size	Tree Cover	Pct Conifer	Shr Cover	Dsh Cover	Forb Cover	Bar. Cover	Oth Cover	Aspect	Slope	Elev
4432Sup	91215	0.971	22007	AM-PM:tree/AN-CS:shrub pd	27	12	100	4	0	1	83	0	11	4	6827
44321Sup	82414	1.477	21009	PC:tree/AcEl:forb	18	66	100	0	0	12	22	0	90	1	6574
4432Sup	83117	1.491	22016	AM:tree/AN:shrub pd	17	16	100	6	0	0	78	0	315	6	6702

Good/Acceptable Confusion:

Trsite_id:	90514	0	TM:tree/LoAE:forb	26	42	100	0	0	24	34	0	131	14	8267	
Training Set	Confused trsite_id	J-M Dist	Iso Class	Calculated Class	Size	Tree Cover	Pct Conifer	Shr Cover	Dsh Cover	Forb Cover	Bar. Cover	Oth Cover	Aspect	Slope	Elev
4432sup	90612	1.339	0	TM:tree/LoPd:forb	37	48	100	0	0	18	34	0	106	18	8142
4432sup	102003	1.495	11036	TM:tree/AN:shrub	24	22	100	20	0	4	54	0	142	15	8005

Trsite_id:	91404	1027	AM-PM-PC:tree	17	60	100	0	0	0	40	0	0	2	7004	
Training Set	Confused trsite_id	J-M Dist	Iso Class	Calculated Class	Size	Tree Cover	Pct Conifer	Shr Cover	Dsh Cover	Forb Cover	Bar. Cover	Oth Cover	Aspect	Slope	Elev
4432Sup	101813	1.337	21001	AM-PM-PC:tree/AN:shrub	15	43	100	11	0	5	41	0	83	2	7178
4432Sup	83005	1.413	11027	AM-PM-PC:tree/AN:shrub	13	30	100	8	0	18	44	0	225	3	7165
4432Sup	101103	1.416	21009	AM-PM-PC:tree/AcEl:forb	16	60	100	0	0	12	28	0	270	2	7037

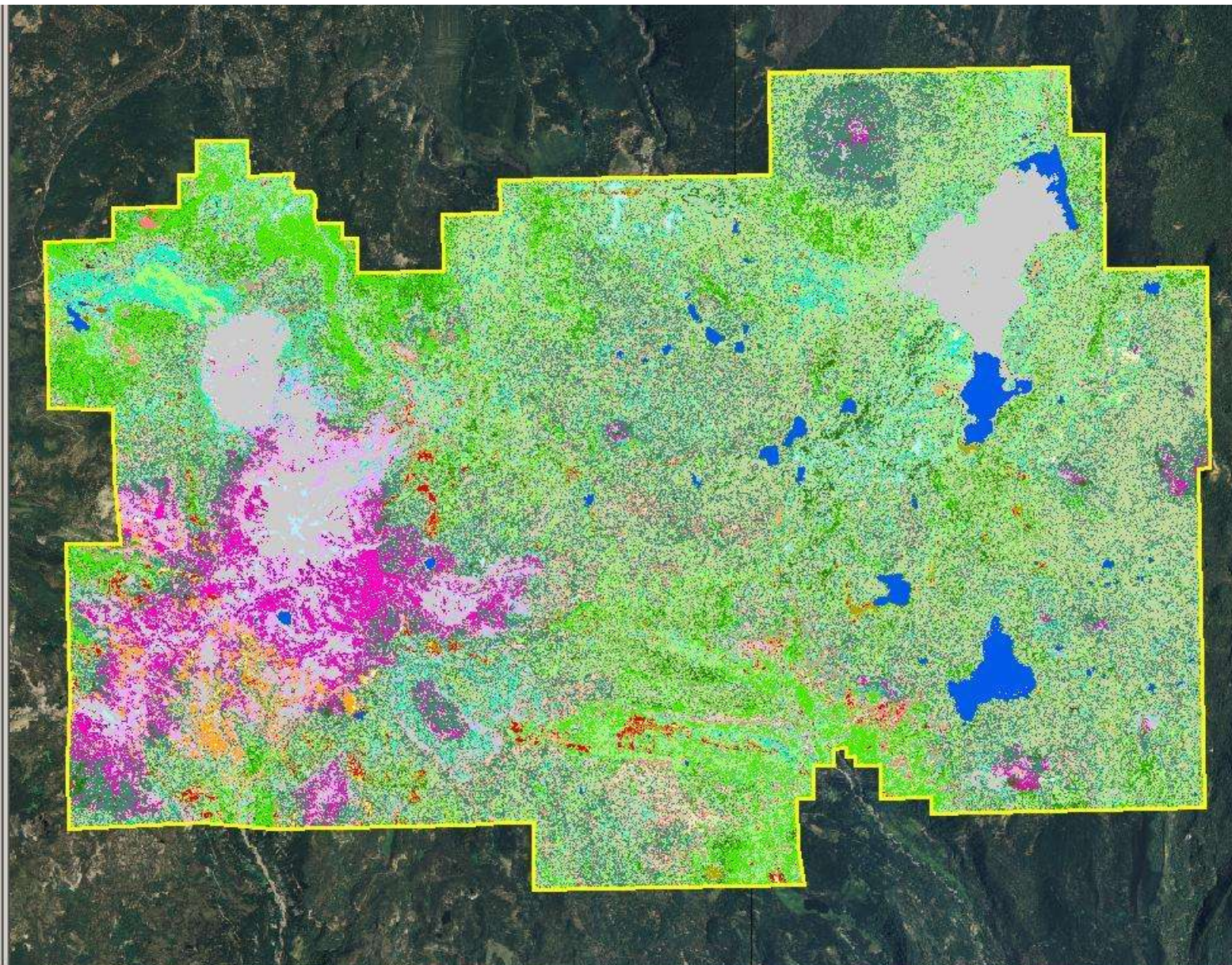
Trsite_id:	101116	2031	PC:tree/AcEl:forb pd	15	30	100	0	0	16	54	0	0	2	6358	
Training Set	Confused trsite_id	J-M Dist	Iso Class	Calculated Class	Size	Tree Cover	Pct Conifer	Shr Cover	Dsh Cover	Forb Cover	Bar. Cover	Oth Cover	Aspect	Slope	Elev
44321Sup	101115	0.808	21001	PC:tree pd	12	30	100	0	0	2	68	0	333	2	6335
44321Sup	82414	1.065	21009	PC:tree/AcEl:forb	18	66	100	0	0	12	22	0	90	1	6574
4432Sup	101115	1.126	21001	PC:tree pd	12	30	100	0	0	2	68	0	333	2	6335
44321Sup	101114	1.175	11032	PC:tree/AcEl:forb	12	64	100	2	0	8	26	0	16	3	6312

1st Mapping Product -Pixel Classification Map

lavoclassmap - Generalized Alliant

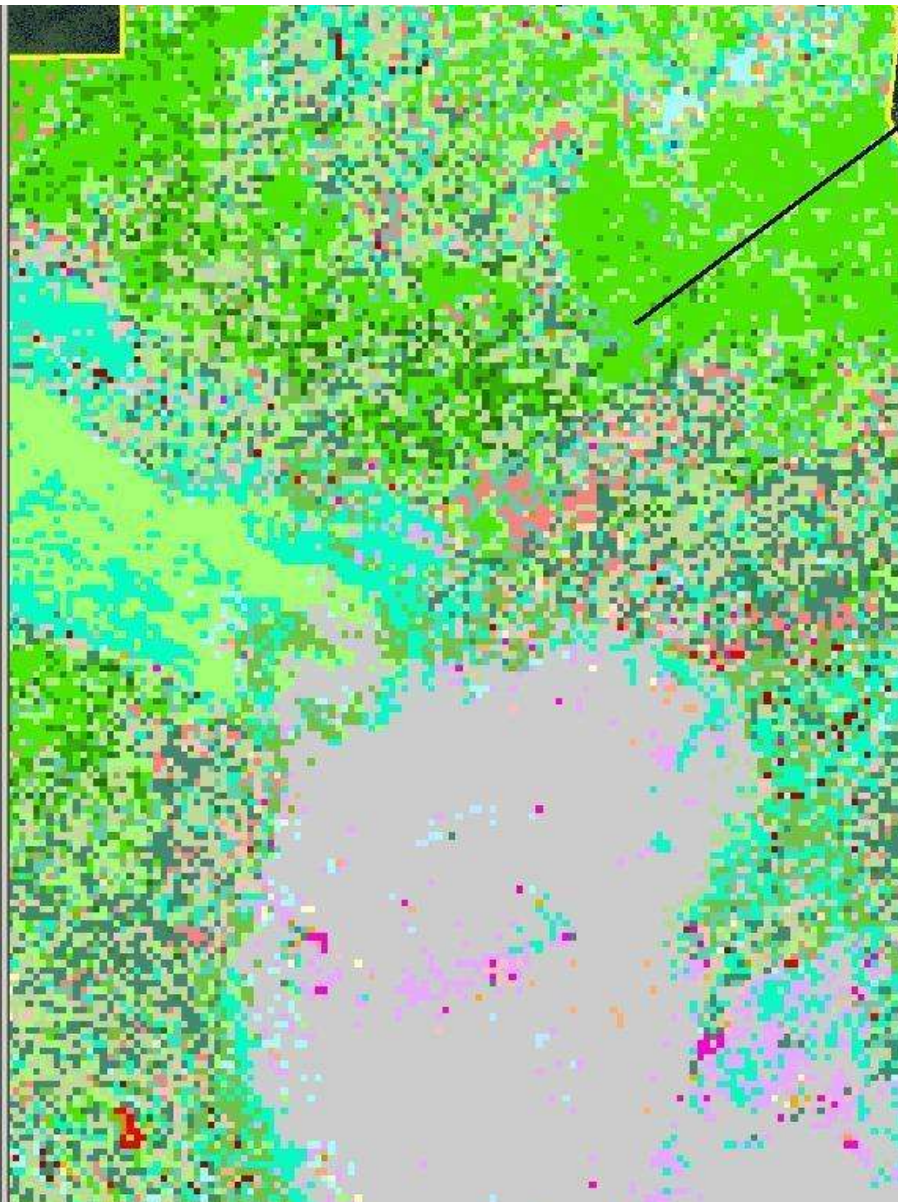
GENERALIZEDALLIA

- AC-(PJ)-(Mix):tree
- AC:tree
- AI-(Mix):shrub
- AM-Mix:tree
- AM-PC-Mix:tree
- AM:tree
- AN-(Mix):shrub
- AoEe:forb
- AP-(Mix):shrub
- Barren:other
- Dry:shrub
- EB-(Mix):shrub
- Herbaceous dry:forb
- Herbaceous mesic:forb
- Herbaceous other:forb
- Herbaceous wet:forb
- HF Other:tree
- LupObt:forb
- Mixed:shrub
- NHF Other:tree
- PA:tree
- PC:tree
- PJ-Mix:tree
- PJ:tree
- QV-(Mix):shrub
- Sal-(Mix):shrub
- Snow:other
- Subalpine Mix:tree
- Svg:other
- TM:tree
- True-Fir Mix:tree
- True-Fir-Lodgepole Pine Mix:t
- True-Fir-Longneedle Pine Mix:
- Water:other
- WmBs:forb



Pixel Classification Map and Attributes

- javoclassmap - Generalized Allianc
- GENERALIZEDALLIA
- AC-(PJ)-(Mix):tree
- AC:tree
- AI-(Mix):shrub
- AM-Mix:tree
- AM-PC-Mix:tree
- AM:tree
- AN-(Mix):shrub
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- Subalpine Mix:tree
- Svg:other
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- True-Fir Mix:tree
- True-Fir-Lodgepole Pine Mix:t
- True-Fir-Longneedle Pine Mix:
- Water:other
- WmBs:forb



VALUE	3027
COUNT	504
TRSITE_ID	101012
SOURCE	GR5
GENERALIZEDTYPE	10
GENERALIZEDCLASS	AC:tree
GENERALIZEDALLIA	AC:tree
GENERALIZEDASSOC	
DETAILEDTYPE	1700
DETAILEDCLASS	AC:tree
DETAILEDALLIANCE	AC:tree
DETAILEDASSOC	
ELEVATION_FT	7181
SLOPE_DEGREES	19
ASPECT	273
X_COORD	636224.17
Y_COORD	4494739.27
LATITUDE	
LONGITUDE	
PHOTO_DATE	
SCENE_IND	100000000
OTHER_ID	402
SPEC_CLASS	AC:tree
GRIDCLVAL	3
MAJOR_CLASS	Conifer
REGIME	MESIC
MODIFIER	BOREAL
LFORM	
REMAP_VAR	0
TYPE	1700
PR_COMP	White fir
CALC_CLASS	AC:tree
PR_COMP_COVER	76
COVER_CLASS	Closed
TREE_COVER	82
OTHER_VEG_COVER	0
CONF_COVER	82
HDWD_COVER	0
SHR_COVER	0
TSH_COVER	0
LSH_COVER	0
HRB_COVER	0
BAR_COVER	18
WAT_COVER	0
LUNDF_COVER	0
PCT_CONF	100
PCT_HDWD	0
FWD1	23.3
FWD10	6.8
FWD100	0.7
CWDDC1	0
CWDDC2	0.7
CWDDC3	1.2

Identified 1 feature

Pixel Aggregation - Stand Formation

- Raster data set is aggregated to polygons that all meet the Project MMU of 0.5 hectares
- Aggregation of sub-MMU areas is based upon same vegetation characteristics as the ordination used in the vegetation classification
 - Species presence
 - Relative species cover magnitude
- Sub-MMU areas with similar vegetation characteristics are merged first followed by aggregation of areas with different characteristics



Pixel Classification Map and Stand Boundaries

- lavoclassmap - Generalized Allian...
 GENERALIZEDALLIA
- AC-(PJ)-(Mix):tree
 - AC:tree
 - AI-(Mix):shrub
 - AM-Mix:tree
 - AM-PC-Mix:tree
 - AM:tree
 - AN-(Mix):shrub
 - AoEe:forb
 - AP-(Mix):shrub
 - Barren:other
 - Dry:shrub
 - EB-(Mix):shrub
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 - Water:other
 - WmBs:forb

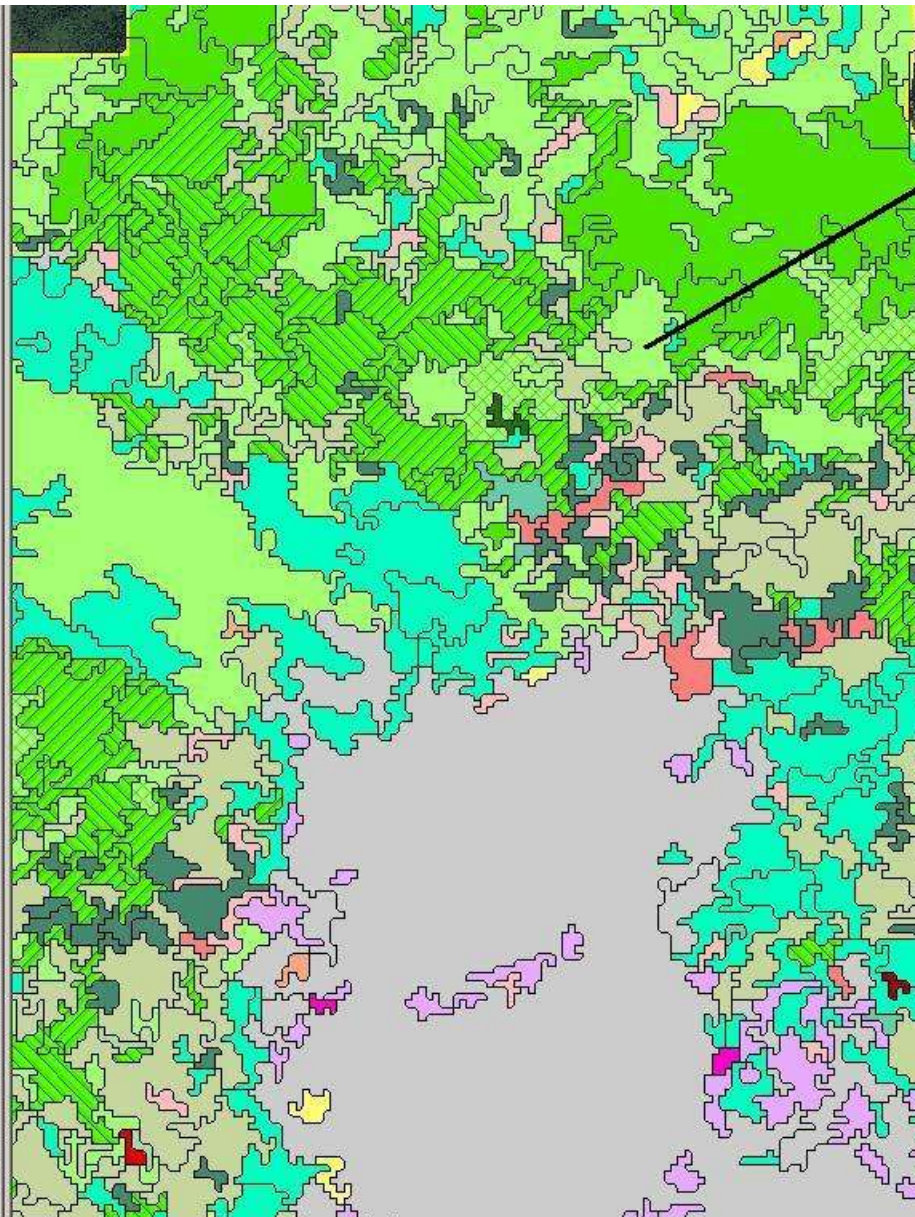


Shape	Polygon
AREA	100918.777499
PERIMETER	2391.769897
LAVOCLASSMAP#	1575
CLASSMAP-ID	51809
TYPENUMBER	1900
STAND_ID	51809
PIXEL_COUNT	124
CALC_CLASS	AC-PJ:tree
ASSOC_DETAILED	AC-PJ:tree
ASSOC_GENERALIZE	AC-(PJ)-(Mix):tree
PR_COMP	White fir
PR_COMP_COV	67.199997
COVER_CLASS	3
TREE_COV	83.699997
OTH_VEG_COV	3.8
CONF_COV	100
HDWD_COV	0
SHR_COV	2.7
TSHR_COV	2.7
LSHR_COV	0
HRB_COV	1.1
AQU_COV	0
BAR_COV	12.4
WAT_COV	0
UNDF_COV	0
CV_ABICON	67.199997
CV_ABIMAG	0.8
CV_PINJEF	13.3
CV_PINCON	0
CV_TSUMER	0
CV_PINMON	0.1
CV_PINALB	0
CV_OTH_CONIFER	2.3
CV_ARCNEV	0
CV_ARCPAT	0.6
CV_QUEVAC	0
CV_ALNINC	0
CV_SALIX	0
CV_OTHERSHRUB	2.1
CV_FORB	0
CV_GRAMINOID	0
SIZE_CLASS	4
QMD	22.1
QMDC	22.1
QMDH	0
FWD1	16.61
FWD10	7.84
FWD100	2.36
CWD_DC1	0.06
CWD_DC2	0.4
CWD_DC3	0.59
CWD_DC4	0.17

Identified 1 Feature

2nd Map Product - Stand Map and Attributes

- lavoClassMap
 GENERALIZED ALLIANCE
- PA:tree
 - Subalpine Mix:tree
 - TM:tree
 - AM-Mix:tree
 - AM:tree
 - AM-PC-Mix:tree
 - PC:tree
 - True-Fir Mix:tree
 - True-Fir-Longneedle Pine Mix:
 - True-Fir-Lodgepole Pine Mix:t
 - AC:tree
 - AC-(PJ)-(Mix):tree
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 - PJ:tree
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 - AP-(Mix):shrub
 - QV-(Mix):shrub
 - AI-(Mix):shrub
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 - EB-(Mix):shrub
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 - AcEe:forb
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 - WmBs:forb
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 - Barren:other
 - Snow:other
 - Water:other

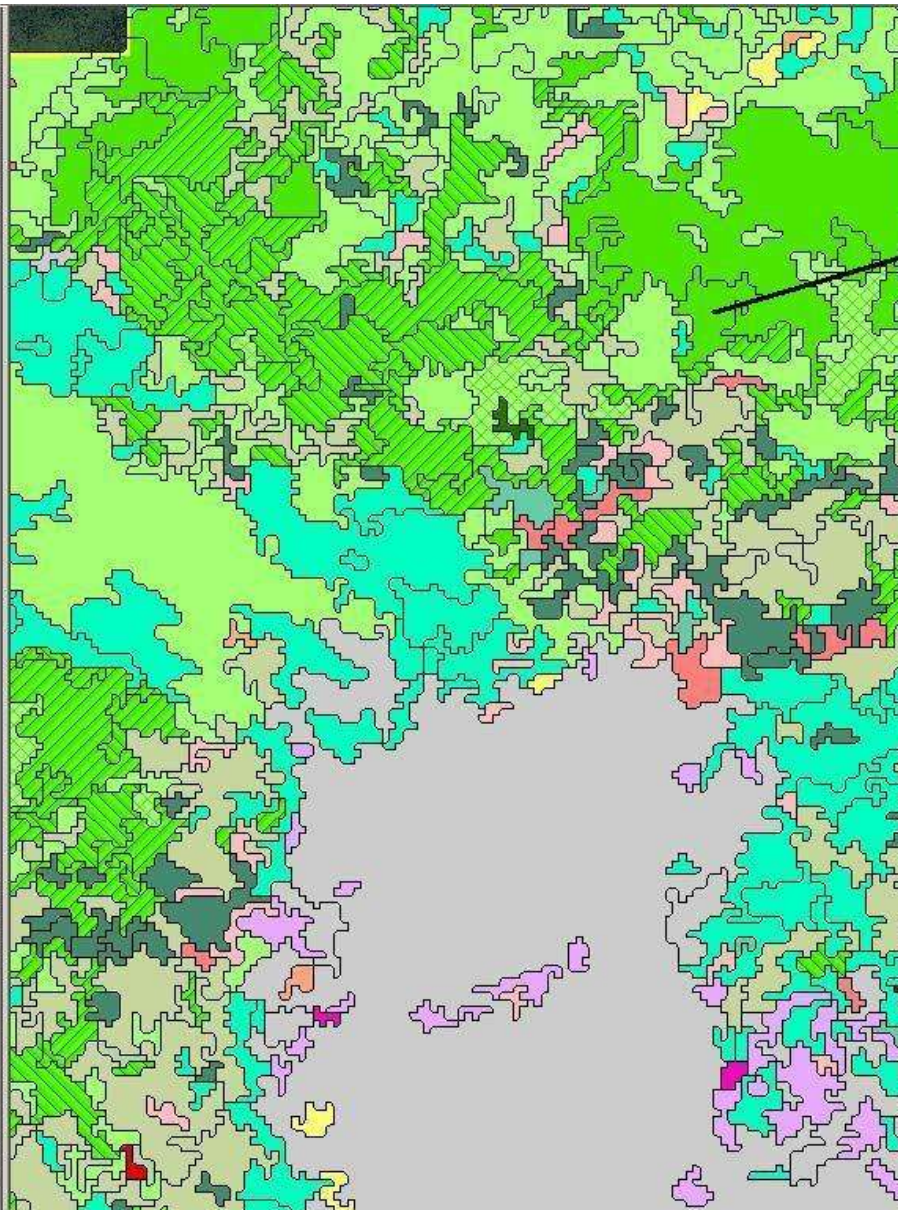


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PR_COMP_COV	67.199997
COVER_CLASS	3
TREE_COV	83.699997
OTH_VEG_COV	3.8
CONF_COV	100
HDWD_COV	0
SHR_COV	2.7
TSHR_COV	2.7
LSHR_COV	0
HRB_COV	1.1
AQU_COV	0
BAR_COV	12.4
WAT_COV	0
UNDF_COV	0
CV_ABICON	67.199997
CV_ABIMAG	0.8
CV_PINJEF	13.3
CV_PINCON	0
CV_TSUMER	0
CV_PINMON	0.1
CV_PINALB	0
CV_OTH_CONIFER	2.3
CV_ARCNEV	0
CV_ARCPAT	0.6
CV_QUEVAC	0
CV_ALNINC	0
CV_SALIX	0
CV_OTHERSHRUB	2.1
CV_FORB	0
CV_GRAMINOID	0
SIZE_CLASS	4
QMD	22.1
QMDC	22.1
QMDH	0
FWD1	16.61
FWD10	7.84
FWD100	2.36
CWD_DC1	0.06
CWD_DC2	0.4
CWD_DC3	0.59
CWD_DC4	0.17

Identified 1 feature

Stand Map and Attributes

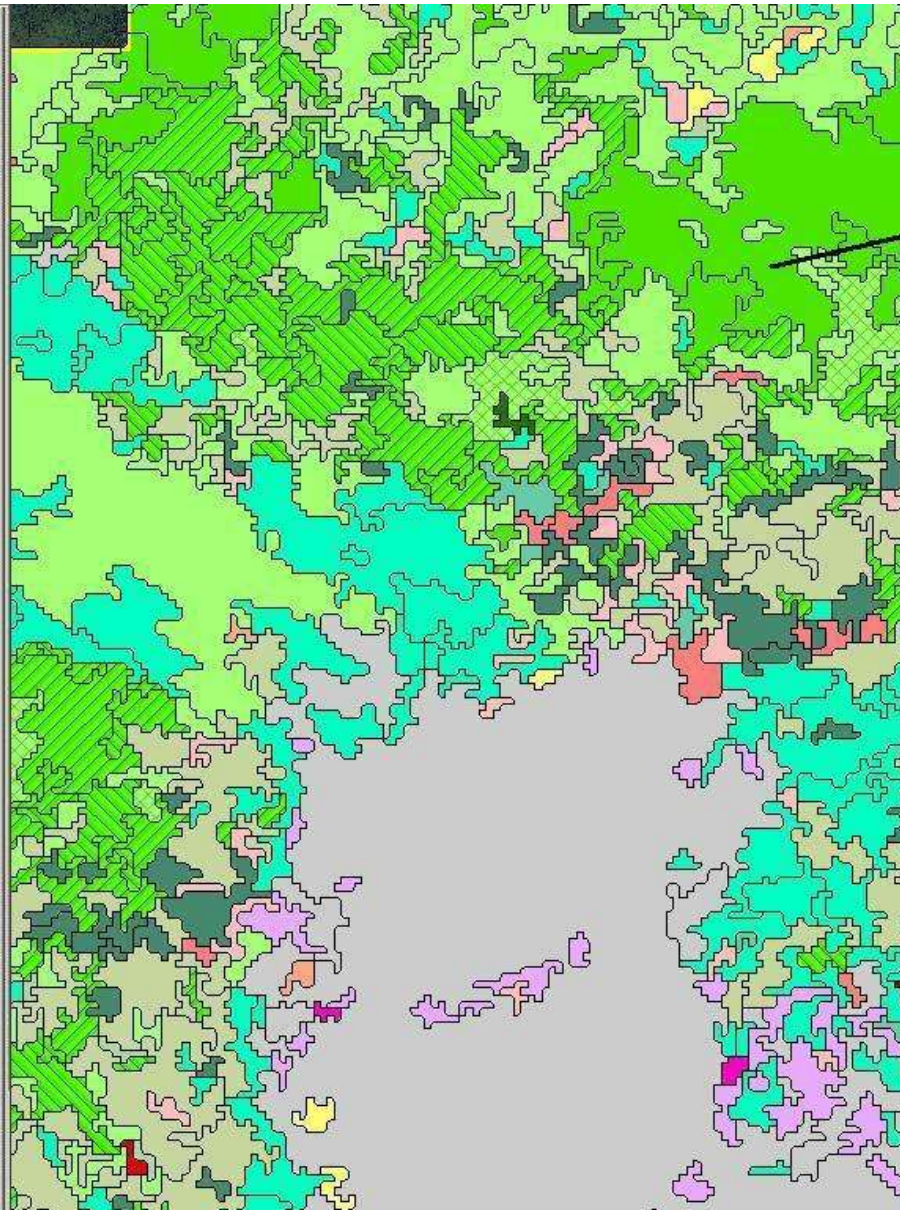
- lavoClassMap
- GENERALIZED ALLIANCE
- PA:tree
 - Subalpine Mix:tree
 - TM:tree
 - AM-Mix:tree
 - AM:tree
 - AM-PC-Mix:tree
 - PC:tree
 - True-Fir Mix:tree
 - True-Fir-Longneedle Pine Mix:
 - True-Fir-Lodgepole Pine Mix:t
 - AC:tree
 - AC-(PJ)-(Mix):tree
 - PJ-Mix:tree
 - PJ:tree
 - NF Other:tree
 - NHF Other:tree
 - HF Other:tree
 - AN-(Mix):shrub
 - AP-(Mix):shrub
 - QV-(Mix):shrub
 - AI-(Mix):shrub
 - Sal-(Mix):shrub
 - EB-(Mix):shrub
 - Dry:shrub
 - Mixed:shrub
 - Other:shrub
 - AoEe:forb
 - LupObt:forb
 - WmBs:forb
 - Herbaceous dry:forb
 - Herbaceous mesic:forb
 - Herbaceous wet:forb
 - Herbaceous other:forb
 - Svg:other
 - Barren:other
 - Snow:other
 - Water:other



FID	1558
Shape	Polygon
AREA	72692.89125
PERIMETER	2106.869822
LAVOCLASSMAP#	1558
CLASSMAP-ID	49948
TYPENUMBER	1700
STAND_ID	49948
PIXEL_COUNT	89
CALC_CLASS	AC:tree
ASSOC_DETAILED	AC:tree
ASSOC_GENERALIZE	AC:tree
PR_COMP	White fir
PR_COMP_COV	76.5
COVER_CLASS	0
TREE_COV	83.400002
OTH_VEG_COV	3.4
CONF_COV	99.900002
HDWD_COV	0.1
SHR_COV	3.3
TSHR_COV	3.3
LSHR_COV	0
HRB_COV	0
AQU_COV	0
BAR_COV	13.3
WAT_COV	0
UNDF_COV	0
CV_ABICON	76.5
CV_ABIMAG	5.3
CV_PINJEF	1.3
CV_PINCON	0
CV_TSUMER	0
CV_PINMON	0.1
CV_PINALB	0
CV_OTH_CONIFER	0
CV_ARCNEV	0.6
CV_ARCPAT	0.5
CV_QUEVAC	0
CV_ALNINC	0
CV_SALIX	0
CV_OTHERSHRUB	2.2
CV_FORB	0
CV_GRAMINOID	0
SIZE_CLASS	4
QMD	19.299999
QMDC	19.299999
QMDH	0
FWD1	19.74
FWD10	8.59
FWD100	3.07
CWD_DC1	0.09
CWD_DC2	0.66
CWD_DC3	1.33
CWD_DC4	0.32

Stand Map and Attributes

- lavoClassMap
- GENERALIZED ALLIANCE
- PA:tree
 - Subalpine Mix:tree
 - TM:tree
 - AM-Mix:tree
 - AM:tree
 - AM-PC-Mix:tree
 - PC:tree
 - True-Fir Mix:tree
 - True-Fir-Longneedle Pine Mix:
 - True-Fir-Lodgepole Pine Mix:t
 - AC:tree
 - AC-(PJ)-(Mix):tree
 - PJ-Mix:tree
 - PJ:tree
 - NF Other:tree
 - NHF Other:tree
 - HF Other:tree
 - AN-(Mix):shrub
 - AP-(Mix):shrub
 - QV-(Mix):shrub
 - AI-(Mix):shrub
 - Sal-(Mix):shrub
 - EB-(Mix):shrub
 - Dry:shrub
 - Mixed:shrub
 - Other:shrub
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 - LupObt:forb
 - WmBs:forb
 - Herbaceous dry:forb
 - Herbaceous mesic:forb
 - Herbaceous wet:forb
 - Herbaceous other:forb
 - Svg:other
 - Barren:other
 - Snow:other
 - Water:other



FID	1178
Shape	Polygon
AREA	936399.717501
PERIMETER	17113.79869
LAVOCLASSMAP#	1178
CLASSMAP-ID	46235
TYPENUMBER	1700
STAND_ID	46235
PIXEL_COUNT	1150
CALC_CLASS	AC:tree
ASSOC_DETAILED	AC:tree
ASSOC_GENERALIZE	AC:tree
PR_COMP	White fir
PR_COMP_COV	73.199997
COVER_CLASS	3
TREE_COV	79.300003
OTH_VEG_COV	3.5
CONF_COV	99.900002
HDWD_COV	0.1
SHR_COV	3.2
TSHR_COV	3.2
LSHR_COV	0
HRB_COV	0.3
AQU_COV	0
BAR_COV	17.200001
WAT_COV	0
UNDE_COV	0
CV_ABICON	73.199997
CV_ABIMAG	1.2
CV_PINJEF	3.2
CV_PINCON	0.6
CV_TSUMER	0
CV_PINMON	0.2
CV_PINALB	0
CV_OTH_CONIFER	0.9
CV_ARCNEV	0
CV_ARCPAT	0.6
CV_QUEVAC	0
CV_ALNINC	0
CV_SALIX	0
CV_OTHERSHRUB	2.6
CV_FORB	0
CV_GRAMINOID	0
SIZE_CLASS	4
QMD	18.5
QMDC	18.5
QMDH	0
FWD1	19.09
FWD10	7.55
FWD100	2.96
CWD_DC1	0.14
CWD_DC2	0.53
CWD_DC3	1.24
CWD_DC4	0.41

Discrete Classification Map

lavoClassMap

GENERALIZED ALLIANCE

- PA:tree
- Subalpine Mix:tree
- TM:tree
- AM-Mix:tree
- AM:tree
- AM-PC-Mix:tree
- PC:tree
- True-Fir Mix:tree
- True-Fir-Longneedle Pine Mix:
- True-Fir-Lodgepole Pine Mix:t
- AC:tree
- AC-(PJ)-(Mix):tree
- PJ-Mix:tree
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- Dry:shrub
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- AoEe:forb
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- Herbaceous dry:forb
- Herbaceous mesic:forb
- Herbaceous wet:forb
- Herbaceous other:forb
- Svg:other
- Barren:other
- Snow:other
- Water:other

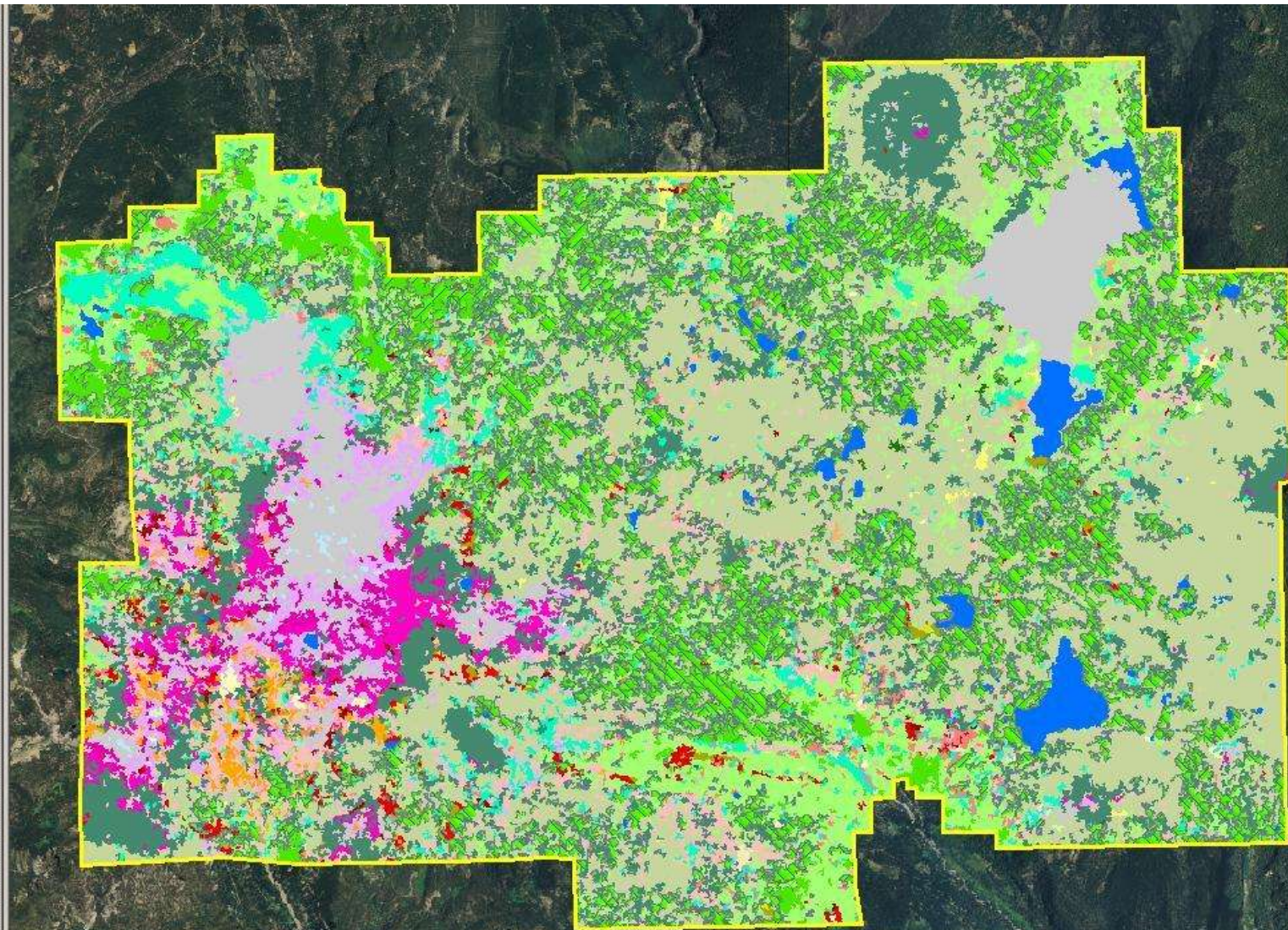


Photo Interpretation Map

lavoPhotoMap

GENERALALLIANCE

- PA:tree
- Subalpine Mix:tree
- TM:tree
- AM-Mix:tree
- AM:tree
- AM-PC-Mix:tree
- PC:tree
- True-Fir Mix:tree
- True-Fir-Longneedle Pine Mix:tree
- True-Fir-Lodgepole Pine Mix:tree
- AC:tree
- AC-(PJ)-(Mix):tree
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- QV-(Mix):shrub
- AI-(Mix):shrub
- Sal-(Mix):shrub
- EB-(Mix):shrub
- Dry:shrub
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- WmBs:forb
- Herbaceous dry:forb
- Herbaceous mesic:forb
- Herbaceous wet:forb
- Herbaceous other:forb
- Svg:other
- Barren:other
- Snow:other
- Water:other

lavoClassMap

Herbaceous Cover

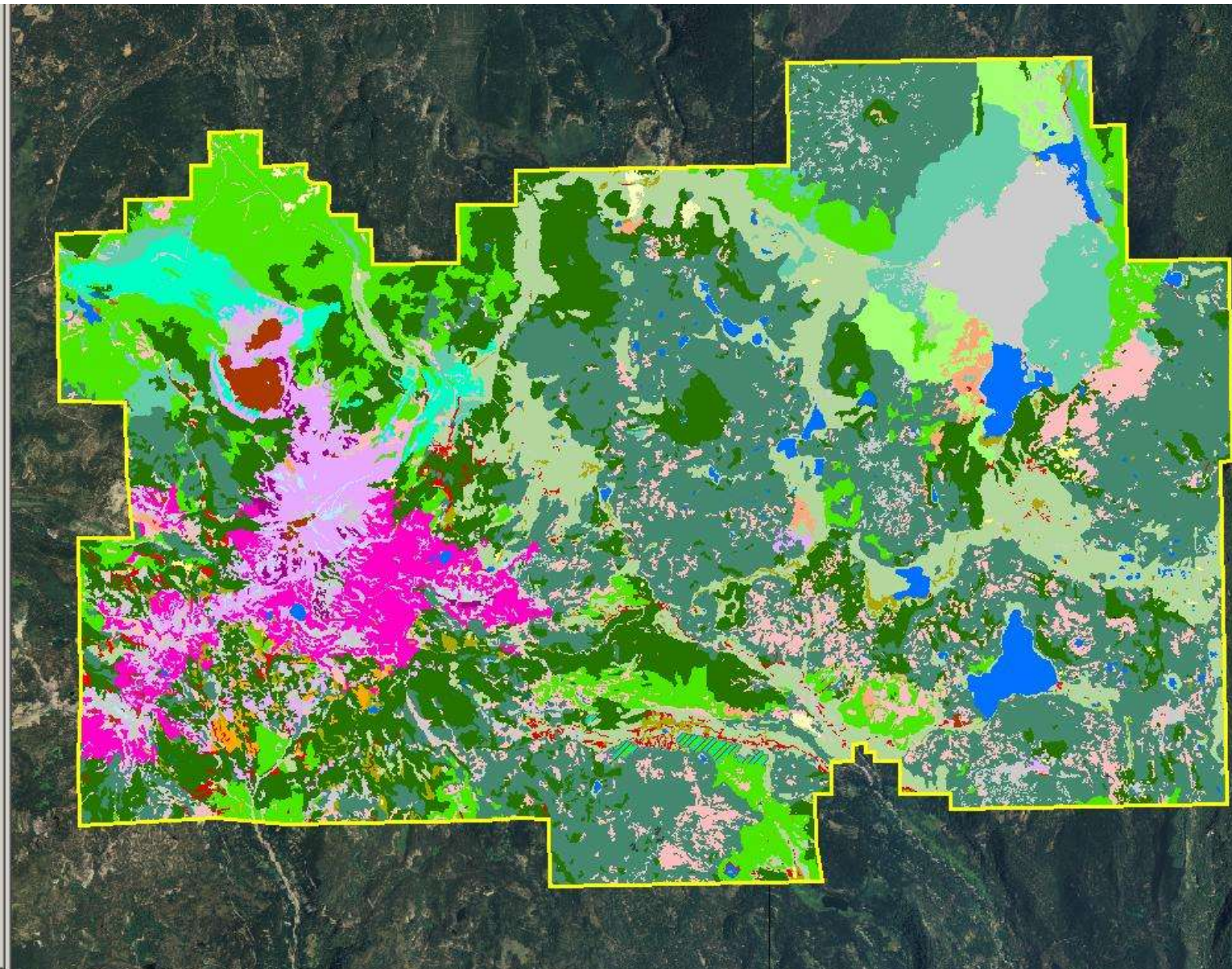
Shrub Cover

Lavophotomap shrub types

Shrub Type Cover

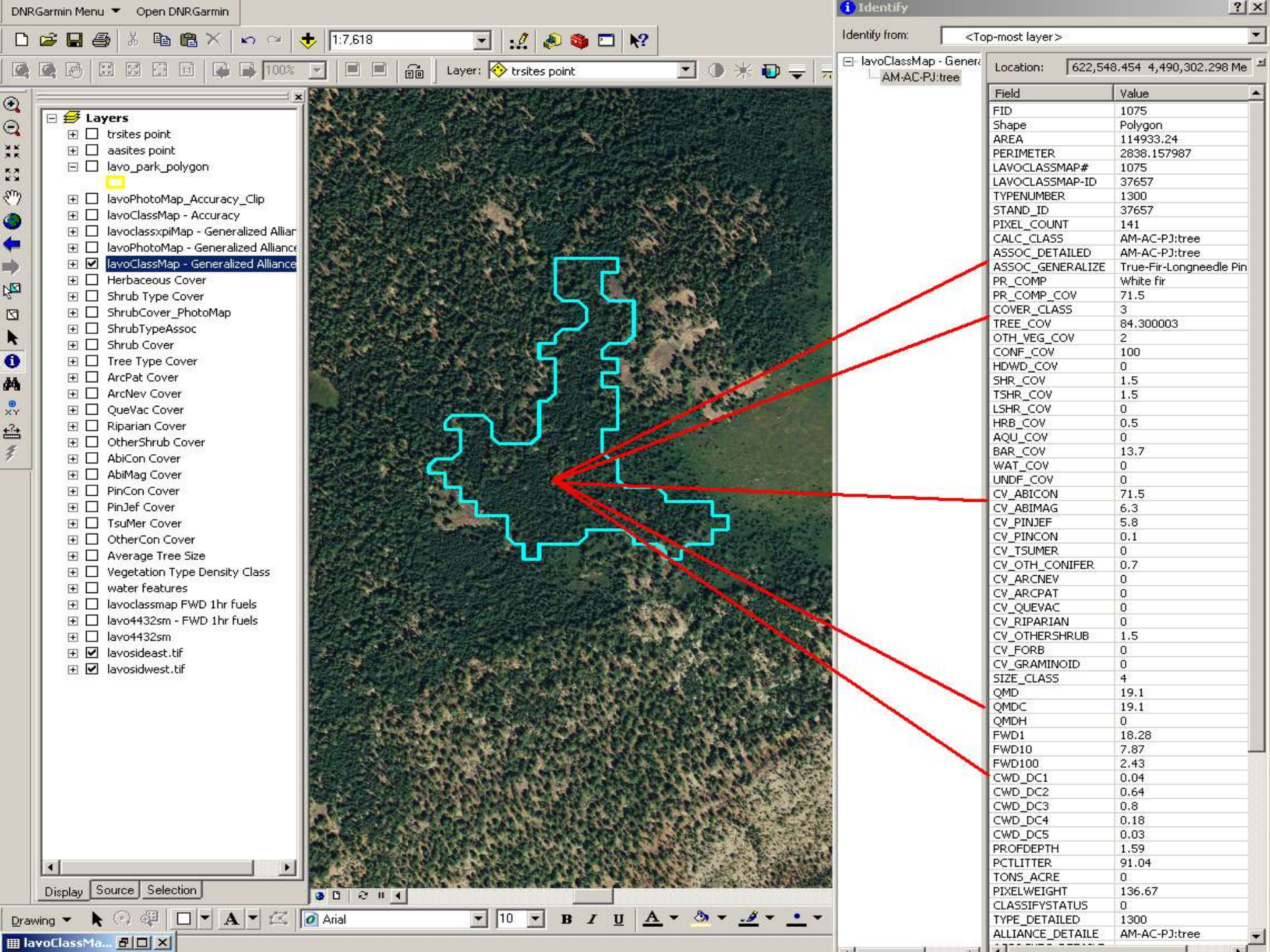
Tree Type Cover

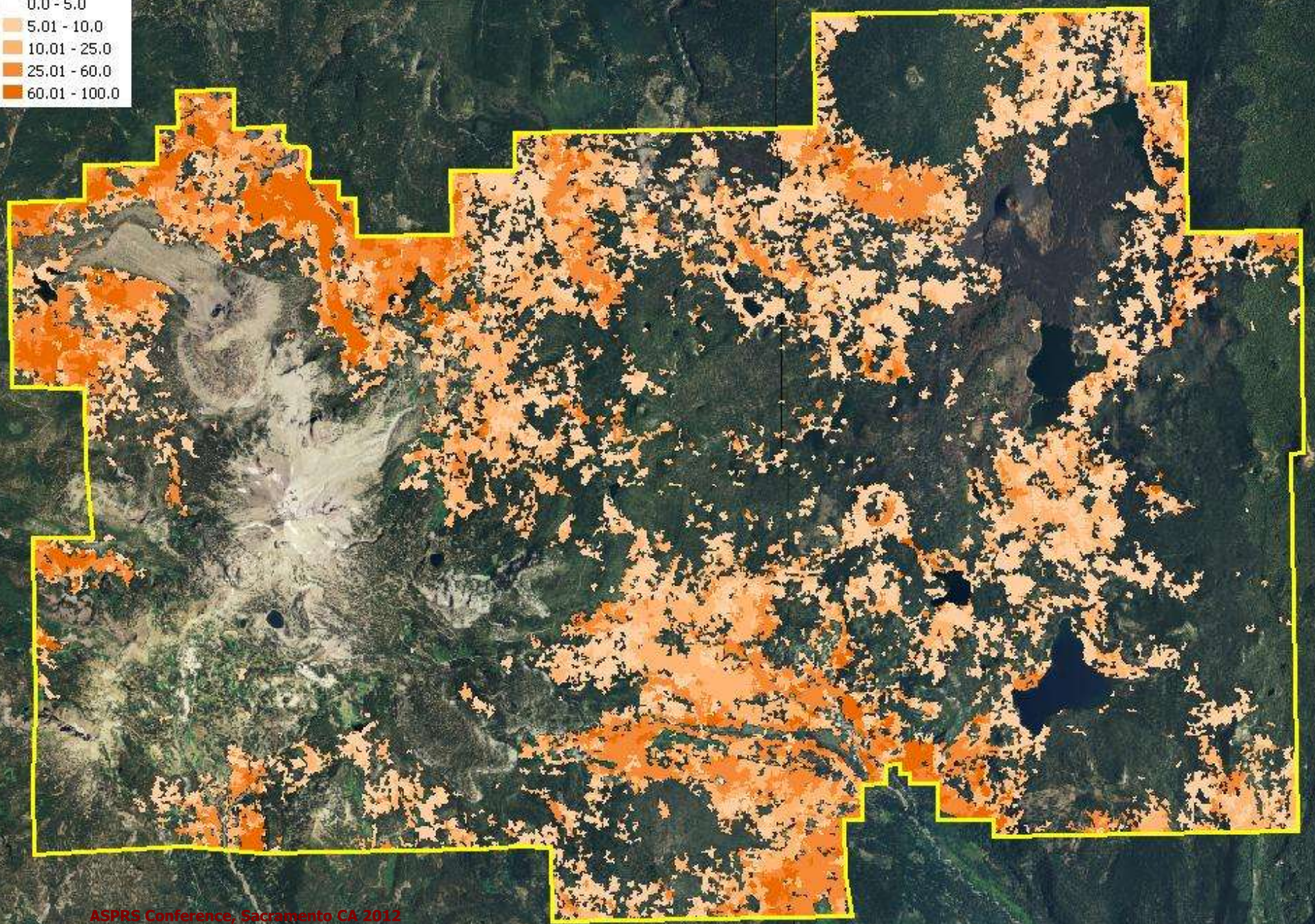
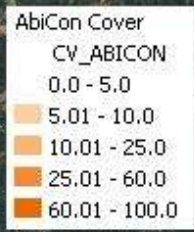
ArcPat Cover



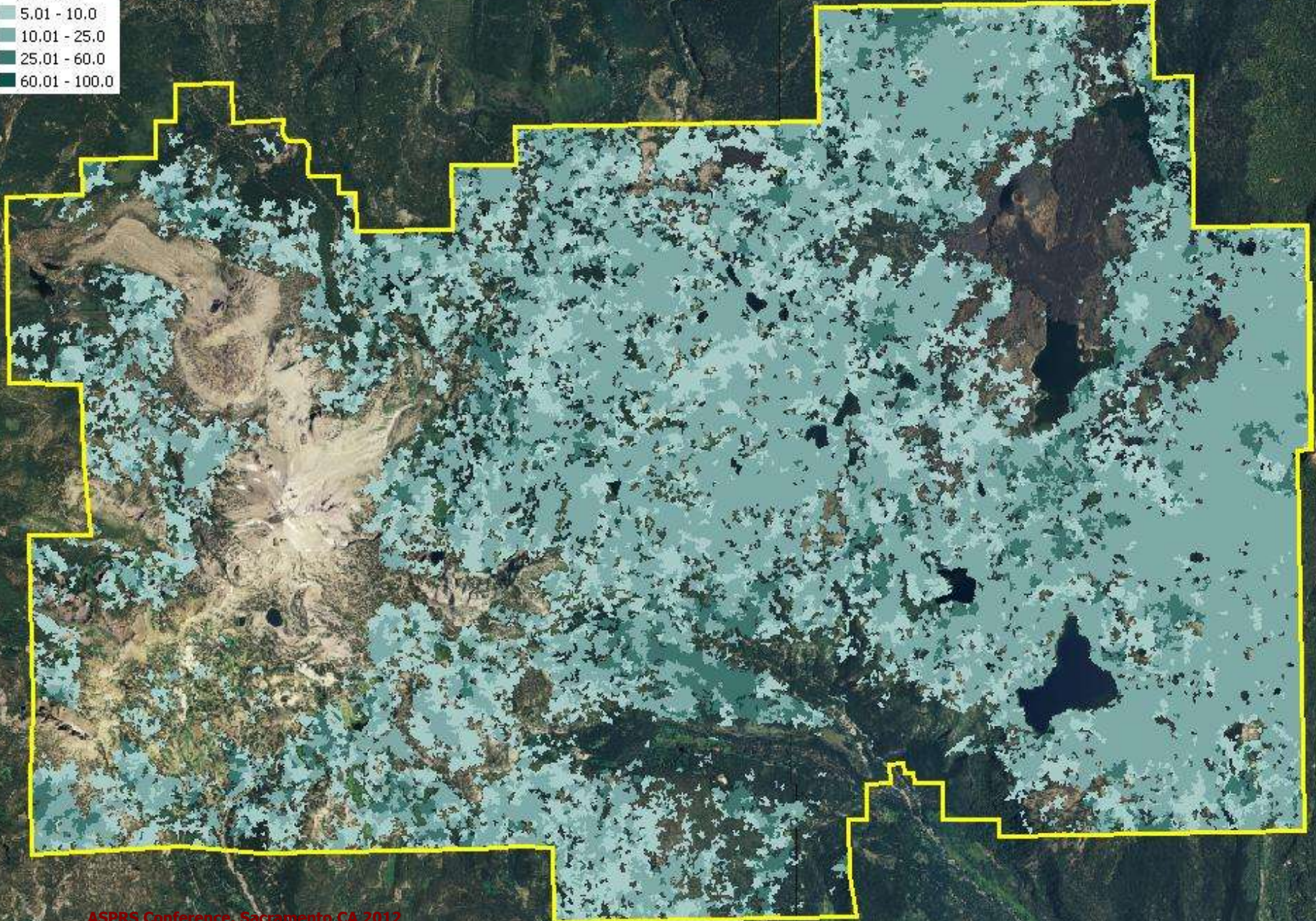
Number of Associations per Map

Map	Detailed Associations	Generalized Associations
PI	34	25
IC	94	29

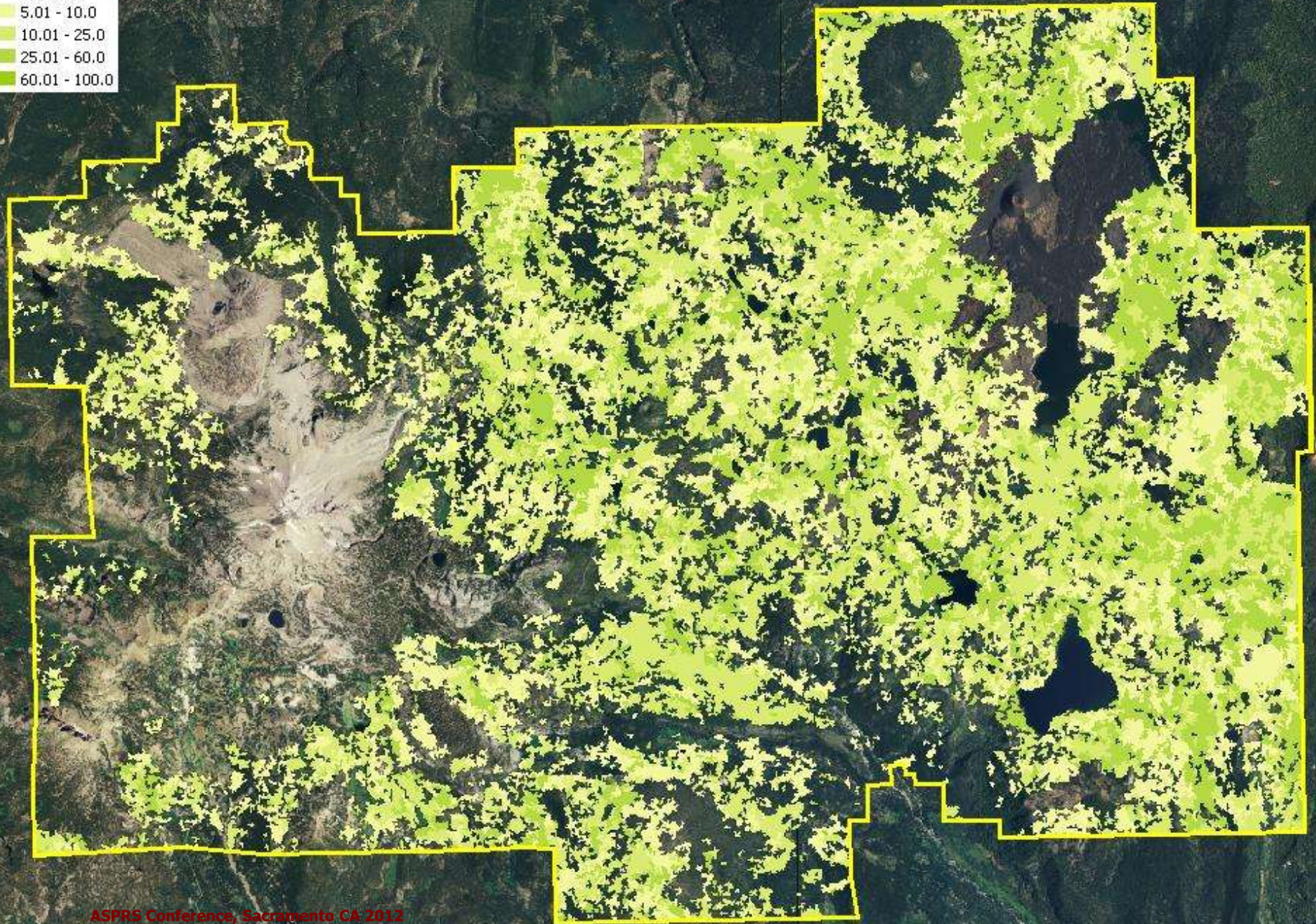




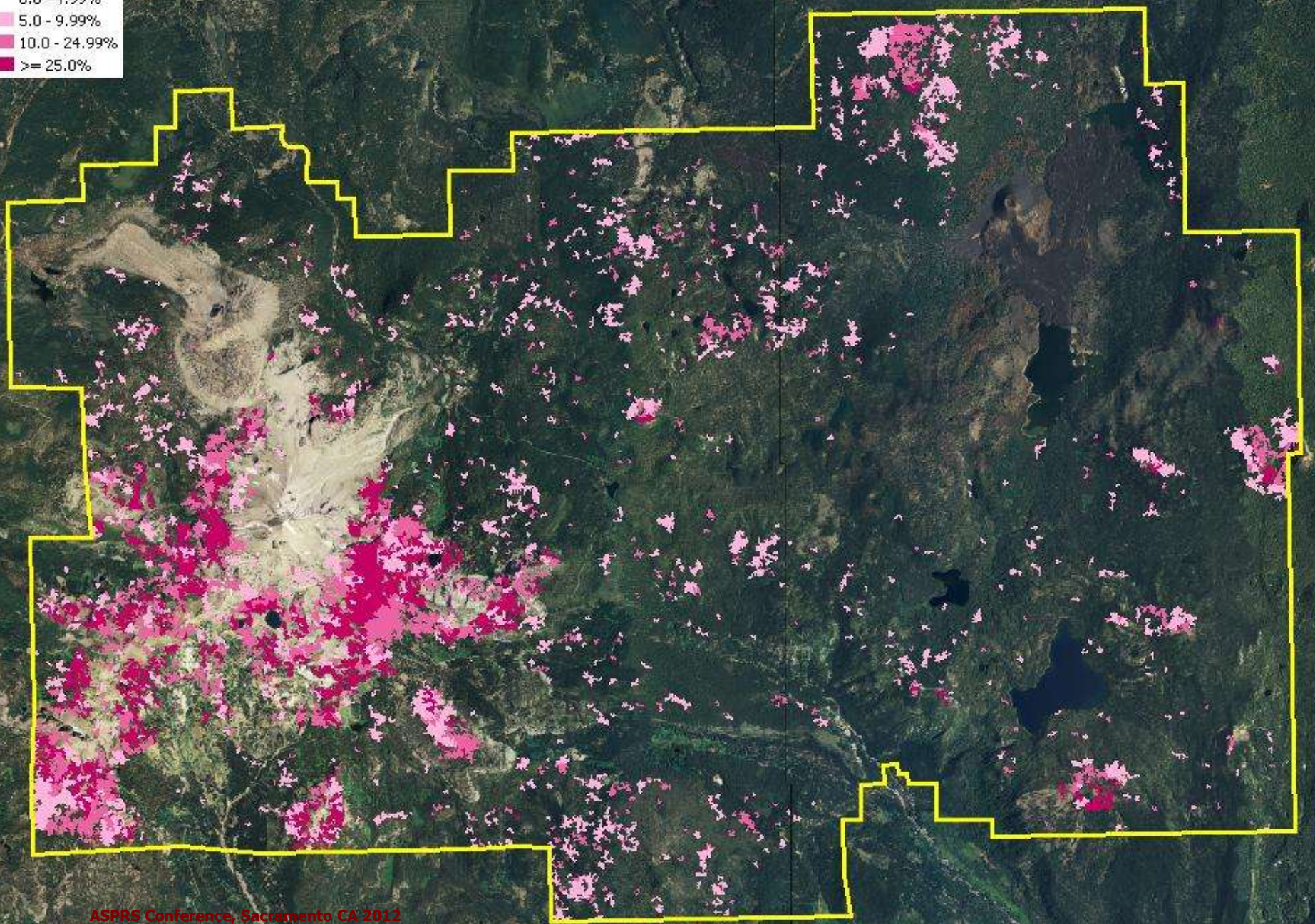
AbiMag Cover
CV_ABIMAG
0.0 - 5.0
5.01 - 10.0
10.01 - 25.0
25.01 - 60.0
60.01 - 100.0



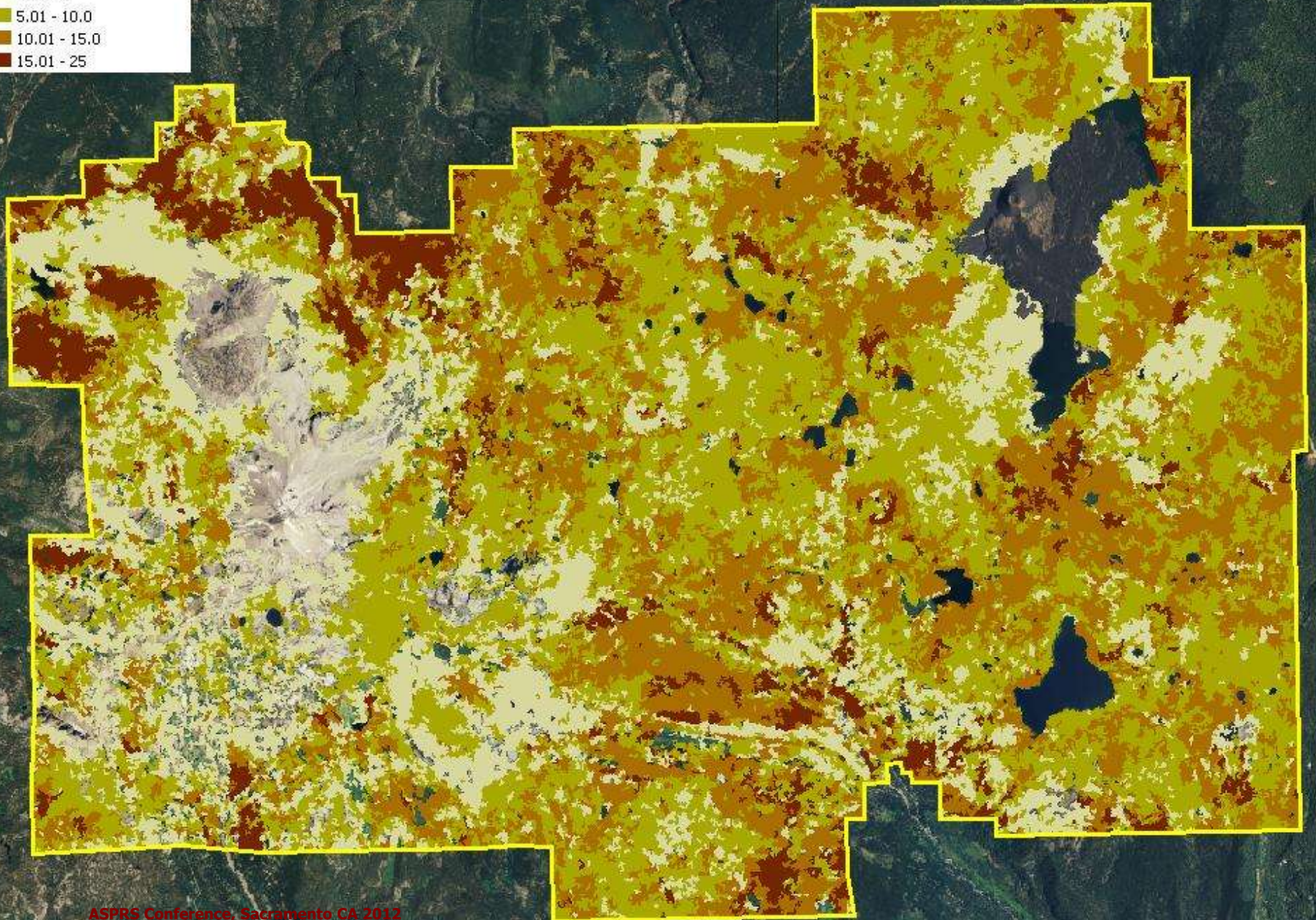
PinCon Cover
CV_PINCON
0.0 - 5.0
5.01 - 10.0
10.01 - 25.0
25.01 - 60.0
60.01 - 100.0



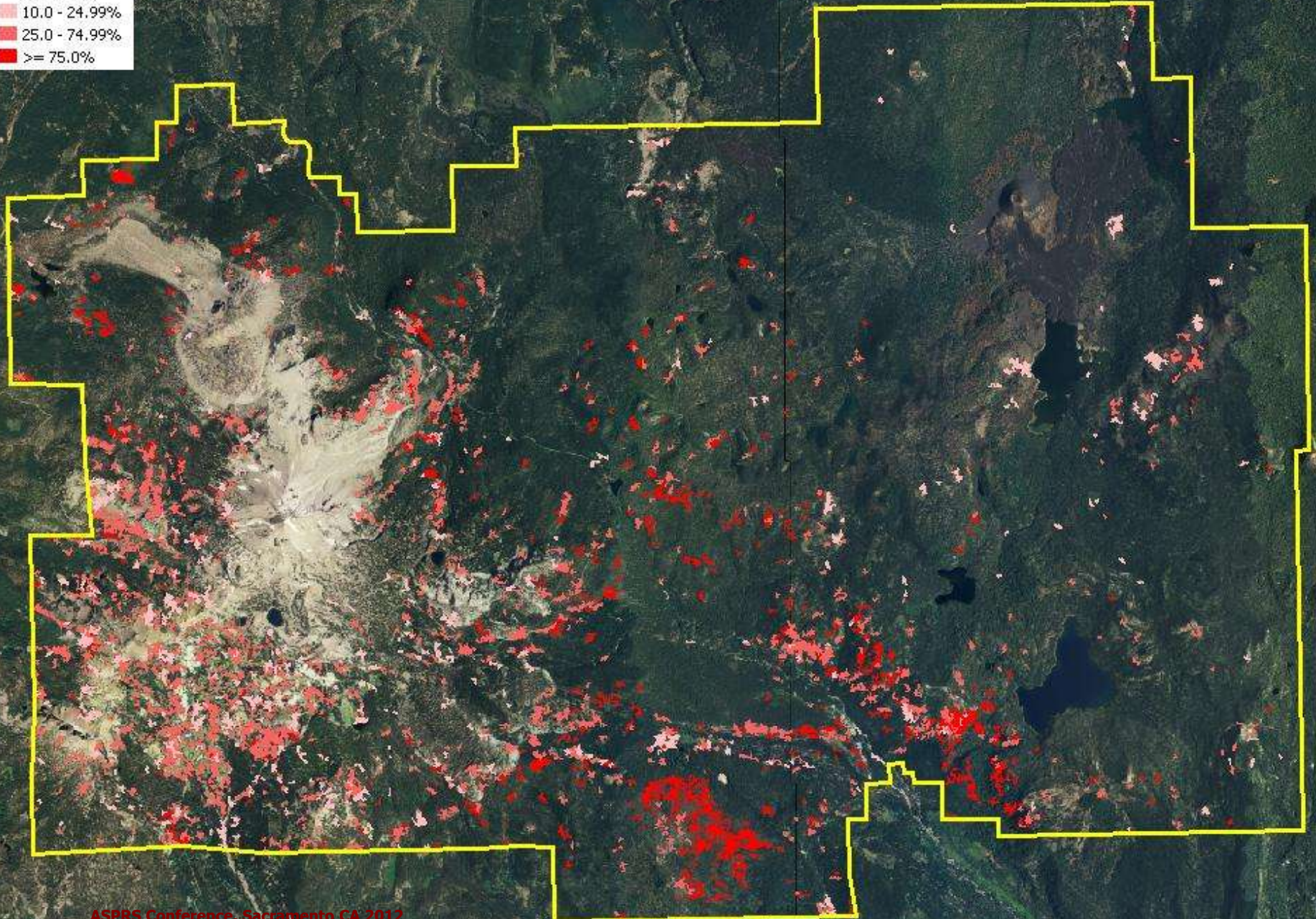
TsuMer Cover
CV_TSUMER
0.0 - 4.99%
5.0 - 9.99%
10.0 - 24.99%
>= 25.0%

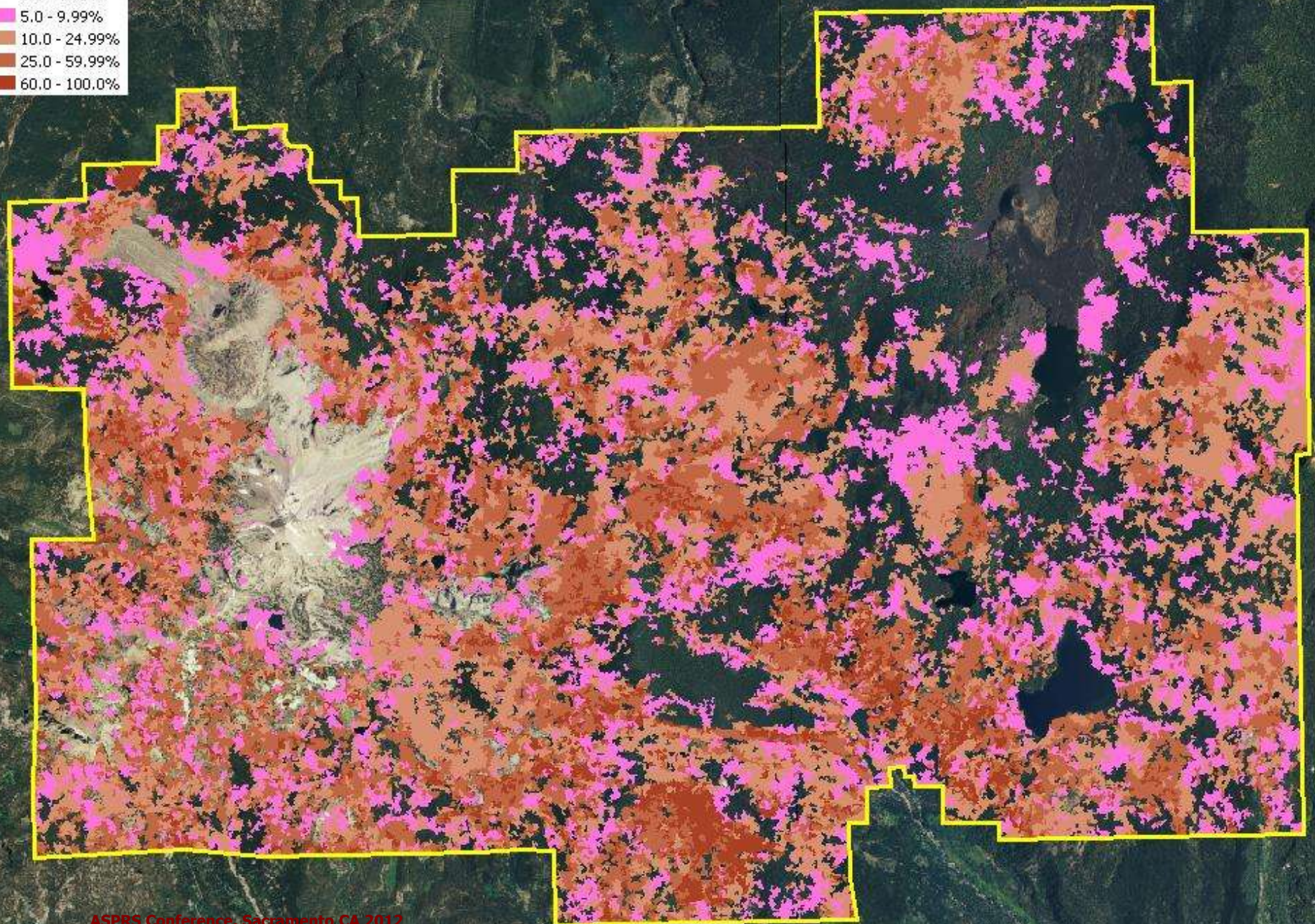


lavoclassmap FWD 1hr fuels
FWD1
0.00 - 1.00
1.01 - 5
5.01 - 10.0
10.01 - 15.0
15.01 - 25

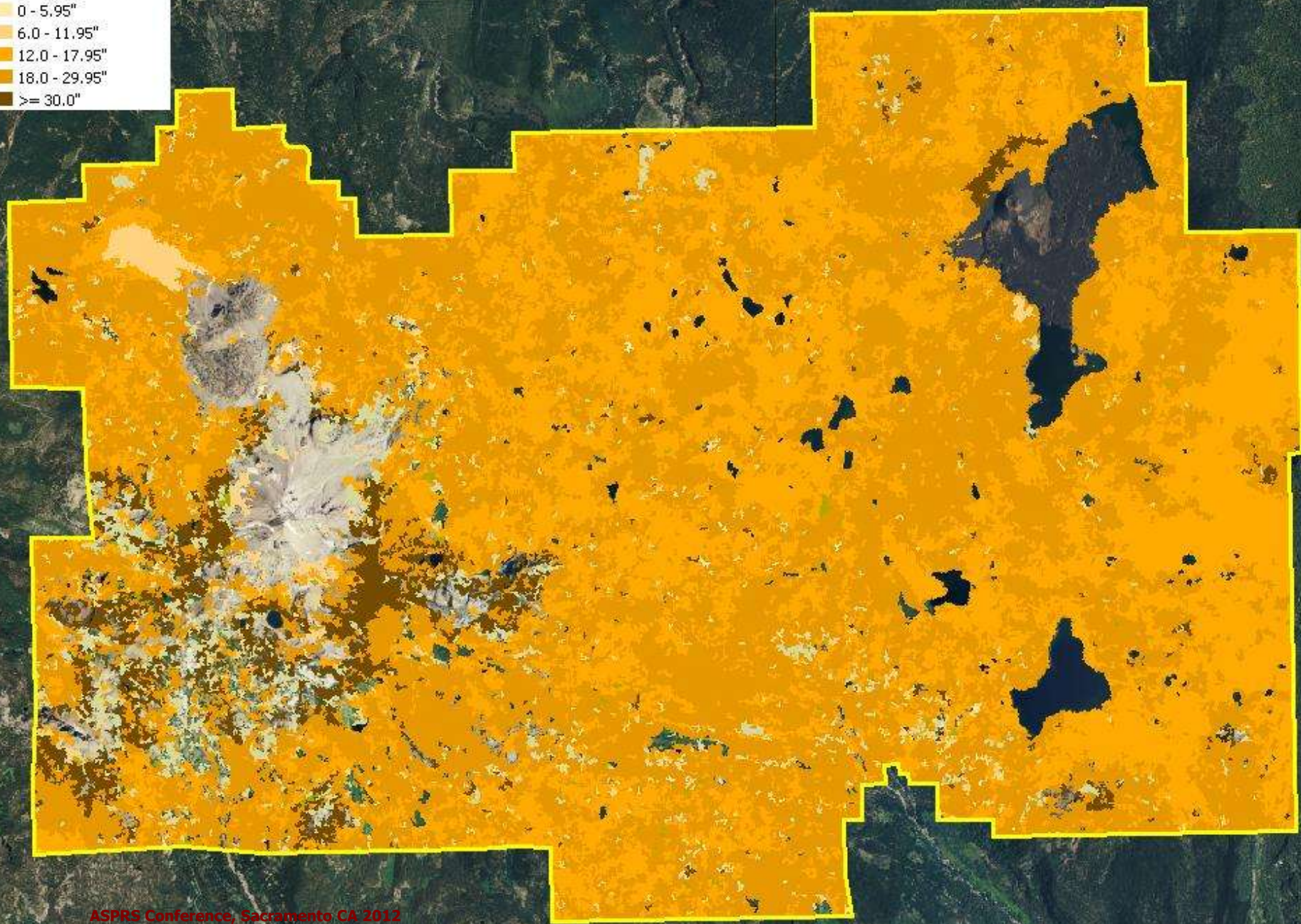


Shrub Type Cover
COVER_CLASS
Non Shrub
10.0 - 24.99%
25.0 - 74.99%
≥ 75.0%

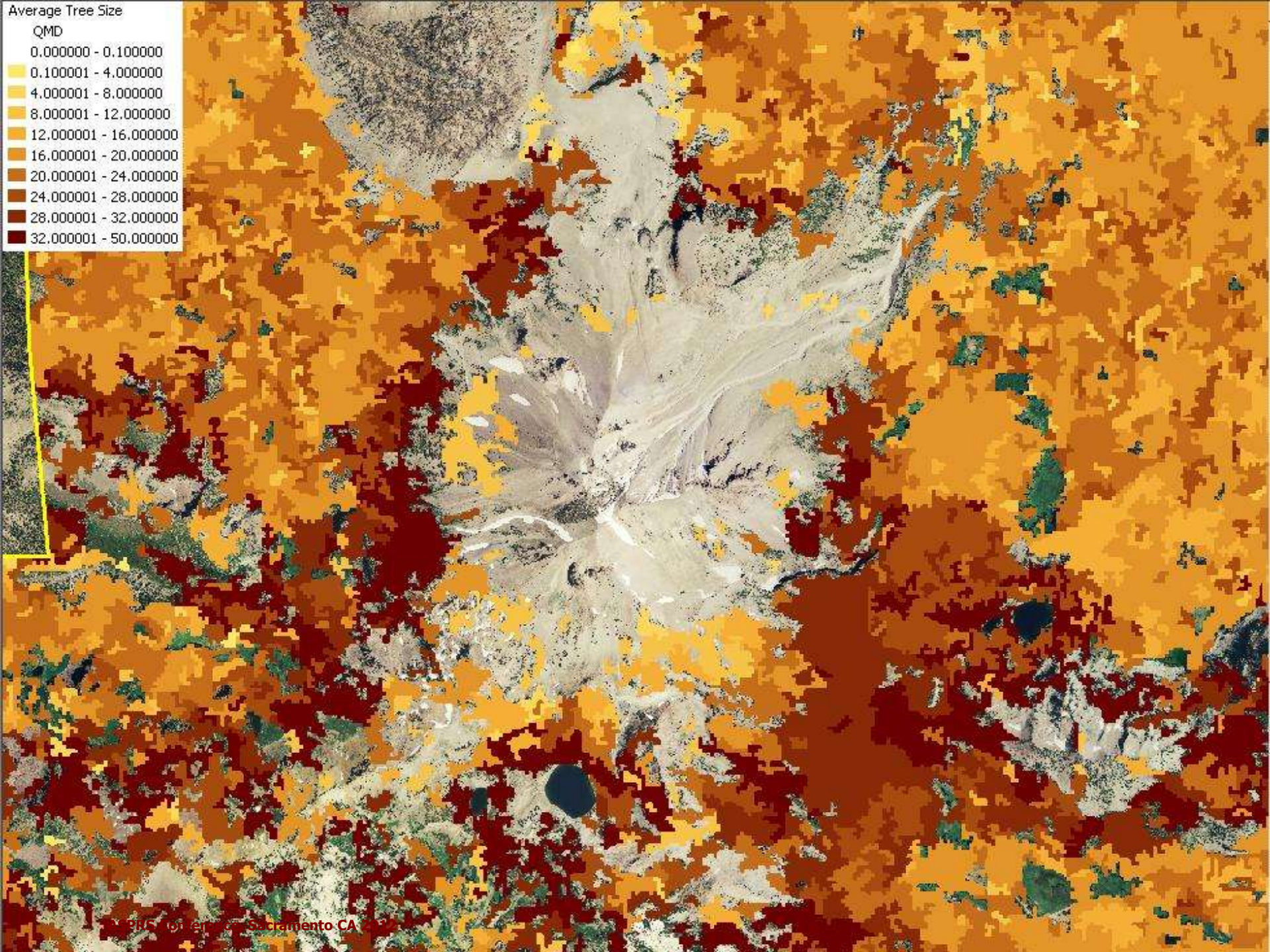




Average Tree Size
SIZE_CLASS
< 5% Tree Cover
0 - 5.95"
6.0 - 11.95"
12.0 - 17.95"
18.0 - 29.95"
>= 30.0"







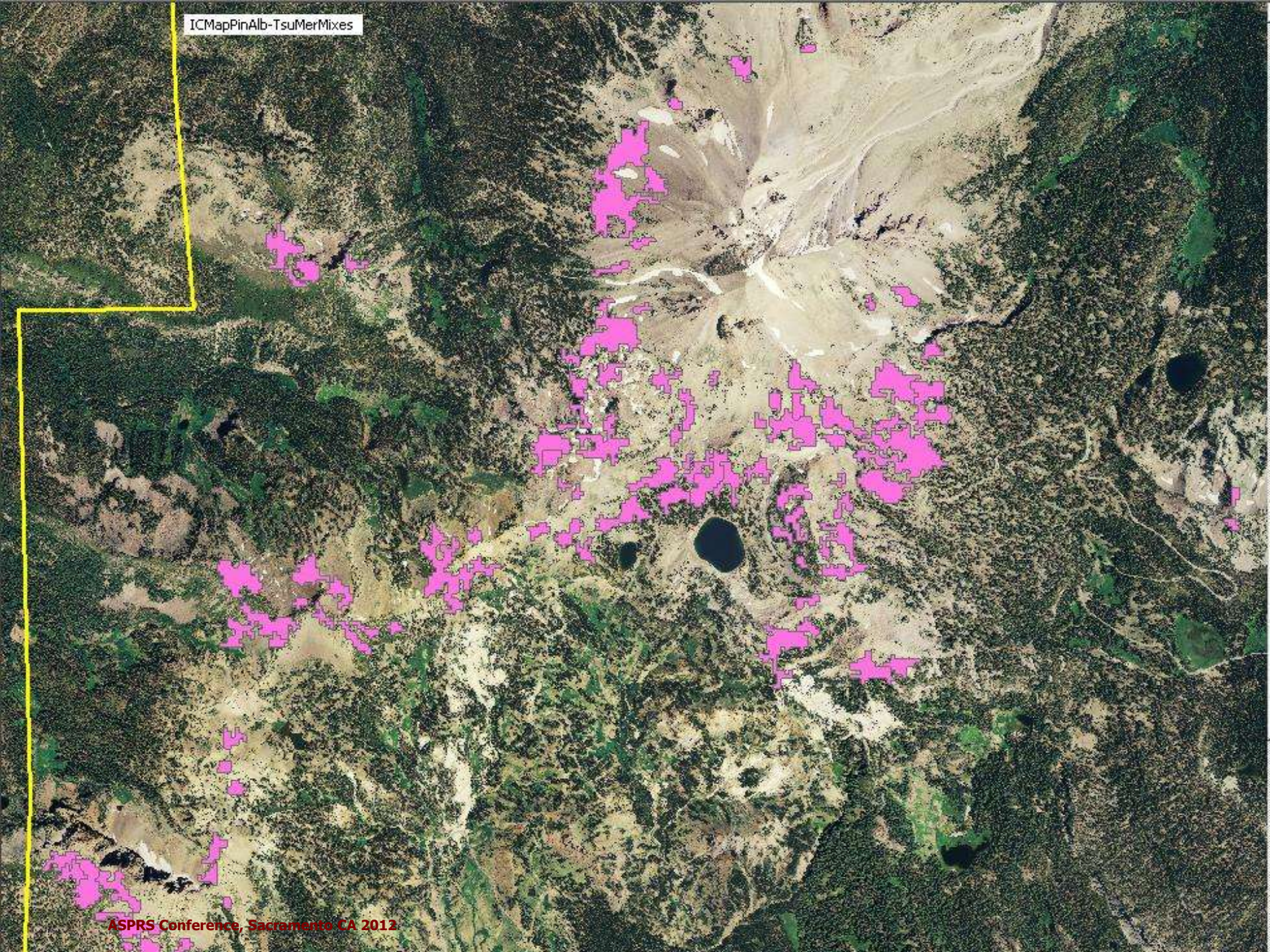
Average Tree Size
QMD

0.000000 - 0.100000
0.100001 - 4.000000
4.000001 - 8.000000
8.000001 - 12.000000
12.000001 - 16.000000
16.000001 - 20.000000
20.000001 - 24.000000
24.000001 - 28.000000
28.000001 - 32.000000
32.000001 - 50.000000

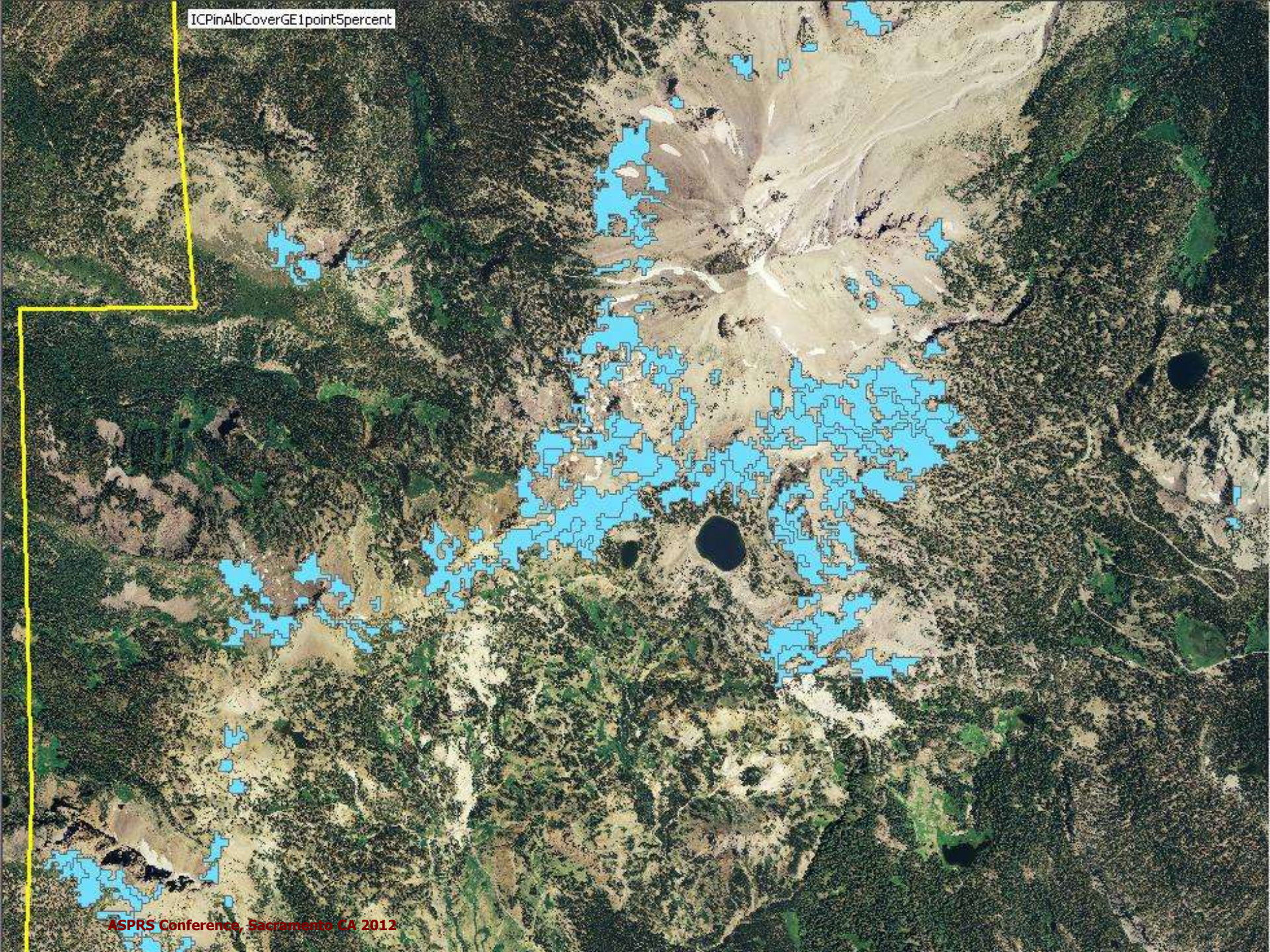
All Cover Components Are Accessible

- **Classify_info table**
 - Stand level characteristics
 - Cover by life form
 - Cover by major species or species groups
 - Tree size
 - Trees per acre
- **Classify_cover table**
 - Cover by species and size

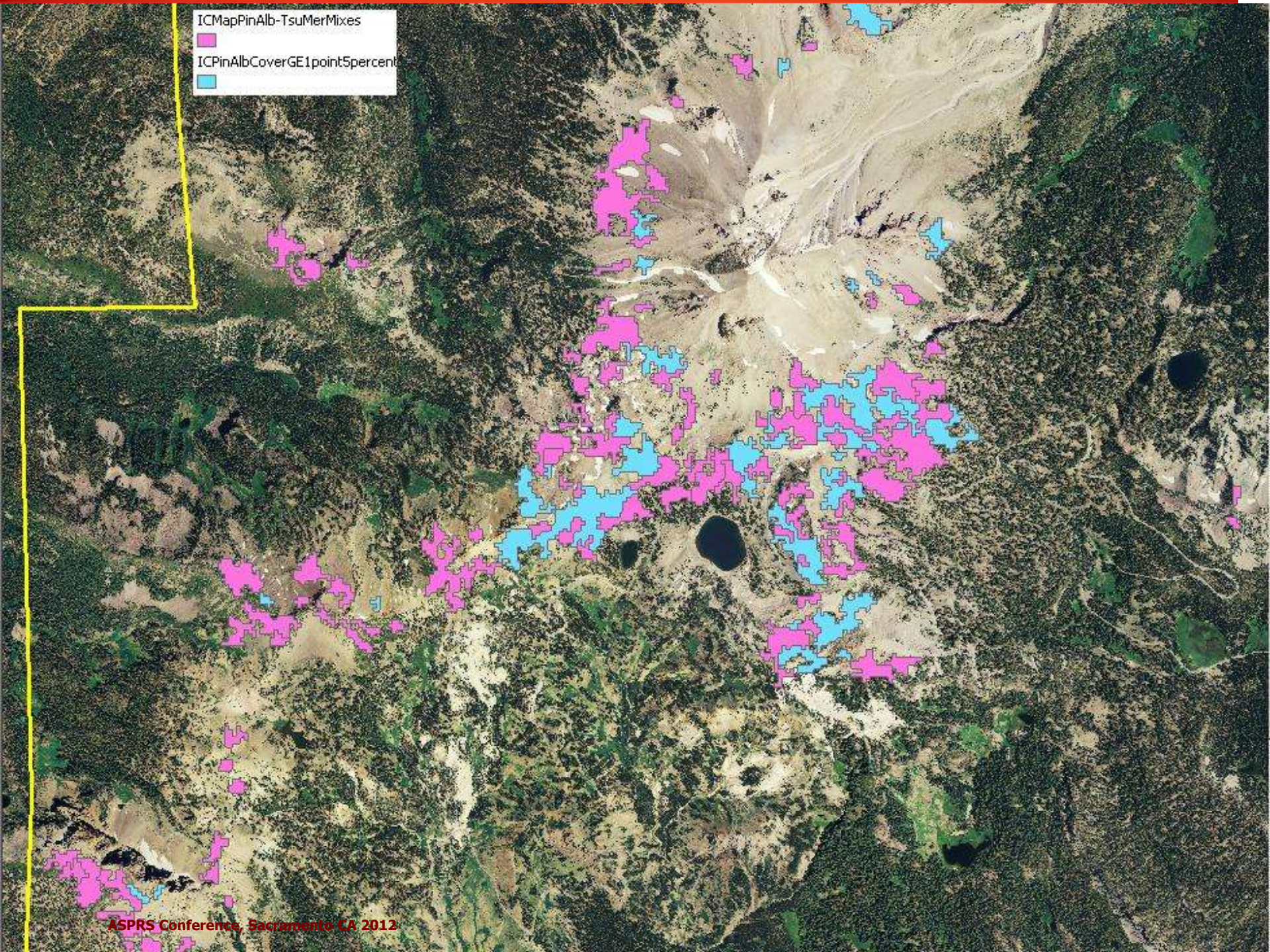




ICPinAlbCoverGE1point5percent



ICMapPinAlb-TsuMerMixes
ICPinAlbCoverGE1point5percent



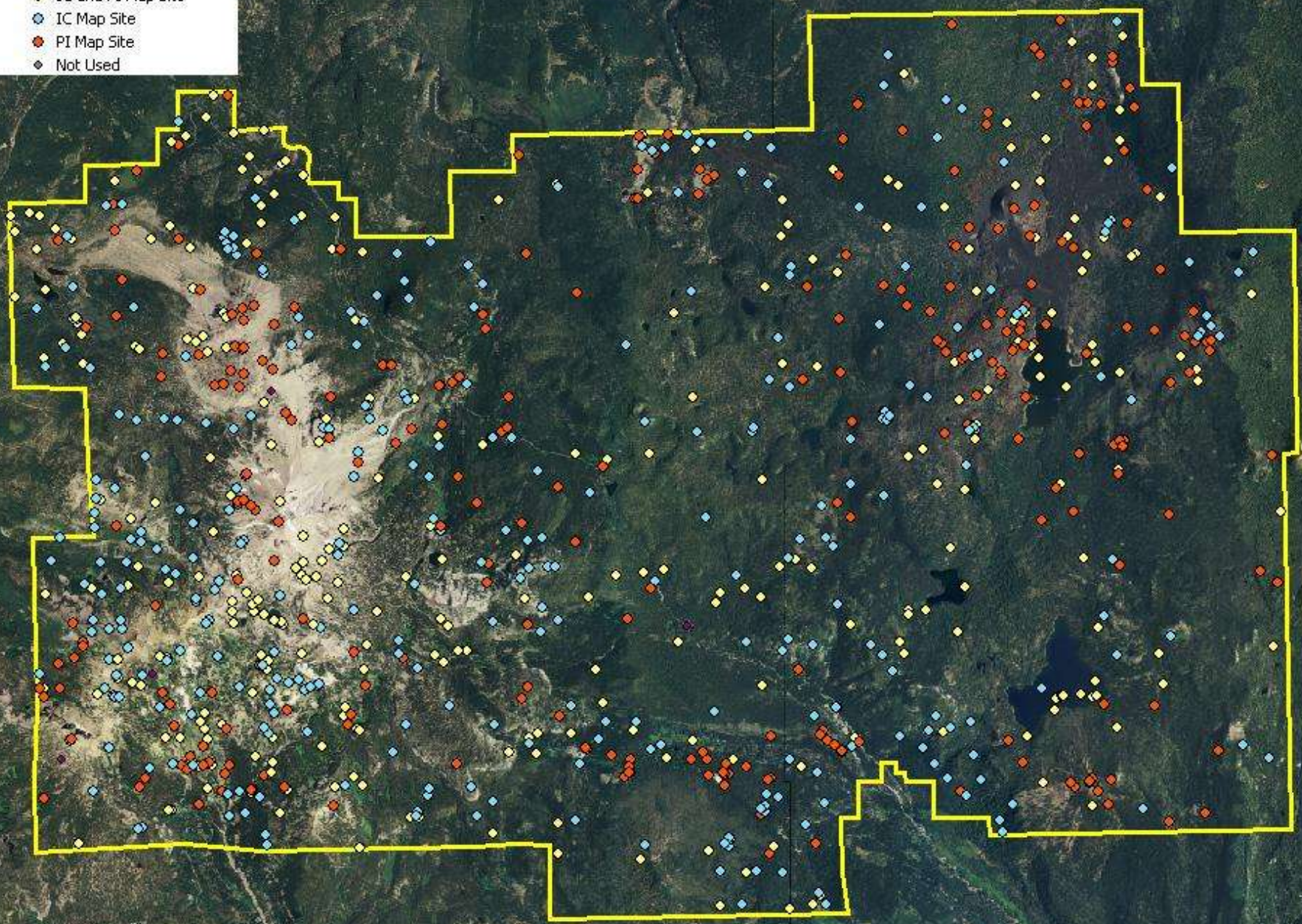
Accuracy Assessment – Preliminary

- **Stratified random sample based upon Generalized Classes (Alliances)**
- **The two maps were tested independently of each other**
- **Over 1000 field sample sites visited and assessed**
- **Some sites tested one map, some the other map, and some both maps**



aasites point

- ◆ <all other values>
- AASITE_TYP
- IC and PI Map Site
- IC Map Site
- PI Map Site
- ◆ Not Used



View Preliminary Accuracy Results ...

- Represented by incorporating Map Accuracy into the Map data Set attributes
 - Photo Interpreted Map
 - Image Classification Map

Field	Value
FID	6581
Shape	Polygon
AREA	9725301.11445
PERIMETER	170690.404784
UNIT_ID	7260
TYPE_ID	13
ACREAGE	2403.1599
DENSITY_MO	> 60%
DENSITY_CL	9
ASSOCIATION_GENERALIZED	LupObt:forb
ALLIANCE_GENERALIZED	LupObt:forb
ASSOCVEG_GENERALIZED	
ASSOCIATION_DETAILED	LoPd:forb
ALLIANCE_DETAILED	LoPd:forb
ASSOCVEG_DETAILED	
AAMAP_GENERALIZED	69
AAMAP_DETAILED	69



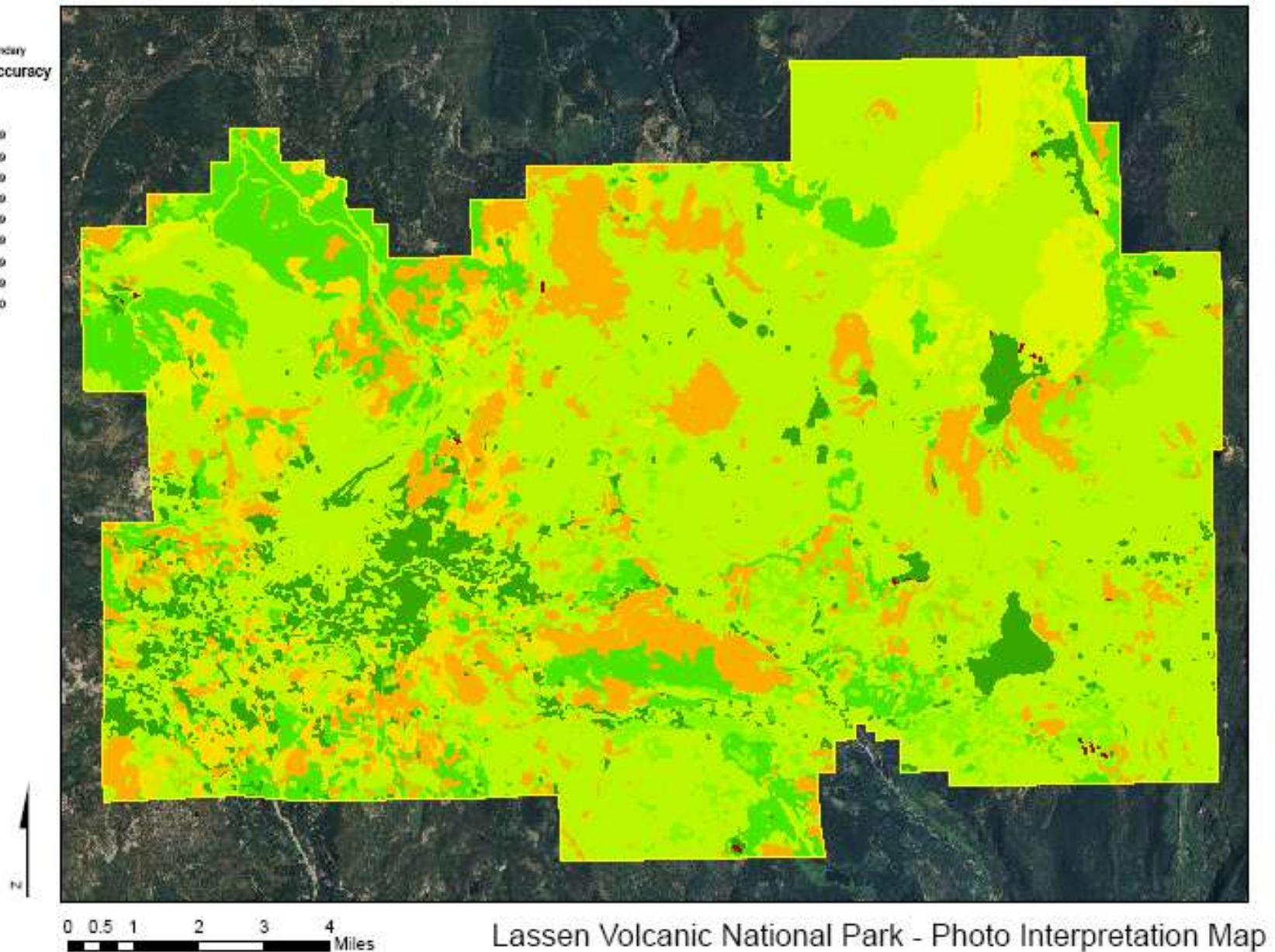
Lassen Volcanic National Park Comparative Mapping Project

Legend

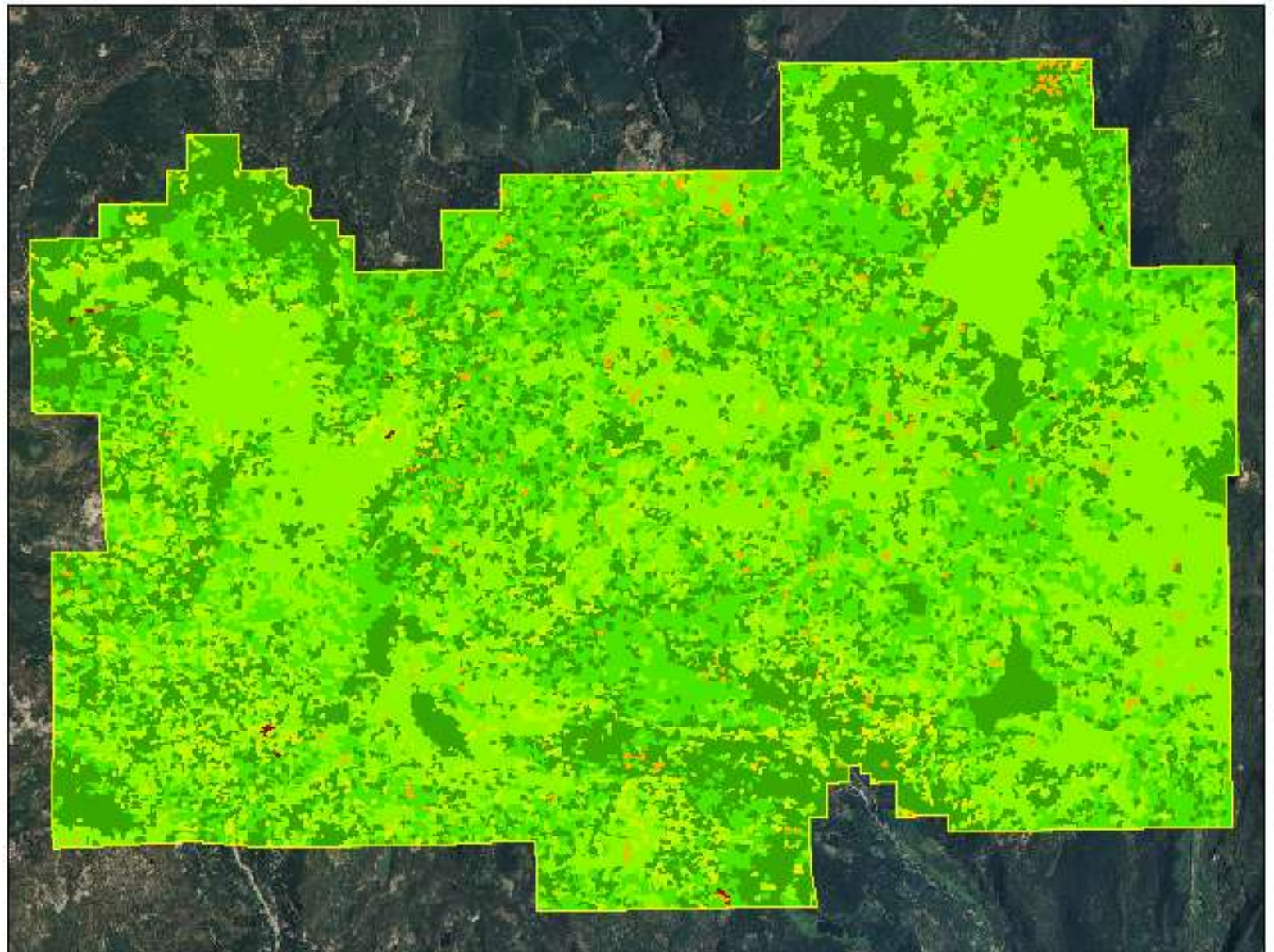
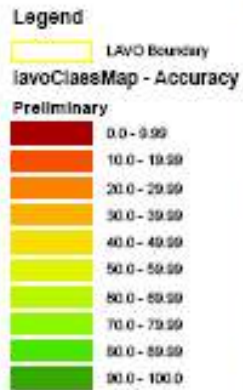
LAVO Boundary

lavoPhotoMap - Accuracy

Preliminary



Lassen Volcanic National Park Comparative Mapping Project



0 0.5 1 2 3 4 Miles

Lassen Volcanic National Park - Image Classification Map

Summary

- **Field data provides the foundation of Discrete Classification**
- **Discrete Classification enables the 1:1 correspondence between field data (sites) and classes in the classmap.**
- **Estimating and mapping discrete species-specific estimates of the continuous variable of cover and size provide tremendous flexibility in making land cover data sets.**
- **Ecological rules are used to develop polygons, rather than spectral values.**
- **Discrete estimates provide the basis for a statistically based Accuracy Assessment without fuzzy logic.**



Questions and Comments

