



# Winter ET

Alex Moody  
Treasure Valley MTAC  
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# Winter ET

- METRIC: covers growing season
- Determine winter ET with ETIdaho
- Methods: Traditional ET volume estimates using;
  - Crop Data Layer (CDL)
  - Crop mix by county
  - National Land Cover Database



# Data Sources

- Data sources
  - Crop Data Layer (CDL): 2005, 2007-2015
    - Reclassified to ET Idaho
  - NASS QuickStats
  - NLCD Reclassified to ET Idaho: 1992, 2001, 2006, 2011
  - ET Idaho 2017 ( crop-specific actual ET [L])
- Products
  - Monthly 30m ET rasters



# ET Idaho (Allen & Robison, 2007)

- Penman-Monteith
  - Full cover, extensive, dry, well-watered reference crop (alfalfa)
  - Daily ET<sub>c</sub> for 42 crop/land-cover types using dual crop coefficient method
    - Basal and evaporative crop coefficients
    - Soil water balance to account for water stress

$$ET_{c\_act} = (K_s K_{cb} + K_e) ET_r$$

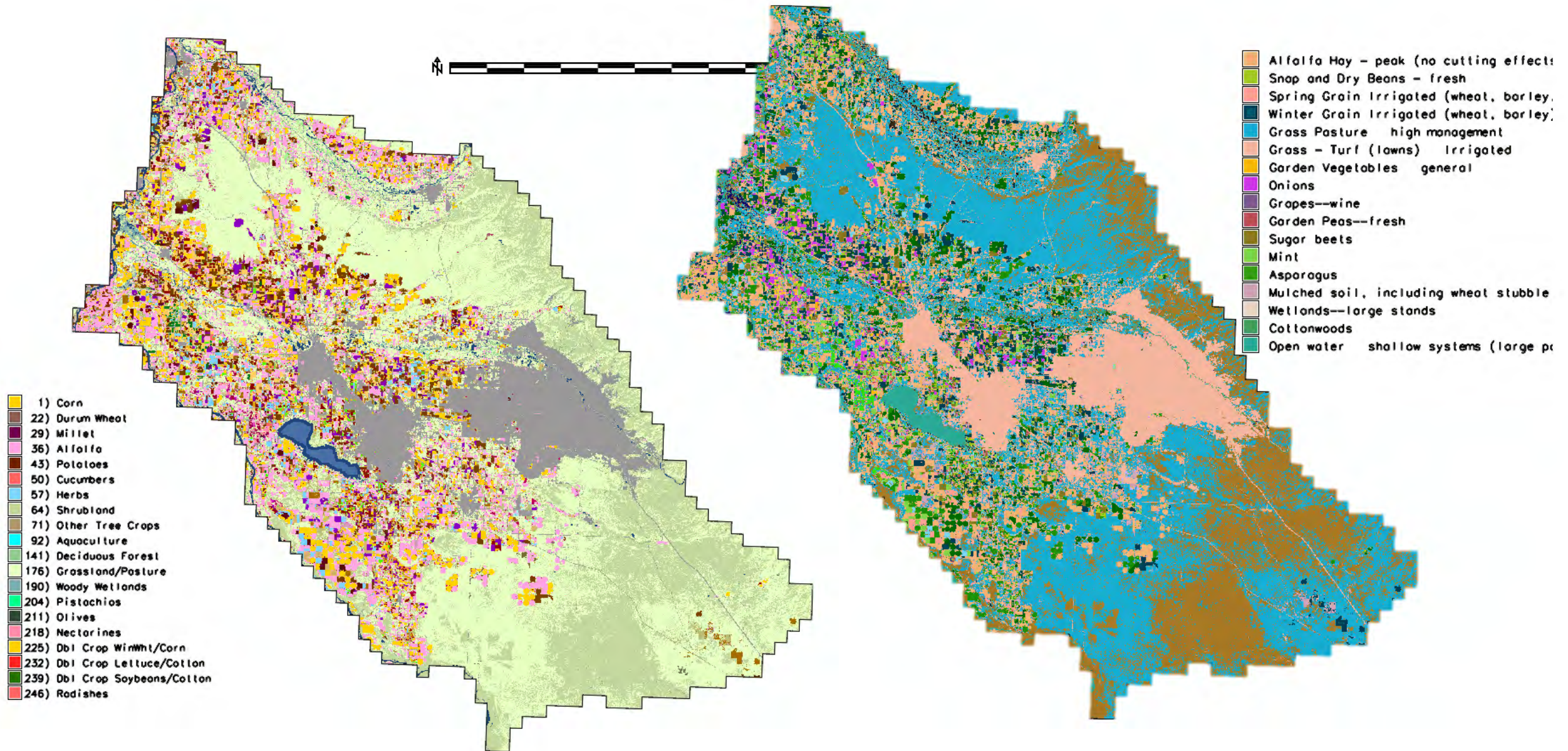


# CDL/NLCD Methods

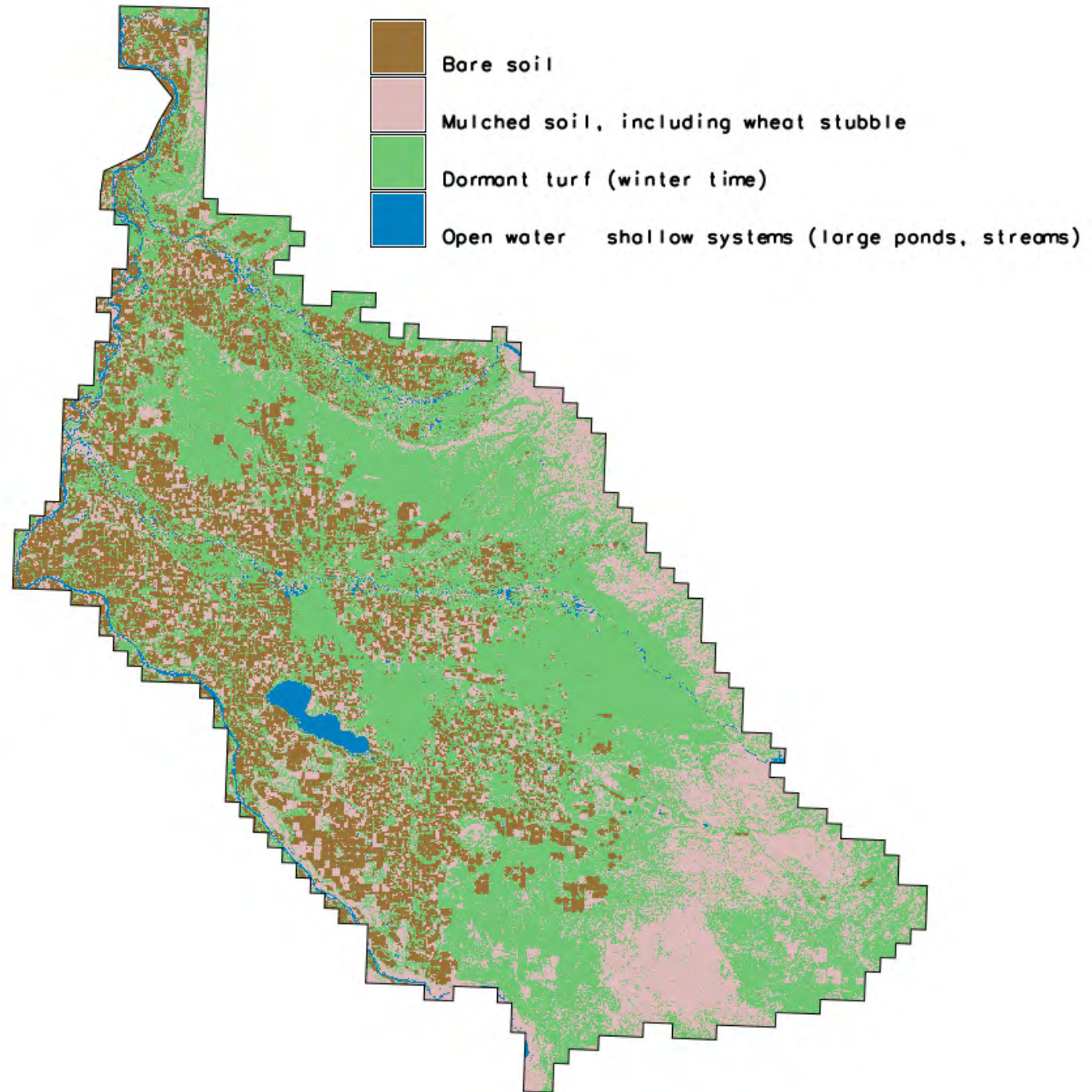
- Reclassify CDL/NLCD to ETIdaho
  - 1992 NLCD reclassified 2x
    - NLCD 1992 > NLCD 2001 – 2011 > ETIdaho
- Create voronoi polygons to designate weather station footprints.
- Directly apply aggregated ETIdaho depths to CDL



# Reclassifying CDL to ETI



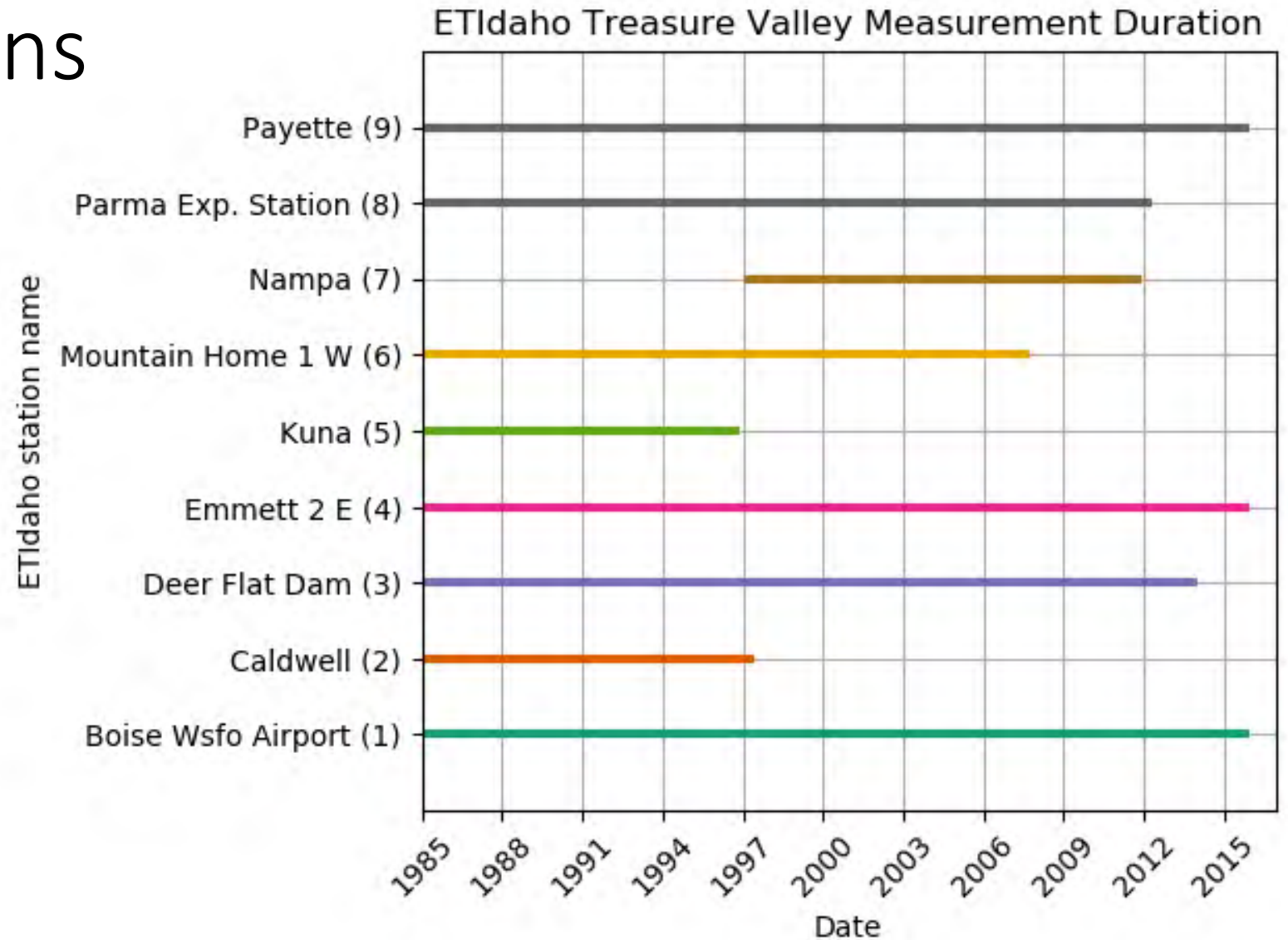
# Winter Cover Types



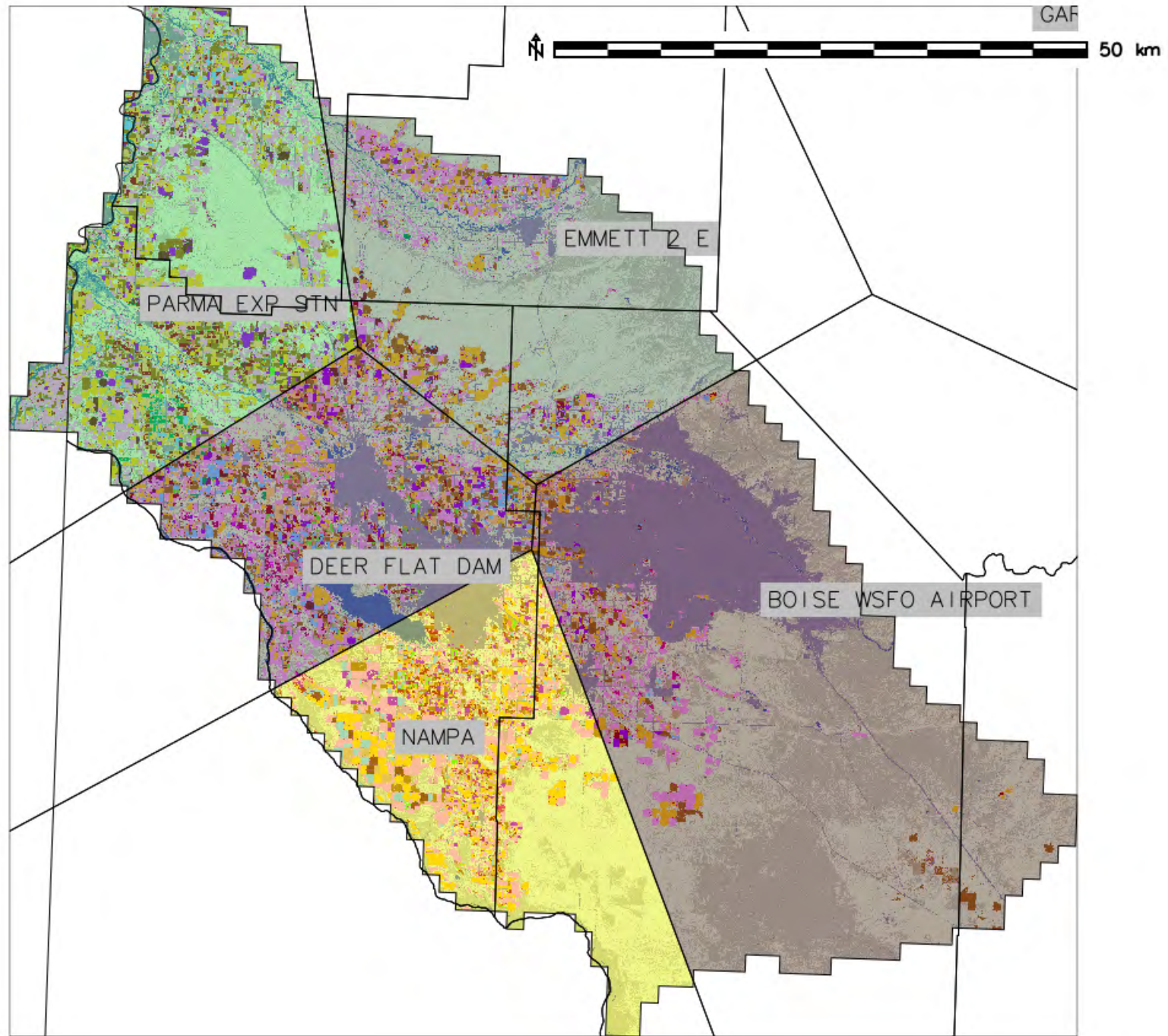
Cover type	% cover
Bare soil	22
Mulched soil	27
Turf	49
Water	2

# ET Idaho Stations

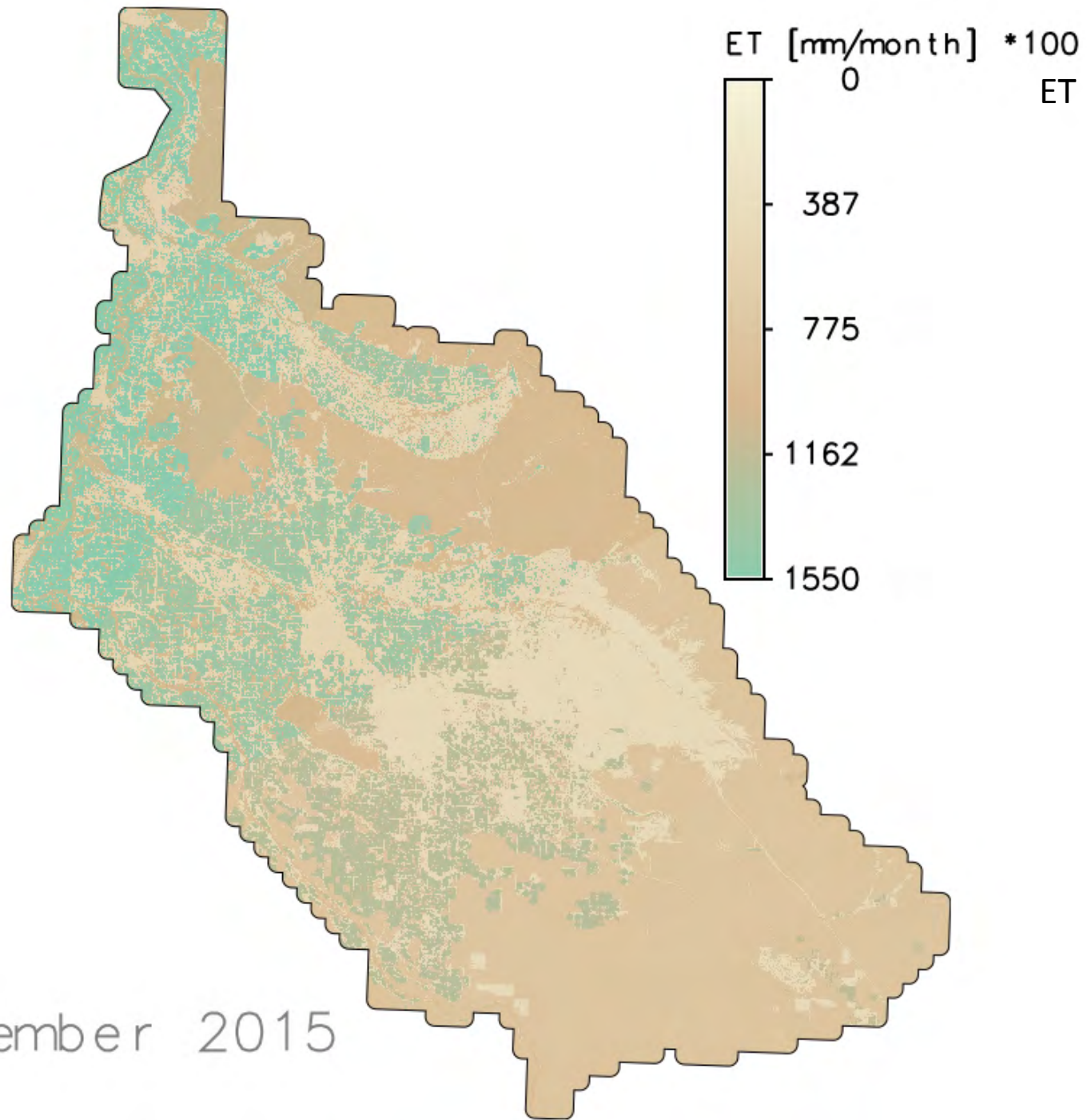
- Varying records for stations in the model boundary
- Applying ETa: Designate areas with Voronoi polygons
- Similar method to Allen's designation of station footprints



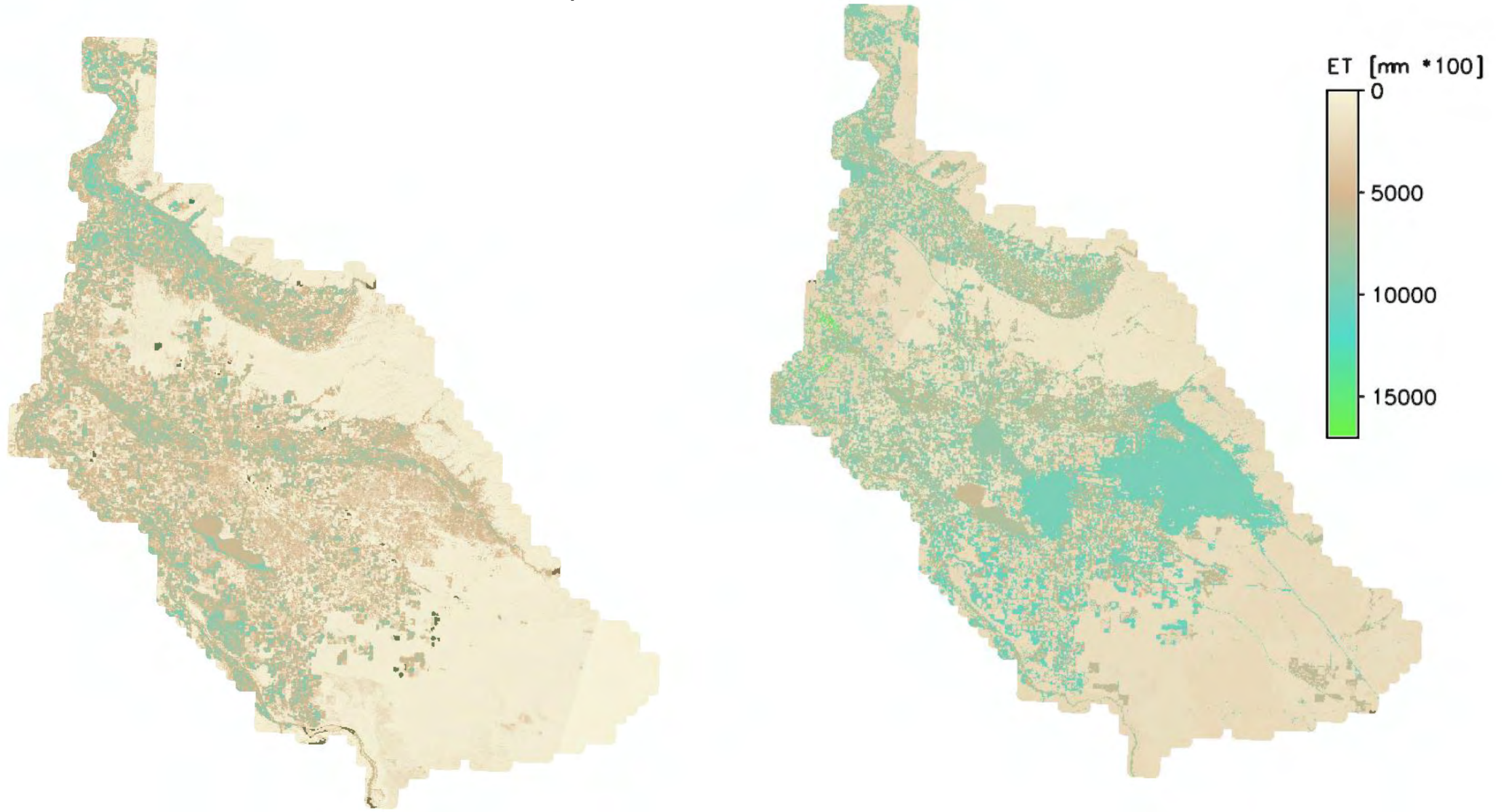




Total ET  $\approx$  41,000 AF



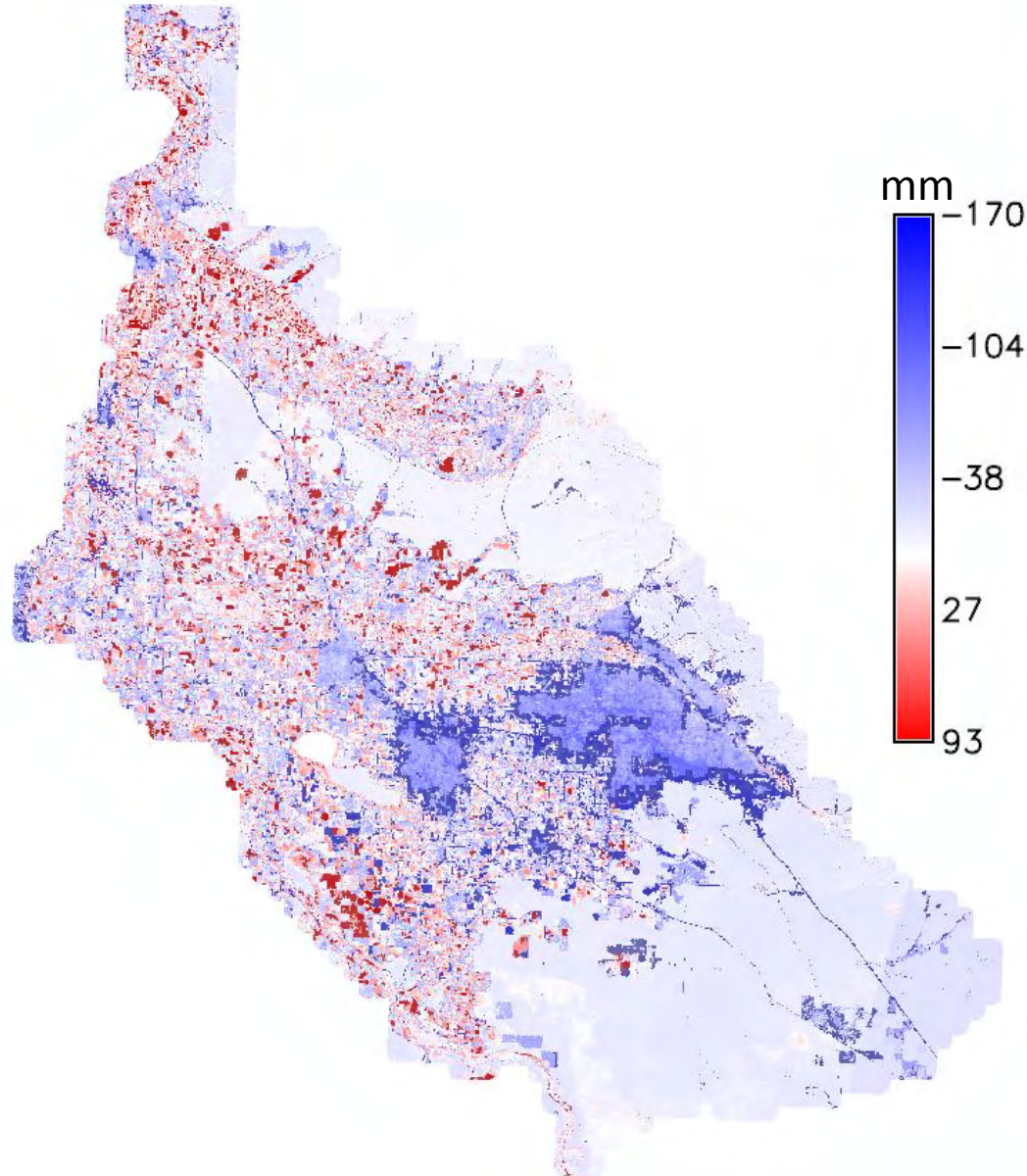
# METRIC / Traditional Comparison for October 2015



METRIC Total ET  $\approx$  127,000 AF

Traditional Total ET  $\approx$  197,000 AF

# METRIC vs Traditional ET



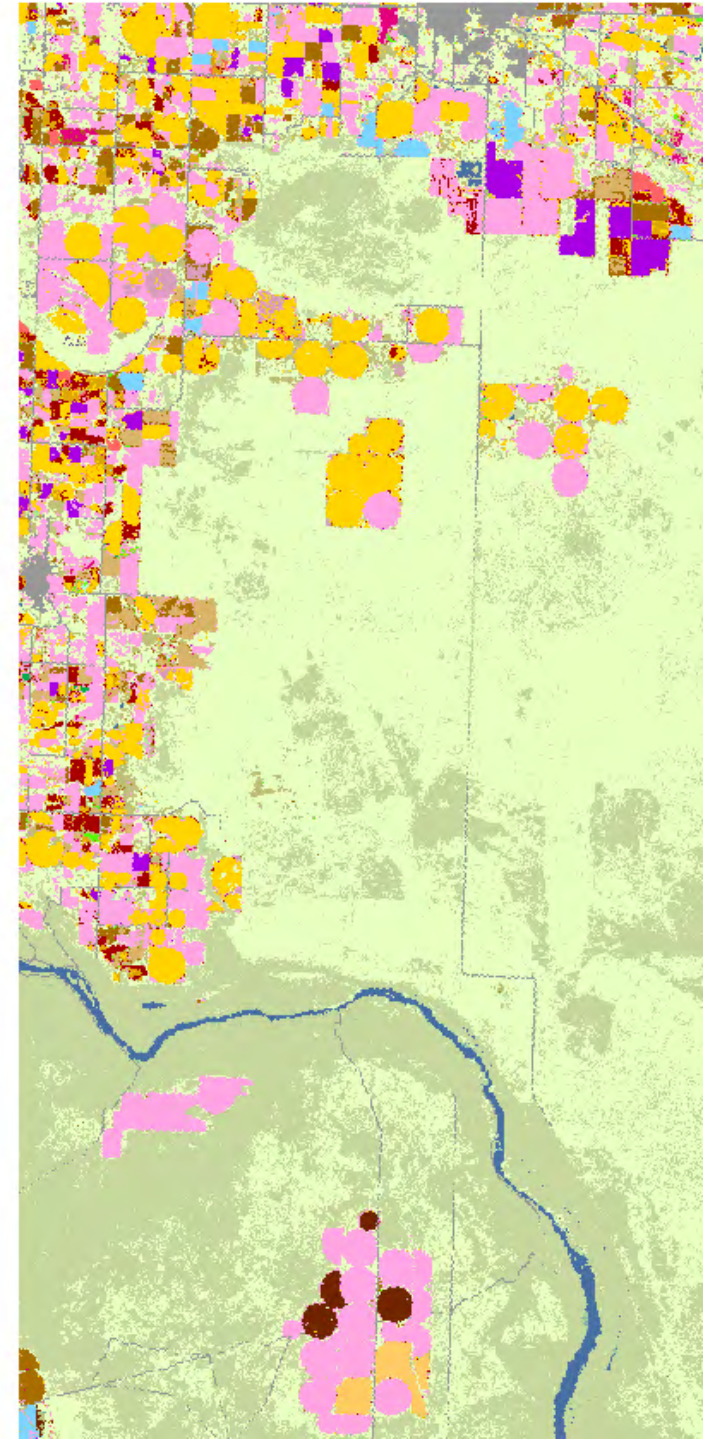
Crop / Land use	METRIC = ETI	METRIC > ETI	METRIC < ETI
Dormant turf (winter time)	2.76	81.11	16.13
Sweet Corn late plant	2.15	81.05	16.79
Mulched soil, including wheat stubble	2.86	65.96	31.19
Bare soil	5.15	51.23	43.63
Grass Pasture – high management	1.9	10.74	87.36
Alfalfa Hay peak (no cutting effects )	1.05	3.4	95.55
Grass Turf (lawns) – Irrigated	0.03	0.05	99.91

- Developed areas are overestimated by the traditional ET method.
  - Apply a reduction factor based on density, similar to ESPAM2
- Traditional ET overestimate or underestimate not constant across crop or land-use types

# NASS Crop Mix

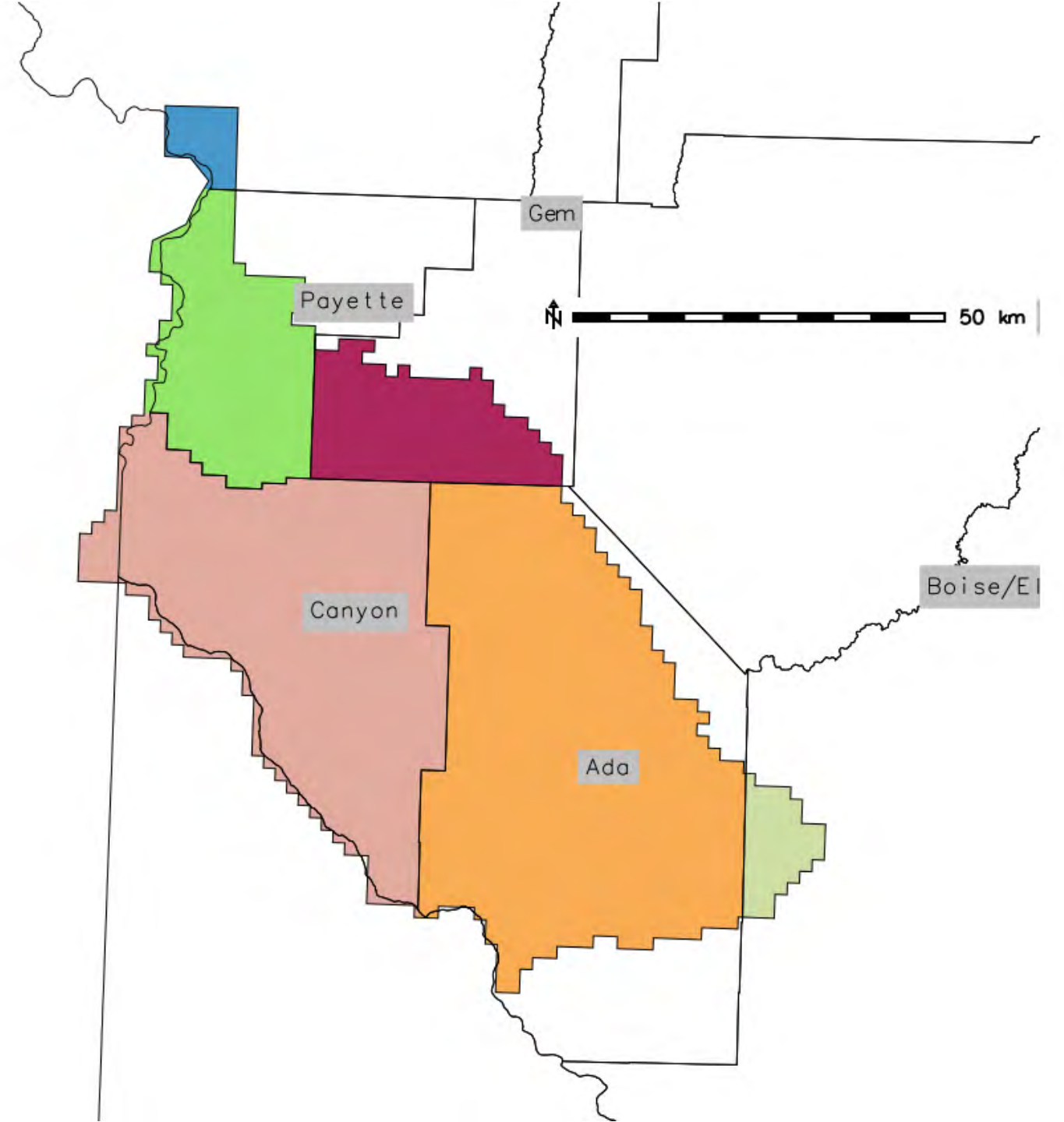
- Aggregate NASS data into crop mix
  - Requires mapping of various crops to ETIdaho classes
  - Used total acres harvested for crops, vs. using irrigated designation
- Designate one weather station per county
- Sum by county

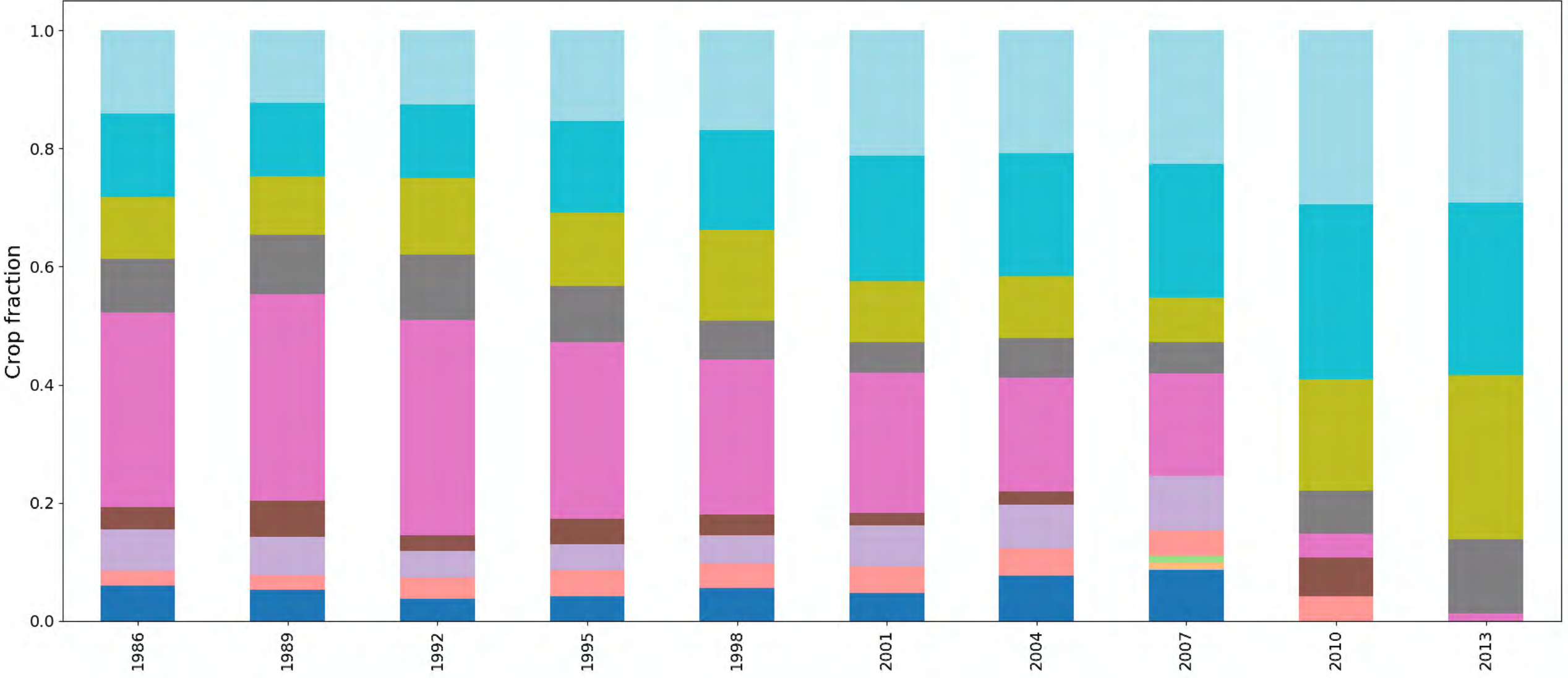
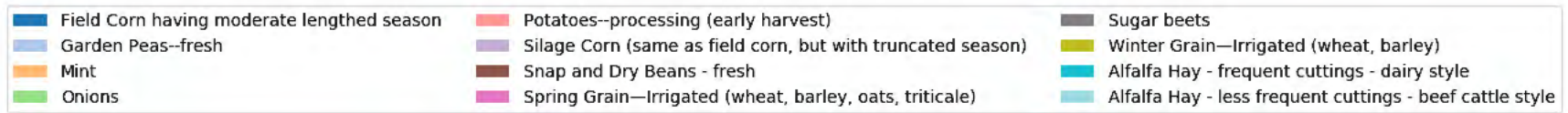
$$ET = \sum ET_{a,i} K_{crop,i}$$



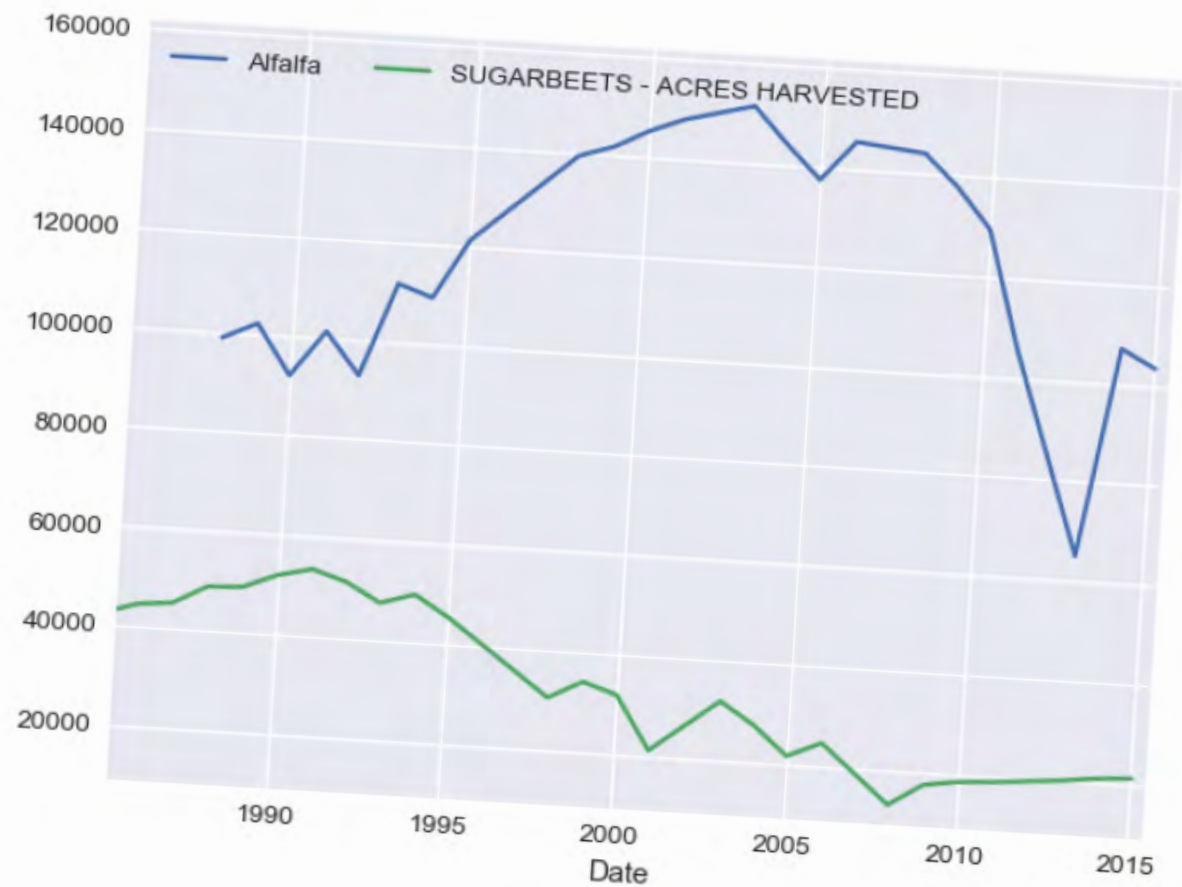
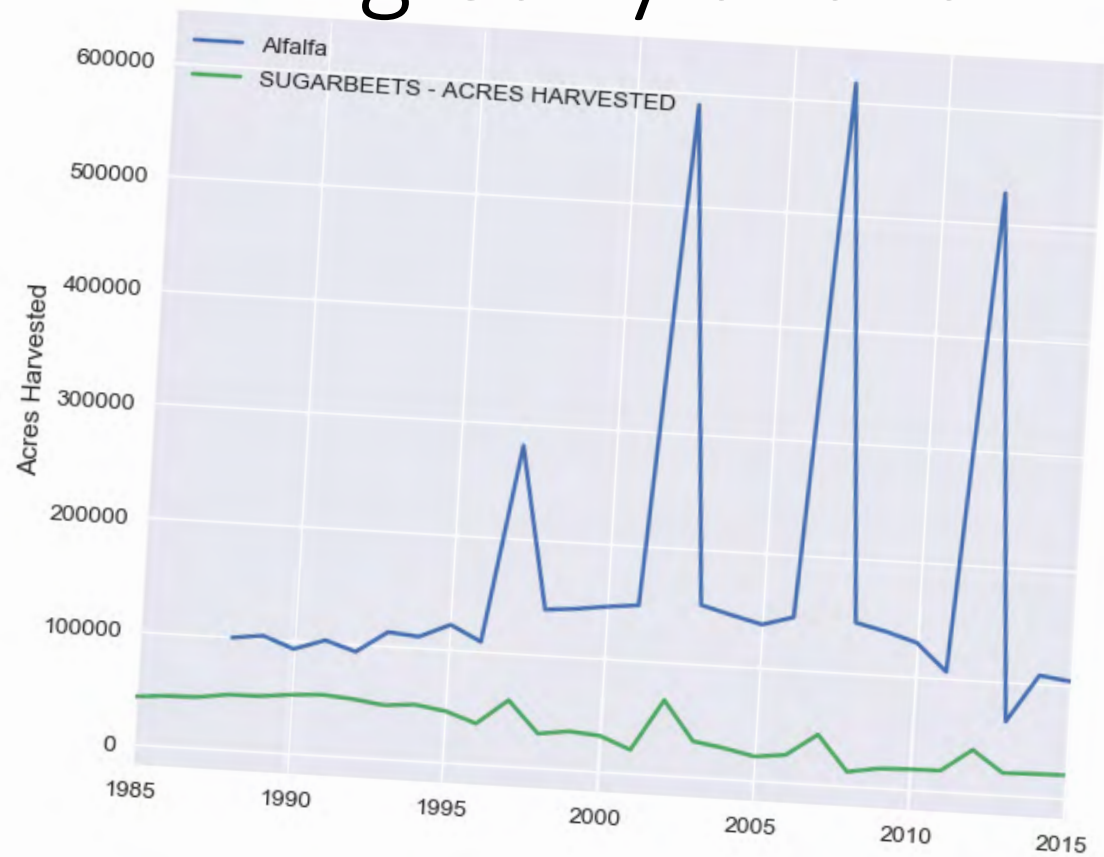
# County Designations

county	Model acres
ADA	513,077
CANYON	414,466
PAYETTE	157,801
GEM	111,415
ELMORE	34,305
WASHINGTON	21,326
TOTAL	1,252,390





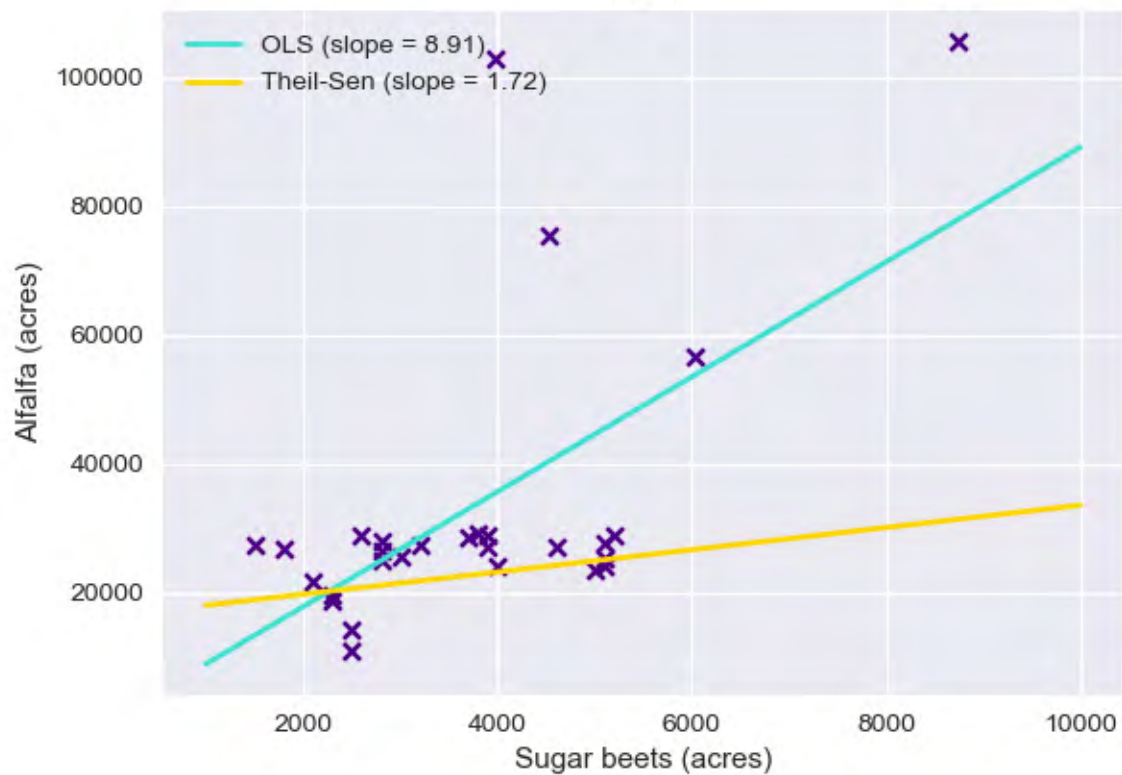
# Filling early alfalfa



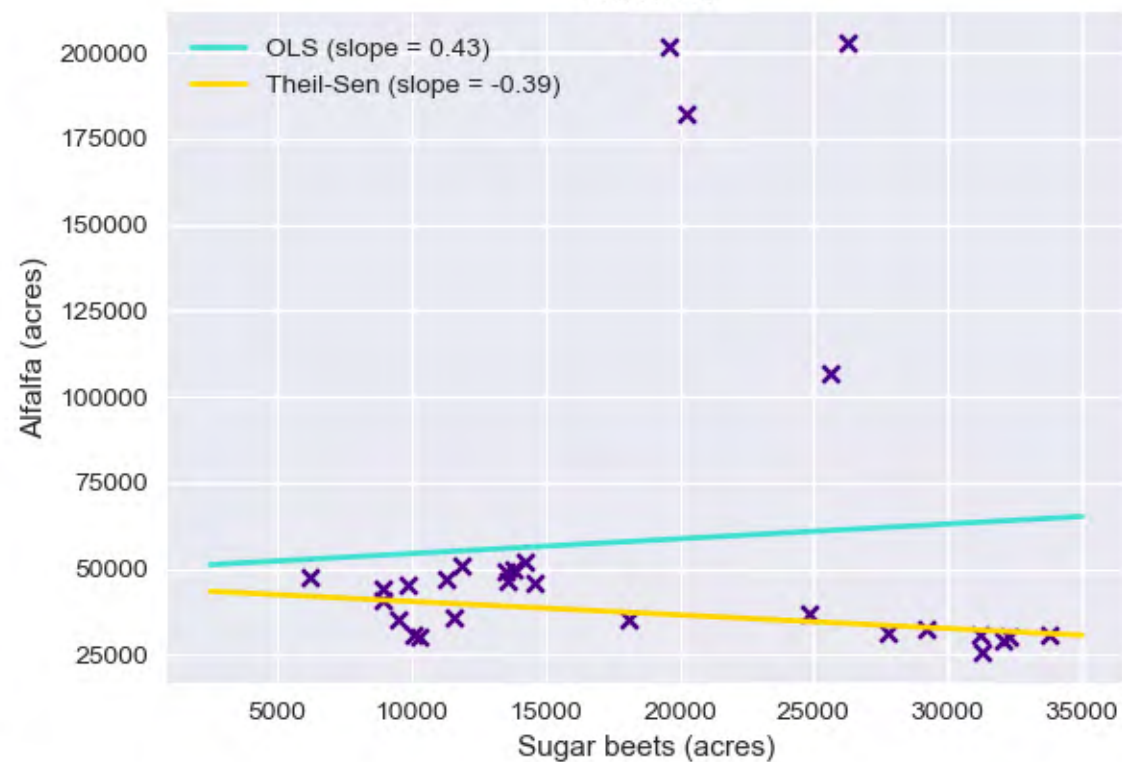


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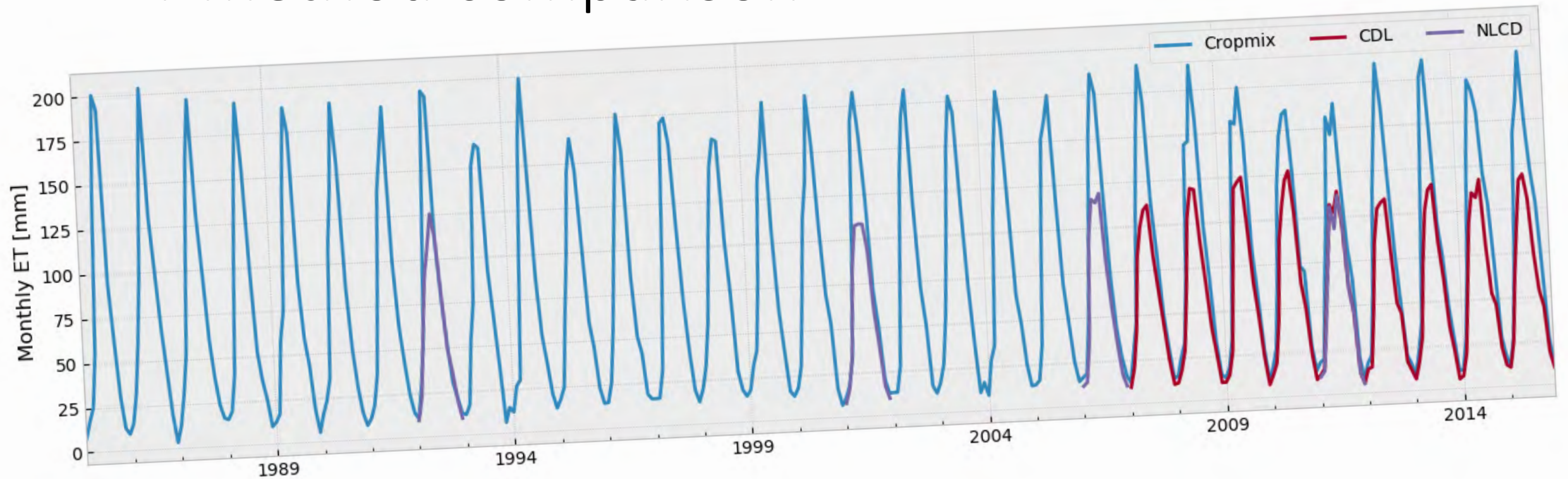
ADA



CANYON

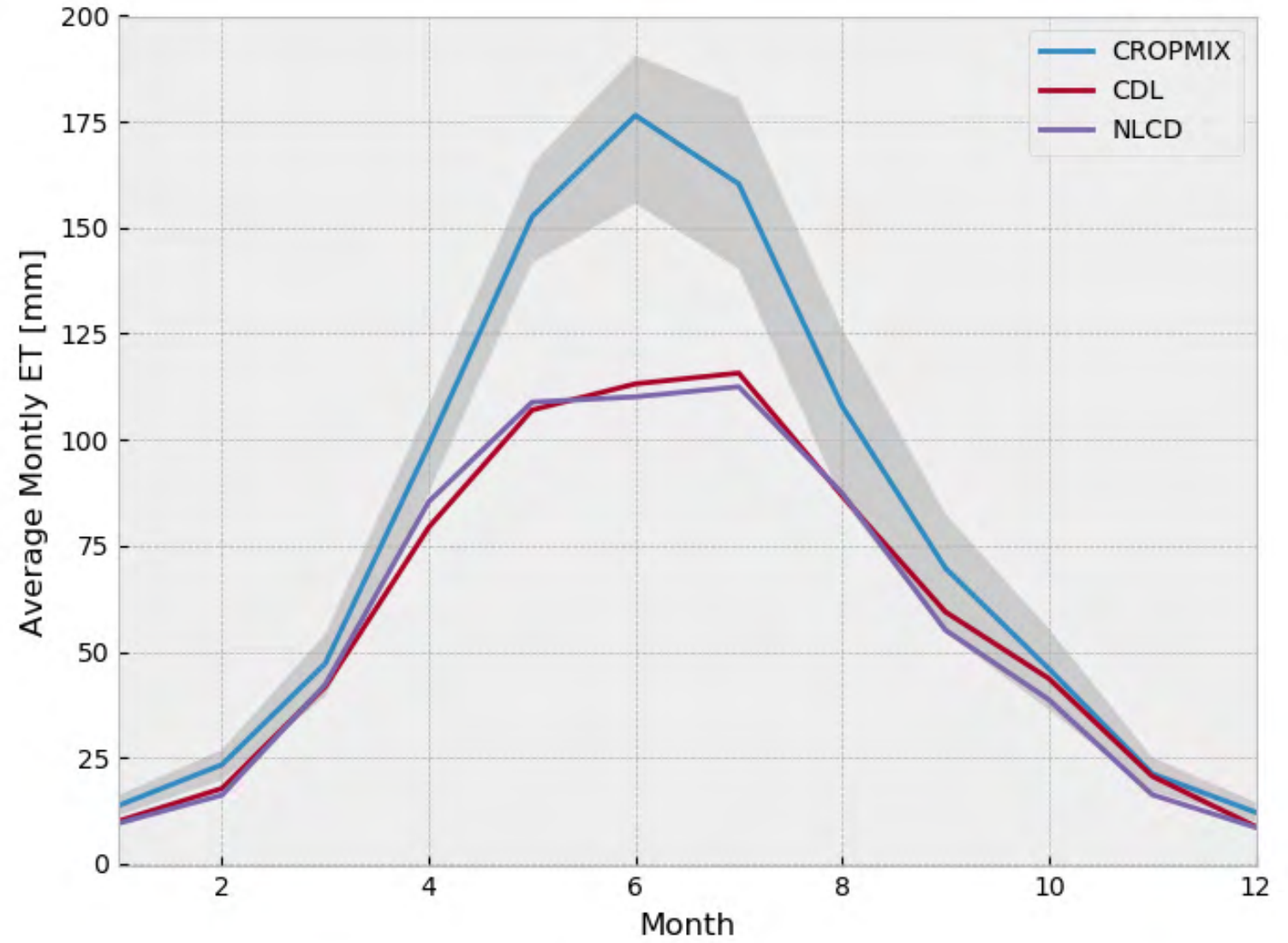


# ET method comparison



- 2005 CDL lacks crop detail and is missing for Oregon
- 2011,2012 lows
  - Different classification of grasslands in SE Ada ( more sage and range grass )
- Crop mix data not accounting for non-irrigated rangeland.

# Monthly Means



- Winter ET/ low values follow more closely between datasets
- Crop mix method is slightly larger than CDL derived values

